Office Automation Tools

DECAP279

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Unit 01: Computer Fundamentals, Data Representation

Objectives

• Understanding and Introduction of computers

• Discussion of computer evolution

• Explanation of all generation of computers

• Understanding of block diagram of computers

• Understanding of memory and its types

Introduction

The word "computer" comes from the word "compute", which means, "to calculate". Hence, people usually use a computer to be a calculating device that can perform arithmetic operations at high speed. The original objective for inventing the computer was to create a fast calculating machine. However, more than 80% of work done by computers today is of non-mathematical or non-numerical nature. Hence, to define a computer merely as a calculating device is to ignore over 80% of its functions.

More accurately, we can define a computer as a device that operates upon data. Data can be anything like biodata, hence computer is used for shortlisting candidates for recruiting; marks obtained by students in when used for preparing results; details (name, age, sex, etc.) of passengers when used for or railway reservations: or the number of different parameters when used for solving scientific problems, etc.

Hence, data comes in various shapes and sizes depending upon the type of computer application. A computer can and retrieves data as and when desired. The fact that computers process data is so fundamental that have started calling it a *data processor*.

The name data processor is more inclusive because modern computers not only compute in the usual sense but also perform other functions with data that flows to and from them. For example, data processors may gather data from various incoming sources, merge (a process of mixing or putting together) them all, sort (a process of arranging in some of the sequences— ascending or descending) them in the desired order, and finally print them in the desired format. Notice that none of these operations involves arithmetic computations in the usual sense but a computer is the most suitable device for performing them.

People usually consider a computer to be a calculating device that can perform arithmetic operations at high speed. It is also known as a data processor because it not only computes in the usual sense but also performs other functions with the data.

The activity of processing data using a computer is called data processing. Data processing consists of three sub-activities: capturing input data, manipulating the data, and managing output results. As used in data processing, information is data arranged in an order and form that is useful to people receiving it. Hence, data is a raw material used as input to data processing and information is processed data obtained as an output of data processing.

1.1 Characteristics of Computers

The increasing popularity of computers has proved that it is a very powerful and useful tool. The power and use of this popular tool are mainly due to its following characteristics:

Figure 1 Characteristics of Computer

1. **Automatic.** An automatic machine works by itself without human intervention. Computers automatic machines because once started on employment , they perform the work (normally without a person's assistance) until it's finished. However, computers being machines cannot start themselves and can't leave and find their own problems and solutions. We need to instruct a computer using coded instructions that specify exactly how it'll do a specific job. a number of the other characteristics of computers (such as speed and accuracy) are because they're automatic and work on a problem with none human intervention.

2. **Speed.** A computer may be a in no time device. It can perform during a few seconds, the quantity of labor that a person's being can neutralize a whole year if he/she worked day and night and did nothing else. In other words, a computer can neutralize a couple of minutes what would take a person his entire life time while talking about the speed of a computer we don't talk in terms of seconds or maybe milliseconds (10–3) but in terms of microseconds (106), nanoseconds (10–9),

and even picoseconds (10–12). a strong computer is capable of performing several billion (l09) simple arithmetic operations per second.

3. **Accuracy**. In addition to being in no time , computers are very accurate. Accuracy of a computer is consistently high and therefore the degree of its accuracy depends upon its design. A computer performs even calculation with an equivalent accuracy. However, errors can occur during a computer. These errors are mainly thanks to human instead of technological weaknesses. for instance , errors may occur thanks to imprecise thinking by a programmer (a one that writes instructions for a computer to unravel a specific problem) or incorrect input file . we frequently ask computer errors caused thanks to incorrect input file or unreliable programs as garbage-in-garbage-out (GIGO).

4. **Diligence.** Unlike citizenry , a computer is free from monotony, tiredness, and lack of concentration. It can continuously work for hours without creating any error and without grumbling. Hence, computers score over citizenry in doing routine sort of jobs that need great accuracy. If ten million calculations need to be performed, a computer will perform the last one with precisely the same accuracy and speed because the first one.

5. **Versatility**. Versatility is one of the most wonderful things about a computer. One moment it is preparing results of an examination, next moment it is busy preparing electricity bills, and in between, it may be helping an office secretary to trace an important letter in seconds. All that is required to change its talent is to slip in a new program (a sequence of instructions for the computer) into it. In brief, a computer is capable of performing almost any task, if the task can be reduced to a finite series of logical steps.

6. **Power of Remembering.** As a human being acquires new knowledge, his/her brain subconsciously selects what it feels to be important and worth retaining in memory. The brain relegates unimportant details to back of mind or just forgets them. This is not the case with computers. A computer can store and recall any amount of information because of its secondary storage (a type of detachable memory) capability. It can retain a piece of information as long as a user desires and the user can recall the information whenever required. Even after several years, a user can recall exactly the same information that he/she had stored in the computer several years ago. A computer forgets or looses creation information only when a user asks it to do so. Hence, it is entirely up to the user to make a computer retain or forget some information.

1.2 Generation of Computers

Generation in computer talk may be a step in technology. It provides a framework for the expansion of industry . Originally, the term "generation" was wont to distinguish between varying hardware technologies but it's now been extended to incorporate both hardware and software that together structure a computing system .The custom of pertaining to computer era in terms of generations came into wide use only after 1964. There are totally five computer generations known till today. Below we describe each generation along side its identifying characteristics. Although there's a particular amount of overlap between different generations, the approximate period shown against each are normally accepted. During description of varied computer generations, you'll encounter several new terminologies and computer jargons that you simply might not be ready to understand properly. However, the thought here is to supply you an summary of the main developments and technologies during the five generations of computers. Subsequent chapters will cover these developments and technologies intimately . the target of this section is especially to supply an summary of what all you're getting to learn during this entire book.
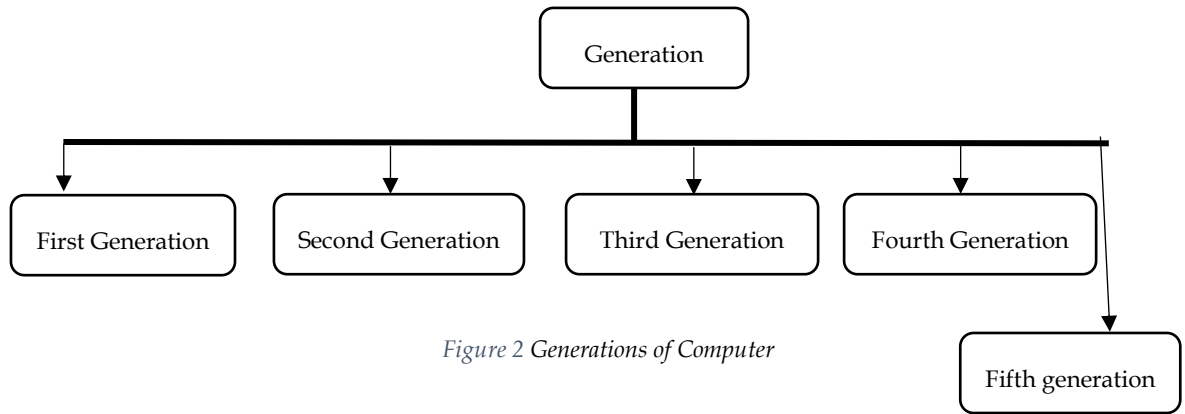
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│First Generation│ │Second Generation│ │Third Generation│ │Fourth Generation│
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Figure 2 Generations of Computer

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                                                    ┌────────────────┐
                                                    │Fifth generation│
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First Generation (1942-1955)

The first generation computers used **vacuum tubes** as the main electronic part. For memory devices, punch card and paper tapes were used. Magnetic drums are also used for storage. At that time memory was very expensive. Electronic time per calculation ranged from 0.1 milliseconds to 1 millisecond. They used two types of computer programming languages
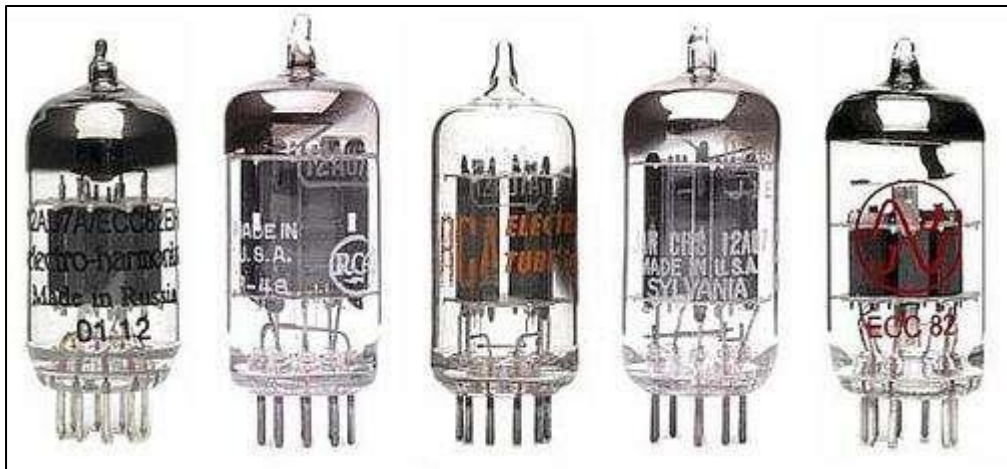
- Machine Language
- Assembly Language

Figure 3 Vaccum Tubes

A vacuum tube [see Figure 3] was a fragile glass device, which used filaments as a source of electronics and could control and amplify electronic signals. It was the only high-speed electronic switching device available in those days. These vacuum tubes computer could perform computations in milliseconds and were referred to as first-generation computers.

The memory of these computers used electromagnetic relays, and all data and instructions were fed into the system from punched cards. The instructions were written in machine and assembly languages because high-level programming languages were introduced much later. Since machine and assembly languages are very difficult to work with, only a few specialists understood how to program these early computers.

Characteristic features of first-generation computers are as follows:

1. They were the fastest calculating devices of their time.

2. They were too bulky in size, requiring large rooms for installation.

3. They used thousands of vacuum tubes that emitted large amount of heat and burnt out frequently. Hence, the rooms/areas in which these computers were located had to be properly air-conditioned.

4. Each vacuum tube consumed about half a watt of power. Since a computer typically used more than ten thousand vacuum tubes, power consumption of these computers was very high.

5. As vacuum tubes used filaments, they had a limited life. Because a computer used thousand of vacuum tubes, these computers were prone to frequent hardware failures.

6. Due to low mean time between failures, these computers required constant maintenance.

7. In these computers, thousands of individual components were assembled manually by hand in to electronic circuits. Hence, commercial production of these computers was difficult and costly.

8. Since these computers were difficult to program and use, they had limited commercial use.

📋 Give brief description about the first-generation computer

Second Generation (1955-1964)

John Bardeen, Willian Shockley, and Walter Brattain invented a new electronic switching device called transistor [see Figure 1.1(b)] at Bell Laboratories in 1947. Transistors soon proved to be a better electronic switching device than vacuum tubes due to their following properties:

1. They were more rugged and easier to handle than tubes since they were made of germanium semiconductor material rather than glass.

2. They were highly reliable as compared to tubes since they had no parts like a filament that could burn out.

3. They could switch much faster (almost ten times faster) than tubes. Hence, switching circuits made of transistors could operate much faster than their counterparts made of tubes.

4. They consumed almost one-tenth the power consumed by tube.

5. They were much smaller than a tube.

6. They were less expensive to produce.

7. They dissipated much less heat as compared to vacuum tubes.

The second-generation computers were manufactured using transistors instead of vacuum tubes. Due to the properties of transistors listed above, these computers were more powerful, more reliable, less expensive, smaller, and cooler to operate than the first-generation computers. They used magnetic cores for main memory, and magnetic disk and tape as secondary storage media. Punched cards were still popular and widely used for preparing and feeding programs and data to these computers.

On software front, high-level programming languages (like FORTRAN, COBOL, ALGOL, and SNOBOL) and batch operating system emerged during second-generation. High-level programming languages were easier for people to understand and work with than assembly or machine languages making second-generation computers easier to program and use than first-generation computers. Introduction of batch operating system enabled multiple jobs to be batched together and submitted at a time. A batch operating system causes automatic transition from one job to another as soon as the former job completes. This concept helped in reducing human intervention while processing multiple jobs resulting in faster processing, enhanced throughput, and easier operation of second-generation computers.

The first-generation computers were mainly used for scientific computations. However, the second-generation computers were increasingly used in business and industry for commercial data processing applications like payroll, inventory control, marketing, and production planning.

Characteristic features of second-generation computers are as follows:

1. They were more than ten times faster than the first-generation computers.

2. They were smaller than first-generation computers and required smaller space.

3. They consumed less power and dissipated less heat than the first-generation computers. The rooms/areas in which the second-generation computers were located still required to be properly air conditioned.

4. They were more reliable and less prone to hardware failures than the first-generation computers.
5. They had faster and larger primary and secondary storage as compared to first-generation computers.

6. They were easier to program and use than the first-generation computers. Hence, they had wider commercial use.

7. In these computers, thousands of individual transistors had to be assembled manually by hand into electronic circuits making commercial production of these computers difficult and costly.
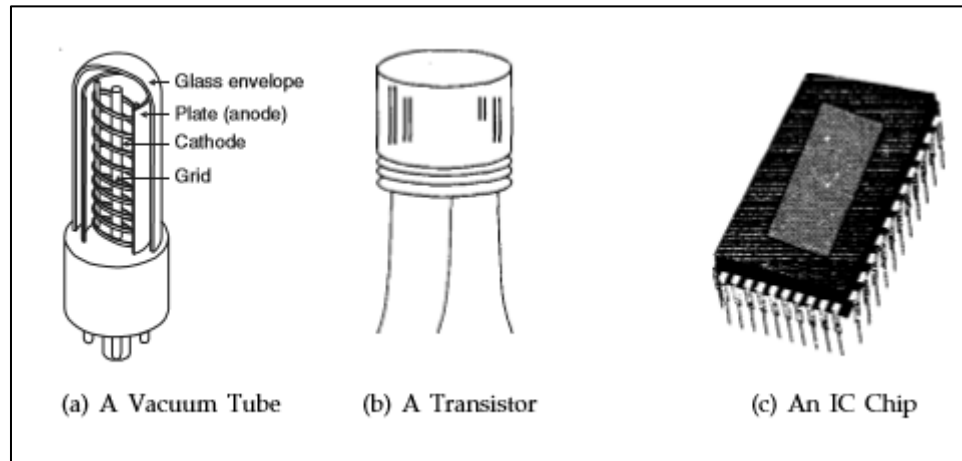

Figure 4 Different devices for different generations

Third Generation (1964-1975)

In 1958, Jack Clair Kilby and Robert Noyce invented the first integrated circuit. Integrated circuits (called ICs) are circuits consisting of several electronic components like transistors, resistors, and capacitors grown on a single chip of silicon eliminating wired interconnection between components. The IC technology was also known, 0 technologies because it made it possible to integrate larger number of circuit components into very small (less than 5 mm square) surface of silicon, known as "chip" [see Figure l.l(c)]. Initially the integrated circuits contained only about ten to twenty components. This technology was named small scale integration (SSI). Later with the advancement in technology for manufacturing ICs, it became possible to integrate up to about components on a single chip. This technology came to be known as medium scale integration (MSI).

Computers built using integrated circuits characterized the third generation. Earlier ones used SSI technology and later used MSI technology. ICs were smaller, less expensive to produce, more rugged and reliable, faster in operations, dissipated less heat, and consumed less power than circuits built by wiring electronic components manually. Hence third generation computers were more powerful, more reliable, less expensive, smaller, and cooler to operate than second-generation computers.

Parallel advancements in storage technologies allowed construction of larger magnetic core based random access memory as well as larger capacity magnetic disks and tapes. Hence, third-generation computers typically had few megabytes (less than 5 Megabytes) of main memory and magnetic disks capable of storing few tens of megabytes of data per disk drive.

On software front, standardization of high-level programming languages, timesharing operating systems, unbundling of software from hardware, and creation of an independent software industry happened during third generation. FORTRAN and COBOL were the most popular high-level programming languages in those days. American National Standards Institute (ANSI) standardized them in 1966 and 1968 respectively, and the standardized versions were called ANSI FORTRAN and ANSI COBOL. The idea was that as long as programmers follows these standards in program writing, a program could be run on any computer with an ANSI FORTRAN or ANSI COBOL compiler. Some more high-level programming languages were introduced during the third-generation period. Notable among these were PL/1, PASCAL, and BASIC.

We saw that second-generation computers used batch operating system. In these systems, users had to prepare their data and programs and then submit them to a computer centre for processing. The operator at the computer centre collected these user jobs and fed them to a computer in batches at scheduled intervals. The respective users then collected their job's output from the computer centre. The inevitable delay resulting from this batch processing approach was very frustrating to some users, especially programmers, because often they had to wait for days to locate and correct a few program errors. To rectify this situation, John Kemeny and Thomas Kurtz of Dartmouth

College introduced the concept of timesharing operating system. Timesharing operating system enables multiple users to directly access and share computing resources simultaneously in a manner that each user feels that no one else is using the computer. This is accomplished by using a large number of independent relatively low-speed, on-line terminals connected to the main computer simultaneously. Introduction of timesharing concept helped in drastically improving the productivity of programmers and made on-line systems feasible, resulting in new on-line applications like airline reservation systems, interactive query systems, etc.

Until 1965, computer manufacturers sold their hardware along with all associated software without any separate charges for software. For example, buyers received language translators for all languages supported on a computer they purchased. From user's standpoint, software was free. However, the situation changed in 1969 when IBM and other computer manufacturers began to price their hardware and software products separately. This unbundling of software from hardware gave users an opportunity to invest only in software of their need and value. For example, now buyers could purchase only the language translators they needed and not all language translators supported on the purchased computer. This led to the creation of many new software houses and the beginning of an independent software industry.

Development and introduction of minicomputers also took place during the third-generation period. Computers built until the early 1960s were mainframe systems that only very large companies could afford to purchase and use. Clearly, a need existed for low-cost smaller computers to fill the gaps left by the bigger, faster, and costlier mainframe systems. Several innovators recognized this need and formed new firms in the 1960s to produce smaller computers. Digital Equipment Corporation (DEC) introduced the first commercially available minicomputer, the PDP-8 (Programmed Data Processor), in 1965. It could easily fit in the corner of a room and did not require attention of a full-time computer operator. It used timesharing operating system and a number of users could access it simultaneously from different locations in the same building. Its cost was about one-fourth the cost of a traditional mainframe system making it possible for smaller companies to afford computers. It confirmed the tremendous demand for small computers for business and scientific applications, and by 1971, there were more than 25 computer manufacturers in minicomputer market.

Characteristic features of third-generation computers are as follows:

1. They were more powerful than second-generation computers. They were capable of performing about one million instructions per second.

2. They were smaller than second-generation computers requiring smaller space.

3. They consumed less power and dissipated less heat than second-generation computers. The rooms/areas in which third-generation computers were located still required to be properly air-conditioned.

4. They were more reliable and less prone to hardware failures than second-generation computers requiring lower maintenance cost.

5. They had faster and larger primary and secondary storage as compared to secondgeneration computers.

6. They were general-purpose machines suitable for both scientific and commercial applications.

7. There manufacturing did not require manual assembly of individual components into electronic circuits resulting in reduced human labor and cost involved at assembly stage. Hence, commercial production of these systems was easier and cheaper. However, highly sophisticated technology and expensive setup was required for the manufacture of IC chips.

8. Standardization of high-level programming languages allowed programs written for one computer to be easily ported to and executed on another computer.

9. Timesharing operating system allowed interactive usage and simultaneous use of these systems by multiple users.

10. Timesharing operating system helped in drastically improving the productivity of programmers down the time and cost of program development by several fold.

11. Timesharing operating system also made on-line systems feasible resulting in usage of these systems oil-line applications.

12. Unbundling of software from hardware gave users of these systems an opportunity to invest only in software of their need and value.

13. Minicomputers of third-generation made computers affordable even by smaller companies.

Fourth Generation (1975-1989)

Average of electronic components packed on a chip doubled annually after 1965. This progress soon led to the age of huge scale integration (ISI) when it had been possible to integrate over 30,000 electronic components on one chip, followed by very large scale integration (VLSI) when it had been possible to integrate about a million electronic components on one chip. This progress led to a dramatic development — creation of a microprocessor. A microprocessor contains all circuits needed to perform arithmetic logic and control: functions, the core activities of all computers, on one chip. Hence, it became possible to create an entire computer with a Microprocessor, a couple of additional primary storage chips, and other support circuitry. It started a replacement social revolution — personal computer (PC) revolution. Overnight computers became incredibly compact. They become inexpensive to form , and suddenly it became possible for anyone to have a computer.

During forth generation, semiconductor memories replaced core memories leading to large random access memories with in no time time interval . On the opposite hand, hard disks became cheaper, smaller, and bigger in capacity. additionally to magnetic tapes, floppy disks became very fashionable as a transportable medium for porting programs and data from one computing system to a different .

Another significant development during fourth-generation period was spread of high-speed computer networking enabling interconnection of multiple computers to enable them to speak and share data. Local area networks (LANs) became popular for connecting computers within a corporation or within a campus. Similarly, wide area networks (WANs) became popular for connecting computers located at larger distances. This gave rise to networks computers and distributed systems.

On software front several new developments emerged to match the new technologies of fourth generation. For examples, several new operating systems were developed for PCs. Notable among these were MS-DOS, MS-windows, and apple's propriety OS. Since PCs were for people who weren't computer professionals, companies developed graphical user interfaces for creating computers more user friendly (easier to use).

A graphical interface ((U1) provides icons (pictures) and menus (list of choices) that users can select with a mouse. this permits new computer users to find out to use a PC quickly. Several new PC-based applications were also developed to form PCs a strong tool. Notable among these were powerful data processing packages that allowed easy development of documents, spreadsheet package that allowed easy manipulation and analysis of knowledge organized in columns and rows, and graphics packages that allowed easy drawing of images and diagrams. Another very useful concept that became popular during fourth-generation period was that of multiple windows on one terminal screen. This feature allowed users to ascertain the present state of' several applications simultaneously in separate windows on same terminal screen. During fourth-generation period, UNIX OS and C programing language also became very fashionable .

Characteristic features of fourth-generation computers are as follows:

1. PCs were smaller and cheaper than mainframes or minicomputers of third generation.

2. Although the fourth-generation mainframes required proper air-conditioning of the rooms/areas in which they were located, no air-conditioning was required for PCs.

3. They consumed less power than third-generation computers.

4. They were more reliable and less prone to hardware failures than third-generation computers requiring negligible maintenance cost.

5. They had faster and larger primary and secondary storage as compared to thirdgeneration computers.

6. They were general-purpose machines.

7. Their manufacturing did not require manual assembly of individual components into electronic circuits resulting in reduced human labour and cost involved at assembly stage. Hence, commercial production of these systems was easier and cheaper. However, highly sophisticated technology and expensive setup was required for manufacturing LSI and VLSI chips.

8. Use of standard high-level programming languages allowed programs written for one computer to be easily ported to and executed on another computer.

9. Graphical user interface (GUI) enabled new users to quickly learn how to use computers.

10. PC-based applications made PCs a powerful tool for both office and home usage.

11. Network of computers enabled sharing of resources like disks, printers, etc. among multiple computers and their users. They also enabled several new types of applications involving interaction among computer users at geographically distant locations. Computer Supported Cooperative Working (CSCW), or groupware is one such application in which multiple members working on a single project and located at distant locations cooperate with each other by using a network of computers.

12. In addition to unbundled software, these systems also used add-on hardware feature that allowed users to invest only in the hardware configuration and software of their need and value.

13. PCs of fourth generation made computers affordable even by individuals for their personal use at home.

Fifth Generation (1989-Present)

The trend of further miniaturization of electronic components, dramatic increase in power of microprocessor-chips, and increase in capacity of main memory and hard disc continued during fifth generation. VLSI technology came ULSI ((Ultra Large Scale Integration) technology in fifth generation leading to production of Microprocessor chips having ten million electronic components. In fact, the speed of microprocessors and therefore the size of main memory and hard disc doubled almost every eighteen months. As a result, many features found within the CPUs of huge mainframe systems of third- and fourth-generation systems became a part of microprocessor architecture in fifth generation. This ultimately resulted in availability of very powerful and compact computers becoming available at cheaper rates and death of traditional large mainframe systems. thanks to this fast space of advancement in technology , we see more compact and more powerful computers being introduced almost per annum at more or less an equivalent price or maybe cheaper. Notable among these are portable notebook computers that give the facility of a PC to their users even while travelling, powerful desktop PCs and workstations, powerful servers, and really powerful supercomputers.

Storage technology also advanced in no time making larger and bigger main memory and disk storage available in newly introduced systems. During fifth generation, optical disks also emerged as a well-liked portable mass storage D-ROM (Compact Disk - Read Only Memory). During fifth generation, there was tremendous outgrowth of computer networks. Communication technologies become faster day-by-day and more and more computers were networked together. This trend resulted in emergence and recognition of the web and associated technologies and applications. the web made it possible for computer users sitting across the world to speak with one another within minutes by use of electronic message (known as e-mail) facility. a huge ocean of data became readily available to computer users through the planet Wide Web (known as WWW). Moreover, several new sorts of exciting applications like e-commerce, virtual libraries, virtual classrooms, distance education, etc., emerged during the amount .

Tremendous processing power and large storage capacity of fifth-generation computers also made them a really popular tool for a good range of multimedia applications that affect information containing text, graphics animation, audio, and video data. generally , the info size of multimedia information is far larger than textual information because representation of graphics, animation, audio, or video media in digital form requires larger number of bits than that required for representation of textual information.

Characteristic features of fifth-generation computers are as follows:

1. Portable PCs (called notebook computers) are much smaller and handy than PCs of fourth generation allowing users to use computing facility even while travelling.

2. Fifth-generation desktop PCs and workstations are several times more powerful than PCs of fourth generation.

3. Although fifth-generation mainframes require proper air-conditioning of the rooms/ areas in which they are located, no air-conditioning is normally required for notebook computers, desktop PCs, and workstations.

4. They consume less power than their predecessors do.

5. They are more reliable and less prone to hardware failures than their predecessors were, requiring negligible maintenance cost.

6. Many of the large-scale fifth-generation systems have hot-plug feature that enables a failed component to be replaced with a new one without the need to shutdown the system. Hence, the uptime of these systems is very high.

7. They have faster and larger primary and secondary storage as compared to their predecessors.

8. They are general-purpose machines.

9. Their manufacturing does not require manual assembly of individual components into electronic circuits resulting in reduced human labour and cost involved at assembly stage. Hence, commercial production of these systems is easier and cheaper. However, highly sophisticated technology and expensive setup (affordable only by a few organizations in the world) is required for manufacturing IJLSI chips.

10. Use of standard high-level programming languages allows programs written for one computer to be easily ported to and executed on another computer.

11. More user-friendly interfaces with multimedia features make the systems easier to learn and use by anyone, including children.

Figure 4 Touch Screen technology

1.3 Block Diagram of Computer

The basic components of a computer are:

• Input Unit

• Output Unit

• Memory/Storage Unit

• Arithmetic Logic Unit

• Control Unit

• Central Processing Unit

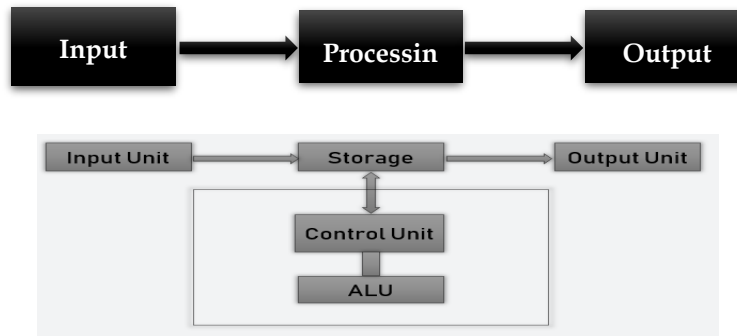These are shown in Figure 5

Figure 5 Block Diagram of Computer

Input Unit

Computers need to receive data and instruction in order to solve any problem. Therefore, we need to input the data and instructions into the computers. The input unit consists of one or more input devices. Keyboard is the one of the most commonly used input devices. Other commonly used input devices are the mouse, floppy disk drive, magnetic tape, etc. All the input devices perform the following functions:

• Accept the data and instructions from the outside world.

• Convert it to a form that the computer can understand.

• Supply the converted data to the computer system for further processing.

Storage Unit

The storage unit of the computer holds data and instructions that are entered through the input unit, before they are processed. It preserves the intermediate and final results before these are sent to the output devices. It also saves the data for the later use. The various storage devices of a computer system are divided into two categories:

1. **Primary Storage:** Stores and provides very fast. This memory is generally used to hold the program being currently executed in the computer, the data being received from the input unit, the intermediate and final results of the program. The primary memory is temporary in nature. The data is lost, when the computer is switched off. In order to store the data permanently, the data has to be transferred to the secondary memory. The cost of the primary storage is more compared to the secondary storage. Therefore, most computers have limited primary storage capacity.

2. **Secondary Storage:** Secondary storage is used like an archive. It stores several programs, documents, data bases etc. The programs that you run on the computer are first transferred to the primary memory before it is actually run. Whenever the results are saved, again they get stored in the secondary memory. The secondary memory is slower and cheaper than the primary memory. Some of the commonly used secondary memory devices are Hard disk, CD, etc.

Memory Size

All digital computers use the binary system, i.e. 0's and 1's. Each character or a number is represented by an 8 bit code. The set of 8 bits is called a byte. A character occupies 1 byte space. A numeric occupies 2 byte space. Byte is the space occupied in the memory. The size of the primary storage is specified in KB (Kilobytes) or MB (Megabyte). One KB is equal to 1024 bytes and one MB is equal to 1000 KB. The size of the primary storage in a typical PC usually starts at 16 MB. PCs having 32 MB, 48 MB, 128 MB, 256 MB memory are quite common.

Output Unit

The output unit of a computer provides the information and results of a computation to outside world. Printers, Visual Display Unit (VDU) are the commonly used output devices. Other commonly used output devices are floppy disk drive, hard disk drive and magnetic tape drive.

Arithmetic Logical Unit

All calculations are performed in the Arithmetic Logic Unit (ALU) of the computer. It also does comparison and takes decision. The ALU can perform basic operations such as addition, subtraction, multiplication, division, etc and does logic operations viz, >, <, =, 'etc. Whenever calculations are required, the control unit transfers the data from storage unit to ALU once the computations are done, the results are transferred to the storage unit by the control unit and then it is send to the output unit for displaying results.

Control Unit

It controls all other units in the computer. The control unit instructs the input unit, where to store the data after receiving it from the user. It controls the flow of data and instructions from the storage unit to ALU. It also controls the flow of results from the ALU to the storage unit. The control unit is generally referred as the central nervous system of the computer that control and synchronizes its working.

Central Processing Unit

The control unit and ALU of the computer are together known as the Central Processing Unit (CPU). The CPU is like brain performs the following functions:

• It performs all calculations.

 • It takes all decisions.

• It controls all units of the computer

The activity of processing data using a computer is called data processing. Data is raw material used as input to data processing and information is processed data obtained as output of data processing.

1.4 <u>Data Representation</u>

While **the essential** memory unit **during a computer is that the** bit, holding **a worth** of 1 or 0, or equivalently ON or OFF, most information of interest to the user requires **quite an easy** bi-valued representation. Thus, **it's** practical **to make** groups of bits, each consisting of some carefully chosen number of bits, **and style the pc** hardware to **affect** these groups as complete units. In modern computers **the foremost** basic group consists of 8 bits, called the byte.

Most computers implement groupings of two bytes, 4 bytes, **and eight** bytes. In order **to debate** how data is processed by a computer, **we should always** first understand **the shape during which** data is stored in its memory. There are two basic **sorts of** data which are stored and processed by computers, namely character and numbers. Characters include letters and special symbols. **for instance** , computer **could also be** programmed to read **an inventory** of names, sort them in alphabetical order and print the sorted list. **an inventory** of names, **like** VINEET, PRADIP, GANESH read by an input unit would be stored in memory, sorted by the program in alphabetical order and printed the strings being VINEET, PRADIP and GANESH. **the opposite sort of** data is decimal numbers **like** 1234, 456 etc. Numbers are processed using arithmetic operations such add, subtract, multiply and divide. **during this** case, we assign values to numbers **and therefore the** processing **leads to** new values. The characters and numbers fed to a computer, **and therefore the** output from **the pc** , must be **during a** form which is usable by people. For this purpose **tongue** symbols and **digit** are appropriate. These constitute the external data representation. On **the opposite** hand, the representation **of knowledge** inside a computer must match the technology **employed by the pc** to store and process data. Thus **we should** always first determine **the foremost** appropriate **representation** to **representation** and **the other way around** .

Number System

A set of values used to represent different quantities is known as Number System. A numerical system is a writing system for expressing numbers. Mathematical notation for representing numbers of a given set using digits or other symbols in consistent manner.

Example

A number system can be used to represent the number of students in a class or number of viewers watching a certain TV program etc. The digital computer represents all kinds of data and information in binary numbers. Number systems have numerous forms. The data can be in the form of audio, text, graphics and numbers. Total number of digits which composes a number is called as a **Base** or **Radix.**

Types of number system

Number system are of so many times but lets discuss the most commonly used ones. Following are the 4 main number systems types:

- Binary Number System
- Decimal Number System
- Hexadecimal Number System
- Octal Number System
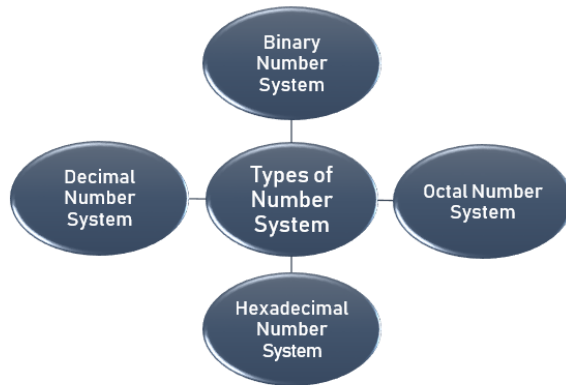
Figure 6 Types of Number System

Each number system comes with a Base value. The base value of a number system is the number of different values the set has before repeating itself. The below mentioned table shows the number system along with its base value.

SYSTEM	BASE	SYMBOLS
Binary	2	0,1
Decimal	10	0,1,2,3……9
Octal	8	0,1,2,3……7
Hexa-decimal	16	0,1,2…. 9, A,B,….F

Table 2 Number system with its Base Value

Binary Number System

Binary Number System: According to digital electronics and mathematics, a binary number is defined as a number that is expressed in the binary system or base 2 numeral system. It describes

numeric values by two separate symbols; 1 (one) and 0 (zero). The base-2 system is the positional notation with 2 as a radix.

The binary system is applied internally by almost all latest computers and computer-based devices because of its direct implementation in electronic circuits using logic gates. Every digit is referred to as a **bit**.

n

What is Bit in Binary Number?

A single binary digit is called a "**Bit".** A binary number consists of several bits. Examples are:

- 10101 is a five-bit binary number
- 101 is a three-bit binary number
- 100001 is a six-bit binary number

Facts to Remember:

- Binary numbers are made up of only 0's and 1's.
- A binary number is represented with a base-2
- A bit is a single binary digit.

How to Calculate Binary Numbers

For example, the number to be operated is 1235.

Thousands	Hundreds	Tens	Ones
1	2	3	5

Table 1 Binary calculation

This indicates,

$1235 = 1 \times 1000 + 2 \times 100 + 3 \times 10 + 5 \times 1$

Given,

1000	$= 10^3 = 10 \times 10 \times 10$
100	$= 10^2 = 10 \times 10$
10	$= 10^1 = 10$
1	$= 10^0$ (any value to the exponent zero is one)

Table 2

The above table 3 can be described as,

Thousands	Hundreds	Tens	Ones
10^3	10^2	10^1	10^0
1	2	3	5

Hence,

$1235 = 1 \times 1000 + 2 \times 100 + 3 \times 10 + 5 \times 1$

$= 1 \times 10^3 + 2 \times 10^2 + 3 \times 10^1 + 5 \times 10^0$

The decimal number system operates in base 10, wherein the digits 0-9 represent numbers. In binary system operates in base 2 and the digits 0-1 represent numbers, and the base is known as **radix.**

Example to calculate decimal equivalent

Binary Number - 10101_2

Step 1 Convert Binary number into decimal

$10101_2 = ((1 \times 2^4) + (0 \times 2^3) + (1 \times 2^2) + (0 \times 2^1) + (1 \times 2^0))_{10}$

As you can see in the above example after conversion the deciamal number system is displayes

Step 2 Simplify the calculation of Decimal number system by multiplication and addition function

$10101_2 = (16 + 0 + 4 + 0 + 1)_{10}$

Step 3 Sum it up and display the results

$10101_2 = 21_{10}$

Decimal Number System

In the **decimal number system**, the numbers are represented with base 10. The way of denoting the decimal numbers with base 10 is also termed as decimal notation. This number system is widely used in computer applications. It is also called the base-10 number system which consists of 10 digits, such as, 0,1,2,3,4,5,6,7,8,9. Each digit in the decimal system has a position and every digit is ten times more significant than the previous digit.

For example, the decimal number **1234** consists of

- 4 in the unit's position
- 3 in the tens position
- 2 in the hundreds position
- 1 in the thousands position

The value of 1234 can be written as

$(1 \times 1000) + (2 \times 100) + (3 \times 10) + (4 \times 1)$

$(1 \times 10^3) + (2 \times 10^2) + (3 \times 10^1) + (4 \times 10^0)$

$1000 + 200 + 30 + 4 = 1234$

Suppose, 25 is a decimal number, then 2 is ten times more than 5. Some examples of decimal numbers are:-

$(12)_{10}, (345)_{10}, (119)_{10}, (200)_{10}, (313.9)_{10}$

A number system which uses digits from 0 to 9 to represent a number with base 10 is the decimal system number. The number is expressed in base-10 where each value is denoted by 0 or first nine positive integers. Each value in this number system has the place value of power 10. It means the digit at the tens place is ten times greater than the digit at the unit place. Let us see some more examples:

$(92)_{10} = 9 \times 10^1 + 2 \times 10^0$

$(200)_{10} = 2 \times 10^2 + 0 \times 10^1 + 0 \times 10^0$

The decimal numbers which have digits present on the right side of the decimal (.) denote each digit with decreasing power of 10. Some examples are:

$(30.2)_{10} = 30 \times 10^1 + 0 \times 10^0 + 2 \times 10^{-1}$

$(212.367)_{10} = 2 \times 10^2 + 1 \times 10^1 + 2 \times 10^0 + 3 \times 10^{-1} + 6 \times 10^{-2} + 7 \times 10^{-3}$

Octal Number System

Octal Number System has a base of eight and uses the number from 0 to 7. The octal numbers, in the **number system**, are usually represented by binary numbers when they are grouped in pair of

three. For example, 12_8 is expressed as 001010_2, where 1 is equivalent to 001 and 2 is equivalent to 010.

Octal Number System
Base – 8
Octal Symbol – 0, 1, 2, 3, 4, 5, 6 and 7

Characteristics of Octal Number System

- Uses eight digits, 0,1,2,3,4,5,6,7.
- Also called base 8 number system
- Each position in an octal number represents a 0 power of the base (8). Example 8^0
- Last position in an octal number represents a x power of the base (8). Example 8^x where x represents the last position - 1.

Like Octal number is represented with base 8, in the same way, a binary number is represented with base 2, decimal number with base 10 and the hexadecimal number is represented with base 16.

Examples for these number systems are:

- 22_2 is a binary number
- 100_{10} is a decimal number
- 40_{16} is a hexadecimal number

If we solve an octal number, each place is a power of eight.

- $124_8 = 1 \times 8^2 + 2 \times 8^1 + 4 \times 8^0$

Example of converting Octal into Decimal

Octal Number : 12570_8

Step 1 Convert the octal number to decimal with the base value 10

$12570_8 = ((1 \times 84) + (2 \times 83) + (5 \times 82) + (7 \times 81) + (0 \times 80))10$

Step 2 Simplify the calcukation after the decimal convertion by multiplication and addition

$12570_8 = (4096 + 1024 + 320 + 56 + 0)_{10}$

Step 3 Perform addition to get the conversion results

$12570_8 = 5496_{10}$

Hexadecimal Number System

In the **hexadecimal number system**, the numbers are represented with base 16. It is also pronounced sometimes as **'hex'**. Just like the **binary number, octal number and decimal number** whose base representation are 2, 8 and 10, respectively, the hexadecimal conversion is also possible which can be represented in a table. The **list of 16 hexadecimal digits** with their decimal,

octal and binary representation is provided here in the form of a table, which will help in number system conversion.

Characteristics of Hexadecimal Number System

- Uses 10 digits and 6 letters, 0,1,2,3,4,5,6,7,8,9,A,B,C,D,E and F

- Letters represents numbers starting from 10. A=10, B=11, C=12, D=13, E=14, F=15

- Also called base 16 number system

- Each position in a hexadecimal number represents a 0 power of the base (16). Example, 16^0

- Last position in a hexadecimal number represents a x power of the base (16). Example 16^x where x represents the last position - 1.

Hexadecimal to Decimal Number System Conversion

Here, you will see the representation of a hexadecimal number into decimal form.

Hexadecimal	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Decimal	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Decimal to Hexadecimal Number System Conversion

You have learned how to convert hexadecimal number to decimal number. Now let us find out how we can convert a decimal number in hexadecimal. Follow the below steps:

- Firstly divide the number by 16

- Take the quotient and divide again by 16

- The remainder left will produce the hex value

- Repeats the steps until the quotient has become 0

Example: Convert $(242)_{10}$ into hexadecimal.

Solution: Divide 242 by 16 and repeat the steps, till the quotient is left as 0.

```
16 | 242
16 | 15   2 → 2
   |  0  15 → F
```

Therefore, $(242)_{10} = (F2)_{16}$

Hexadecimal Number System Conversion Examples

Example 1: What is 5C6 (Hexadecimal)?

Solution: Step 1: The "5 " is the "16 x 16" position, so that means 5 x16 x16

Step 2: The 'C' (12) is in the "16" position, so that means 12 x 16.

Step 3: The "6" in the "1" position so that means 6.

Answer is : 5C6 = 5 x 16 x 16 + 12 x 16 +6 = (1478) in Decimal.

Example 2: What is 3C5 (Hexadecimal)?

Solution: Step 1: The "3 " is the "16 x 16" position, so that means 3 x16 x16

Step 2: The 'C' (12) is in the "16" position, so that means 12 x 16.

Step 3: The "5" in the "1" position so that means 5.

Answer is : 5C6 = 3 x 16 x 16 + 12 x 16 +5 = (965) in Decimal.

Example 3: What is 7B5 (Hexadecimal)?

Solution: Step 1: The "7 " is the "16 x 16" position, so that means 7 x16 x16

Step 2: The 'B' (11) is in the "11" position, so that means 11 x 16.

Step 3: The 5" in the "1" position so that means 5.

Answer is : 7B5 = 7 x 16 x 16 + 11 x 16 +5 = (1973) in Decimal.

What is 5D6 (Hexadecimal)?

Decimal	Hexadecimal	Binary	Octal
0	0	0	0
1	1	1	1
2	2	10	2
3	3	11	3
4	4	100	4
5	5	111	5
6	6	110	6
7	7	111	7
8	8	1000	10
9	9	1001	11
10	A	1010	12
11	B	1011	13
12	C	1100	14
13	D	1101	15
14	E	1110	16
15	F	1111	17
16	10	10000	20

Table 3 Relationship among Decimal,Hexadecimal,Binary and Octal Number System

Summary

- The word computer comes from the word "compute", which means, "to calculate".
- Then characteristics of computer discuss which include Automatic Machine, Speed, Accuracy, Diligence, Versatility, Power of Remembering.
- Computer generation like First Generation (1942-1955), Second Generation (1955-1964), Third Generation (1964-1975), Fourth Generation (1975-1989) and Fifth Generation (1989-Present).
- Block Diagram of Computer means sub part of computer like input, output and memory devices.
- The control processing unit is combination of ALO and Au.
- In octal number system their are only eight symbols or digits i.e. 0, 1, 2, 3, 4, 5, 6, 7, 8. • In hexadecimal number system each position represent a power of the base 16.

Keywords

Data processing: The activity of processing data using a computer is called data processing.

Generation: Originally, the term "generation" was used to distinguish between varying hardware technologies but it has now been extended to include both hardware and software that together make up a computer system.

Integrated circuits: They are usually called ICs or chips. They are complex circuits which have been etched onto tiny chips of semiconductor (silicon). The chip is packaged in a plastic holder with pins spaced on a 0.1" (2.54 mm) grid which will fit the holes on stripboard and breadboards. Very fine wires inside the package link the chip to the pins.

Medium scale integration (MSI): Medium-Scale Integration is a term used in electronic chip manufacturing industry. An integrated circuit which contained hundreds of transistors on each chip, called Medium-Scale Integration (MSI).

Small-scale integration" (SSI): The first integrated circuits contained only a few transistors. Called "Small-Scale Integration" (SSI), they used circuits containing transistors numbering in the tens.

Storage unit: The storage unit of the computer holds data and instructions that are entered through the input unit, before they are processed. It preserves the intermediate and final results before these are sent to the output devices.

Very-large-scale integration (VLSI): It is the process of creating integrated circuits by combining thousands of transistors into a single chip.

Binary number system: It is like a decimal number system, except that the base is 2, instead of 10 which use only two symbols (0 and 1).

n-bit number: An n-bit number is a binary number consisting of 'n' bits.

Decimal number system: In this system, base is equal to 10 because there are altogether ten symbols or digits (0, 1, 2, 3, 4, 5, 6, 7, 8, and 9).

Self-Assessment Questions

1. Computer's third generation is from………….. to …………

(a) 1955-1964   (b) 1964-1975

(c) 1942-1955 (d) 1975-1989

2. Developed an electronic machine to solve certain mathematical equations.

(a) Dr John Atanasoff   (b) Herman Hollerith

(c) Professors J. Presper Eckert   (d) All of these

3. The activity of processing data using a computer is called Data handling.

(a) True   (b) False

4. A powerful computer is capable of performing several billion (109) arithmetic operation per second.

(a) True   (b) False

5. The second generation computers were manufactured by using …………

(a) Vacuum tubes   (b) Transistors

(c) IC Chip (d) None of above

6. ANSI stands for…………

(a) American National Standards Institute (b) Asia National Standards Institute

7. Which of the following is not a positional number system?

a) Roman Number System

b) Octa l Number System

c) BinaryNumberSystem

d) Hexadecimal Number System

8. The value of radix in binary number system is _____

a) 2

b) 8

c) 10
d) 1

9. The input hexadecimal representation of 1110 is _____

a) 0111

b) E

c) 15

d) 14

10. A bit in a computer terminology means either 0 or 1.

a) True

b) False

11. Convert the binary equivalent 10101 to its decimal equivalent.

a) 21

b) 12

c) 22

d) 31

12. Which of the following is the correct representation of a binary number?
a) $(124)_2$

b) 1110

c) $(110)^2$

d) $(000)_2$

13. Which of the following is not a binary number?

a) 1111

b) 101

c) 11E

d) 000

14. A term in computer terminology is a change in technology a computer is/was being used.

a)development

b)generation

c) advancement

d) growth

15. The fourth generation was based on integrated circuits.

a) True

b) False

Review Questions

1.What is "generation" in computer terminology? How many computer generations are there till date?

2.List the various computer generations along with the key characteristics of computers of each generation.

3.List key hardware technologies used in building computers of each of the five generations.

4.List key software technologies used in building computers of each of the five generations.

5.What is an IC? How does it help in reducing the size computers?

6.Why were first- and second-generation computers more difficult and costlier to produce commercially that computer of subsequent generations?

7.Name the technologies used for constructing main memory in first-, second-, third-, and fourth-generation computers.

8.Name the secondary storage media popularly used, i.e. first-, second-, third-, fourth-, and firth-generation computers.

9.Find decimal equivalent of following binary numbers:

(a) 1101011

(b) 1000

(c) 10110011

(d) 11011101

(e) 1110101

(f) 1000

(g) 10110001100

(h) 110001

(i) 1010101100

(j) 111

10.Convert the following numbers to decimal numbers:

(a) 1101102

(b) 25736

(c) 2A3B16

(d) 12349

Answers to Self-Assessment Questions

1.	B	2.	A	3.	B	4.	A	5.	B
6.	A	7.	A	8.	A	9.	B	10.	A
11.	A	12.	D	13.	C	14.	B	15.	B

Further Readings

Fundamental Computer Concepts, William S. Davis.

Fundamental Computer Skills, Feng-Qi Lai, David R. Hofmeister

https://www.javatpoint.com/computer-fundamentals-tutorial

Unit 02: Memory

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2.2   Types of Memory
2.3   Secondary Storage Devices
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Objectives

After studying this unit, you will be able to:

Understand the unit memory

• Discussed the various types of memory

• Explain the random access memory

• Discussed the read only memory

• Explain the auxiliary storage device

 • Understanding of input and output devices in computer

 • Knowledge and understanding of latest input and output devices in market

Introduction

CPU contains necessary circuitry for processing controlling other components of the pc . However, one thing it doesn't have built into it's the place to store programs and data needed during processing . CPU contains several registers for storing data and directions but they will store only a couple of bytes at a time. they're just sufficient to carry just one or two instructions with corresponding data. If the instructions and data of a program being executed by a CPU were to reside in auxiliary storage sort of a disk, and fetched and loaded one by one into CPU registers because the program execution proceeded, this is able to cause the CPU being idle most of the time. This isbecause there's an outsized speed mismatch between the speed at which CPU can process data and therefore the rate at which data can be transferred from disk to CPU registers. for instance , a CPU can process data at a rate of about 5 nanosecond/byte and a disk reader can read data at a speed of about 5 microseconds/byte. Hence, within the time during which a disk can supply one byte of knowledge a CPU can process 1000 bytes. this is able to cause a really slow overall performance albeit a computer used a really fast CPU. to beat this problem, there's a requirement to possess a fairly large space for storing which will hold the instructions and data of the program(s) on which CPU is currently working time to fetch and cargo data from this space for storing into CPU registers must even be very small as compared thereto space from disk storage to scale back the speed mismatch problem with CPU speed. Every computer has such a space for storing referred to as primary storage, main memory, or just memory. it's a short lived cargo area built into the pc hardware. Instructions and data of a program reside mainly during this area when CPU is executing the program. Physically, this memory consists of some microcircuit (IC) chips either on the motherboard or on a little circuit card attached to the motherboard of

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a computing system . This built-in memory allows CPU to store and retrieve data very quickly. the speed of fetching data from this memory is of the order of fifty nanoseconds/byte. Hence, the speed of knowledge fetching from main memory is about 100 times.

2.1 Units of Memory

Starting with the Unit of memory, you can see the difference between things like a "Kilobyte" and a "Megabyte" and other computer memory terms. Memory devices are to store the data for later reference. The smallest unit of memory is defined as a **Bit(0,1).**The bit is a term shortly used instead of the word 'Binary digit', which is nothing but the 0's and 1's. When the number of bits increases into four it is stated as a **Nibble.**Nibble can be defined as the collection of four bits, which is characterized as a hexadecimal number to store the data in the memory. Another terminology which is most used is **Byte.** A byte can be defined as the group of eight binary digits, which generally corresponds to the other compounds of 8 bits. This is the commonly used unit terminology, as it comes with the prefixes for the multiples of bytes, such as the prefixes as kilo-, mega-, giga-, tera-, peta-, etc.

The charts below will give you a clear understanding of:

Name	Symbol	Binary Measurement	Decimal Measurement	Number of Bytes	Equal to
kilobyte	KB	2^{10}	10^3	1,024	1,024 bytes
megabyte	MB	2^{20}	10^6	1,048,576	1,024 KB
gigabyte	GB	2^{30}	10^9	1,073,741,824	1,024 MB
terabyte	TB	2^{40}	10^{12}	1,099,511,627,776	1,024 GB
petabyte	PB	2^{50}	10^{15}	1,125,899,906,842,624	1,024 TB
exabyte	EB	2^{60}	10^{18}	1,152,921,504,606,846,976	1,024 PB
zettabyte	ZB	2^{70}	10^{21}	1,180,591,620,717,411,303,424	1,024 EB
yottabyte	YB	2^{80}	10^{24}	1,208,925,819,614,629,174,706,176	1,024 ZB

Table 1 Units of Memory

How many bytes in 2 GB describe with example?

2.2 Types of Memory

Computer memory is the storage space in the computer, where data is to be processed and instructions required for processing are stored.
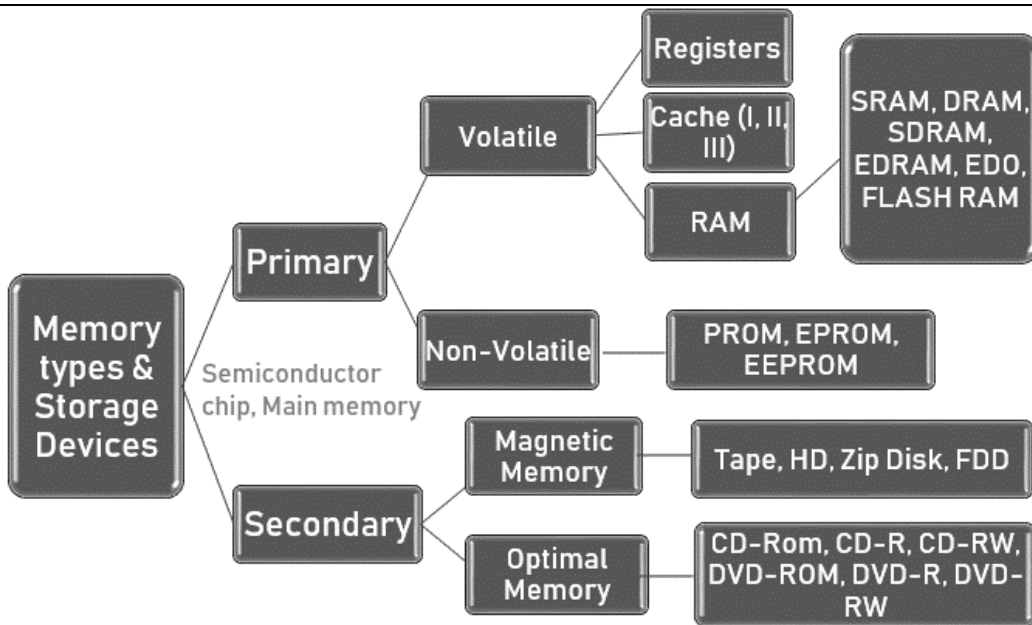
Figure 2 Diagram of memory types

Random Access Memory (RAM)

When people mention memory, they typically mean the volatile RAM memory. Physically, this memory consists of some microcircuit (IC) chips (see Figure 3) either on the motherboard or on a little circuit card attached to the motherboard. A computer's motherboard is meant during a manner that its memory capacity are often enhanced easily by adding more memory chips. Hence, if you opt to possess more memory than your computer currently has, you'll buy more memory chips and plug them within the empty memory slots on the motherboard. Service engineers normally do that job. the extra RAM chips which plug into special sockets on the motherboard, are referred to as single in-line memory modules (SIMMs).

Figure 3 Random Access Memory

Read-Only Memory (ROM)

A special sort of RAM, called ROM (ROM), may be a non-volatile chip during which data is stored permanently and can't be altered by usual programs. In fact, storing data permanently into this type of memory is named "burning within the data" because data in such memory is stored by using fuse-links. Once a fuse link is burnt, it's permanent. Data stored during a ROM chip can only be read and used—they can't be changed. this is often the rationale why it's called ROM (ROM). Since ROM chips are non-volatile, data stored during a ROM aren't lost when power is transitioned or interrupted unlike within the case of a volatile RAM chip. ROM is additionally referred to as field stores, permanent stores, or dead stores. ROMs are mainly wont to store programs and data that don't change and are frequently used. most elementary computer operations are administered by wired electronic circuits. However, several higher-level and regularly used operations require very complicated electronic

circuits for his or her implementation. Hence, rather than building electronic circuits for these operations, special programs are written to perform them. These programs are called micro programs because they affect low-level machine functions and are essentially substitutes for extra hardware. ROMs are employed by computer manufacturers to store these micro-programs in order that they can't be modified by theusers. an honest example of a micro-program is that the set of instructions needed to form a computing system able to use when it's powered on. This micro-program, called ''system boot program'', contains a group of start-up instructions to see if the system hardware like memory, I/O devices, etc. are functioning properly. it's for an OS and loads its core part within the volatile RAM of the system to supply the initial display-screen prompt. Note that this micro-program is employed whenever the pc is switched on and wishes to be retained when the pc is transitioned. Hence, ROM is a perfect storage for storing it.

Some of the characteristics

- These are semiconductor memories.

- It is known as the main memory.

- Usually volatile memory.

- Data is lost in case power is switched off.

- It is the working memory of the computer.

- Faster than secondary memories.

- A computer cannot run without the primary memory.

Figure 4 Read Only memory

Programmable Read-Only Memory (PROM)

There are two sorts of ROM (ROM) - manufacturer-programmed and userprogrammed. A manufacturer –programmed ROM is one during which data is burnt in by the manufacturer of the equipment during which it's used. for instance , a private computer manufacturer may store the system boot program permanently during a ROM chip located on the motherboard of every PC manufactured by it. Similarly, a printer manufacturer may store the printer controller software during a ROM chip located on the circuit card of every manufactured by it. Manufacturer-programmed ROMs are used mainly in those cases where the demand for such programmed ROMs is large. Note that manufacturer-programmed ROM chips are supplied by the manufacturers of equipment and it's impossible for a user to switch the programs or data stored during a ROM chip. On the opposite hand, a userprogrammed ROM is one during which a user can load and store "read-only" programs and data. That is, it's possible for a user to "customize" a system by converting his/her programs to micro-programs and storing them during a user-programmed ROM chip. Such a ROM is usually referred to as Programmable ROM (EPROM) because a user can program it. Once the user programs are stored during a PROM chip they will be executed usually during a fraction of the time previously required. PROMs are programmed to record information employing a special device referred to as PROM-programmer. However, once the chip has been programmed, the PROM become a ROM. That is, the knowledge recorded in it can only be read (it can't be changed). PROM is additionally nonvolatile storage , i.e., the stored information remains intact albeit power is transitioned or interrupted.

2.3 Secondary Storage Devices

Secondary storage devices, as indicated by the name, save data after it's been saved by the first memory device , usually mentioned as RAM (Random Access Memory). From the instant you begin typing a letter in Microsoft Word, for instance , and until you click on "Save", your entire work is stored in RAM. However, once you power off your machine, that

employment is totally erased, and therefore the only copy remaining is on the auxiliary storage device where you saved it, like internal or external hard disc drive, optical drives for CDs or DVDs, or USB flash drive.

Primary storage of a computing system has following limitations:

1. Limited Capacity. it's often necessary to store many millions, sometimes billions, and even trillions, of bytes of knowledge during a computer. Unfortunately, the storage capacity of primary storage of today's computers isn't sufficient to store the massive volume of knowledge handled by most processing centers.

2. Volatile. Primary storage is volatile and therefore the data stored in it's lost when power is turned off or interrupted. However, computer systems got to store data on permanent basis for several days, several months, or maybe several years.

As a result, additional memory, called auxiliary memory or auxiliary storage , is employed with most computing system . auxiliary storage is non-volatile and has lower cost per bit stored but it generally has an operating speed far slower than that of primary storage. it's used primarily to store large volume of knowledge on permanent basis which will be partially transferred to primary storage, whenever required for processing. Over the years, several devices and media are used as auxiliary storage in computer systems. Many of them like punched paper and punched cards became obsolete now. they're mag tape , magnetic disc , optical disc , and memory storage devices. during this chapter, you'll study the terminologies, principles of operation, uses, and tradeoffs of various sorts of auxiliary storage devices.

Hard Disks

Hard disks are the first on-line auxiliary storage device for many computer systems today. they're made from rigid metal (frequently aluminum) platters and are available in many sizes starting from 1 to 14-inch diameter.
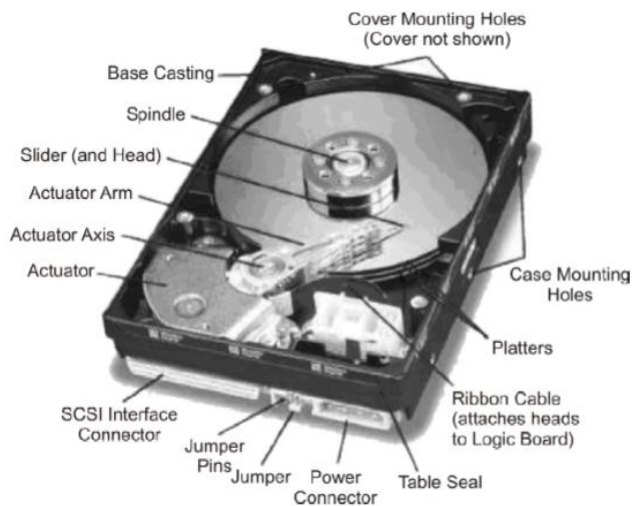
Figure 5 Hard Disks

Types of Hard Disks

Depending on how they're packaged, hard disks are normally categorized into three types:

1. Zip/Bernoulli Disk: It consists of one hard disc platter encased during a plastic cartridge. The disk commonly of 3‰-inch size having storage capacity of about 100 MB. The storage capacity slightly varies counting on the formatting style employed by a computing system with which it's used. Its disc drive , called zip drive, could also be of portable or fixed type. The fixed type is a component of a computing system permanently connected thereto. The portable type are often brought and connected to a computer for the duration of use and may then be disconnected and brought away. a zipper per disk are often easily loaded/unloaded into a zip drive even as we insert/remove a diskette during a diskette drive or a video cassette during a VCR.
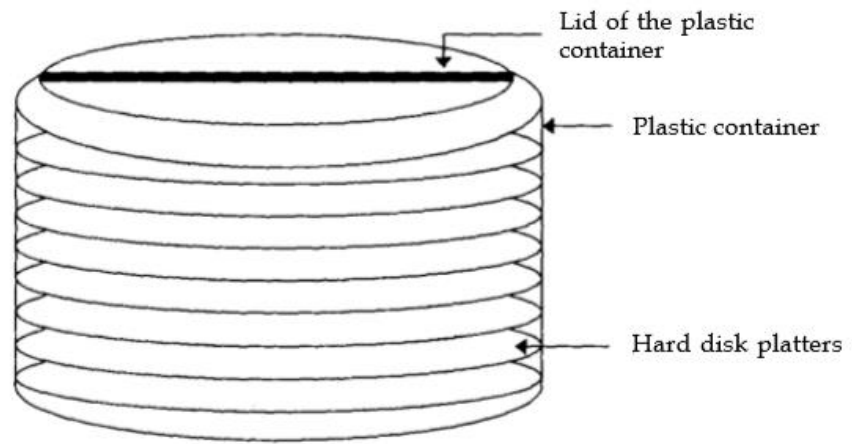
Figure 6 A Disk Pack

2. Disk Pack: It is made up of several hard disc platters (two or more) placed on a single central shaft. At the same time, both discs revolve. Its disc drive has a read/write head for each available disc surface (keep in mind that when several discs are used in a disc system, the upper surface of the topmost disc and the lower surface of the bottommost disc are not always usable). Its disc drive is interchangeable, allowing for the loading and unloading of different disc packs as required. A disc pack is kept off-line in a plastic case when not in use (see Figure 6). Disk packs now have nearly infinite storage capacity.

3. Winchester Disk: A Winchester disc is made up of several hard disc platters (two or more) placed on a single central shaft. A Winchester disc drive, on the other hand, is a fixed-type drive, unlike a disc pack drive. That is, the hard disc platters and disc drive are packed together in a contamination-free container and are unable to be removed.As a result, the ability of Winchester discs is reduced. However, for the same number of identically sized disc platters. Because of the following factors, Winchester discs can have a greater storage capacity than disc packs:

(a) As both disk platters and disc drive are permanently sealed together, all surfaces of all disk platters (including the side of the topmost platter and therefore the lower surface of the bottommost platter) are used for data recording during a Winchester disk. That is. For a Winchester disk with four platters there are eight usable surfaces as against six surfaces just in case of a disc pack with four platters.

(b) The contamination-free environment allows Winchester disks to use greater precision of knowledge recording and accessing, leading to greater data storage density than interchangeable disk packs.

Winchester disks were so named after the 30-30 Winchester rifle because the first Winchester disk systems had two 30-MB disks. Storage capacity of today's Winchester disks ranges from a couple of tens of megabytes to a couple of gigabytes (l09 bytes).

Flash Drive (Pen Drive)

Flash drive may be a compact device of the dimensions of a pen, comes in various shapes and classy designs (such as pen shape, wallet shape, etc.), and should have different added features (such like a camera, with a built-in N1P3IWMA/FM Radio replay for music on the go, etc.). It enables easy transport of knowledge from one computer to a different .it's a plug-and-play device that simply plugs into a USB (Universal Serial Bus) port of a computer. the pc detects it automatically as removable drive. Now one can read, write, copy, delete, and move data from the computer's hard disc drive to the flash drive or from the flash drive to the hard disc drive. One can even run applications, view videos, or play MP3 files from it directly. Once done, it are often simply plugged out of the USB port of the pc and kept into the pocket for being carried anywhere. A flash drive doesn't require any battery cable, or software, and is compatible with most PCs, desktop, and laptop computers with USB 2.0 port. of these features make it ideal external data storage for mobile people to hold or transfer data from one computer to a different . because the name implies, it's supported flush memory storage technology Recall that flash is non-volatile, Electrically Erasable Programmable Read Only Memory (EEPROM) chip. it's a highly Aid-state storage having data retention capability of quite 10 years.

Figure 7 Flash Drive (Pen Drive)

Figure 7 shows a flash drive is seen It consists of a main body and, in most cases, a port connector cover. If the drive is to be inserted into a computer's USB port, the cover is removed or the port connector is pushed out. A write protect tab, a read/write LED (Light Emitting Diode) indicator, and a strap hole are normally found on the main body. Some manufacturers also have applications that can be used in conjunction with the drive.

Optical Disk Drive

An optical disc is mounted on an optical disc drive for reading/writing of data thereon. An optical disc drive contains all the mechanical, electrical, and electronic components for holding an optical disc and for reading/writing of data thereon. That is, it contains the tray on which the disk is kept, read/write laser beams assembly and motor to rotate the disk. Figure 8. shows an optical disc drive.

Figure 8 Optical Disk Drive

Types of Optical Disks

All optical disks are round platters. they are available in several sizes and capacities. Commonly used sorts of optical disc are CD-ROM, WORM (CD-R), CD-RW, and DVD disks. they're described below.

CD-ROM

CD-ROM stands for Compact Disk-Read-Only-Memory. it's a spin-off of audio CD technology and works very similar to audio CDs utilized in music systems. In fact, if your computer has sound card and speakers, you'll play audio CDs together with your computer. CD-ROM disk may be a shiny, silver color metal disk usually of 5/4-inch (12 cm) diameter. it's made from polycarbonate plastic and thin layer of pure aluminum is applied to form the surface reflective. for a few excellent quality disks, gold layer is employed . a skinny layer of lacquer protects it. it's storage capacity of about 650 Megabytes or 700 Megabytes in newer ones. it's so called due to its large storage capacity on a compact-size disk and since it's a read-only memory medium. "That is, these disks come pre-recorded and knowledge stored on them can't be altered. Since an optical disc is read from the middle to fringes , several sizes are possible. aside from the foremost common 120mm 74/8 minute disk having storage capacity of 650 MB to 700 MB, 80mm 21 minute disk (called Mini-CD) having 184 MB storage is additionally available. they will be used with the disc drive of a 120 mm disk. Mini CDs are designed in various fancy shapes like round, oval, triangle, etc., while ensuring that the cargo area is affected.

CD Read/Write (CD-RW) Disk

A CD Read/Write (CD-RW) disk is extremely almost like a WORM disk with the exception that you simply can erase the previous content and write of it multiple times. Such disks use metallic alloy layer. beam changes the property during writing (or burn process) changing reflectivity at desired places. The land-pit difference on CD-RW isn't significant and hence CD drives need to be compatible to read such disks. A CD-RW disk usually features a lifetime of 100 or more erase-write cycle. A disk written once are often erased by changing by the property again then it are often written on to afresh. CD-RW drives have such erase capability. CD-RW disks are little expensive than CD-R disks but are an excellent cost saver because they will be reused repeatedly thanks to their erase capability.

Digital Video (or Versatile) Disk (DVD)

DVD was designed primarily to store and distribute movies. However, it's fast becoming mainstream optical disc as prices are reducing and wish for giant capacity storage is increasing. it's almost like CD-ROM in theory but is denser in recording data. It follows Eight-toFourteen Modulation Plus %1Plus) encoding as compared to Eight-to-Fourteen Modulation (EFM) encoding employed by CD-ROM. There are variants of DVD—single-layer disk and doublelayer disk. Single-layer disk has storage capacity of 4.7GB, whereas, double-layer disk has storage capacity of 8.5 GB.

• Like CD-ROM, DVD also has many types—DVD-R/RW, DVD+R/RW, DVD-Video, and DVD-Audio. DVD-Video is now the foremost dominant movie storage format used. It allows storage of video in 4:3 or 16:9 aspect ratios in MPEG-2 video format using NTSC or PAL resolution. it's going to be of interest to notice that NTSC has resolution of 720 x 576 and PAL has resolution of 720 x 576. The audio is typically Dolby Digital (AC-3) or Digital Theater system (DTS) and may be either monaural or 5.1 Surround Sound.

DVD has enough space to store movie and support multi-lingual subtitles, multi-lingual audio, multiple camera, angles etc. It also supports region marking to guard against piracy and use of DVD from one region to a different . It also supports Content Protection for Prerecorded Media (CPPM) security technique to safe guard against n; etc.

2.4 Advantages and Limitations of Optical Disks

Advantages

1. The Cost-per-bit of storage for optical disks is extremely low due to their low cost and high storage density. Additional cost benefit comes from the very fact that some optical disks are often erased and reused repeatedly.

2. Use of one spiral track makes optical disks a perfect data-storage medium for reading large blocks of sequential data like audio or video.

3. Optical disc drives don't have any mechanical read/write heads to rub against or crash into the disk surface. This makes optical disks a more reliable data-storage medium than magnetic tapes or magnetic disks.

4. Optical disks have a knowledge storage lifetime of over 30 years. This makes them a far better data-storage medium for data archiving as compared to magnetic tapes or magnetic disks.

5. Since data once stored on CD-ROM/WROM disks becomes permanent, the danger of stored data getting inadvertently erased/overwritten isn't there.

6. Thanks to their compact size and light-weight , optical disks are easy to handle, store, and port from one place to a different .

7. Audio CDs are often played on a computer having a CD-ROM drive along side a sound card and speakers. this enables computer systems to be also used as music systems, whenever desired.

8. A computer having a DVD drive are often wont to play DVDs allowing it to be used for watching videos like movies.

Limitations

1. CD-ROM and WORM disks are read-only (permanent) storage mediums. Data once recorded, can't be erased. Hence, they can't be reused.

2. Data access speed for optical disks is slower than magnetic disks.

3. Optical disks require a more complicated drive mechanism than magnetic disks thanks to the necessity to possess a laser generating source and detection lens that need precision engineering and careful handling.

4. Since the optical disc may be a removable media, it's susceptible to scratches, dust, sticky prints (including fingerprints), etc. while handling. Hence, they have careful handling.

5. When used for off-line storage, they ought to be labeled properly for straightforward identification.

Uses of Optical Disks are used for the subsequent purposes:

1. For distributing large amounts of knowledge at a coffee cost. for instance , an entire encyclopedia, dictionary, world atlas, dictionary of quotations, biographies of great people, information about all educational institutions of a specific type during a country, etc. are often distributed on CD-ROM disks.

2. For distribution of the electronic version of conference proceedings, journals, magazines, books, product catalogs, etc.

3. For distribution of audio like songs.

4. For distribution of latest or upgraded versions of software products by software vendors.

5. For storage and distribution of a good sort of multimedia applications like video games.

6. For archiving of knowledge not used frequently but which can be used occasionally.

7. WORM disks are often employed by end-user companies to form permanent storage of their own proprietary information. for instance , many banks use them for creating a permanent record of their daily transactions.

8. DVDs became a well-liked medium for the distribution of flicks .

Summary

- Secondary storage is a hard disc that stores more data in a computer.
- Secondary storage facilities are hard discs.

Keywords

Flush memory: Storage technology Recall that flash is non-volatile, Electrically Erasable Programmable Read Only Memory (EEPROM) chip.

Define all secondary storage devices

Self-Assessment Questions

1. RAM chips plugged into special sockets on the motherboard are known as ………

(a) SIMMs

(b) SINNs

(c) SIMNs

(d) None of these

2. The act of retrieving data from a storage location is called ………

(a) Memory write operation

(b) Memory read operation

(c) Memory read and write operation

(d) None of these

3. ……………. storage system consists of a rotating disk coated with a thin metal.

(a) Memory disc

(b) Optical disk

(c) Hard disk

(d) None of these

4.A plug and play storage device that simply plugs in the port of a computer is _____

(a) Flash drive

(b) Compact disk

(c) Hard disk

(d) CD

5.What does USB stand for?

(a) Universal Signal Board

(b) Universal Signal Bus

(c) Universal Serial Bus

(d) Universal Serial Board

6. A device similar to a flash drive _____

(a) Memory card

(b) Compact drive

(c) Compact disk

(d) Memory disk

7. Which of the following is not a magnetic disk?

(a) Floppy

(b) Winchester

(c) Zip

(d) FLASH

8. Brain of computer is _____

(a) Control unit

(b) Arithmetic and Logic unit

(c) Central Processing Unit

(d) Memory

9. General register organization is also known as _____ CPU register organization.

(a) Five

(b) Seven

(c) Six

(d) Nine

10. The storage device that uses rigid, permanently installed magnetic disks to store data is

(a). Floppy

(b). Permanent disk

(c). Optical disk

d). Hard disk

11._____has smallest storage capacity

(a). Floppy disk

(b). Zip disk

(c). Hard disk

(d). CD

12. How much is one terabyte equal to?

(a). 1024 megabytes

(b). 1024 bytes

(c). 1024 kilobytes

(d). 1024 gigabytes

13. What is the term used for the disk content that is recorded at the time of manufacturer and that cannot be changed or erased by the user?

(a). Read only

(b). Write only

(c). Once only

(d). Run only

14. Which of the following is the most common type of storage device?
(a). Steel

(b). Magnetic

(c). Optical

(d). Flash

15. HDD stands for

(a). High disk drive

(b). Hard Digital disk

(c). High digital drive

(d). Hard disk drive

Answers

1.	A	2.	B	3.	B	4.	A	5.	C
6.	A	7.	D	8.	C	9.	B	10.	D
11.	A	12.	D	13.	A	14.	B	15.	D

Review Questions

1. What is a secondary storage? How does it differ from a primary storage?

2. What are the main limitations of primary storage of a computer system?

3. Why is the secondary storage used in most computer\stems?

4. Name some popular secondary storage devices used in today's computer systems.

Further Readings

Fundamental Computer Skills, Feng-Qi Lai, David R. Hofmeister. A Study of Computer Fundamental, Shu-Jung Yi

https://www.tutorialspoint.com/computer_fundamentals/computer_memory

Unit 03 – Input/ Output Devices

CONTENTS

Introduction

Outcomes

In this unit we will learn

- about various input/output devices
- about different types of mouses
- about different types of keyboards
- differences among various printers

Introduction

In computing, input/output (I/O, or informally io or IO) is that the communication between an information science system, like a computer, and therefore the outside world, possibly a person's or another information science system. Inputs are the signals or data received by the system and outputs are the signals or data sent from it. The term also can be used as a part of an action; to "perform I/O" is to perform an input or output operation.

I/O devices are the pieces of hardware employed by a person's (or other system) to speak with a computer. as an example, a keyboard or mouse is an data input device for a computer, while monitors and printers are output devices. Devices for communication between computers, like modems and network cards, typically perform both input and output operations.

The designation of a tool as either input or output depends on perspective. Mice and keyboards take physical movements that the human user outputs and convert them into input signals that a computer can understand; the output from these devices is that the computer's input. Similarly, printers and monitors take signals that computers output as input, and that they convert these signals into a representation that human users can understand. From the human user's perspective, the method of reading or seeing these representations is receiving output; this sort of interaction between computers and humans is studied within the field of human–computer interaction. an extra complication is that a tool traditionally considered an data input device , e.g., card reader, keyboard, may accept control commands to, e.g., select stacker, display keyboard lights, while a tool traditionally considered as an output device may provide status data, e.g., low toner, out of paper, paper jam.

In computer architecture, the mixture of the CPU and main memory, to which the CPU can read or write directly using individual instructions, is considered the brain of a computer. Any transfer of data to or from the CPU/memory combo, for instance by reading data from a disc drive, is considered I/O. The CPU and its supporting circuitry may provide memory mapped I/O that's utilized in low-level programming, like within the implementation of device drivers, or may provide access to I/O

channels. An I/O algorithm is one designed to take advantage of locality and perform efficiently when exchanging data with a auxiliary storage device, like a disc drive.
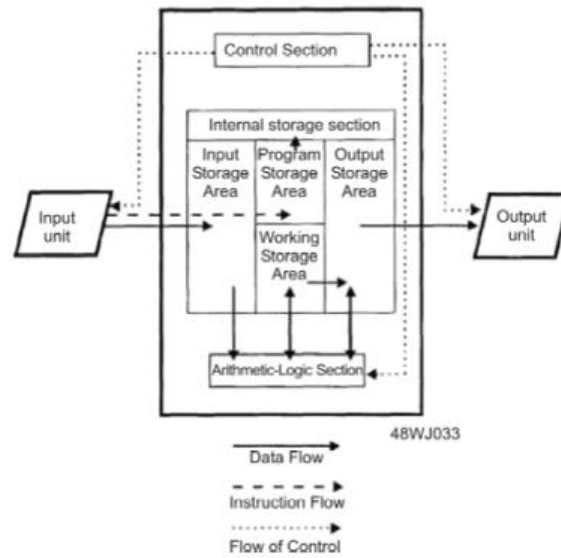
Figure 1 Illustrating role of Input/Output devices in a Computer System

3.1 <u>Input Devices</u>

The data input device is a mechanical device that accepts data from outside world and translates them into a computer can interpret. Several input devices are available today. they will be broadly classified into following categories:

- Keyboard devices
- Point-and-draw devices
- Data scanning devices
- Digitizer
- Electronic cards based devices.
- Speech recognition devices
- Vision based devices

    Different types of input devices are explained below along with-it applications.

Keyboard devices

Keyboard is a portable wired or wireless electronic device that contains all the alphabets, numeric, symbols and special characters. Keyboard devices are the foremost commonly used input devices today. they permit data entry into a computing system by pressing a group of keys (labeled buttons) neatly mounted on a keyboard connected to a computing system. the favored keyboard used today is that the 101-keys QWERTY keyboard. This device is used to enter information or input data into desktop/laptop.

Figure 2 Qwerty keyboard

Keyboards are of two sizes 84 keys or 101/102 keys, but now keyboards with 104 keys or 108 keys are also available for Windows and Internet.

The keys on the keyboard are as follows –
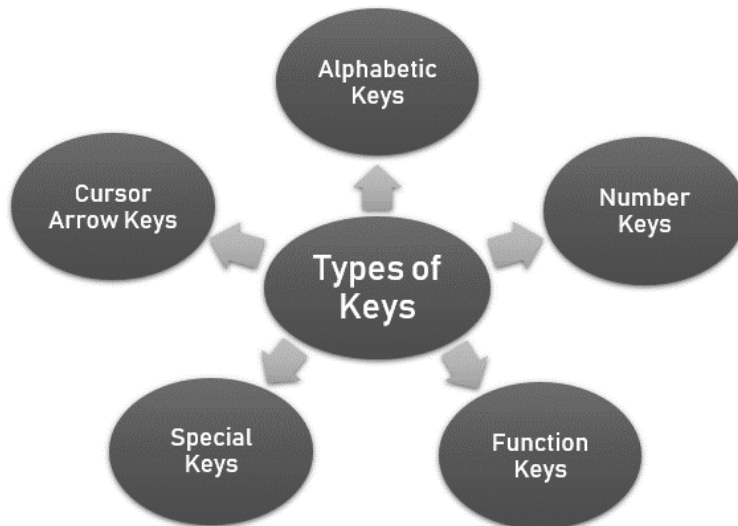
Keys and Description
Typing Keys These keys include the letter keys (A-Z) and digit keys (09) which generally give the same layout as that of typewriters.
Numeric Keypad It is used to enter the numeric data or cursor movement. Generally, it consists of a set of 17 keys that are laid out in the same configuration used by most adding machines and calculators.
Function Keys The twelve function keys are present on the keyboard which are arranged in a row at the top of the keyboard. Each function key has a unique meaning and is used for some specific purpose.
Control keys These keys provide cursor and screen control. It includes four directional arrow keys. Control keys also include Home, End, Insert, Delete, Page Up, Page Down, Control (Ctrl), Alternate(Alt), Escape(Esc).
Special Purpose Keys Keyboard also contains some special purpose keys such as Enter, Shift, Caps Lock, Num Lock, Space bar, Tab, and Print Screen.

Table 1 Keys along with its description

Alphabetic Keys

- Alphabet keys are used to type letters, words or sentences.
- There are 26 alphabet keys on a keyboard (from A to Z).
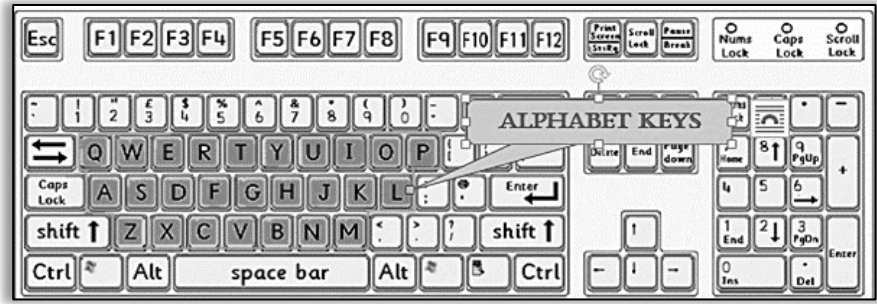
Figure 3 Alphabet keys on a keyboard

Number Keys

- Number keys are used to type numbers from 0-9.

- There are 10 number keys on a keyboard. (0,1, 2,…9)

- There are two set of number keys on a standard keyboard.

Figure 4 Number keys on a keyboard

Cursor Control Keys

- It is also called as Arrow keys.

- There are 4 cursor control keys.

- These keys are used to move the cursor in four directions on the monitor- up, down, left and right.
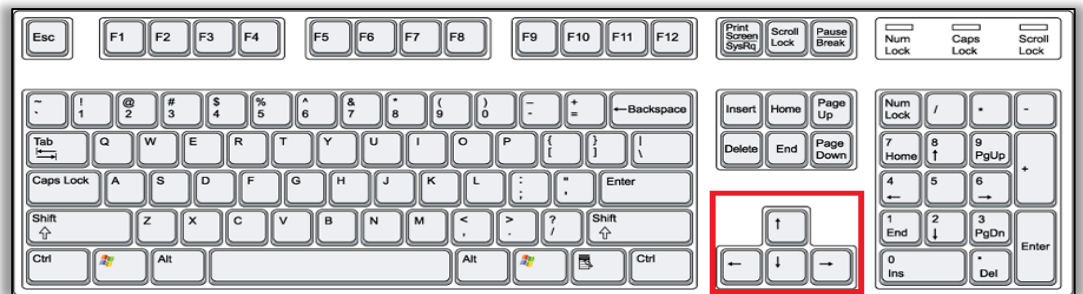
Figure 5 Cursor control keys on a keyboard

Home Key

Moves the cursor to the starting of the current row in a document.
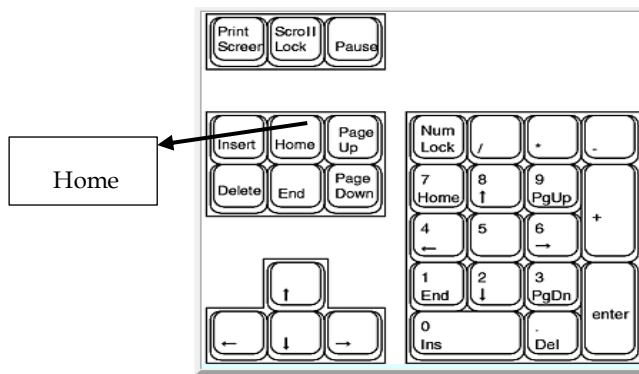
Figure 6 Home key

End Key

Moves the cursor to the end of the current row in a document.
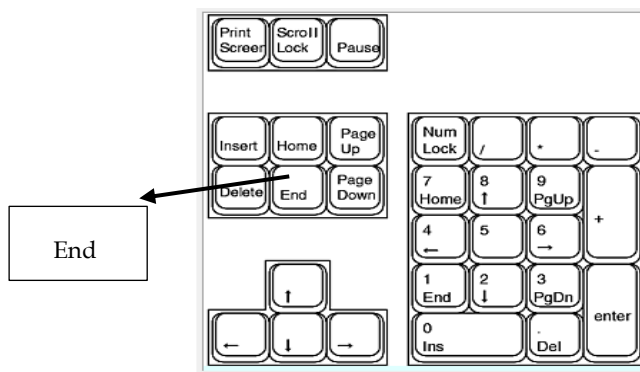
Figure 7 End key

Esc Key

A key on computer keyboards, usually labeled Escape key. This helps in aborting or cancelling of the current operations.

Function keys

- There are 12 function keys.
- They are placed at the top row of the keyboard.
- They are marked from F1 to F12.
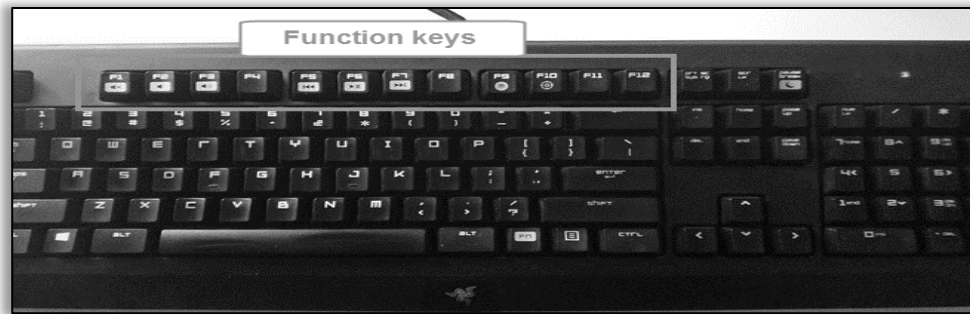
Figure 8 Function keys

Functionality from F1 to F12 keys are described in below table

Function Key	Use
F1	This key opens up the "Help Screen" for almost every program.
F2	This key allows you to "Rename" a selected file/folder.
F3	This key opens the "Search Feature" for the application that's currently active.
F4	Close an active window combining "Alt with F4".
F5	This key allows you to "Refresh/Reload" the current page or document window.
F6	This key highlights the "Address bar" in most browsers.
F7	This key "Spell/Grammar Checks" a document in microsoft applications.
F8	With this key. "Turn on the Boot Menu" on the startup of your windows computer.
F9	"Refresh" a Microsoft Word document & "Send and Receive" emails on Microsoft Outlook.

F10	"Shift + F10" works same as right click that activates the menu bar.
F11	"Enter and Exit FullScreen Mode" on your internet browser with this function key.
F12	This key "Opens the Save As Dialogue Box" on Microsoft Word

Table 2 Function keys and its usage

Types of Keyboards

The computer keyboard is a device that allows a person to input text using keys representing the alphabet, numbers, and special symbols. These devices come in different shapes and sizes. There are different styles to choose from, some specifically designed to suit your needs.

Mechanical Keyboard

Flexible keyboards

Ergonomic Keyboards

Gaming Keyboard

Wireless Keyboard

Handheld Keyboard

Projection Keyboard

Point and Draw Device

Interaction with computers was initially restricted mainly to text mode. However, it had been soon realized that interacting with computers in text mode is cumbersome and time-consuming. Hence, a replacement sort of interface called graphical interface (GUI), was devised for interacting with computers. A GUI provides a screen with icons (small images on the screen) or menus and allows a user to form rapid selections from them to offer instructions to a computer. For efficient utilization, OUI requires a data input device which will be used rapidly point to, and choose a graphic icon or menu item from the multiple options displayed on the screen. The keyboard though usable was found to be inconvenient and unsuitable for this requirement. Hence, research efforts to seek out an appropriate data input device to satisfy this requirement gave birth to many input devices sort of a mouse, trackball, joystick, light pen, and touch screen. Later it had been realized that a lot of of those devices, like mouse and lightweight pen, could even be used very effectively to make graphic elements on the screen like lines, curves, and freehand shapes. With this new ability, these devices came to be referred to as point-and-draw devices. These input devices have made computers a way more easily usable tool establishing them as a flexible tool for a good range of users including children, illiterate citizens, and graphic designers. Some commonly used point-and-draw devices are described below.
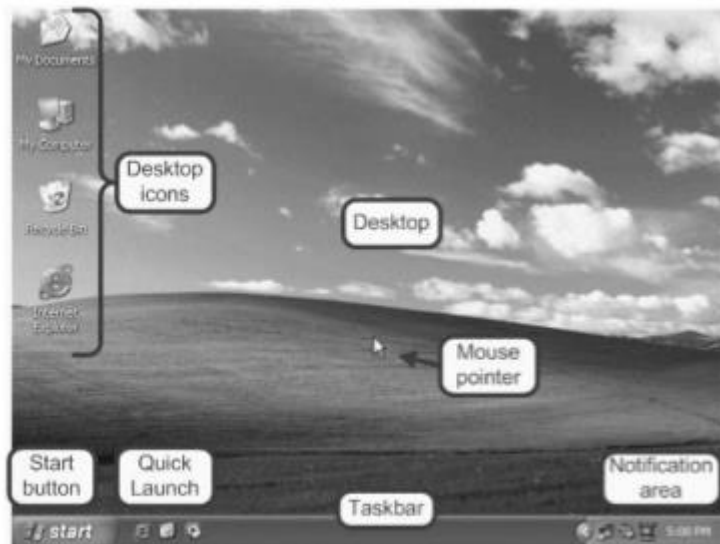
Figure 9 Point and Draw Device

Mouse

Mouse is that the hottest point-and-draw device. it's a must have data input device on modern personal computers and workstations because they support GUI as their primary interface. A mouse may be a small hand-held device that matches during a user's palm comfortably. It rolls on a little bearing and has one or more buttons on the highest. When a mouse that's connected to a user terminal is rolled on a flat surface, a graphics cursor moves on the terminal screen within the direction of the mouses movement. Since all movements of the mouse are reproduced by the graphics cursor on the screen, you'll move the graphics cursor at a menu item or an icon by moving the mouse. It is a handheld hardware data input device that controls a cursor during a GUI (graphical user interface). It can move and choose text, icons, files, and folders on your computer. For desktop computers, the

mouse is placed on a flat surface (e.g., mouse pad or desk) ahead of your computer. Example of a personal computer mouse with two buttons and a wheel. Below is the image of a mouse with a pad.

Figure 10 Wired Mouse with a pad

The graphical cursor is displayed as a spread of symbols like an arrow, a wrist a pointing finger etc. counting on the appliance, the text and graphics cursor could also be displayed on the screen at an equivalent time. The graphics cursor, regardless of its size and shape, features a pixel-size point that's considered the purpose of regard to decide where the cursor is positioned on the screen. now is named hot-spot of the graphics cursor when the hot-spot is positioned at a menu item or an icon, the graphics cursor is claimed to point

 thereto menu item or icon. With a click of the mouse's button, the system can then be notified of this choice. Note that notifying the system of a specific choice, out of the varied options provided by the software, is far easier a mouse than pressing various key combinations. With proper software, a mouse also can be wont to draw picture on the screen and edit text.

The rollerball based mouse is now being replaced with optical sensor based mouse. The optical sensor mouse features a light with a sensor arranged in such a fashion that the sunshine coming from the source is detected by the sensor after reflection from the surface. The on-board electronics on the mouse uses the reflection differences to calculate the direction and speed of movement and notifies the pc system. The optical sensor mouse is more sensitive, easier, and smoother to use. Another innovation in mouse is to possess user-programmable buttons on the edges and therefore the middle button on top is replaced with a wheel which will be rotated as scroll to scroll the screen display and may even be pressed as a button.

Activities of a Mouse

There are numerous functionalities of a mouse. Some of these activities are mentioned below which makes the life of a computer user very easy and efficient.

- Move the mouse cursor
- Open or execute a program
- Select
- Drag-and-drop
- Hover
- Scroll
- Perform other functions
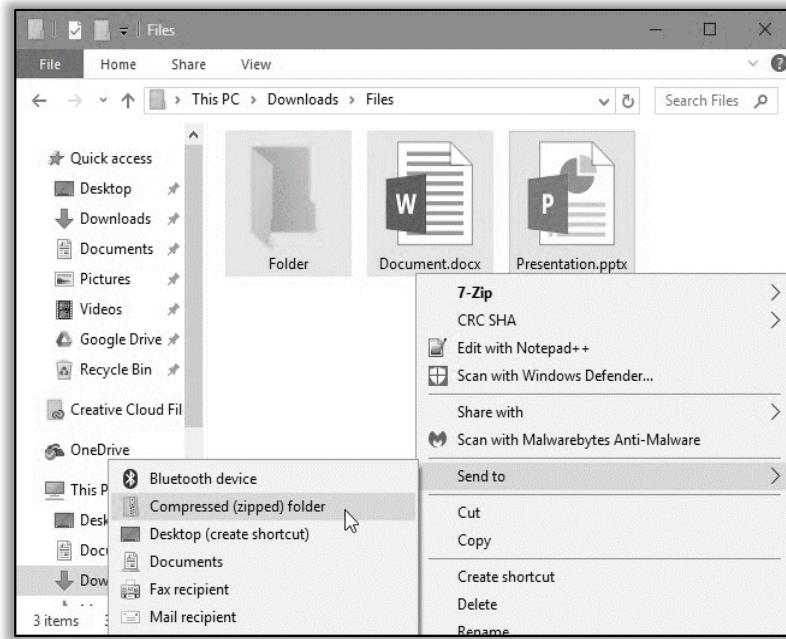
Types of Mouse

When PCs first hit the marketplace for consumers, the pc mouse was simple and had limited functions. Today, there are numerous sorts of mouse and trackball designs to suit every computing style.

Wired Mouse

A wired mouse connects on to your desktop or laptop, usually through a USB port, and transmits information via the cord. The cord connection provides several key advantages. For starters, wired mice provide fast reaction time, because the data is transmitted directly through the cable. They also tend to be more accurate than other designs. this will make wired models great for gamers, digital artists, and other users who believe high accuracy.

Figure 11 Wired Mouse

Wireless Mouse

Wireless mice transmit radio signals to a receiver connected to your computer. the pc accepts the signal and decodes how the cursor was moved or what buttons were clicked. While the freedom or range with wireless models is convenient, there are some drawbacks. The decoding process, as an example, means a wireless mouse is typically not as conscious of gestures as a wired mouse. Gamers especially might find the lag frustrating. That said, there are specific wireless mice designed for gaming that address the latency issue in their design and have quicker response times. for several users, however, the lag or lost accuracy with a wireless model are getting to be negligible.

Figure 12 Wireless Mouse

Bluetooth Mouse

Wireless mouse designs and Bluetooth mouse designs tend to seem very similar, as neither need a wired connection to work. Most wireless mice models use a dongle that connects to your PC, and therefore the mouse communicates back and forth therein manner. A Bluetooth mouse, however, utilizes an indoor Bluetooth connection on your PC, allowing you to attach the mouse to multiple devices at a time.

Keep in mind, however, that not all devices have Bluetooth connections. If your computer doesn't have an indoor Bluetooth receiver, you'll get USB receiver which will be plugged into your computer to use together with your Bluetooth mouse and other Bluetooth devices.

Figure 13 Bluetooth Mouse with USB to connect

Wired vs. Wireless vs. Bluetooth Mice

The debate of whether a wired or wireless mouse is the best choice is one of the oldest arguments. The fact is, they are both excellent choices depending on how you most often use your mouse. Here's a quick comparison to help you decide:

	Wired Mouse	Wireless Mouse	Bluetooth Mouse
Advantages	• Better accuracy • Low-latency • More affordable • No batteries required	• Extended range from computer • Not restrained by cord length • Unrestricted movement • Doesn't require mousepad	• Extended range from computer • Not restrained by cord length • Unrestricted movement • Doesn't require mousepad
Disadvantages	• Less freedom of movement • Constrained to length of cord • Less convenient	• Requires batteries to operate • Lower accuracy (may be negligible for non-gamer users) • More expensive than wired models	• Requires batteries to operate • Lower accuracy (may be negligible for non-gamer users) • More expensive than wired models • May require purchase of USB Bluetooth receiver if your machine does not have Bluetooth functionality

Table 3 shows the advantage and disadvantage among Wired, Wireless and Bluetooth Mouse

Trackball Mouse

A trackball mouse looks tons like an upside-down mouse. These mice feature a ball with sensors that move the cursor on the screen when the ball is moved together with your thumb. A trackball generally requires less effort to maneuver around than a wired or wireless mouse while also allowing easier scrolling. That said, a mouse generally gives you more freedom of movement and faster reaction time, which makes non-trackball styles better for gaming and computing activities that need heavy mouse use.

Optical Mouse

Technically, all mice are optical and take images thousands of times per second because the mouse is moved. Traditional mice track the X and Y coordinates of the peripheral. truth optical mouse uses a red or infrared LED light projected onto a surface to trace movement by bouncing the sunshine off the surface into a CMOS sensor, which converts the sunshine particles into an electrical current. The resulting analog data passes over 10,000 digital images each second. The result's smooth movement and accurate pointing on your display that does not require a mouse pad and even allows the mouse to figure over a glass surface.

Laser Mouse

Whether wired or wireless, an optical mouse and laser mouse are considerably alike in design but have one key difference. While optical mice use infrared LED light to bounce off surfaces to trace movement, laser mice utilize an LED outside the color spectrum and appears to possess no light in the least. Both types perform well, but laser mice models tend to possess a touch more accuracy. Either way, both mouse types are excellent choices for normal PC duties.

Trackball vs. Optical vs. Laser Mice

Although very similar in how they function, there are some distinct differences between trackballs, optical mice and laser mice. What you choose should depend on your ergonomic and accuracy needs. Here's a quick comparison to help you decide:

	Trackball Mouse	**Optical Mouse**	**Laser Mouse**
Advantages	• Ergonomic design • No space required for movement (great for travel or laptop use) • Can be wired or wireless	• Performs well for most standard PC duties • Can be wired or wireless	• More accurate than optical mice • Does not emit light • Can be wired or wireless
Disadvantages	• Less accurate • Not ideal for gaming	• Less accurate than laser mice • Requires some space to move • Less ergonomic than trackball designs	• Requires some space to move • Less ergonomic than trackball designs

Table 4 Shows the advantage and disadvantage of Trackball, Optical and Laser Mice

USB Mouse

A USB mouse is one of the most common types of computer mice and has been a part of computer peripherals since the USB Standard was set in 1996. USB computer mice may be wired or wireless. The wired mouse plugs into a USB slot on your PC, while a wireless mouse usually has a transmitter that plugs into the USB slot and communicates with the mouse. These are good standard mice for all PC activities.

Gaming Mouse

Gaming mice are available in both wired and wireless designs and should include additional features beyond standard models to enhance your gaming experience. generally, these mice models are designed to try to everything a traditional mouse can do while offering higher accuracy, less latency, and more ergonomic designs.

Other key features which will be found with gaming mice are the inclusion of more buttons (which could also be programmable for unique in-game use), flashy designs, DPI control, and customizable drivers which will be tailored to your specific gaming needs. Some gaming mouse models even have adjustable weights, which may make a difference when making repeated movements together with your mouse over long gaming sessions. And, of course, you'll still use your gaming mouse for non-gaming day-to-day activities also.

Working of a Mechanical Mouse

Mouse allows quick and straightforward access to several icons and operations on the pc, like selecting from an inventory of possible actions (menu), work with Windows and moving files. once you move the mouse, the rubber ball turns and runs two rollers, both related to wheel with slots. LED (LED) sends light through the slits and transducers convert light into an electrical signal. Pressing the button will send additional information to the pc.

The main goal of any mouse is to translate the motion of your hand into signals that the pc can use. Let's take a glance inside a track-ball mouse:
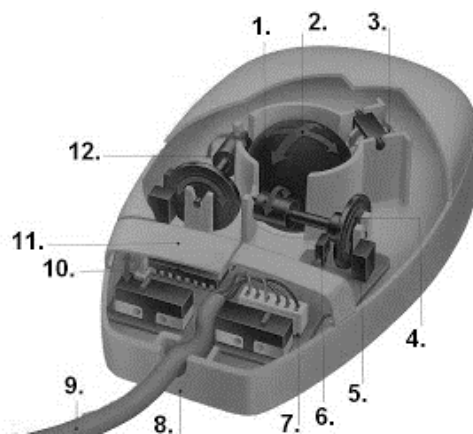
Figure 14 Shows the different parts of a Mechanical Mouse

1. **Roller** - Roller turns by turning the rubber ball back and forth

2. **Rubber Ball** - The ball is turning when you run the mouse over the surface

3. **Moving Roller**

4. **Slotted wheel** - This wheel with the slots associated with vertical rollers.

5. **Light emitting diode**

6. **Converter**

7. **Cable coupling**

8. **Plastic housing**

9. **Cable** - cable connects the mouse to the computer through input on your computer

10. **Chip** - The chip processes data from the transducer movement and buttons before it transmits them to computer

11. **Right button** - The button pressing their work to encourage the chip and the chip sends signals to the computer

12. **Roller** - This is moved by rotation of Roller balls
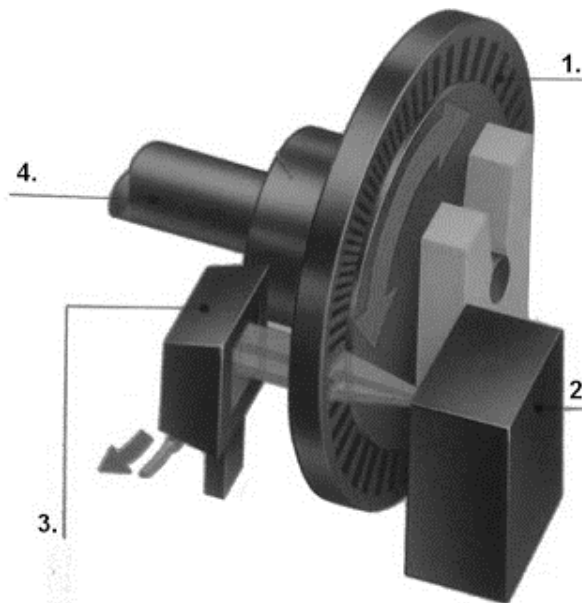
Figure 15 Working of a mechanical mouse

Figure 15 shows the internal working of a mechanical mouse where these below mentioned components plays an important role.

1. Wheel with slots - when the wheel rotates, the movement of the slot next to the diode produces light flashes

2. Light-emitting diode (LED) - LED sends light through the slits on the outer edge of the wheel

3. Converter - Converter code flashes of light into electrical signals.

4. Roller Lever - Lever roller transfers spins on the wheel with slits.

How do optical mouse works?

It appears that the venerable wheeled mouse is in peril of extinction. The now-preferred device for pointing and clicking is that the optical mouse. -

Developed by Agilent Technologies and introduced to the planet in late 1999, the optical mouse uses a small camera to require 1,500 pictures every second. ready to work on almost any surface, the mouse features a small, red LED (LED) that bounces light off that surface onto a complementary metal-oxide semiconductor (CMOS) sensor.

The CMOS sensor sends each image to a digital signal processor (DSP) for analysis. The DSP, operating at 18 MIPS (million instructions per second), is able to detect patterns within the images and see how those patterns have moved since the previous image. supported the change in patterns over a sequence of images, the DSP determines how far the mouse has moved and sends the corresponding coordinates to the pc. the pc moves the cursor on the screen supported the coordinates received from the mouse. This happens many times each second, making the cursor appear to maneuver very smoothly.

Optical mice have several benefits over wheeled mice:

- No moving parts means less wear and a lower chance of failure.
- There's no way for dirt to urge inside the mouse and interfere with the tracking sensors.
- Increased tracking resolution means smoother response.
- They don't require a special surface, like a mouse pad.

Although LED-based optical mice are recent, another sort of optical mouse has been around for over a decade. the first optical-mouse technology bounced a focused beam of sunshine off a highly reflective mouse pad onto a sensor. The mouse pad had a grid of dark lines. whenever the mouse was moved, the beam of sunshine was interrupted by the grid. Whenever the sunshine was interrupted, the sensor sent a sign to the pc and therefore the cursor moved a corresponding amount. this type of optical mouse was difficult to use, requiring that you simply hold it at precisely the proper angle to make sure that the sunshine beam and sensor aligned. Also, damage to or loss of the mouse pad rendered the mouse useless until a replacement pad was purchased. Today's LED-based optical mice are much more user-friendly and reliable.
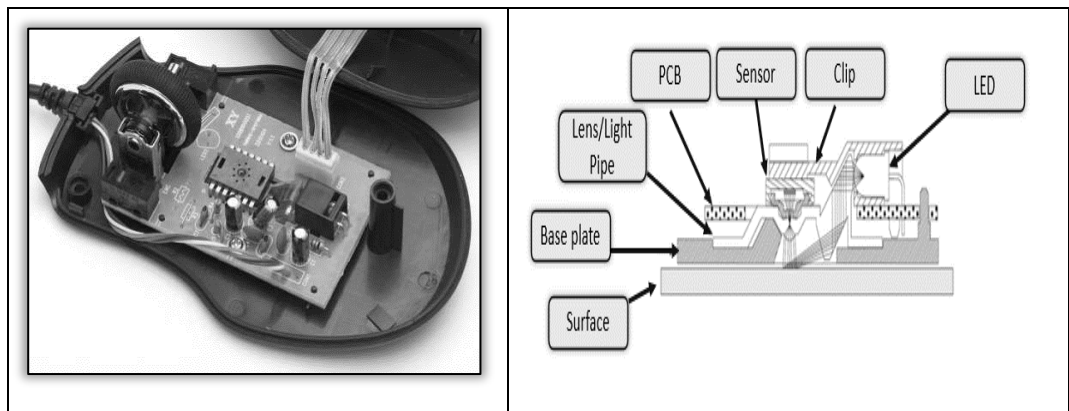
Figure 16 Internal Structure of an Optical Mouse

3.2 <u>Data Scanning Devices</u>

Data scanning devices are input devices used for direct data entry into a computing system from source documents. several them also are capable of recognizing marks or characters. These devices have following characteristics:

1. They eliminate the necessity for manual entry of knowledge by citizenry. Automatic entry of knowledge with their use improves data accuracy and increases timeliness of the knowledge processed.

2. They demand top quality of input documents due to direct data entry from source documents. Documents that are typed poorly, have strikeovers, or have erasures are normally rejected.

3. Form design, and ink specification usually becomes more critical with the utilization of those devices than when keyboard devices are wont to key in data from forms. Data scanning devices are of the many types. Commonly used ones are described below

Image Scanner

An image scanner is a data input device that translates paper documents into an electronic format which will be stored in computer. The input documents could also be typed text, pictures, graphics, or maybe handwritten material. This data input device has been found to be very useful in preserving paper documents in electronic form. a replica of a document stored during a computer during this manner will never deteriorate in quality or become yellow with age, and may be displayed or printed,

whenever desired. The stored images can even be altered and manipulated in interesting ways, if the pc has image-processing-software.

Image scanners come in various shapes and sizes. Two commonly used types are:

- **Flatbed scanner.** A flatbed scanner is sort of a copier machine consisting of a box having a glass plate on its top and a lid that covers the glass plate. A document to be scanned is placed the wrong way up on the glass plate. a light-weight source, situated below the glass plate, moves horizontally from one end to a different when activated. After scanning one line, the sunshine beam moves up a touch and scans subsequent line. the method is repeated for all the lines. It takes about 20 seconds to scan a document of size 21 cm x 28 cm.

- **Hand-held scanner.** A hand-held scanner features a set of sunshine emitting diodes encased during a small case which will be held in hand conveniently (See Figure 4.10). To scan a document, the scanner is dragged slowly over it from its one end to the opposite end with its light on. The scanner has got to be dragged very steadily and punctiliously, otherwise the conversion of the document into its equivalent bit map will not be correct. thanks to this reason, handheld scanners are used only in cases where high accuracy is not needed. they are also used when the quantity of documents to be scanned is low. they are less expensive than flatbed scanners.

Optical Character Recognition (OCR) Device

When image scanners are used for inputting text documents (typed or handwritten), they need following two limitations:

1. Since a scanned input document is stored as a picture, rather than text, it's impossible to try to any data processing of the document (the computer cannot interpret the stored document as letters, numbers and special characters).

2. Space for storing required for storing the document as a picture is far quite that required for storing an equivalent document as a text. for instance, a page of printed text having 2000 characters are often stored as 2000 bytes by using the ASCII representation. A bitmap-image representation of an equivalent document would require 10 to fifteen times more storage counting on the resolution (granularity) of grid points. OCR technology is employed to beat these limitations. during this case, the scanner is provided with character recognition software (called OCR software) that converts the bitmap images of characters to equivalent ASCII codes. That is, the scanner first creates the bitmap image of the document then the OCR software translate the array of grid points into ASCII text that the pc can interpret as letters, numbers, and special characters. OCR software is extremely complex because it's difficult to form a computer recognize a vast number of typefaces and fonts. Hence, this software are designed to acknowledge texts written using standard type fonts (called OCR fonts). Two such standard fonts are OCR-A (American standard) and OCR-B (European standard). Note that if the document contains italics or bold face letters, or fonts aside from that that the OCR software has been designed, the OCR software won't work effectively.

Digitizer

A digitizer is an data input device used for converting (digitizing) pictures, maps, and drawings into digital form for storage in computers. for instance, the x and y coordinates of points during a drawing could also be stored in digital form. this permits re-creation of the drawing from the stored information and straightforward incorporation of changes within the drawing, whenever required. A digitizer consists of a digitizing tablet (also referred to as graphics tablet) related to a stylus.

The digitizing tablet may be a flat surface that contains many fine copper wires forming a grid. Each copper wire receives electric pulses. The digitizing tablet are often cover a working table and is connected to a computer. The stylus a sort of a pen or a lens-like cursor with a cross wire and button. it's connected to the tablet and may be pressed down at some extent on the tablet to input the (x, y) coordinates of the purpose. On moving the stylus on the tablet, a cursor on computers screen moves simultaneously to a corresponding position on the screen to supply visual feedback to the operator. this permits the operator to draw sketches directly or to input sketched drawings very easily. Inputting drawings or developing sketches by employing a digitizer is further simplified by the very

fact that poorly sketched lines, arcs, and other graphical objects are automatically input as mathematically precise objects like straight lines and smooth curves.

Digitizers are used commonly within the area of Computer Aided Design (CAD) by architects and engineers to style cars, buildings, medical devices, robots, mechanical parts, etc. they're also utilized in the world of Geographical data system (GIS) for digitizing of maps available in paper form

3.3 Output Devices

An output device is an electromechanical device that accepts data from a computer and translates them into a form suitable for use by outside world (users). Several output devices are available today. They can be broadly classified into following categories:

1. Monitors

2. Printers

3. Voice response system

4. Plotter

5. Screen image projector

These types of output devices along with their applications are described in next page. Output devices generate computer output that can be broadly classified into following two types: l. Soft-copy output. A soft-copy output is not produced on a paper or some material that can be touched and carried for being shown to others. They are temporary in nature. For example, content displayed on a terminal screen, or words spoken out by a voice response system are S011-copy output. 2. Hard-copy output. A hard-copy output is produced on a paper or some material that can be touched and carried for being shown to others. They are permanent in nature and can be kept in paper files or can be looked later when the person is not using a computer. For example. output produced on paper by printers or plotters are hardcopy output.

Monitors

Monitors are the foremost popular output devices used today for producing soft-copy output. They display the generated output on a television like screen. A monitor is associated usually with a keyboard and together they form a display screen terminal (VDT). A VDT (often mentioned as just terminal) is that the hottest input/output (I/O) device used with today's computers. It is both an input and output device. The keyboard is employed for input to a computer and therefore the monitor is employed to display the output from the pc. The name "terminal" comes from the very fact that a terminal is at the terminus or end of a communication path. Two basic sorts of monitors used today are cathode-ray-tube (CRT) and LCD (Liquid Crystal Display) flat-panel. CRT monitors work very similar to a television screen and are used with nonportable computer systems. On the opposite hand, LCD flat-panel monitors are thinner, lighter. and are used commonly with personal computer systems like notebook computers. With gradual reduction in price of LCD flat panel monitors, they're used increasingly with nonportable personal computer systems also. they're also preferred because they occupy less table space.
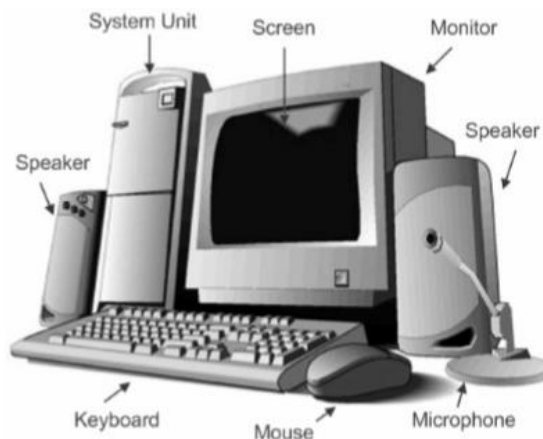
Figure 17 A Video Display Terminal Consists of a Monitor and a Keyboard

LCD Monitor

LCD stands for liquid Display, pertaining to the technology behind these popular flat panel monitors. An LCD monitor is distinguishable from a standard CRT monitor because the latter features a bulky footprint with a depth of several inches and a weight 13-23 kilograms or more, while LCDs are commonly 1-3 inches (2.5-7.5 cm) thick and weigh but 4.5 k.

LCD displays were used on laptop computers before the technology improved enough to form the jump to desktop monitors. An LCD monitor consists of 5 layers: a backlight, a sheet of polarized glass, a "mask" of colored pixels, a layer of liquid solution aware of a wired grid of x, y coordinates, and a second polarized sheet of glass. By manipulating the orientations of crystals through precise electrical charges of varying degrees and voltages, the crystals act like tiny shutters, opening or closing in response to the stimulus, thereby allowing degrees of sunshine that have skilled specific colored pixels to illuminate the screen, creating an image .

Figure 18 LCD Monitor

Printers

Printers are the most popular output devices used today for producing hard-copy output. Different types of printers are described below

Dot Matrix Printers

Dot-matrix printers arc character printers that print one character at a time. They form characters and everyone sorts of images as patterns of dots. Figure 4.16 shows how various sorts of characters are often formed as patterns of dots. A matrix printer features a print head that moves horizontally (left to right and right to left) across the paper. Print contains an array of pins which will be activated independent of every other to increase and strike against an inked on to make patterns of dots on the paper. To print a personality, the printer activates the acceptable set of pins because the print head moves horizontally. For faster printing, many dot-matrix printers print both ways—while the printer head moves from left to right and while it moves from right to left, on return. Such method is named bidirectional printing. Figure 4.16 shows a dot-matrix printer.

Figure 19 Dot Matrix Printer
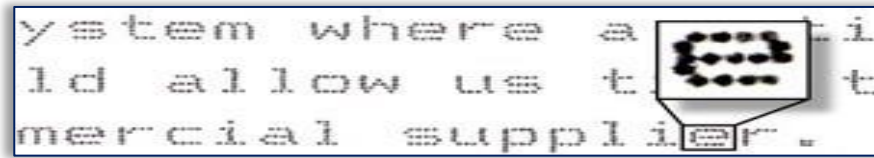
Figure 20 A typical Dot-matrix output

Since matrix printers produce printed output as patterns of dots, they will print any shape of character that a gram can describe. They, therefore, can print many special characters, different sizes of print, and even have the power to print graphics like charts and graphs. Dot-matrix printers are impact printers because they print by hammering the pins on the inked ribbon to go away ink impressions on a paper. Hence, they will be wont to produce multiple copies by using carbon or its equivalent. thanks to impact printing, dot-matrix printers are noisy as compared to non-impact printers.

Dot-matrix printers are normally slow with printing speeds starting from 30 to 600 characters per second. However, they're cheap in terms of both initial cost and price of operation. Hence, they're preferred by individuals and organizations for generating printed outputs if the speed and quality of printing aren't important factors. they're also used for applications requiring multi-copy output like shipping forms and invoice that on impact printing for generating multiple copies.

Inkjet Printers

Inkjet printers are character printers that form characters, and everyone sorts of images by spraying small drops of ink on paper. The print head of an inkjet printer contains up to 64 tiny nozzles which will be heated selectively during a few microseconds by a microcircuit resistor. When the resistor heats up, the ink near it vaporizes and is ejected Through the nozzle making a dot on the paper placed ahead of the print head. To print a personality, the printer selectively heats the acceptable set of nozzles because the print head moves horizontally. Figure 4.18 shows an inkjet printer. Inkjet printers produce higher quality output than dot-matrix printers do because they form characters by very tiny ink dots. A high-resolution inkjet printer has as many as 64 nozzles within a height of 7mm' providing print resolution of around 360 dots per inch.
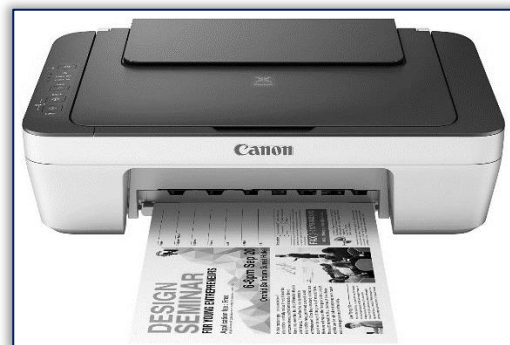
Since inkjet printers produce printed output as patterns of small dots, they will print any shape of characters that a program can describe. this enables the printer to print many special characters, different sizes of print, and therefore the ability to print graphics like charts and graphs. Inkjet printers are non-impact printers because they print by spraying ink on the paper. Hence, they're quieter operational. Being of non-impact type, they can't be wont to produce multiple copies of a document during a single printing. A color inkjet printer usually comes with two ink cartridges — black and tricolor. The tri-color cartridge contains red, blue, and yellow colors during a package which will mix appropriate amount of those colors with black from the opposite cartridge to urge any desired color with saturation. This makes it possible to urge multi-colored and photo quality output from inkjet printers. Inkjet printers are slower than dot-matrix printers are with printing speeds starting from 40 to 300 characters per second. Typically, an inkjet printer is costlier than a dot-matrix printer. they're preferred if speed of printing isn't a crucial factor.

Drum Printers

Drum printers are line printers that print a whole line at a time. Recall that matrix and inkjet printers print one character at a time. Figure 4.19 shows the print mechanism of a line printer. It consists of a solid cylindrical drum with characters embossed (raised characters) on its surface within the sort of circular bands. Each band consists of all the printing characters supported by the printer in its list. Total number of bands is adequate to the utmost number of characters (print positions) which will be printed on a line. Hence, a line printer with 132 characters per line and supporting a personality set of 96 characters will have altogether 12,672 (132 x 96) characters embossed on its surface. additionally, to the drum, the printer features a set of hammers (one opposite each band) mounted ahead of the drum during a manner that an inked ribbon and paper are often placed between the hammers and therefore the drum. the entire number of hammers is adequate to the entire number of bands on the drum, which is additionally adequate to the entire print positions per line.
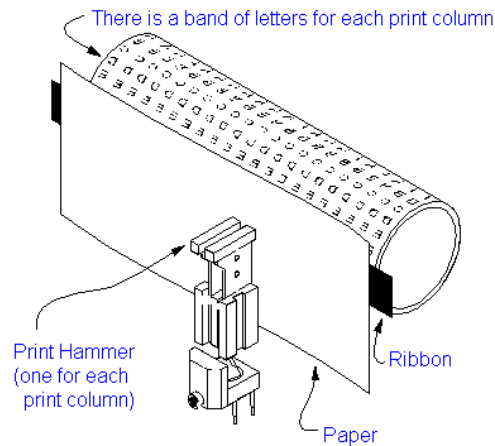
Figure 21 Drum Printer

The drum rotates at a high speed. a personality is printed at a desired print position by activating the acceptable hammer when the character embossed on the band at the print position passes below it. Hence, the drum would need to complete one full revolution to print each line of output. this suggests that not all characters on a line are printed at precisely the same time, but the time required to print a whole line is so fast that it appears as if one line is printed at a time.

The drum of a line printer is dear and can't be changed often. Hence, drum printers can print a pre-defined set of characters only during a pre-defined style embossed on the drum. Drum printers, therefore, don't have ability to print any shape of characters, different sizes of print, and graphics like charts and graphs.

Drum printers are impact printers because they print by hammering on a paper and inked ribbon against the -3cters embossed on the drum. Hence, they will be wont to produce multiple copies by using carbon or its equivalent. thanks to impact printing, drum printers are noisy operational and sometimes use a canopy to scale back the background level. Printing speeds of drum printers are within the range of 300 to 2000 lines per minute.

Laser Printer

Laser printers are page printers that print one page at a time. Main components of a electrostatic printer are a beam source, a multi-sided mirror, a photoconductive drum, and toner (tiny particles of oppositely charged ink). To print a page of output, the beam is concentrated on the electro statically charged drum by the spinning multi-sided mirror. The mirror focuses the beam on the surface of the drum during a manner to make the patterns of characters/images to be printed on the page. Since the drum is photoconductive, a difference in charge is made on those parts of the drum surface that are exposed to the beam. As a result, the toner, composed of oppositely charged ink particles, sticks to the drum within the places where the beam has charged the drum's surface. The toner is then fused permanently on. The paper with heat and pressure to get the printed output. The drum is then rotated and cleaned with a rubber blade to get rid of the toner sticking to its surface to organize the drum for next page printing.
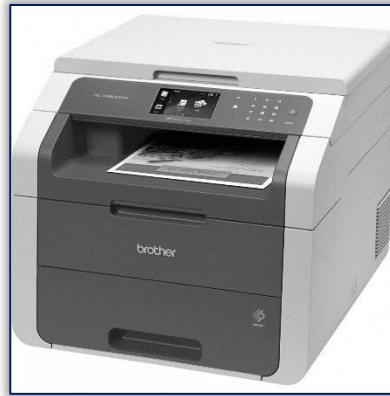
Figure 22 Laser Printer

Laser printers produce very top-quality output because they form characters by very tiny ink particles. the foremost -common laser printers have resolution of 600 dpi (dots per inch), whereas some high-end laser printers have resolution. of 1200 dpi. thanks to their high resolution, these printers give excellent graphics art quality.

Since laser printers produce printed output as patterns generated by the beam, they will print any shape of characters that a program can describe. They, therefore, can print many special characters, different sizes of print, even have the power to print graphics like charts and graphs.

Laser printers are non-impact printers. Hence, they're very quiet operational. Being of non-impact type, they will not be wont to produce multiple copies of a document during a single printing.

Although most laser printers can print in black color only because they need one toner drum arrangement, now even color laser printers are available at affordable price. A color electrostatic printer like color inkjet printer four color toners, each with a drum of its own. The usage of drums and toners are same as earlier, but drum is charged in such how that together they produce the specified color output.

Laser printers are faster in printing speed than other printers discussed earlier. Low speed laser printers can print 4 = pages per minute. High-speed laser printers also are available. due to their better print quality and printing speed, laser printers are costlier than other sorts of printers.

Plotters

We learnt earlier that matrix, inkjet, and laser printers are capable of manufacturing graphics output. However, engineering design applications like plan of a building, design of mechanical components of an aircraft or a car etc., often require high quality, perfectly proportioned graphic output on large sheets. The various: sorts of printers discussed above aren't suitable for meeting this output requirement of such applications. A special sort of output device, called plotters, is employed for this purpose. Plotters are a perfect output device for architects, engineers, city planners, et al. who got to routinely generate high-precision, hard-copy, graphic output of widely varying sizes. 'Two commonly used sorts of plotters are drum plotter and flatbed plotter. they're described below:

Drum Plotters

In a drum plotter, the paper on which the planning is to be made is placed over a drum which will rotate in both clockwise and anti-clockwise directions to supply vertical motion. The mechanism also consists of 1 or more penholder mounted perpendicular to the drum's surface. The pen(s) clamped within the holder(s) can move left to or right to left to supply horizontal motion. A graph-plotting program controls the movements of the drum and pen(s) that's, under computer control, the drum and pen(s) move simultaneously to draw designs and graphs; sheet placed on the drum. The plotter also can annotate the designs and graphs so drawn by using the pen to draw characters of varied sizes. Since each pen is program selectable, pens having ink of various colors are often mounted in several holders to supply multi-colored design

Figure 23 Drum Plotter

Figure 24 A Flat-bed Plotter

3.4 Latest Input Devices in Market

1. Keyboard

2. Pointing Devices

(a) Mouse

(i) Mechanical mouse

(ii) Optical mouse

(b) Track Ball

(c) Joystick

(d) Touch Screen

(e) Light Pen

(f) Touch Pad

4. Digital Camera

5. Scanner

6. Microphone

7. Graphic Digitizer

8. Optical Scanners

9. Optical Character Recognition (OCR)

10. Optical Mark Recognition (OMR)

11. Magnetic-Ink Character Recognition (MICR)

12 Bar Code Reader (BCR)

3.5 Latest Output Devices in Market

1. Monitor

2. Compact Disk

3. Printers

4. Speaker

5. Disk Drives

6. Floppy Disk

7. Headphone

8. Projector

Summary

• Secondary storage is a hard disk that save more data in computer.

• Hard disk is secondary storage services.

• Input device means that provide the input from user side in the computer.

• Output devices is used display the result of computer.

• Digitizer consists of a digitizing tablet (also known as graphics tablet) associated with a stylus.

• A potter is special type of output device that use in computer.

• Lager printer are non-impact printer; they are very quiet in operation. Being of nonimpact type, they cannot be used to produce multiple copies of a document in a single printing.

Keywords

Terminal: A monitor is associated usually with a keyboard and together they form a Video Display Terminal (VDT). A VDT (often referred to as just terminal) is the most popular input/output (I/O) device used with today's computers.

Plotter: A special type of output device, called plotters, is used for this purpose. Plotters are an ideal output device for architects, engineers, city planners, and others who need to routinely generate high-precision, hard-copy, graphic output of widely varying sizes.

LCD: LCD stands for Liquid Crystal Display, referring to the technology behind these popular flat panel monitors.

Digitizer: A digitizer is an input device used for converting (digitizing) pictures, maps, and drawings into digital form for storage in computers. For example, the x and y coordinates of points in a drawing may be stored in digital form.

1. Define output device.

2. Define all secondary storage devices.

Self-Assessment

1. RAM chips plugged into special sockets on the motherboard are known as ………

(a) SIMMs (b) SINNs

(c) SIMNs (d) None of these

2. The act of retrieving data from a storage location is called ………

(a) Memory write operation (b) Memory read operation

3. ……………. storage system consists of a rotating disk coated with a thin metal.

(a) Memory disc (b) Optical disk

(c) Hard disk (d) None of these

4. LED indicator stands for ………………

(a) Light-emitting diode (b) Level-emitting diode

(c) Low-emitting diode (d) None of these

5. A …………….. is a pointing device similar to a roller-ball mouse?

(a) Electronic pen (b) Trackball

(c) All of above (d) None of these

6. A color inkjet printer comes with two ink cartridges-black and ……..

(a) Tricolor (b) Blue, green, white (c) None of these

7. A4 size is equal to 8" × 12" page.

(a) True (b) False

8. CRT stands for …………..

(a) Crystal ray tube (b) Cathode ray tube

9. The UPC bar code patterns are decoded as ………. digit.

(a) 5 (b) 10

(c) 12 (d) 2

10. Input Devices that use a special ink that contains magnetizable particles of iron oxide are _____
a) Optical disks

b) Magnetic disks

c) MICR

d) Magnetic drives

11. Which of the following is a name of plotter as well as a printer?

a) Flatbed

b) Laser

c) Drum

d) Impact

12. Which of the following is not a part of a digitizer?

a) Digitizing tablet

b) Cursor

c) Stick

d) Stylus

13. Which of the following Printers have a speed in the range of 40-300 characters per second?

a) Inkjet

b) Laser

c) Dot matrix

d) Drum

14. Which of the following is a temporary output?

a) Hard copy

b) Soft copy

c) Duplicate copy

d) On paper

15. MICR character set consists of only 2 digits 0 and 1.

a) True

b) False

Review Questions

1. What is a secondary storage? How does it differ from a primary storage?

2. What are the main limitations of primary storage of a computer system?

3. Why I/O devices are necessary for a computer system?

4. What are peripheral devices? Why are they called so?

5. Why I/O devices are very slow as compared to the speed of primary storage and CPU?

6. What is an input device? Name some commonly used input devices.

7. What are keyboard devices?

8. What are point-and-draw devices? Name some commonly used point-and-draw devices.

9. Explain how information is recorded on a magnetic tape.

10. Why is the secondary storage used in most computer\stems?

11. Name some popular secondary storage devices used in today's computer systems.

12. What is a sequential-access storage device? Write examples of a few applications for which such a storage device is suitable.

13. What is a random-access storage device '? Write examples of a few applications for which such a storage device is suitable.

14. Distinguish between a sequential access, a direct access, and a random-access storage device. Write one example of each.

15. What factors determine storage capacity of disks?

Answers for Self-Assessment Questions

1. (a)   2. (b)   3. (b)   4. (a)   5. (b)   6. (a)   7. (b)   8. (b)   9. (b)

10.(c)   11.(c)   12.(c)   13.(a)   14.(b)   15.(b)

Further Reading

Fundamental Computer Skills, Feng-Qi Lai, David R. Hofmeister. A Study of Computer Fundamental, Shu-Jung Yi.

https://www.tutorialspoint.com/computer_fundamentals/computer_input_devices.htm

Unit 04: MS Windows

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Objectives

- After studying this unit, you will be able to:
- Understand the windows various features.
- An overview of different properties of windows
- Discussed about the desktop and its display.
- Explain the execution pattern of My Computer.
- Discussed the using of My Computer, also adjuster of system sittings with computer.

Introduction

Microsoft Windows, commonly mentioned as Windows, may be a group of several proprietary graphical OS families, all of which are developed and marketed by Microsoft. Each family caters to a particular sector of the computing industry. Active Microsoft Windows families include Windows NT and Windows IoT; these may encompass subfamilies, (e.g., Windows Server or Windows Embedded Compact) (Windows CE). Defunct Microsoft Windows families include Windows 9x, Windows Mobile, and Windows Phone.

Microsoft introduced an operating environment named Windows on November 20, 1985, as a graphical OS shell for MS-DOS in response to the growing interest in graphical user interfaces (GUIs).[5] Microsoft Windows came to dominate the world's pc (PC) market with over 90% market share, overtaking Mac OS, which had been introduced in 1984, while Microsoft has in 2020 lost its dominance of the buyer OS market, with Windows right down to 30%, less than Apple's 31% mobile-only share (65% for desktop operating systems only, i.e. "PCs" vs. Apple's 28% desktop share) in its home market, the US, and 32% globally (77% for desktops), where Google's Android leads.

As of October 2020, the foremost recent version of Windows for PCs, tablets and embedded devices is Windows 10, version 20H2. the foremost recent version for server computers is Windows Server, version 20H2. A specialized version of Windows also runs on the Xbox One computer game console.

In a nutshell, below is how Microsoft windows evolved over time:

- Windows 1.0 – Nov 1985
- Windows 2.0 – Dec 1987
- Windows 3.0 – May 1990

- Windows 95 – Aug 1995
- Windows 98 – June 1998
- Windows ME – Sep 2000
- Windows XP – Oct 2001
- Windows Vista – Nov 2006
- Windows 7 – July 2009
- Windows 8.0 – Oct 2012
- Windows 8.1 – Oct 2013
- Windows 10 – July 2015

Microsoft has released most versions of Windows with multiple editions, tailored for different users. For example, Windows 10 is available in "Home" and "Pro" editions. The Home edition is sufficient for most users, while the Pro edition includes additional networking and administrative features useful in corporate workspaces.

Windows runs on standard x86 hardware, such as Intel and AMD processors. Unlike Apple, Microsoft licenses the OS to multiple manufacturers. Therefore, numerous companies, such as Dell, HP, Acer, Asus, Lenovo, sell Windows PCs. Microsoft develops its own line of Windows Surface laptops as well.

Software programs written for Windows may be called apps, applications, or executable files. Regardless of their label, Windows software programs have an .EXE file extension. 64-bit versions of Windows run both 32 and 64-bit apps, while 32-bit versions only run 32-bit applications.

4.1 What is Windows 10?

Windows 10 brings an extended list of important changes that any IT pro should anticipate to, including major improvements within the user experience, significant security enhancements, and a replacement browser.

But the foremost significant change is meant to get rid of the anxiety that accompanies enterprise upgrades. The goal of Windows 10 is to deliver new features when they're ready, instead of saving them for subsequent major release. In fact, the very concept of a serious release goes away — or a minimum of recedes into the distant background — with Windows 10. Terry Myerson, the Microsoft executive responsible of the operating systems division, calls it "Windows as a Service." actually , he argues, "One could reasonably consider Windows within the next few years together of the largest Internet services on the earth . And a bit like any Internet service, the thought of asking 'What version are you on?' will cease to form sense" That process has already begun, with the launch in late 2014 of a Windows 10 Technical Preview aimed at IT pros and consumers. those that have opted into the Windows 10 preview program are receiving major new features, bug fixes, and security update.

4.2 Installation

There are two methodologies you can take for introducing Windows 10 in your PC: Upgrade or a Clean Install.

Normally, when you overhaul your working framework, every one of your records and applications stay unaltered, while with a clean introduce you would be beginning again without any preparation. Be that as it may, something significant to check initially is if your PC has the fundamental equipment to help Windows 10.

System Requirements

Although most computers nowadays probably have the necessary requirements for Windows 10. It will certainly be useful to know them in case you want to upgrade from an older system.

The main requirements are −

- A processor (CPU) with a clock rate of at least 1GHz.
- At least 1 to 2GB of memory (RAM), but Microsoft recommends 4GB.
- At least 16GB space in your hard disk.

One important thing to note is that the installation process itself will verify your computer hardware and let you know if it qualifies for a Windows 10 upgrade or not. If not, then you will need to upgrade your hardware.

Upgrade

If your computer qualifies for a Windows 10 upgrade, then you can follow these steps to perform the upgrade −

Step 1 − Look for the Windows 10 notification in the lower-right corner of the screen. This is a one-year-only offer that Microsoft is extending to valid users of Windows 7 and Windows 8.1.

Step 2 − By clicking on the notification, it will start the download and installation process of Windows 10 in your system. The download required for the upgrade is quite large, so make sure you have a stable Internet connection and continuous power for your computer to avoid interruptions during the process.

Step 3 − After the download is complete, it will prompt you to accept Microsoft's license terms.

Step 4 − After agreeing to the terms, it will ask if you want to install the upgrade at that moment or schedule it for later.

Since the upgrade process can take approximately 2 hours, it will be helpful to schedule it for a time, that will be more suitable to you.

Step 5 − Once the upgrade starts, the system will perform a series of tasks, during which you will see the following screen.

During this time, your computer will reboot a couple of times, so don't worry. The process itself will take you through the steps to complete the upgrade.

Step 6 − As the upgrade approaches its end, it will ask you to configure some basic Windows settings. You can choose to use **Express settings**, which will apply the most common or recommended settings, or you can choose to **customize the settings** as you please.

Step 7 − After the upgrade finishes, you will see the Windows welcome screen.

4.3 Getting Started with Windows 10

After you have installed or upgraded your Windows, you will get a Welcome Screen with the time and date. Just click anywhere to go to the User Accounts Screen.

This screen lets you choose which user you want to log in to from the lower-left corner. After choosing the right user, and entering a password if necessary, you will see the Windows Desktop.

The Windows Desktop is simply your operating system main screen. Here you have access to an array of tools like the Start Menu, Taskbar, and other icons. Windows 10 also introduces a search box in the Taskbar, which facilitates browsing both your computer and the Web.

4.4 Windows 10 Graphical User Interface (GUI) Basics

Once you get to the Windows Desktop screen, here are some basic features you will see.
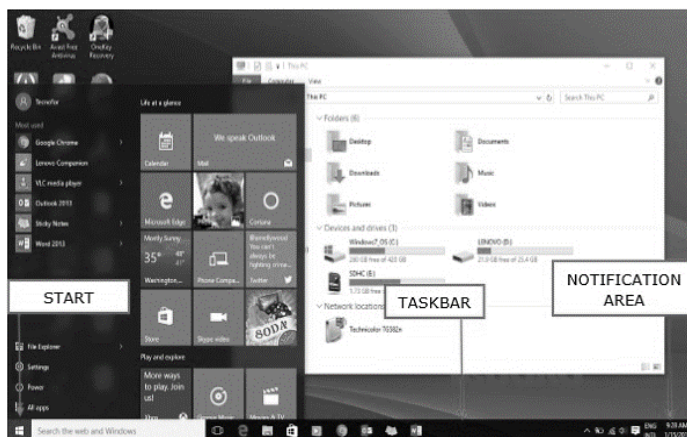
Figure: GUI of Windows 10

One of the most important parts of your Desktop is the Taskbar. By default, it sits at the bottom of your screen giving you access to the Start Menu, several application icons, and the Notification Area.

Windows

In Windows 10, if an application is active or opened, you will see a Green Line below its icon. Clicking the icon will bring the appliance window up.

Features Three Buttons

Every open window features three buttons within the upper-right corner. These are wont to minimize, maximize, or close the window −

- Minimizing means the window will hide within the Taskbar.
- Maximizing will bring the window to a full-screen size.

Windows are often moved around or resized as you please −

- To move a window, just click on its Title Bar on the top of the window and drag it.
- To resize a window, move your mouse to any corner until you see a double-sided arrow. Then click and drag until you reach the specified size.

Icons

Most Windows versions will feature different icons on the background. An icon is just a graphic representation of an application or a file. To open or access an icon, just double click thereon.
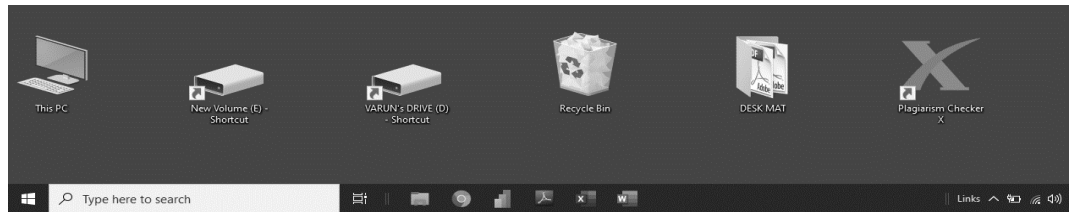
Figure: Shows the icons on a desktop

Although the quantity and sort of icons will vary, counting on the pc, you can add more icons by following these steps −

Step 1 − Right-click on the Desktop Background.

Step 2 − Choose "New" and "Shortcut".

Step 3 − Browse for the appliance or file you would like to make a shortcut to.

Step 4 − Assign a reputation to the shortcut and click on "Finish".

Icons also can be moved around by clicking on them and dragging them to a different place within the screen.

Desktop Background

Another component of your Desktop is that the Background. this is often simply a picture that appears at the rear of your screen. Most computers accompany a pre-selected background, but you'll change it to any image you would like .

To change the background, follow these steps −

Step1 − Right-click on the background and choose "Personalize".

Step 2 − From the Personalization window, choose from a series of pre-selected pictures or browse for your own. After choosing a picture, the Background will change automatically.
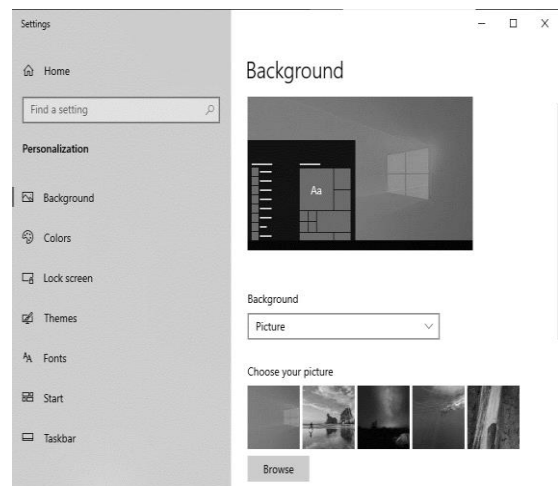
Navigation

To navigate your Windows, you can simply type what you are looking for on the Taskbar search. It can be the name of a document or application, or just any information you are looking for.

Start Menu

If you are looking for a specific application, you can also open the Start Menu and click "All Applications". This will open an alphabetical list of all the applications installed on your computer.

The Start Menu is the main point of access to your applications. There are two main ways to open it

Step 1 − Use your mouse to click Windows icon in the lower-left corner of the taskbar.

Step 2 − Press the Windows key on your keyboard.

The Windows 10 Start Menu features two panes.

The left pane resembles the traditional Start Menu from Windows 7 and earlier, while the right pane features live tiles that were used in Windows 8.

Left Pane

Among the things you can do in the left pane are −

- Click the username at the top of the menu to change account settings or log in with another user.
- Access the applications you use more frequently.
- A small arrow next to an application will open a sub-menu with a list of recent documents opened with that application.
- Open the "File Explorer" to navigate your folders and files.
- Change the settings of your computer like your Internet connection or changing your background.
- See different options to shut down your computer.
- See a list of all the applications installed in your computer.

Search Box
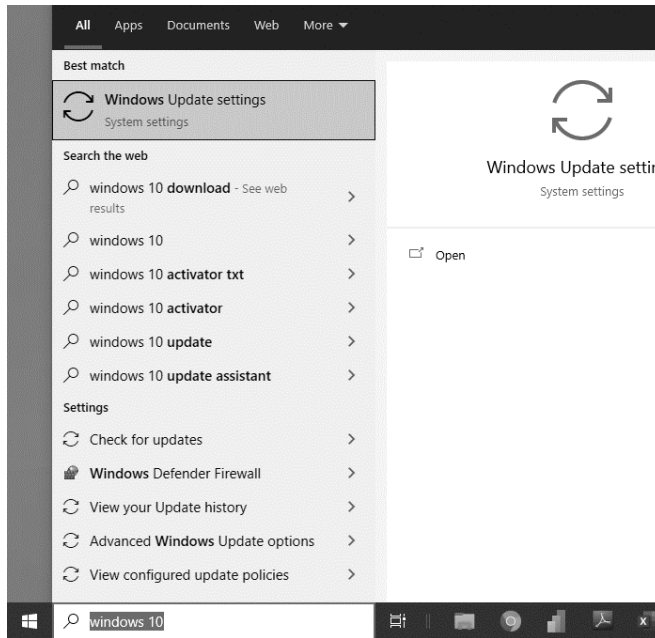
The "Search box" on the Taskbar will allow you to search within your documents and files or on the Web for anything you write. The initial results will appear within the Start Menu itself.

The results will be grouped according to the closest match (or matches) labeled "**Best match**" at the top of the list.

The remaining results will be grouped according to what they are or their location −

- Web results
- Documents or folders
- Apps
- System settings

Right Pane

The right pane features a varied array of tiles, similar to the ones that were seen on the Start Screen of Windows 8.

These tiles can be moved and dragged to different places by holding the mouse button.

You can also configure them by right-clicking on them to see options to resize them or "unpin" them (remove them) from the Menu.

The whole Start Menu can also be resized by dragging the borders with the mouse to the desired size.
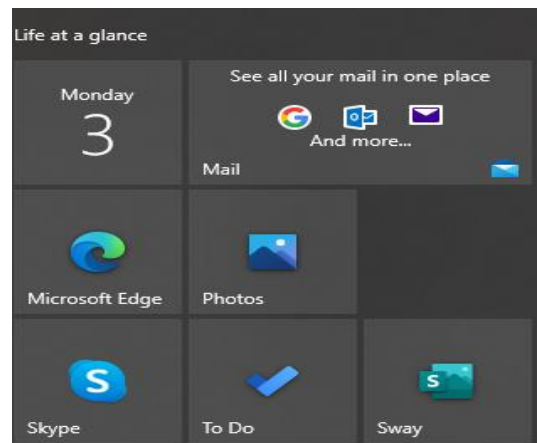
Taskbar

The Windows 10 taskbar sits at the bottom of the screen giving the user access to the Start Menu, as well as the icons of frequently used applications. On the right-side, the Taskbar features the Notification Area which informs the user of different things like the state of the Internet connection or the charge of the laptop battery.
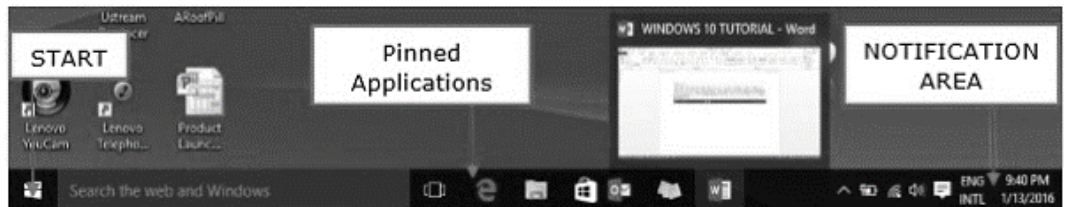
The icons in the middle of the Taskbar are "pinned" applications, which is a way to have a quick access to applications you use frequently. "Pinned" applications will stay in the taskbar until you "unpin" them by using unpin option that you get by right clicking on the icon.

Similarly, if an icon is not there on the taskbar that you would like over there can be brought by using following steps: -

"Click on Start ⟶ Right Click on the icon ⟶ Pin to Taskbar"

This will attach or "pin" the application icon to your Windows Taskbar.

Notification Area

The Notification Area is located at the right side of the Taskbar. It shows different types of notifications from your computer like your Internet connection, or the volume level.

At first, the Notification Area shows a limited number of icons. But you can click the upward arrow on its left side to see other icons as well.
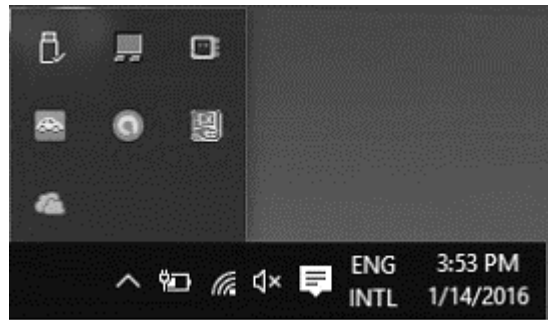
Task View

Task View allows you to quickly move within your open windows and applications. You can access it by clicking the "Task View" button from the Taskbar.
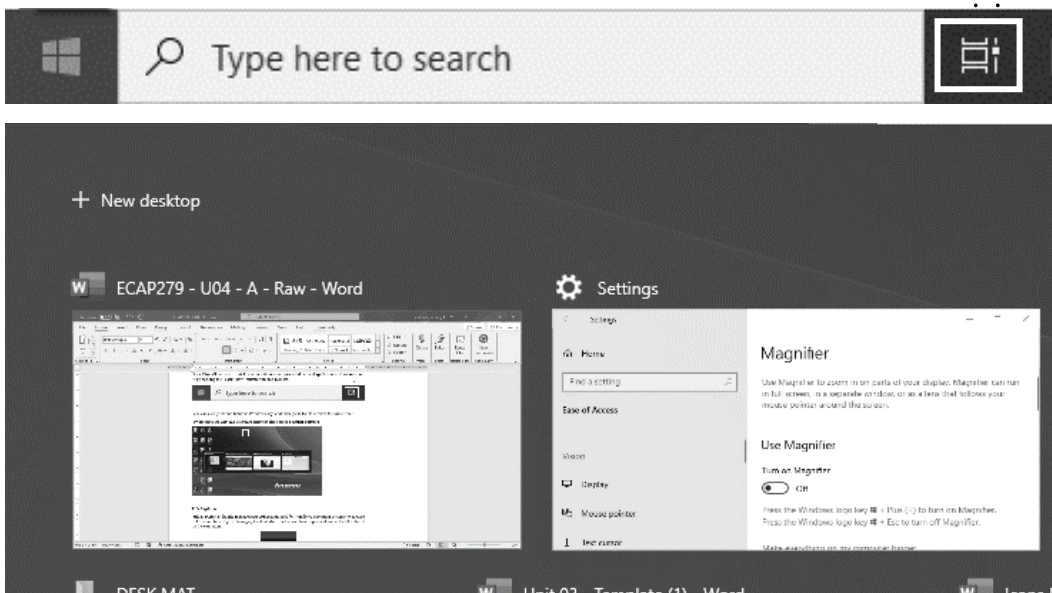
You can also press and hold the Windows key, and then press Tab to achieve the same result.

By pressing the Alt+Tab keyboard shortcut also serves a similar purpose.

File Explorer

File Explorer is the file management application used by Windows operating systems to browse folders and files. It provides a graphical interface for the user to navigate and access the files stored in the computer.

The main way to access the File Explorer is by clicking the folder icon in the Taskbar. After clicking the icon, the File Explorer window will open.
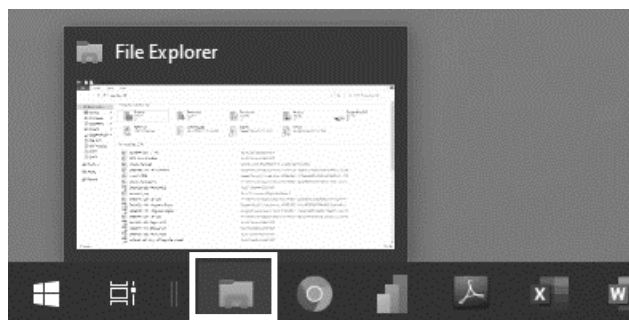
The initial File Explorer window is comprised of the following sections −

1. The **File Explorer ribbon**, which resembles the ribbon featured in Microsoft Office. The ribbon contains buttons for common tasks to perform with your files and folders.

2. The **Navigation Pane** gives you access to your libraries of documents and pictures, as well as your storage devices. It also features frequently used folders and network devices.
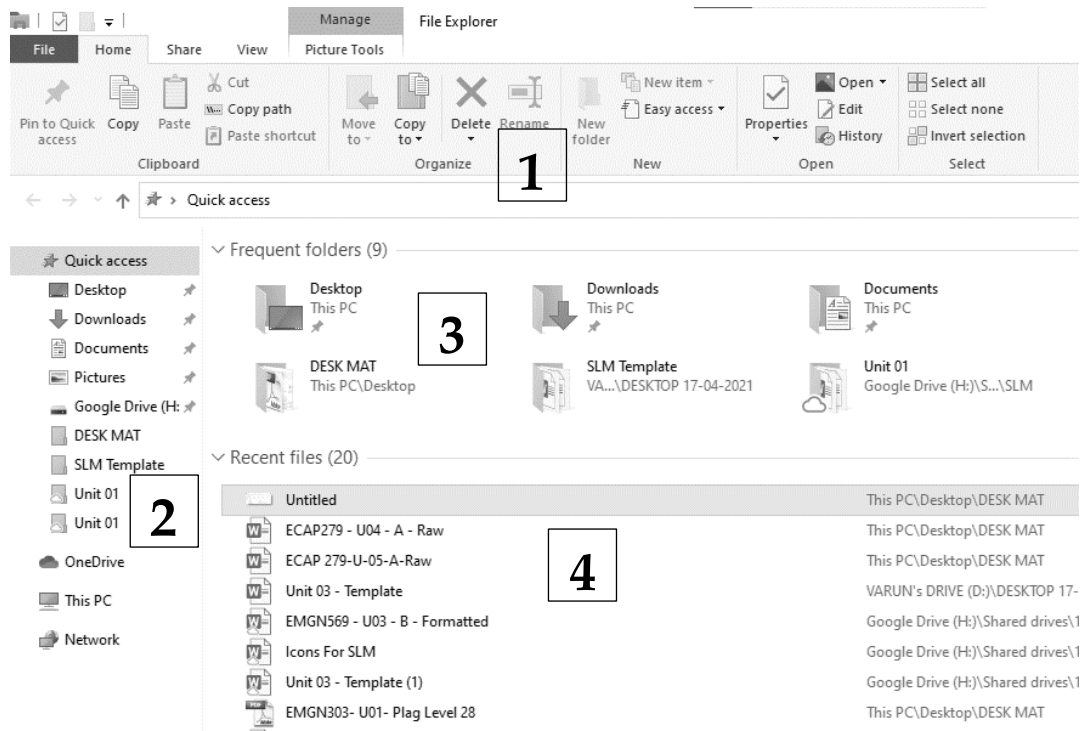
3. The **Frequent folders** section on the right features the folders you've worked with recently to allow for quick access to them.

4. The **Recent files section** in the lower part of the window features files and documents that you've opened recently.

Cortana

Cortana is Microsoft's intelligent personal assistant. It is included in Windows 10, as well as with other Microsoft systems and devices like Windows Phones and Xbox, among others.

Cortana will help you find things in your computer, set appointments, answer questions, and many other things.

To use Cortana simply type a question in the search box in the Taskbar or click the microphone icon and talk to Cortana.

The icons on the left-side are for −

- Home
- Notebook
- Reminders
- Feedback

Home is the initial Cortana window where you can type or ask questions.

Activating Cortana

If Cortana isn't active, you can turn it on by typing "Cortana" in the Taskbar search to access the Cortana settings, or just clicking the "Gear" icon on the left-side of the menu.
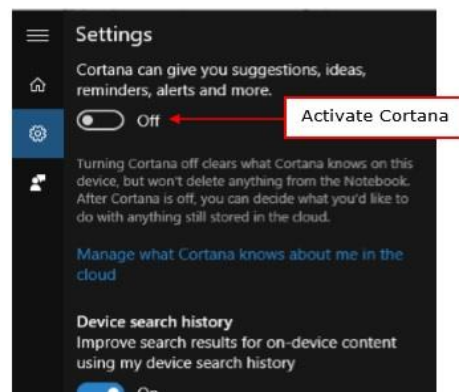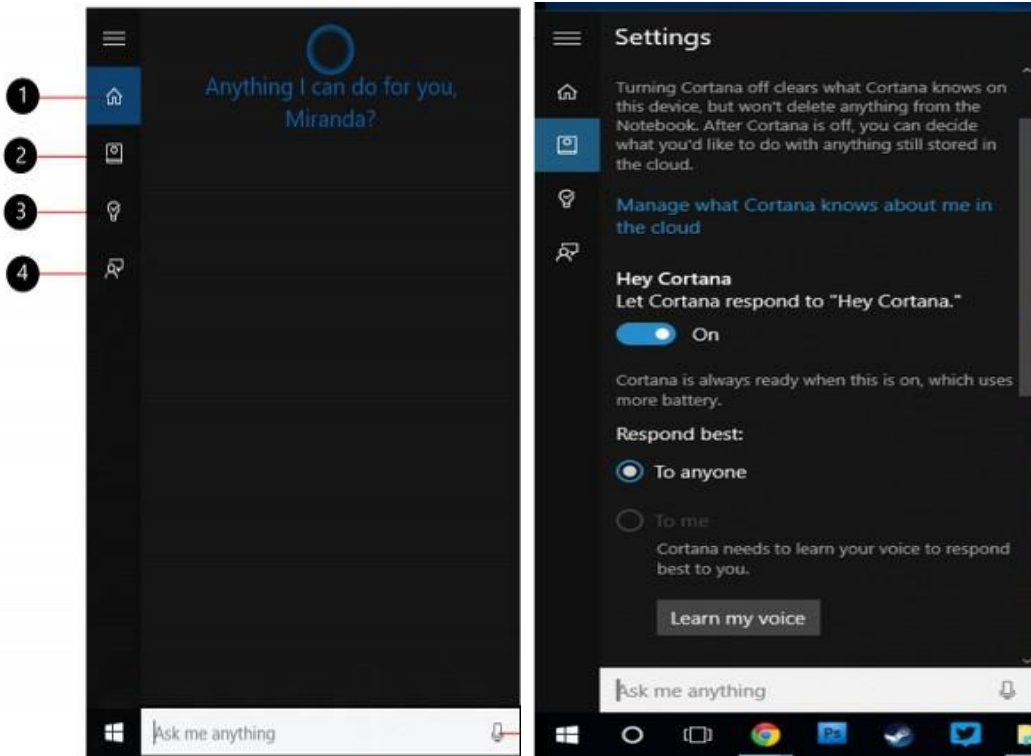
After activating Cortana, it will start gathering information about you to personalize the experience.

You can also customize how Cortana responds to you.

Personalizing Cortana

To further customize Cortana and personalize your interactions with it, you can also access the Cortana Notebook.

This notebook stores what Cortana knows about you.You can also add reminders by either typing them or talking to Cortana.
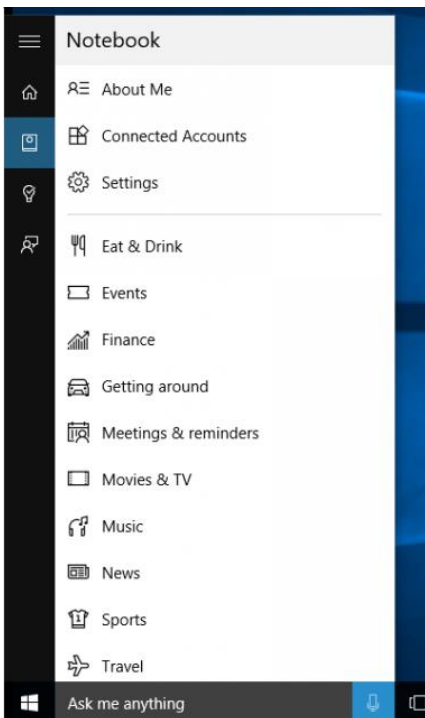
> **Lab Exercise**　　　Using the personalize property try to change the background of your desktop and set your image as a background image.

4.5 Control Panel

The instrument panel may be a component of Microsoft Windows that gives the power to look at and alter system settings. It consists of a group of applets that include adding or removing hardware and software, controlling user accounts, changing accessibility options, and accessing networking settings. Additional applets are provided by third parties, like audio and video drivers, VPN tools, input devices, and networking tools.

The instrument panel has been a part of Microsoft Windows since Windows 1.0, with each successive version introducing new applets. Beginning with Windows 95, the instrument panel is implemented as a special folder, i.e., the folder doesn't physically exist, but only contains shortcuts to varied applets like Add or Remove Programs and Internet Options. Physically, these applets are stored as .cpl files. for instance, the Add or Remove Programs applet is stored under the name appwiz.cpl within the SYSTEM32 folder.

In Windows XP, the instrument panel home screen was changed to present a categorized navigation structure like navigating an internet page. Users can switch between this Category View and therefore the grid-based Classic View through an option that appears on either the left side or top of the window. In Windows Vista and Windows 7, additional layers of navigation were introduced, and therefore the instrument panel window itself became the most interface for editing settings, as against launching separate dialogs.

Many of the individual instrument panel applets are often accessed in other ways. as an example , Display Properties are often accessed by right-clicking on an empty area of the desktop and selecting Properties. The instrument panel are often accessed from a prompt by typing control; optional parameters are available to open specific control panels.

On Windows 10, instrument panel is deprecated in favor of Settings app, which was originally introduced on Windows 8 as "PC settings" to supply a touchscreen-optimized settings area using its Metro-style app platform. Some functions, particularly the power to feature and take away user accounts, were moved exclusively to the present app on Windows 8 and can't be performed from instrument panel.

As of the October 2020 update to Windows 10 trying to open the System page of instrument panel will redirect users to the Windows 10 Settings application.
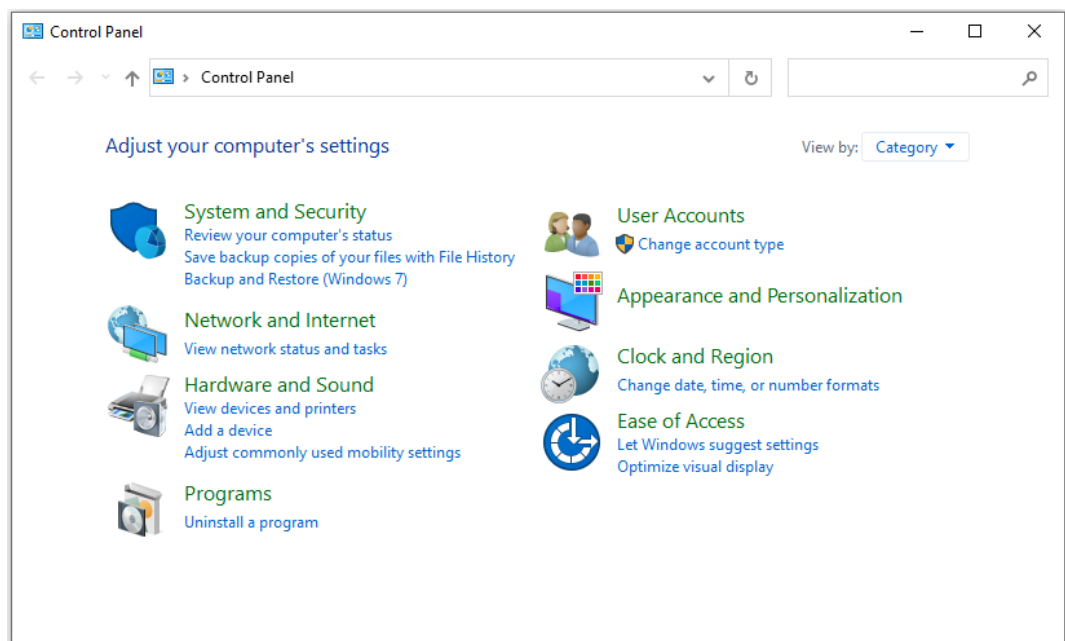
Figure 1 Control Panel applet

How to open Control Panel?

In Windows 10, the Control Panel has largely been superseded by the **Settings App**. To open the Settings app, open the Start Menu and click the gear icon (⚙), or press **Win+I** (hold down the Windows Key and press "i").However, the traditional Control Panel is still available:

There are several ways to open the Control Panel in Windows 10.

From the Start Menu

- Open the Start Menu.
- Scroll down to **W**, click **Windows System**, then click **Control Panel**.
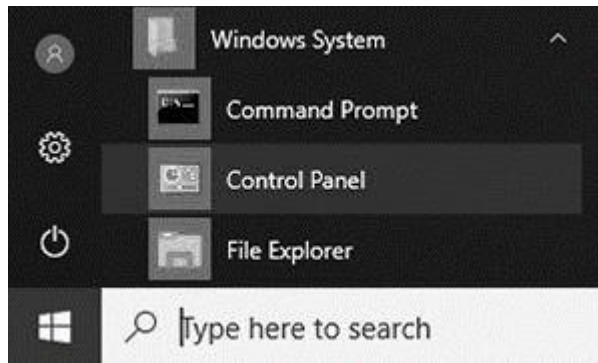
From the Cortana search bar

- The Cortana search bar is on the left side of the taskbar, next to Start Menu button. Click the search bar to place your cursor in this box.
- Type the word **control**. Cortana lists best matches above as you type. In this list, select **Control Panel**.
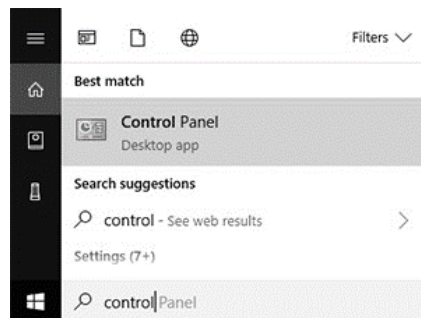
From the Run box

The **control** command may be used to open the Control Panel. For instance:

- Open the **Run** box by pressing **Win+R** (hold down the Windows key on your keyboard, then press the "R" key).
- Type **control** and press Enter.
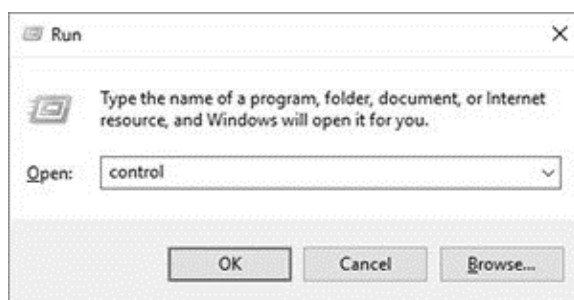
As mentioned below, you can also run the **control** command from the Windows 10 Command Prompt.

Description of each category and icon in the Control Panel

Since its introduction in Windows 95, the Control Panel has undergone many changes including adding, renaming, and removing of icons and the introduction of categories. This page helps give you a better understand the Control Panel, help find where a setting may be adjusted, and give a complete overview of what's available in the Windows Control Panel. Below is a visual example of the Windows 10 Control Panel.

> • In Windows 7, Windows 8, and Windows 10 you can use the search in the top-right corner of the Control Panel window to find the area you are looking to adjust. For example, you could type "firewall" to search for the Firewall settings. You can also use the Windows search in the Taskbar to find Windows settings and tools available through the Control Panel.
>
> • In all new versions of Windows, you can adjust how the Control Panel is shown by changing the View by option. In the top-right corner of the Control Panel, change the View by from Category to Large icons or Small icons to see only icons.

Control Panel categories and icons

Control panel consist of the following categories and icons. Below is the list of applets available along with their detailing:

- **Appearance and Personalization**

The Appearance and Personalization category allows you to change the look and feel of Windows, which includes adjusting the theme, screen saver, and taskbar. Below is a list of each of the subcategories of Appearance and Personalization in Windows 10.

> ➤ *Taskbar and Navigation -* Opens the Taskbar settings that allow you to change how the taskbar is shown or hidden, its location, icons, and other settings.
>
> ➤ *Ease of Access Center-* Opens the Ease of Access Center, which gives you access to all settings that makes Windows easier to use for all users. In this area, you'll find the following settings.
>
>> o   Use the computer without a display - Optimize for blindness.
>>
>> o   Make the computer easier to see - Optimize visual display.
>>
>> o   Use the computer without a mouse or keyboard - Set up an alternative input device.
>>
>> o   Make the mouse easier to use - Adjust settings for the mouse or other pointing devices.
>>
>> o   Make the keyboard easier to use - Adjust settings for the keyboard.
>>
>> o   Use text or visual alternatives for sounds - Set up alternatives to sounds.
>>
>> o   Make it easier to focus on tasks - Adjust settings for reading and typing.
>>
>> o   Make touch and tablets easier to use - Adjust settings for touch and tablets.
>
> ➤ **Accommodate low vision** - *Adjust High Contrast, make text and icons larger, and other settings to help people with low vision use their computer easier.*
>
> ➤ **Use screen reader** - *Enable and disable the Narrator that lets you have things on the screen read to you as you use the computer.*
>
> ➤ **Turn on easy access keys** - *Enable and disable Mouse Keys, Sticky Keys, Toggle Keys, Filter Keys, and get to other keyboard settings.*

➢ **Turn High Contrast on or off** *- Adjust all display settings including the <u>background</u>, colors, <u>lock screen</u>, <u>Themes</u>, Start, and the taskbar.*

➢ **File Explorer Options** *- Open the File Explorer Options window with options on how to view and search files on your computer.*

➢ **Specify single- or double-click to open** *- Adjust the File Explorer mouse settings to be either single-click or double-click.*

➢ **Show hidden files and folders** *- Opens the View tab in the File Explorer Options window that allows you to specify if hidden files should be shown.*

➢ **Fonts** *- Opens the Fonts window that shows all installed <u>fonts</u> on the computer.*

➢ **Preview, delete, or show and hide fonts** *- Opens the Fonts window (same as above).*

➢ **Change Font Settings** *- Opens the Fonts settings window to adjust how fonts are shown on the computer.*

➢ **NVIDIA Control Panel** *- For computers with <u>NVIDIA</u> <u>video cards</u> gives you access to the NVIDIA Control Panel, which gives you more advanced display settings for your video card.*

- **Clock, Language, and Region**

The Clock, Language, and Region category is seen when viewing the Control Panel as categories and allows you to change the date, time, language, and region settings in Windows. Below is a list of each of the subcategories of Clock, Language, and Region in Windows 10.

➢ *Date and Time* - Opens the Date and Time window that shows you the current date and time and the ability to change your date and time settings.

➢ *Set the time and date* - Opens the Date and Time window with the " Change date and time..." button that allows you to change the time or date on the computer.

➢ *Change the time zone* - Opens the Date and Time window with the "Change time zone..." button that allows you to change the time zone.

➢ *Add clocks for different time zones* - Opens the Date and Time window in the Additional Clocks tab that lets you add additional clocks when hovering over the taskbar clock.

➢ *Language* - Open the Language window that allows you to adjust, add, and remove the display language and the input and handwriting language.

➢ *Add a language* - Opens the Language window (same as above) and allows you to add a new language, remove languages, or set the language priorities if more than one language is selected.

➢ *Change input methods* - Opens the Language window (same as above). Clicking the Options link to the right of the language allows you to change the <u>input</u> methods (i.e., the <u>keyboard layout</u>) for the language.

➢ *Region* - Opens the Region window that allows you to change the date and time formats and the first day of the week.

➢ *Change location* - Opens the Region window in the Location tab that lets you to specify the home location.

➢ *Change date, time, or number formats* - Opens the Region window (see above).

- **Ease of Access**

The Ease of Access is a category shown when viewing the Control Panel as categories that adjust the vision, hearing, speech recognition, and mobility settings. Below is a list of each of the subcategories of System and Security in Windows 10.

Ease of Access Center can also be accessed using Ease of Access.

- **Hardware and Sound**

The Hardware and Sound category allows you to add and remove <u>printers</u> and other <u>hardware</u>, change system sounds, update <u>drivers</u> and more. Below is a list of each of the subcategories of Hardware and Sound in Windows 10.

> *Devices and Printers-* Open the Devices and Printers window that shows you all the hardware devices, printers, and multimedia devices detected by your computer. In devices and printers, you have following options: -
>
> o **Add a device -** Open the Add a device <u>wizard</u> to detect any new hardware connected to your computer. You would run this wizard if Windows did not automatically detect and set up a new device.
>
> o **Advanced printer setup** - Open the Add printer wizard to set up a new printer or set up a network printer.
>
> o **Mouse -** Open the Mouse Properties window to configure all your <u>computer mouse</u> settings.
>
> o **Device Manager** - Open the Windows <u>Device Manager</u>.
>
> o **Change Windows to go startup options** - Setup and configure the Windows To Go options.
>
> *AutoPlay–* Open the AutoPlay settings to configure what happens when disc (e.g., CD, DVD, Blu-ray) is inserted into the computer. The AutoPlay settings also allow you to choose what to do with pictures, videos, music, and mixed content. Here, there are two options as listed: -
>
> o **Change default settings for media or devices -** Opens the AutoPlay settings (same as above).
>
> o **Play CDs or other media automatically** - Opens the AutoPlay settings (same as above).
>
> *Sound -* Opens the <u>Sound</u> settings that allows you to adjust the playback, recording, and sounds settings on the computer. In this, you can: -
>
> o **Adjust system volume -** Opens the Volume Mixer to adjust the volume and mute settings of your speakers and other sound devices.
>
> o **Change system sounds -** Opens the Sound settings window in the Sounds tab to adjust the sound theme of your computer. These sounds are what you may hear when starts or while using Windows.
>
> o **Manage audio devices -** Opens the Sound settings window in the Playback tab to adjust the audio devices on the computer.
>
> *Power Options* - Opens the Power Options window to adjust the computer's power plan settings, which are the settings that tell the computer when to go to sleep (<u>Standby</u>) or <u>hibernate</u>. Here, you can: -
>
> o **Change power-saving settings** - Opens the Power Options window (same as above).
>
> o **Change what the power buttons do** - Change the <u>button</u> settings for your power button and sleep button. For example, when pressing the power button, your computer can be set to <u>Shut down</u> the computer, <u>sleep</u>, <u>hibernate</u>, or do nothing.
>
> o **Change when the computer sleeps** - Change the sleep (Standby) settings of the computer and monitor. From this window, you can change how long to wait until the display and computer goes into sleep mode.
>
> o **Choose a power plan** - Change the Power Options power plan settings from Balanced, Power saver, or high performance.

o   **Edit power plan** - Change the sleep (Standby) settings of the computer and monitor. From this window, you can change how long to wait until the display goes into sleep mode and when the computer goes to sleep.

- **Network and Internet**

The *Network and Internet* category is shown when viewing the Control Panel as categories and allows you to view your <u>network</u> status and configure other network settings and preferences. Below is a list of each of the subcategories of Network and Internet in Windows 10.

➢   *Network and Sharing Center -* Opens the Network and Sharing Center window to view basic networking information, set up a new connection, and troubleshoot network problems. Here, you can: -

o   *View network status and tasks -* Open the *Network and Sharing Center* window (same as above).

o   **Connect to a network** - Open the available networks that which include available <u>Wi-Fi</u> networks and the ability to turn on <u>Airplane mode</u> and set up a mobile <u>hotspot</u>.

o   **View network computers and devices** - Opens the *Network* window that shows computers on your network, media devices, network infrastructure (e.g., <u>router</u>), and other devices (e.g., available <u>IoT devices</u> and Internet/Network connected devices).

➢   *Internet Options-* Opens the *Internet Properties* window to adjust <u>Internet Explorer</u> browser settings (e.g., home page, browsing history, and other settings). Here, you can: -

o   **Change your homepage** - Opens the *Internet Properties* window (same as above).

o   **Manage browser add-ons** - Opens the *Internet Properties* window in the *Programs* tab. From the *Programs* tab, you can manage any <u>add-ons</u> that are installed into Internet Explorer and choose how the computer opens links.

o   **Delete browsing history and cookies** - Opens the *Internet Properties* window in the *General* tab that allows you to delete the <u>browsing history</u> and change the browsing history settings and delete <u>cookies</u> and adjust cookie settings.

- **Programs**

The *Programs* category is shown when viewing the Control Panel as categories and allows you to get new <u>programs</u> and <u>uninstall</u> programs on your computer. Below is a list of each of the subcategories of *Programs* in Windows 10.

➢   *Programs and Features -* Opens the *Programs and Features* window that allows you to change, repair, and uninstalled any program that is installed on the computer. Here, there are following options: -

o   **Uninstall a program** - Opens the *Program and Features* window (same as above).

o   **Turn Windows features on or off** - Opens the *Windows Features* window to view enabled Windows features and turn features on and off.

o   **View installed updates** - Opens the *Installed Updates* window to see a full list of all updates that are installed on the computer.

o   **Run programs made for previous versions of Windows** - Open the *Windows Program Compatibility Troubleshooter* to fix problems with running older programs in Windows.

o   **How to install a program** - Opens the Windows support web page for help with installing a program.

> ➤ ***Default Programs*** - Opens the *Default Programs* window with the options to Set your default programs, associate files, change AutoPlay settings, and set program access and computer defaults. Here you have following controls: -
>> o **Change default settings for media or devices** - Opens the *AutoPlay settings* to configure what happens when disc (e.g., CD, DVD, Blu-ray) is inserted into the computer. The AutoPlay settings also allow you to choose what to do with pictures, videos, music, and mixed content.
>> o **Make a file type always open in a specific program** - Open the *Set Associations* window to view and change how file types (files with a certain file extension) are opened.
>> o **Set your default programs** - Open the *Set Default Programs* window to adjust what file types and protocols a program is capable of opening. From this window, you can set a program as the default program for its associated file types or view what file types (file extensions) are associated with the program.
>> o **Java (32-bit)** - If Java is installed on the computer, this option opens the *Java Control Panel* to adjust Java related settings.

- **System and Security**

The *System and Security* category allows you to view computer system information and settings and view and change the computer security settings. Below is a list of each of the subcategories of System and Security in Windows 10.

> ➤ ***Security and Maintenance*** - View the system security settings (e.g., the Network firewall, virus protection, Internet security settings, and User Account Control). In *Security and Maintenance*, you're also able to adjust your maintenance settings.
>> o **Review your computer's status and resolve issues** - Open the *Security and Maintenance* and show any of the computer issues that are detected.
>> o **Change User Account Control settings** - Opens the *User Account Control Settings* to adjust the level of UAC (User Account Control).
>> o **Troubleshoot common computer problems** - Opens the *Troubleshoot tool* to fix common problems with Windows and hardware connected to Windows using the troubleshooter.
> ➤ ***Windows Firewall*** - View the Windows Firewall status and adjust settings.
>> o **Check firewall status** - Show the Windows Firewall status to determine if the firewall is turned on or off and how it is blocking incoming connections.
>> o **Allow an app through Windows Firewall** - Display a list of programs (apps) permitted to communicate through the Windows Firewall and enable or disable private and public access.
> ➤ ***System*** - Opens the *System information* section to display computer information. Information includes the version of Windows, processor speed, RAM, if it's 32-bit or 64-bit, if pen or touch is enabled, computer name, workgroup, and if Windows is activated.
>> o **View amount of RAM and processor speed** - Opens the *System information* window (same as above).
>> o **Allow remote access** - Opens the *System Properties* window Remote tab to allow and not allow remote access to the computer.
>> o **Launch remote assistance** - Launch the *Windows Remote Assistance* that allows you to invite someone to help you with your computer or help someone who has invited you to help them with their computer.

- **See the name of this computer** - Opens the *System* window (mentioned above) that displays system information including the computer name and option to change the name.

➤ *Power Options* - Opens the *Power Options* that allow you to change how Windows manages the power and sleep (Stand By) option to your computer and devices connected to your computer.

- **Change what the power buttons do** - Opens the *System Settings* for the *Power Options* that allows you to change what happens when you press the power button and sleep button. For example, you could change the power button to put your computer to sleep instead of shutting down the computer when it is pressed.

- **Change when the computer sleeps** - Opens *Power Plan Settings* to specify how long to wait until the display and the computer are put to sleep.

➤ *File History -* Opens the *File History* window that shows you if File History is enabled and external drives available for File History.

- **Save backup copies of your files with File History** - If File History is enabled save a backup of your files.

- **Restore your files with File History** - Restore files from your File History if available.

➤ *Backup and Restore (Windows 7) -* Open the Windows 7 *Backup and Restore* option and where you can find the location to create a system image and create a system repair disc.

- **Restore files from backup** - Restore any files that were backed up using Windows.

➤ *BitLocker Drive Encryption* - Enable and disable BitLocker Drive Encryption for your hard drive and removable drives.

- **Manage BitLocker** - Open the *BitLocker Drive Encryption* window (same as above) to adjust the BitLocker settings.

➤ *Storage Spaces -* Manage Storage Spaces that allow you to save files to two or more drives to help protect your computer in case of a drive failure and add more drives when you run low on disk capacity.

- **Manage Storage Spaces** - Manage Storage Spaces (same as above).

➤ *Work Folders -* Manage and set up Work Folders that allow other devices to access your files, even when offline.

- **Manage Work Folders** - Manage Work Folders (same as above).

➤ *Administrative Tools -* Open the *Administrative Tools* window that gives you access to all settings important to system administrators. These tools can include all the following tools.

  i.   Component Services
  ii.   Computer Management
  iii.   Defragment and Optimize Drives
  iv.   Disk Cleanup
  v.   Event Viewer
  vi.   Internet Information Services (IIS) Manager
  vii.   iSCSI initiator
  viii. Local Security Policy
  ix.   ODBC Data Sources (32-bit and 64-bit)
  x.   Performance Monitor
  xi.   Services
  xii.   System Configuration

xiii.   System Information

xiv.   Task Scheduler

xv.   Windows Firewall with Advanced Security

xvi.   Windows Memory Diagnostic

o   **Free up disk space** - Opens the <u>*Disk Cleanup*</u> tool that allows you to free up disk space by cleaning any files no longer needed.

o   **Defragment and optimize your drives** - Opens the *Optimize Drives* tool that allows you to <u>defrag</u> your hard disk drive and optimize the drive.

o   **Create and format hard disk partitions** - Opens the <u>*Disk Management*</u> tool that allows you to <u>partition</u> a disk drive and change other drive settings needed when setting up a <u>hard drive</u> for the first time.

o   **View event logs** - Opens the <u>*Event Viewer*</u> to view the system event logs.

o   **Schedule tasks** - Opens the <u>*Task Scheduler*</u> that allows you to schedule when a task or program needs to run.

➢ *Flash Player (32-bit) -* Opens the <u>*Adobe Flash Player Settings Manager*</u> that allows you to adjust the settings of <u>Adobe Flash</u>.

• **User Accounts**

The *User Accounts* category is shown when viewing the Control Panel as categories and allows you to view <u>user accounts</u>, adjust user settings (e.g., <u>passwords</u>), and adjust other user settings. Below is a list of each of the subcategories of the User Accounts in Windows 10.

➢ *User Accounts -* Opens the *User Accounts* window to make changes to your user account, change your account type, manage another account, and change <u>User Account Control</u> settings. Here, users can: -

o   **Change account type** - Opens the *Manage Accounts* window to adjust the account type of one or more of the users on the computer.

o   **Remove user accounts** - Opens the *Manage Accounts* window (same as above).

➢ *Credential Manager -* Opens the *Credential Manager* window to view the Web Credentials and Windows Credentials. From this area, you can also view, edit, and remove any of the credentials. Here, users can: -

o   **Manage Web Credentials** - Opens the *Credential Manager* window (same as above).

o   **Manage Windows Credentials** - Open the *Credential Manager* window (same as above).

• **Action Center**

Open the *Windows Action Center* that allows you to review recent messages and resolve problems that may have happened with your computer.

• **Broadcom Control Suite**

For computers with a Broadcom <u>network adapter</u> or <u>motherboard</u> Broadcom <u>chipset</u>, the *Broadcom Advanced Control Suite* has network adapter settings, diagnostics, and statistics.

• **Color Management**

Opens the *Color Management* window that allows you to adjust the color settings for your display device and calibrate your display.

• **Desktop Gadgets**

Show the available <u>gadgets</u> available for the Windows desktop of computers running Windows 7 and Windows Vista.

- **Device Manager**

Opens the Windows <u>Device Manager</u> to list detected computer <u>hardware</u>, change hardware settings, and add and remove hardware devices.

- **Display**

Configure the display settings of your computer and your computer screen. Includes the ability to adjust the <u>resolution</u>, calibrate the color, change display settings, adjust <u>ClearType</u> text, and set custom text size (<u>DPI</u>).

- **Fonts**

Opens the *Fonts* window that shows all installed <u>fonts</u> on the computer.

- **Getting Started**

Start the *Getting Started guide* that helps you learn more about Windows by linking you to guides on how to use Windows and important areas of the computer.

- **Indexing Options**

Opens the *Indexing Options* window that shows how many files are <u>indexed</u> and allows you adjust your indexing preferences.

- **Keyboard**

Opens the *Keyboard Properties* window to adjust the <u>keyboard</u> settings such as the character repeat delay and rate settings and the cursor blink rate.

- **Language**

Opens the *Language* window that allows you to adjust, add, and remove the display language and the input and handwriting language.

- **Location and Other Sensors**

Add and configure sensors and get direct access to the Location Activity in the Event Viewer.

- **Mouse**

Opens the *Mouse Properties* window to configure all your <u>computer mouse</u> settings.

- **Network and Sharing Center**

Opens the *Network and Sharing Center* or *Network and Sharing* window to view basic networking information, set up a new connection, and troubleshoot network problems.

- **Notification Area Icons**

Change the settings of the notification icons that appear on the <u>Windows Notification Area</u>. In this area, you can adjust what icons should be shown and what icons should be hidden.

- **NVIDIA Control Panel**

For computers with <u>NVIDIA</u> <u>video cards</u> gives you access to the NVIDIA Control Panel, which gives you more advanced display settings for your video card.

- **Parental Controls**

Setup and control Parental Controls for user accounts using the Windows Live Family Safety in Windows 7 and earlier versions of Windows. In Windows 10, this area has changed to "Family options" and is part of the Windows Defender Security Center.

- **Performance Information and Tools**

View the rating of your computer and tips you can do to help improve the computer's performance. With the introduction of Windows 8, this option is no longer available for Windows 8 and Windows 10.

- **Personalization**

Opens the *Personalization* window that gives you access to change the desktop background, change themes, adjust sounds, and adjust the screen saver. With Windows 10, this option has been moved into the "Themes and related settings" section.

- **Phone and Modem**

Opens the *Phone and Modem settings* that allow you to specify your modem dialing rules and add, remove, and change the properties of the installed modem in the computer.

- **Power Options**

Opens the *Power Options* window to adjust the computer's power plan settings, which are the settings that tell the computer when to go to sleep (Standby) or hibernate.

- **Programs and Features**

Opens the *Programs and Features* window that allows you to change, repair, and uninstalled any program that is installed on the computer.

- **Realtek HD Audio Manager**

If a Realtek sound card is installed with its software, this option opens the Realtek HD Audio Manager to adjust the sound card settings and other audio properties.

- **Recovery**

Opens the *Recovery tools* window that allows you to create a recovery drive, open System Restore, and configure System Restore.

- **Region**

Opens the *Region* window that allows you to change the date and time formats and the first day of the week. In Windows 7 and earlier, this area was called "Region and Language."

- **RemoteApp and Desktop Connections**

Connect to and add new RemoteApp connections.

- **Security and Maintenance**

View the system security settings (e.g., the Network firewall, virus protection, Internet security settings, and User Account Control). In Security and Maintenance, you're also able to adjust your maintenance settings.

- **Sound**

Opens the *Sound settings* that allows you to adjust the playback, recording, and sounds settings on the computer.

- **Speech Recognition**

Open the *Speech Recognition* window that allows you to open the following areas.

  - ➢ *Start Speech Recognition -* Start using your voice to control your computer.
  - ➢ *Set up microphone -* Set up your computer to work properly with Speech Recognition.
  - ➢ *Take Speech Tutorial -* Learn to use your computer with speech. Learn basic commands and dictation.
  - ➢ *Train your computer to better understand you -* Read text to your computer to improve your computer's ability to understand your voice.
  - ➢ *Open the Speech Reference Card -* View and print a list of common commands to keep with you, so you always know what to say.

- **Storage Spaces**

Manage Storage Spaces that allow you to save files to two or more drives to help protect your computer in case of a drive failure and add more drives when you run low on disk capacity.

- **Sync Center**

View recent sync activity, sync now, or change your sync settings.

- **System**

Opens the *System information* section to display computer information. Information includes the version of Windows, processor speed, RAM, if it's 32-bit or 64-bit, if pen or touch is enabled, computer name, workgroup, and if Windows is activated.

- **Taskbar and Navigation**

Opens the *Taskbar* settings that allow you to change how the Taskbar is shown or hidden, its location, icons, and other settings.

- **Troubleshooting**

Opens the *Troubleshooting* window to troubleshoot software programs, hardware and sound, network and Internet, and system and security areas.

- **User Accounts**

Opens the *User Accounts* window to make changes to your user account, change your account type, manage another account, and change User Account Control settings.

- **Windows Anytime Upgrade**

Discontinued option that allowed you to upgrade your version of Windows.

- **Windows CardSpace**

In Windows 7, the Windows CardSpace Control Panel option allows you to add, view, and edit CardSpace card data. Microsoft has discontinued Windows CardSpace.

- **Windows Defender**

In Windows 7 and earlier, this Control Panel option allows you to view and edit Windows Defender options. In Windows 10, this option has been moved into the Windows Defender Security Center.

- **Windows Firewall**

View the Windows Firewall status and adjust settings.

- **Windows Live Language Setting**

Gives you the ability to download and adjust the languages for Windows Live programs.

- **Windows To Go**

Setup and configure the Windows To Go options.

- **Windows Update**

View the available Windows updates available for download and install, change your update settings, view your update history, and other update related settings.

- **Work Folders**

Manage and set up Work Folders that allow other devices to access your files, even when offline.

Summary

- The title bare offers the handling the feature of window like expanding window etc.
- Control panel handle all setting of computer system.
- Windows accessories comes under which we explained multimedia and magnifier.
- Search folder is used for searching the files and folder in computer system memory.

Keywords

Title bar: The title bar is the bar that runs horizontally across an application window. The title bar will contain either the name of the file for example, a document we are viewing or the website we are viewing through Internet browser. Find out how to use, customize and install add-ins to title bars.

Appearance and Personalization :The Appearance and Personalization category allows you to change the look and feel of Windows, which includes adjusting the theme, screen saver, and taskbar.

Microsoft Edge: Microsoft Edge is the new browser for Windows 10 and is the successor to Internet Explorer 11, although Internet Explorer will remain for compatibility and legacy purposes. Cortana has been integrated into Edge, accessible by the option "Ask Cortana" in the right click menu, as well as a Reading View and the ability to write notes directly on web pages and save to OneNote.

Cortana: Cortana is a virtual assistant developed by Microsoft which uses the Bing search engine to perform tasks such as setting reminders and answering questions for the user.

Windows: Windows is a desktop operating system developed by Microsoft. For the past three decades, Windows has been the most popular operating system for personal computers.

Lab Exercises
1. Explain all Windows Accessories.
2. Search Files or Folders.

Self Assessment

1. Name the application that provides detailed information about file, folder and drives.
   a. Application Icon
   b. Gadgets
   c. Windows Explorer
   d. None of these

2. What is the new built-in browser included in Windows 10?
   a. Edge
   b. Safari
   c. Opera
   d. Super Internet Explorer Pro

3. Windows 10 was launched in which year?
   a. 2012
   b. 2013
   c. 2014
   d. 2015

4. Features of windows include:
   a. Running several programs simultaneously
   b. Switching between open applications
   c. Multitasking
   d. All of these

5. Small images that represent commands, files, applications, or other windows are:
   a. Jpegs
   b. Icons
   c. Snips
   d. Application

6. From where you can change the mouse setting?
   a. Setting->mouse
   b. Hardware Setting
   c. Control panel->mouse
   d. None of these

7. Which key is used to close the active window?
   a. Ctrl+F4
   b. Ctrl+F5
   c. Alt+F6

    d.   Alt+F7

8. Software can be removed and installed through_____

    a.   Control Panel

    b.   Installer

    c.   Debugger

    d.   Linker

9. Which of the following is not the element of computer desktop?

    a.   Icons

    b.   Taskbar

    c.   Start Button

    d.   Title bar

10. Which component consists of number of different applets which helps in changing the settings of a computer system?

    a.   Control panel

    b.   Desktop

    c.   Icons

    d.   Taskbar

11. Which file extension is used to compress the files to save disk space?

    a.   .ppt

    b.   .pdf

    c.   .zip

    d.   .doc

12. File which contains the other file names is known as

    a.   Path file

    b.   Batched file

    c.   Directory

    d.   Path name

13. Which of the following is not an image file extension?

    a.   .jpeg

    b.   .jpg

    c.   .doc

    d.   .png

14. You organize files by storing it in _____

    a.   namespaces

    b.   rings

    c.   drawers

    d.   folders

15. A file _____ shows the location of a file or folder

    a.   Matrix

    b.   Run

    c.   Path

    d.   Circuit

Answers for Self-Assessment

1. c	2. a	3. d	4. d	5. b
6. c	7. a	8. a	9. d	10. a
11. c	12. c	13. c	14. d	15. c

Review Question

1. What Is the Purpose of Microsoft Windows?
2. Define role of taskbar.
3. Explain any 5 applets of Control Panel.
4. Explain different features of Windows 10.
5. What is the use of Cortana in windows 10?
6. Write down the steps to search a special file or folder in your computer system.

Further Readings

Computer Basics Absolute Beginner's Guide, Windows 10 Edition,

https://edu.gcfglobal.org/en/windowsbasics/all-about-windows/1/

Unit 05- MS Word

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Purpose and Objective

Introduction

5.1   View of Microsoft Word Window

5.2   Creating a New Document

5.3   Navigation in a Document

5.4   Editing text

5.5   Moving and copying text and object

5.6   Using Clipboard

5.7   Formatting Text

Summary

Keywords

Self-Assessment Questions

Review Questions

Further Reading

Purpose and Objective

- After studying this unit, you will be able to
- Understanding and explanation of Microsoft Word
- Explanation of word environment in micro soft word
- Process of using or creating a word document.
- Explanation of editing in a word document
- Process of saving a document in word.
- Explanation of opening a document.
- Process of finding files.
- Understanding of word document views

Introduction

When you use a computer program to create, edit, and format text documents, you are performing a task known as Word Processing. Part of the Microsoft Office 2013 suite of programs, Microsoft Word 2013 is one of the most sophisticated word processing programs available. By using Word, it is easy to efficiently create a wide range of business and personal documents, from the simplest letter to the most complex report. Word includes many desktop publishing features that you can use to enhance the appearance of documents so that they are visually appealing and easy to read.

You can use Word to:

•   Create professional-looking documents that incorporate impressive graphics.

•   Give documents a consistent look by applying styles and themes that control the font, size, color, and effects of text and the page background.

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• Store and reuse pre-formatted elements such as cover pages and sidebars.

• Create personalized mailings to multiple recipients without repetitive typing.

• Make information in long documents accessible by compiling tables of contents, indexes, and bibliographies.

• Coauthor documents with team members.

• Safeguard documents by controlling who can make changes and the types of changes that can be made, as well as by removing personal and confidential information.

5.1 View of Microsoft Word Window

The program window contains the following elements:

r displays the name of the active
and the program window.
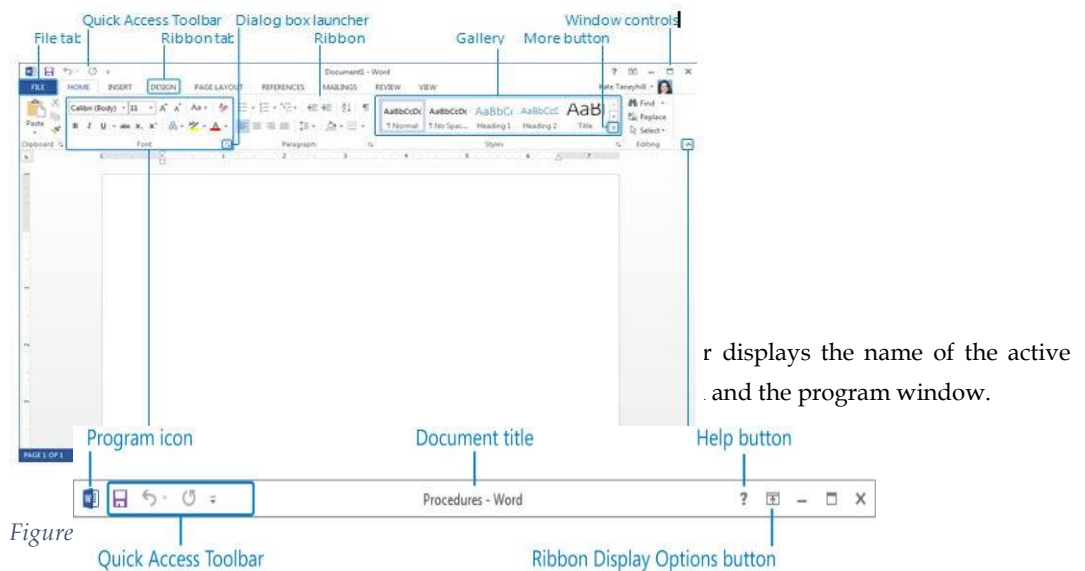
Figure

At the left end of the title bar is the program icon, which you click to display commands to restore, move, size, minimize, maximize, and close the program window.

To the right of the program icon is the Quick Access Toolbar, which by default displays the Save, Undo, and Redo buttons. You can customize the Quick Access Toolbar to display any commands you want.

At the right end of the title bar are five buttons: the Microsoft Word Help button that opens the Word Help window; the Ribbon Display Options button that allows you to entirely hide the ribbon, display only the ribbon tabs, or display the ribbon tabs and commands; and the familiar Minimize, Maximize/Restore Down, and Close buttons.

• **Ribbon Below the title bar:-**all the commands for working with a Word document are gathered together in this central location so that you can work efficiently with the program
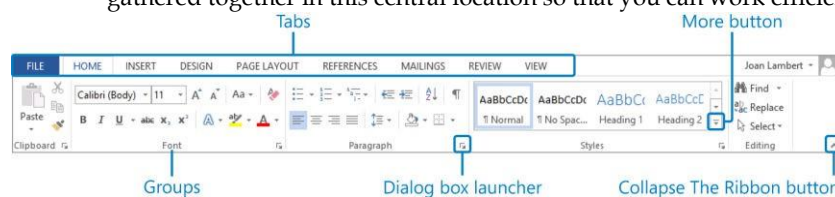
Across the top of the ribbon is a set of tabs. Clicking a tab displays an Associated set of commands.

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Commands related to managing Word and Word documents (rather than document content) are gathered together in the Back stage view, which you display by clicking the colored File tab located at the left end of the ribbon. Commands available in the Back stage view are organized on pages, which you display by clicking the page tabs in the colored left pane. You redisplay the document and the ribbon by clicking the Back arrow located above the page tabs.

Commands related to working with document content are represented as buttons on the remaining tabs of the ribbon. The Home tab, which is active by default, contains the commands most Word users will use most often. When a graphic element such as a picture, table, or chart is selected in a document, one or more tool tabs might appear at the right end of the ribbon to make commands related to that specific object easily accessible. Tool tabs are available only when the relevant object is selected.
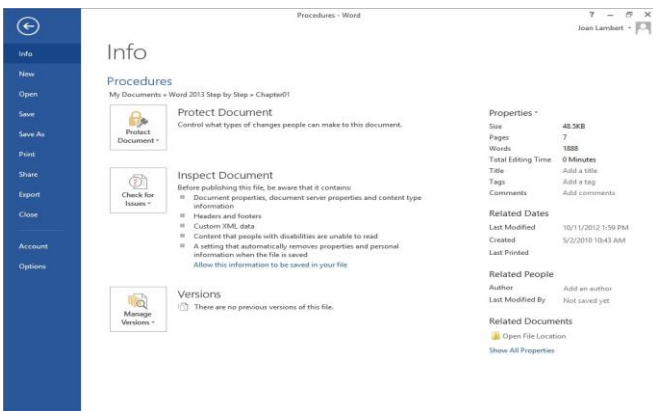
Figure 2 The Backstage view, where you can manage files and customize the program.

in the available ribbon space, you can display more content by clicking the scroll arrow or more button located on the right edge of the gallery.

Related but less common commands are not represented as buttons in a group. Instead, they're available in a dialog box or pane, which you display by clicking the dialog box launcher located in the lower-right corner of the group.

To the right of the groups on the ribbon is the Collapse the Ribbon button, which is shaped like a chevron. Clicking this button hides the groups of buttons but leaves the tab titles visible. When the groups are hidden, the Collapse the Ribbon button changes to the Pin.

The Ribbon button, which is shaped like a pushpin. You can click any tab title to temporarily display the groups, then click a ribbon command or click away from the ribbon to hide the groups again, or click the Pin The Ribbon button to permanently redisplay the groups.

KEYBOARD SHORTCUT:- Press Ctrl+F1 to unpin or pin the ribbon.

- **Status bar:** - Across the bottom of the program window, this bar displays information about the current document and provides access to certain program functions.

Figure 3 I

Figure 4 Status Bar

By default, Word displays the Page Number, Word Count, Spelling And Grammar Check, and Macro Recording indicators at the left end of the status bar. Each of these indicators on the left displays at a glance the status of that feature; clicking any of these indicators displays the related pane or dialog box.

At the right end of the status bar, Word displays by default the View Shortcuts, Zoom Slider, and Zoom Level controls. The View Shortcuts toolbar includes buttons for the three primary document

content views. The Zoom Slider and Zoom Level controls enable you to adjust the magnification of the active document.

You can display the content of the active document in five views: **Draft view, Outline view, Print Layout view, Read Mode view, and Web Layout view.** All views are available from the View tab; Read Mode, Print Layout, and Web Layout views are available from the View Shortcuts toolbar on the status bar. You carry out most of the development work on a document in Print Layout view, which is the default.

5.2 Creating a New Document

By default, Word displays the Page Number, Word Count, Spelling and Grammar Check, and Macro Recording indicators at the left end of the status bar. Each of these indicators on the left displays at a glance the status of that feature; clicking any of these indicators displays the related pane or dialog box.

At the right end of the status bar, Word displays by default the View Shortcuts, Zoom Slider, and Zoom Level controls. The View Shortcuts toolbar includes buttons for the three primary document content views. The Zoom Slider and Zoom Level controls enable you to adjust the magnification of the active document.

You can display the content of the active document in five views: Draft view, Outline view, Print Layout view, Read Mode view, and Web Layout view. All views are available from the View tab; Read Mode, Print Layout, and Web Layout views are available from the View Shortcuts toolbar on the status bar. You carry out most of the development work on a document in Print Layout view, which is the default.

Steps to create a New Blank document

    1.   Select File->New
    2.   Select Blank Document from listed Templates

    3.   Click on Create.
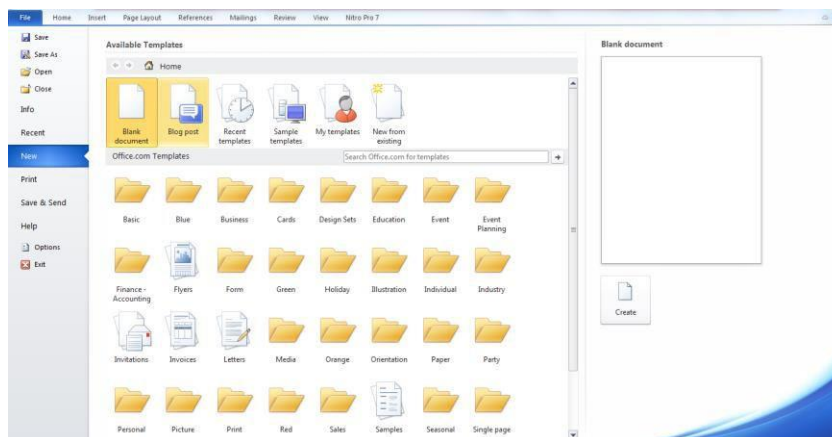
Figure 5 The New page of the Backstage view provides access to document Templates saved locally (on your computer) and online.

Saving a Document

Each document you create is temporary, indicated by a file name such as Document1, until you save it. To save a document for the first time, you click the Save button on the QuickAccess Toolbar or click Save in the Backstage view. Either action displays the Save As page of the Back stage view, where you can choose a storage location, assign a name, attach metadata tags, and specify a file type for the document. When you choose a location on the Save As page, the Save As dialog box opens displaying that location in the Address bar at the top of the dialog box. If you want to save the

document in a folder other than the one shown in the Address bar, you can click the arrow s in the Address bar or click locations in the Navigation pane on the left to display the folder you want. If Figure 8- The Save As page of the Backstage view provides links to identify existing and new locations in which to save documents. 40 you want to create a folder in which to store the document, you can click the New Folder button on the toolbar. But when someone wants to create a duplicate of the current document in same or different location, Save as ….. is used from File menu.
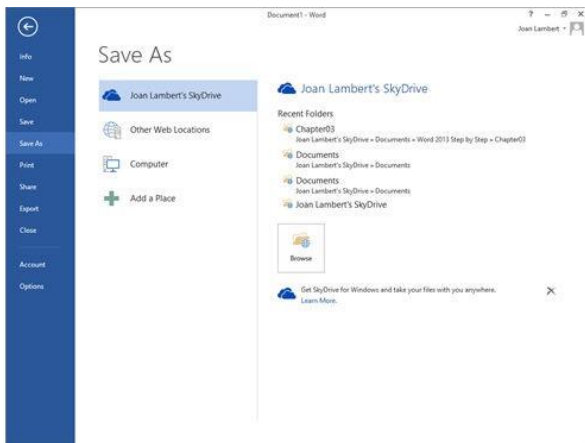
Opening a Document

Click the Open page tab. This page displays locations from which you can open existing documents as well as a list of the documents you recently worked on. The content of the Places list varies based on your available resources.
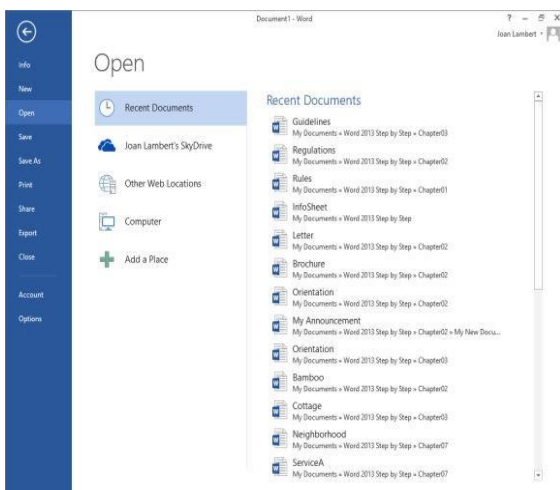
Did you Know? By default, the Recent Documents list displays a maximum of 20 documents. You can change this number on the Advanced page of the Word Options dialog box.

Closing a document

As you know Microsoft word is an application in Windows, which allows to open

multiple documents at a time side by side. Closing represents to close the active

document which can be done by

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1. Click the File tab, and then click Close.

2. Or, press Ctrl+W.

3. Or, Press Ctrl+F4(Function key)

4. Or, Click on the Close Button from the Document Window

Exiting a word document

Exit Word means to close all documents from the Application Microsoft word and Close the Application. This can be done by:

1. Click the File tab, and then click Exit.

2. Or, Press Alt+F4(Function key) Or, Click on the Close Button from the Document.

5.3 Navigation in a Document

Navigation means the way of cursor movements in a document efficiently to work more effectively.

Navigation with Keyboard

These keyboard shortcuts help you to move in a document faster and easily so that you can work more efficiently

Table 1 List of keyboard shortcuts for Navigation

Cursor movement	Key or keyboard shortcut
Left one character	Left Arrow
Right one character	Right Arrow
Up one line	Up Arrow
Down one line	Down Arrow
Up one paragraph	Ctrl+Up Arrow
Down one paragraph	Ctrl+Down Arrow
Left one word	Ctrl+Left Arrow
To the beginning of the current line	Home
To the end of the current line	End
To the beginning of the document	Ctrl+Home
To the end of the document	Ctrl+End
To the top of the window	Alt+Ctrl+Page Up
To the bottom of the window	Alt+Ctrl+Page Down
Up one screen	Page Up
Down one screen	Page Down
To the beginning of the previous page	Ctrl+Page Up
To the beginning of the next page	Ctrl+Page Down
To a previous revision	Shift+F5
Immediately after opening, to where you were working when you last closed	Shift+F5

Navigation with Go To

On the Home tab, in the Editing group, click the Find arrow (not the button), and then click Go To to display the Go To page of the Find and Replace dialog box.

KEYBOARD SHORTCUT: Press Ctrl+G to display the Go To page of the Find And Replace dialog box.
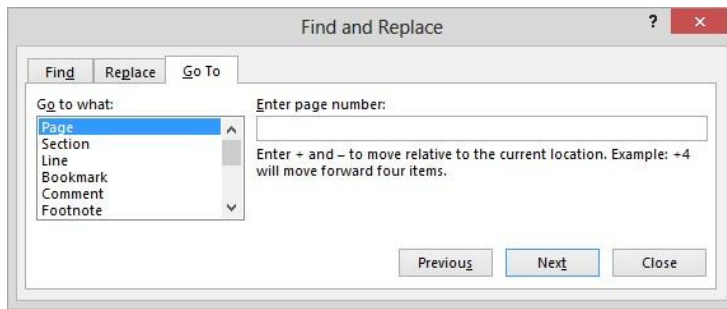
Figure 6 Go to in Find and Replace Box

5.4 Editing text

Editing documents in Word is just as simple as entering text in a blank document. By clicking within the body of the document, you can add text. By default, Overwriting is turned off, which means text to the right of the insertion point will be moved to the right. It is important to note, however, that if you highlight part of your document and then start typing, the highlighted portion will be deleted and the new text will appear in its place; it doesn't matter whether you have hard returns, images, tables, or text highlighted, the results will be the same. In the event you accidentally delete part of your document, you can use the Undo feature (ctrl+z)- to undo up to 100 changes you have made to your document. If you want to delete portions of your document, you can simply highlight the portion you would like to delete and press the delete key; unless you've changed Word options, Word will automatically correct the spacing at the point of the deletion. To delete individual elements of your document, you have two options: The delete key will delete objects to the right of the insertion point, while the backspace key will delete objects to the left of the insertion point.

5.5 Moving and copying text and object

Perhaps the most important benefit of word processing over typewriter use is the ability to move and copy objects and blocks of text. There are many ways of accomplishing move and copy operations in Word, so you can select whatever method is most comfortable for you or makes the most sense in a particular situation. The following sections explain the various move and copy operations and the differences between them.

Moving or Copying Text with Drag-and-Drop

Drag-and-drop operations are popular because they most closely resemble the way you do things outside the computer. (Yes, there really is a life outside the computer!) When you want to move something in your living room, you pick it up and reposition it. Or if it's heavy, like a piece of furniture, you drag it and drop it. You can do the same thing with objects and with blocks of selected text in Word.

For a standard drag-and-drop operation, follow these steps:

1. Select the text or object(s) you want to move or copy.
2. To copy, hold down the Ctrl key. You don't have to hold anything down if you want to move.
3. 3. Position the mouse over the selection, and then click and hold down the left mouse button on it.

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4.   4. Still holding down the left mouse button, drag the selection to a new location. Then release the mouse button.

There are additional drag-and-drop options; to see them, use the right mouse button rather than the left one in the preceding steps. (Don't hold down the Ctrl key if you are using the right mouse button.) When you release the mouse button in step 4, a shortcut menu appears with these choices on it:

• Move Here—The default operation; the same as regular dragging with the left mouse button.

• Copy Here—The same as holding down the Ctrl key with the left-mouse-button drag.

• Link Here—Creates a copy that retains a link to the original location, such that if the original changes, this copy changes too.

• Cancel—Cancels the current drag-and-drop operation.

Using Cut, Copy, and Paste

One of the complaints that many people have with drag-and-drop is that they are simply not coordinated enough to manage positioning the mouse pointer in exactly the right spot while holding down keys and mouse buttons. People who have this problem may prefer to use the Cut, Copy, and Paste commands instead. Cut and Copy are very similar operations. Cut removes the selection from the document and places it on the Clipboard, which is a hidden holding area; Copy leaves the selection as is and places a copy of it on the Clipboard. After a Cut or Copy operation, you can then use Paste to place the Clipboard's content at the insertion point location. There are actually two Clipboards—the Windows Clipboard and the Office Clipboard. The Windows Clipboard holds only one item at a time; when you place a second item on that Clipboard, the first item is erased from it. The Office Clipboard has multiple slots for holding content. It uses the Windows Clipboard for one slot, but it can also hold 23 other items at the same time. I explain more about the Office Clipboard later in the chapter. Word offers ribbon, keyboard, and right-click methods for issuing the Cut, Copy, and Paste commands.

Cut, Copy, and Paste Methods			
	Cut	**Copy**	**Paste**
Click these buttons on the Home tab:	✂	📋	📋
Press these shortcut keys:	Ctrl+X	Ctrl+C	Ctrl+V
Right-click your selection and then choose one of these commands:	Cut	Copy	Paste

If you would like to save something from the Clipboard so that it can be used later, but you don't want to save it in Word The Paste Special command enables you to define the format of the pasted copy, and in some circumstances also create a dynamic link to the original.

5.6 Using Clipboard

Use the Clipboard task pane to access the Office Clipboard's 24 separate areas for storing clips. By default, the Clipboard pane is fixed in location and size, but you can click the down arrow in its top-right corner for a menu from which you can move and resize it.

Each time you copy something to the Clipboard, it is added to the Clipboard task pane's list, with the most recently added items at the top. To paste an item from it, position the insertion point and then click that item in the Clipboard task pane. To paste all the items at once, click Paste All.

To **remove** a single item from the Clipboard task pane, right-click the item and click Delete. (Alternatively, you can point at the item until a down arrow appears to its right. Click that down arrow to open the same menu as with right-clicking; then click Delete.)

To **clear** the entire Clipboard at once, click the Clear All button at the top. Clearing the Office Clipboard also clears the Windows Clipboard.

To **fine-tune** how the Office Clipboard works, click the Options button. A menu appears with these options on it:

• **Show Office Clipboard Automatically**—Displays the Office Clipboard automatically when copying items.

• Show Office Clipboard when Ctrl+C Pressed Twice— Displays the Office Clipboard when Ctrl+C is pressed twice.

• Collect Without Showing Office Clipboard—Copies items to the Office Clipboard but does not show the task pane unless you specifically call for it (by pressing Ctrl+C twice, for example).

• Show Office Clipboard Icon on Taskbar—Displays an Office Clipboard icon in the notification area of the taskbar (near the clock) whenever the Office Clipboard is active. You can double-click that icon to display the Office Clipboard in the active application. (Remember, all Office apps share the Office Clipboard.)

•Show Status Near Taskbar When Copying—Pops up a message near the Office Clipboard icon when something has just been copied to the Clipboard.
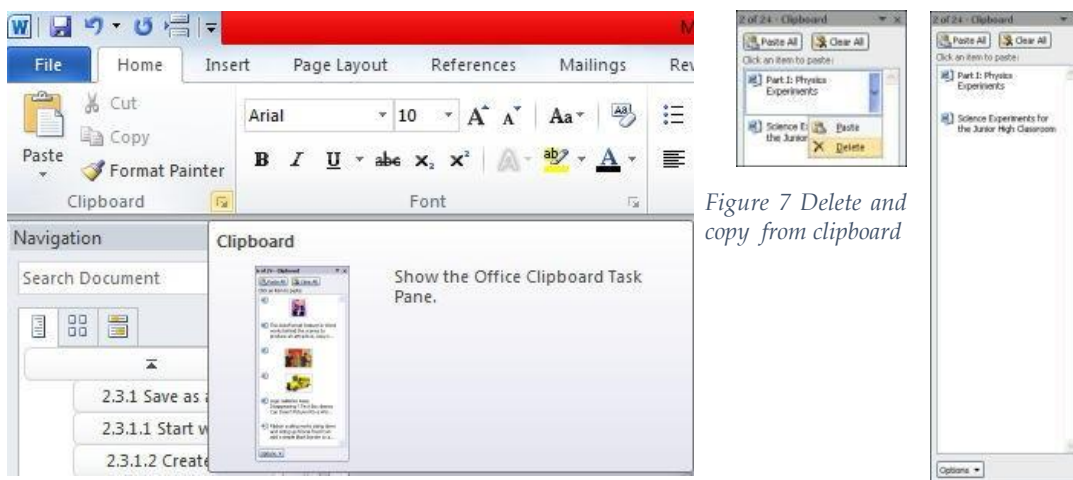
Figure 7 Delete and copy from clipboard

5.7 Formatting Text

The appearance of your documents helps to convey their message. Microsoft Word 2013 can help you develop professional-looking documents whose appearance is appropriate to their contents. You can easily format words and paragraphs so that key points stand out and the structure of your document is clear. You can also change the look of major elements within a document by applying predefined sets of formatting called styles, and you can change the look of selected text by applying predefined combinations called text effects. In addition, you can change the fonts, colors, and effects throughout a document with one click by applying a theme.

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Applying styles to text

You don't have to know much about character and paragraph formatting to be able to format your documents in ways that will make them easier to read and more professional looking. With a couple of mouse clicks, you can easily change the look of words, phrases, and paragraphs by using styles. More importantly, you can structure a document by apply- ing styles that are linked to outline levels. In doing so, you build a document outline that is reflected in the Navigation pane and can be used to create a table of contents. Styles can include character formatting (such as font, size, and color), paragraph formatting (such as line spacing and outline level), or a combination of both. Styles are stored in the template that is attached to a document. By default, blank new documents are based on the Normal template. The Normal template includes a standard selection of styles that fit the basic needs of most documents. These styles include nine heading levels, various text styles including those for multiple levels of bulleted and numbered lists, index and table of contents entry styles, and many specialized styles such as those for hyperlinks, quotations, placeholders, captions, and other elements.
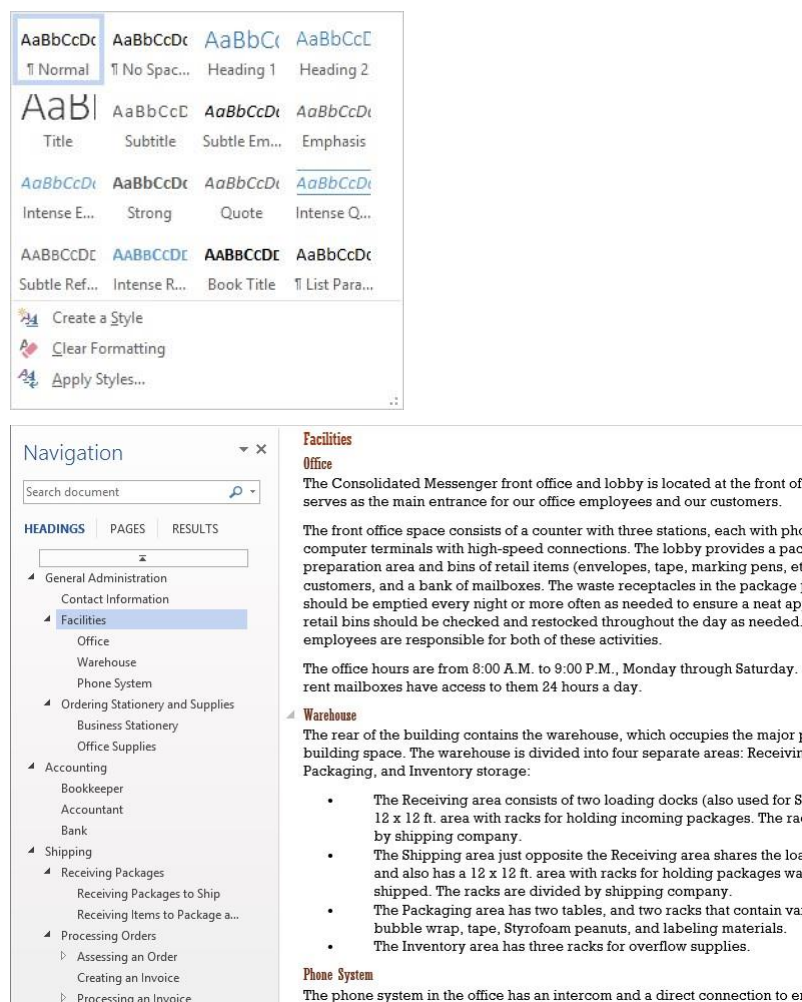
Figure 8 Heading styles define a document outline

Styles stored in a template are usually based on the Normal style and use only the default body and heading fonts associated with the document's theme, so they all go together well. For this reason, formatting document content by using styles produces a harmonious effect. After you apply styles from the current style set, you can easily change the look of the entire document by switching to a different style set, which associates different formatting rules with the same styles. So if you have applied the Heading 1 style to a paragraph, you can change its formatting simply by changing the style set. Style sets are available from the Document Formatting menu on the Design tab.

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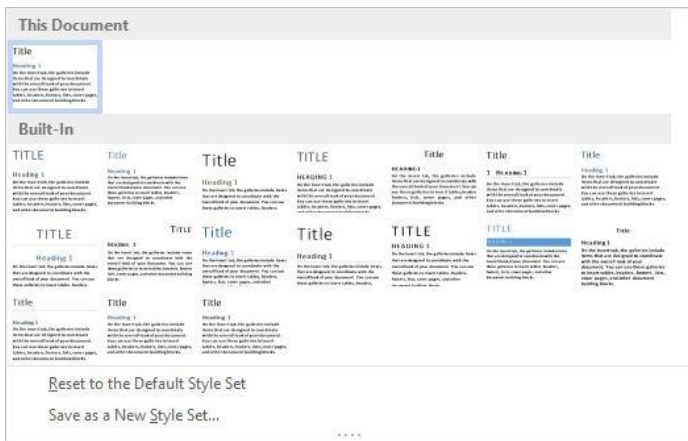
Figure 9 - Pointing to a style set in the gallery displays a live preview of the effects

Applying Borders and Shading

To enhance the appearance of the text in a paragraph, you can quickly add a border and shading to selected text. When you add a border, you can specify what sides you want to include or exclude. For example, you can add a border on just the top and the bottom and leave the sides open. Shading colors the background behind the selected text or paragraph. If you want to customize borders and shading by changing line style, color, and width preferences, you can make changes in the Borders and Shading dialog box.

Figure 10 Border Color
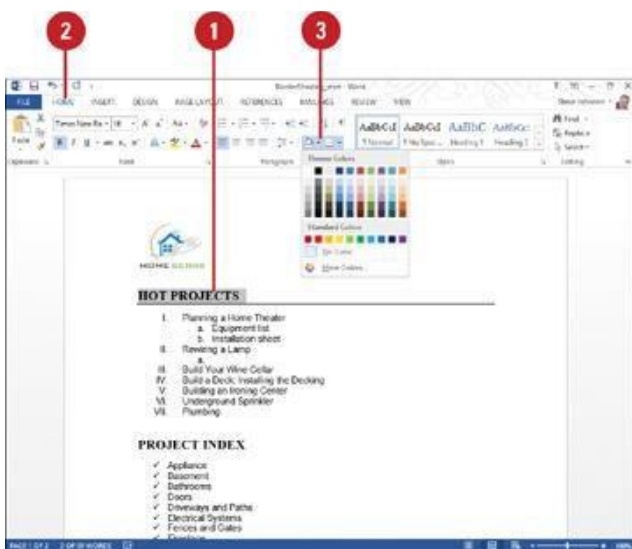
Apply a Border

Select the paragraph text you want to format.

• Click the Home tab.

• Click the Borders and Shading button arrow, and then click Figure Border Color to select the border commands to add or remove a border.

Apply Paragraph Shading and Borders

1. Select the paragraph text you want to format.
2.   Click the Home tab.
3.   Click the Borders and Shading button arrow, and then click Borders and Shading.
4.   Click the Borders tab.
5.   . Click to select the type of Setting you want for your border.
6.   . Click to select the type of Style.
7.   . Apply any other options you want.
8.   . Look in the preview box to see the new border.
9.   Click the Shading tab.
10. Click to select the shading fill color you want to apply to your table.
11. . Apply any other options you want.
12. . Look in the preview box to see the new shading color.
13.   Click OK.
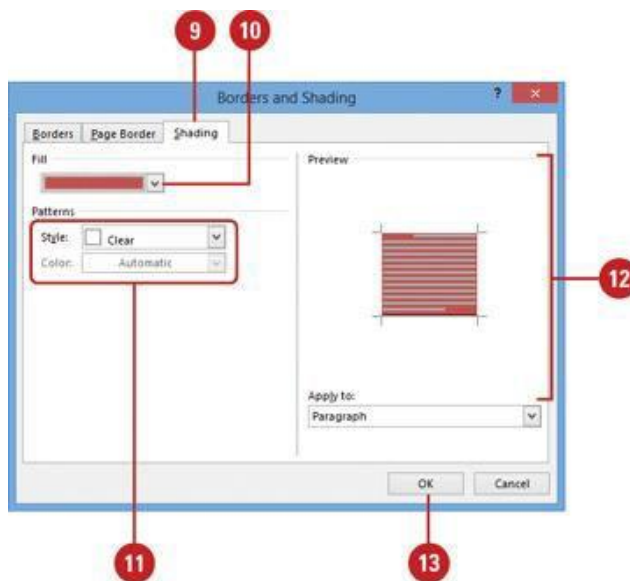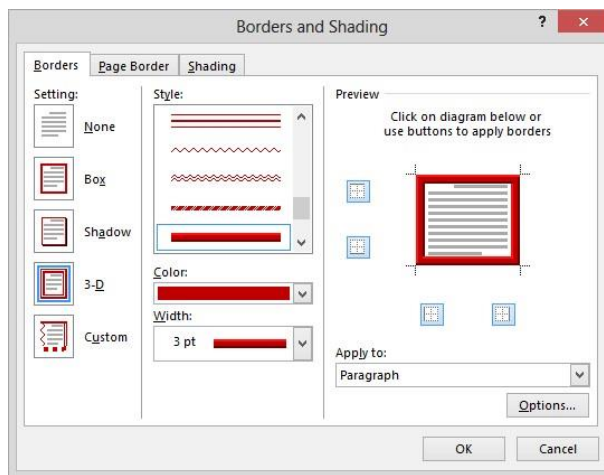
Figure 11 Shading Dialogue box

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Summary

- Word is a word processor, created by Microsoft Corporation, US.
- The word screen contains the title bar, Menu bar, Toolbars, Ruler and etc.
- World 2013 presents a new user interface which is quite different than previous of word.
- The word's document views contains normal views, outline, print layout, web layout and print preview.

Keywords

- **Insertion Point:** In graphics-based programs, the insertion point is the point where the next characters typed from the keyboard will appear on the display screen. A blinking vertical line usually represents the insertion point. You can reposition the insertion point by pressing the arrow keys or by moving the I-beam pointer.
- **Menu Bar:** A horizontal menu that appears on top of a window. Usually, each option in a menu bar is associated with a pull-down menu.
- **Backspace**: Remove characters to the LEFT of the insertion point.
- **Delete:** Remove characters to the RIGHT of the insertion point.

Self-Assessment Questions

1.The process of removing unwanted part of an image is called:

a) Hiding
b) Bordering
c) Cropping
d) Cutting

2.A number of letters that appears little above the normal text is called:

a) Superscript
b) Subscript
c) Supertext
d) Toptext

3.A number of letters that appears little below the normal text is called:

a) Superscript
b) Subscript
c) Supertext
d) Toptext

4.The direction of a rectangular page for viewing and printing is called:

a) Orientation
b) Direction
c) Print Layout
d) Preview

5.A word processor would most likely be used to do_____

a) Keep an account of money spent.

b) Do a computer search in media center.

c) Maintain an inventory.

d) Type a biography.

6.How many types of alignment options are available under paragraph ribbon?

a) 5

b) 6

c) 4

d) 3

7.Which is not in MS word?

a) Italic

b) Magic Tool

c) Font

d) Bold

8._____ is a word processing software package which is used to type letters, documents, reports etc.

a) MS Word

b) Notepad

c) Control Panel

d) Desktop

9.Which is not a Font Style?

a) Bold

b) Superscript

c) Italic

d) Regular

10.The default Page orientation of word document is___

a) Landscape

b) Long sides

c) Portrait

d) Double long side

11. The name of the document is displayed on _____

a) Ruler

b) Status bar

c) Title bar

d) View buttons

12. What is the shortcut key to underline a text?

a) Ctrl+B

b) Ctrl+C

c) Ctrl+U

d) Ctrl+E

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13.Ctrl+N is the shortcut key to open?

 a) A new file/document

 b) An existing file/document

 c) To save a file/document

 d) To print a file/document

14.Which of the following option is not available in paragraph palette?

 a) Bullets and numbering

 b) Color the background of the text

 c) Alignment of text

 d) Superscript and Subscript

15._____option we can customize our documents' view that help us in studying and documenting in different formats.

 a) Edit

 b) View

 c) Insert

 d) File

Answers for Self-Assessment Question

1. C	2. A	3. B	4. A
5. D	6. C	7. B	8. A
9. B	10. C	11. C	
12. C	13. A	14. D	15. B

Review Questions

1. Explain the various buttons displayed in the Preview window.
2. Briefly explain the use of Formatting toolbar in Word.
3. What is the function of the status bar in the Word? List down the information that is displayed in the status bar.
4. What are the various views available to see a document in Word?
5.

Further Reading

Fundamental Computer Skills, Feng-Qi Lai, David R. Hofmeister

http://books.google.co.in/bkshp?hl=en

Unit 06: MS Word

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Objectives

- Discussed finding and replacing the text in MS word.
- Explain proofing of documents and working with tables.
- Discussed about collecting of various spelling errors as will as the quick spelling errors.
- Discussed synonyms thesaurus and hyphenating documents.
- Explain the using and creating, insertion of Auto corrects and Auto text.

Introduction

The most basic function of MS Word is to create a document/file. Once a document has been created, the user may enter data—for example by typing some text. At any point after the document has been created, the user is allowed to save the contents. The document can then be accessed at a later time and modified as necessary. Documents can be printed out at any stage in this process.

6.1 Finding and Replacing Text

The Find and Replace option of Word is a convenient way of searching for a particular word in a document and replacing it with another. It can be used in situations where an error (not an error in spelling) has been committed consistently in a document and has to be corrected. The Find command moves to a specific point in the document quickly and the Replace command searches for and replaces the text.

This opens Word's Find and Replace window. In the "Find What" box, type the word or phrase you want to locate. If you only want to find text in your document, you can go ahead and click the "Find Next" button to have Word jump to the next occurrence of that word. Keep clicking it to browse through all the results.

If you want to replace the text you find with something else, type the replacement text into the "Replace With" box. You can enter up to 255 characters in the both the "Find What" and "Replace With" boxes, by the way.

Find Text

You can use the Navigation pane to search for specific words or phrases in a document.

1. Click Find on the Home tab.(The Navigation pane appears on the left, displaying the Results view.)

   SHORTCUT-> PRESS Ctrl+F.

2. Click in the **Search document** box in the Navigation pane and type the text you want to find.

   The search runs automatically. Results are highlighted in the document, and the Navigation pane lists all instances of the word.

3. Click a search result to jump to it in the document.You can use the arrows under the search box to jump to the Previous or Next search result.
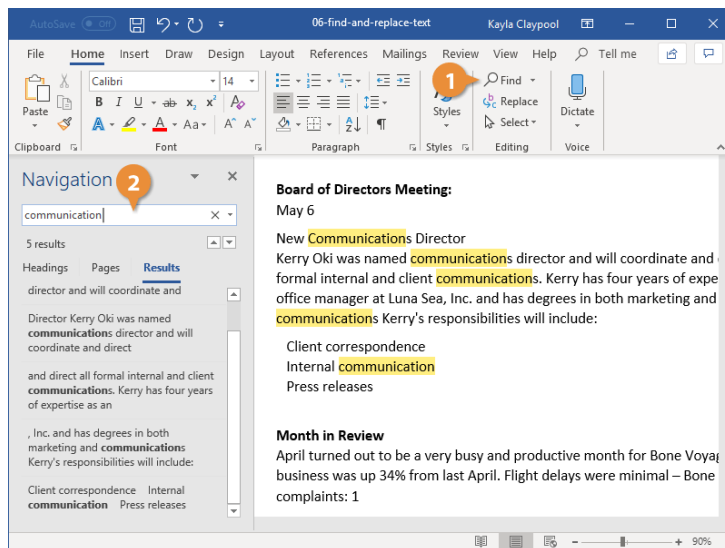
4. Click Close when your are finished.
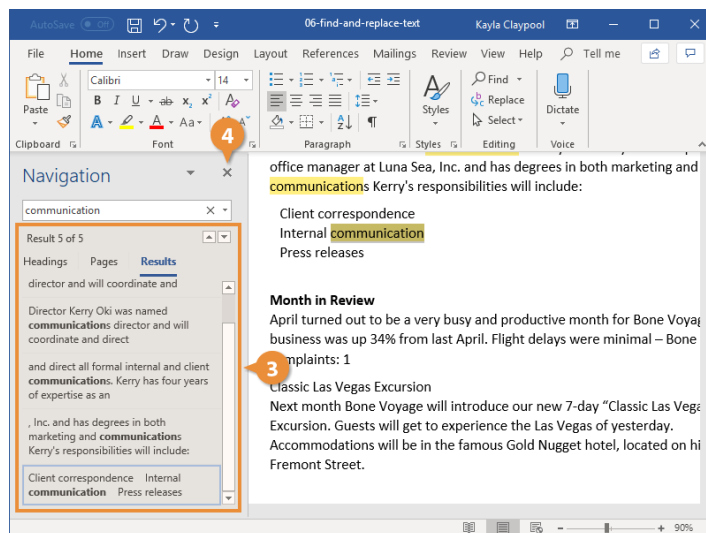
Advanced Find

To search your documents for more specific items, such as certain capitalization or only whole words, use Advanced Find.

1. Click Find button list arrow.
2. Select Advanced Find. The Find and Replace dialog box opens.
3. Type the word you're looking for in the Find box.

By default, the Find and Replace dialog box only shows the basics—a search field. There are more options available if you expand the dialog box.

4. Click the More button
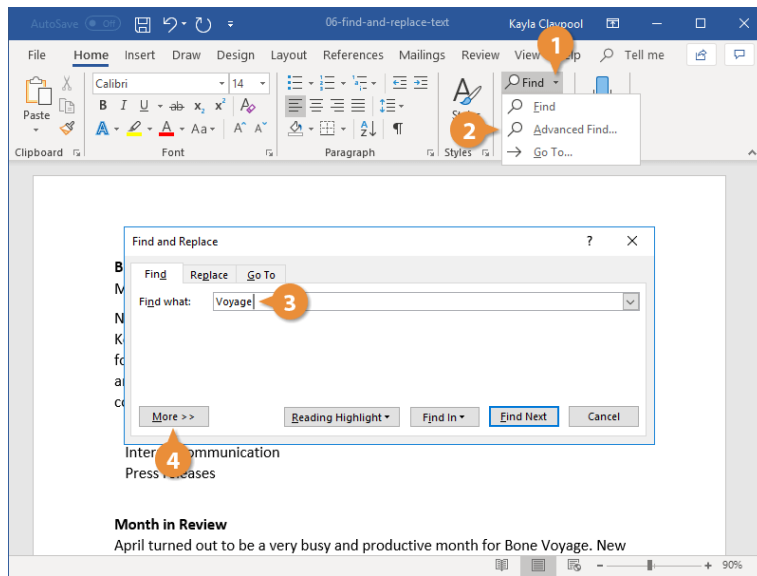
The advanced options here let you set some options on how to conduct the search.

5. Check the advanced criteria you want to use.

TIP: You can choose to exactly match the case or only search for whole words. You can also use wildcards, or ignore punctuation and spacing.

6. Click Find Next. Word navigates to and selects the next instance that fits the additional criteria.
7. Click Close when you're done.
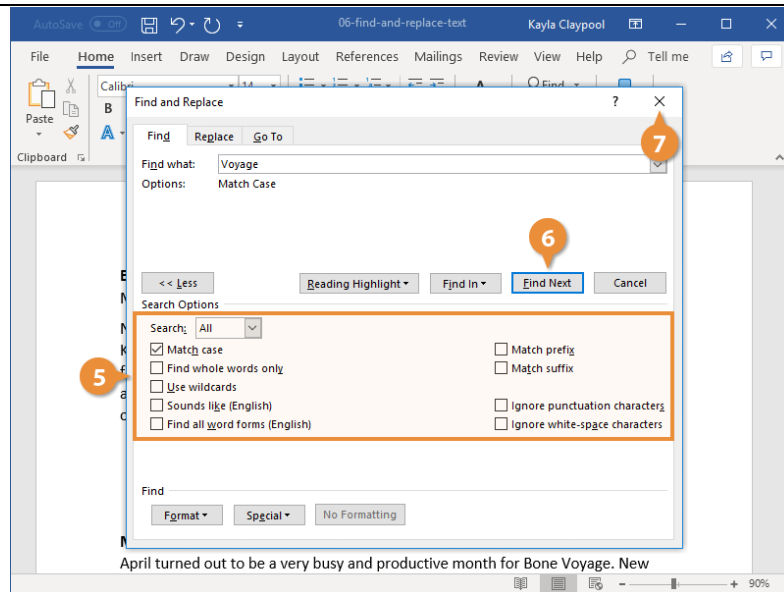
The Find and Replace dialog box closes.

Replace Text

If you've spelled something incorrectly in multiple places, Word can fix them all with just a few steps.

1. Click Replace on the Home tab. The Find and Replace dialog box opens to the Replace tab.
2. Type the word you need to replace in the Find what text field.
3. Type the word you need to replace in the Replace with text field.
4. Select a replacement option.
- Replace: Replaces the first instance of the word. Keep clicking to fix them one at a time.
- Replace All: Fixes all instances of the word at once.
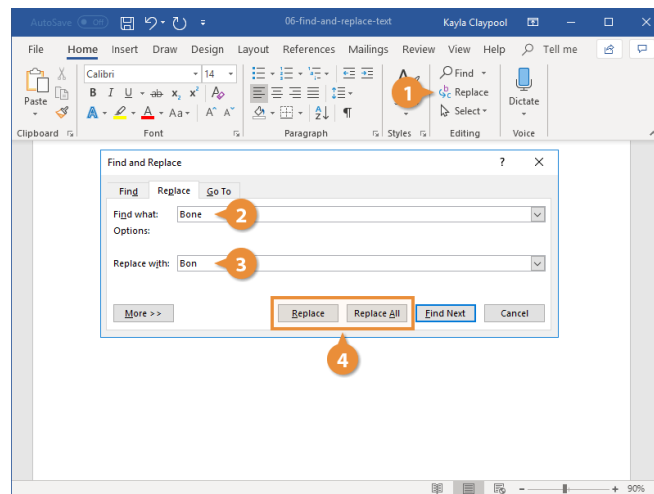
Once all the instances of the word have been replaced, a dialog box will pop up to let you know it's complete.

5. Click OK.
6. Click Close when you're done.
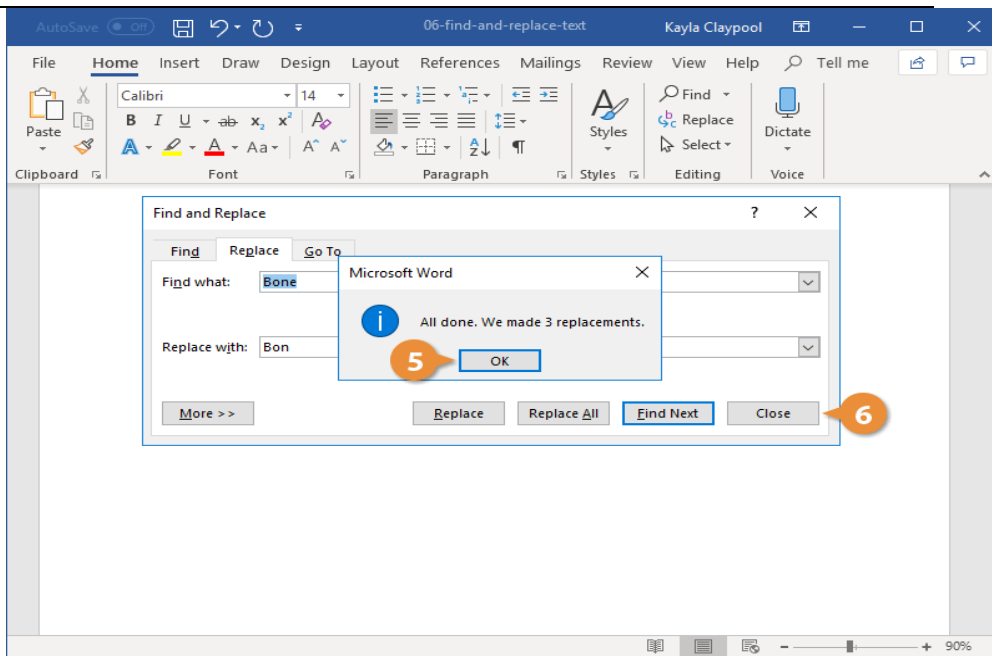
The Find and Replace dialog box closes.

6.2 Working with Table, Chart and Excel Spreadsheet in MSWord

A table is a structure of vertical columns and horizontal rows. Each column and each row can be identified by a heading, although some tables have only column headings or only row headings. The box at the junction of each column and row is a cell in which you can store data (text or numeric information).
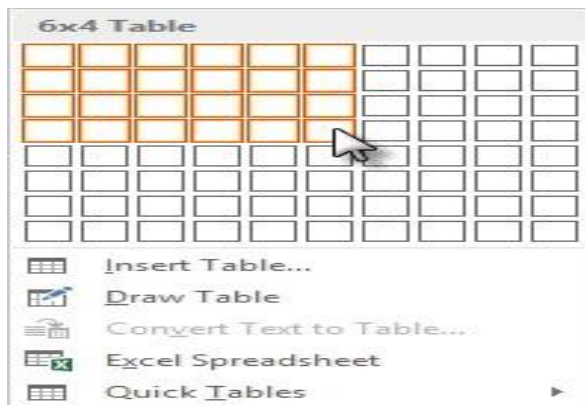
Creating Table

You can create tables in a Word document in the following ways:
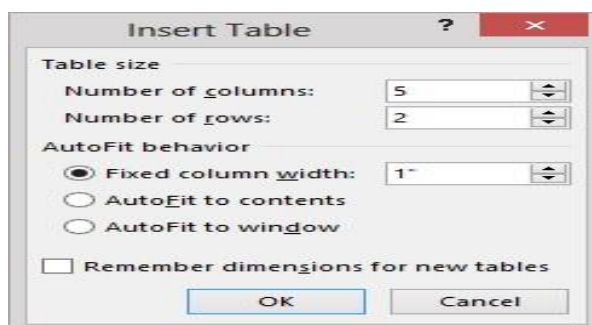
▪ To create a blank table of up to 10 columns and eight rows, click Table on the Insert tab. This displays the Insert Table gallery and menu. The gallery is a simple grid that represents columns and rows of cells. Pointing to a cell in the grid outlines the cells that would be included in a table

created by clicking that cell and displays a live preview of the prospective table. Clicking a cell in the grid inserts an empty table the width of the text column. The table has the number of rows and columns you indicated in the grid, with all the rows one line high and all the columns of an equal width.

▪ To create a more customized empty table, click Insert Table on the Insert Table menu. This displays the Insert Table dialog box, in which you can specify the number of columns and rows and the width of the table and its columns.

▪ To create a less clearly defined empty table, click Draw Table on the Insert Table menu. This displays a pencil with which you can draw cells directly in the Word document to create a table. The cells you draw connect by snapping to a grid, but you have some control over the size and spacing of the rows and columns. After drawing a base table, you can erase parts of it that you don't want and adjust the The intended table dimensions (expressed as columns x rows) are shown in the gallery header. You can create a custom- 95 table, column, and row size by using tools on the Layout tool tab for tables. TIP When drawing a table, you can display the rulers or gridlines to help guide you in placing the lines.

• To present data that already exists in the document (either as regular text or as a tabbed list) as a table, select the data and then click Convert Text to Table on the Insert Table menu. (Conversely, you can convert the active table to regular text by clicking Convert to Text in the Data group on the Layout tool tab.)

• To create a table by entering data in a Microsoft Excel worksheet, click Excel Spreadsheet on the Insert Table menu. Enter the data you want in the spreadsheet that appears in the document—you can use Excel features such as functions and formulas to create or manipulate the data. Format the data in Excel as you want it to appear in Word. Then click in the document outside the spreadsheet window to insert a table- like snapshot of the data. You can modify the data by double-clicking the table and editing the content of the spreadsheet that opens. Tables appear in the document as a set of cells, usually delineated by borders or gridlines. (In some Quick Tables, borders and gridlines are turned off.) Each cell contains an end-of- cell marker, and each row ends with an end-of-row marker.

When you point to a table, a move handle appears in its upper-left corner and a size handle in its lower-right corner. When the cursor is in a table, two Table Tools tabs—Design and Layout—appear on the ribbon.
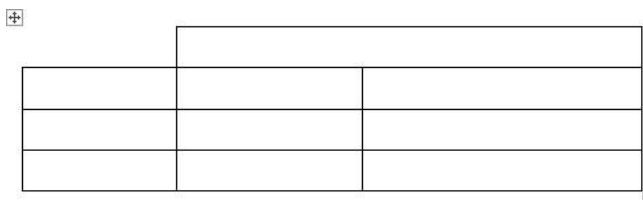
Figure 1 You can directly draw a table on a page
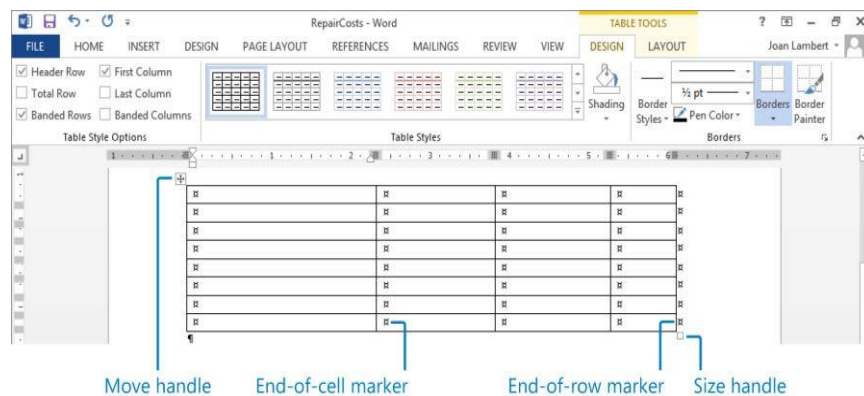
The basic methods for manipulating a table or its contents are as follows:

▪ **Insert rows or columns** Simply point to the left edge of the table where you want to insert a row, or to the top of the table where you want to insert a column. A gray insertion indicator labeled with

a plus sign appears as you approach a possible insertion point (after any existing row or column). When the insertion indicator turns blue, click to insert the row or column where indicated.

To insert one or more rows or columns, select the same number of existing rows or columns adjacent to the location where you want to insert them. On the Mini Toolbar that appears, click Insert and then click Insert Above, Insert Below, Insert Left, or Insert Right. If the Mini Toolbar doesn't appear, on the Layout tool tab, in the Rows & Columns group, click the Insert Above, Insert Below, Insert Left, or Insert Right button.

▪ **Insert cells:** To insert one or more cells in a table, select the number of cells you want to insert adjacent to the location where you want to insert them, click the Rows & Columns dialog box launcher to open the Insert Cells dialog box, and then specify the direction to move adjacent cells to accommodate the new cells.
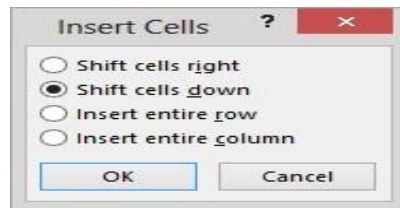
▪ **Delete table elements**: Select one or more rows, columns, or cells. On the Mini Tool- bar that appears, or in the Rows & Columns group, click Delete, and then click Delete Cells, Delete Columns, Delete Rows, or Delete Table.

▪ **Resize an entire table**: Point to the table, and then drag the size handle that appears in its lower-right corner. Hold down the Shift key while dragging the size handle to maintain the original aspect ratio of the table.

▪ **Resize a single column or row:** Drag the right border of a column to the left or right to manually set the width or double-click the border to adjust it to the narrowest width that fits its content. Drag the bottom border of a row up or down to manually set the height or use the commands in the Cell Size group on the Layout tool tab to manage column width and row height.

▪ **Move a table**: Point to the table, and then drag the move handle that appears in its upper-left corner to a new location, or use the Cut and Paste commands in the Clip- board group on the Home tab to move the table.

▪ **Merge cells** :Create cells that span multiple columns or rows by selecting the cells you want to merge and clicking the Merge Cells button in the Merge group on the Layout tool tab. For example, to center a title in the first row of a table, you can merge all the cells in the row to create one merged cell that spans the table's width.

▪ **Split cells**: Divide one cell into multiple cells by clicking the Split Cells button in the Merge group on the Layout tool tab and then specifying the number of columns and rows into which you want to divide the cell.

▪ **Sort information:** Click the Sort button in the Data group on the Layout tool tab to sort the rows in ascending or descending order by the data in any column. For ex- ample, in a table that has the column headings Name, Address, ZIP Code, and Phone Number, you can sort on any one of those columns to arrange the information in alphabetical or numerical order.

Insert or delete elements from the mini toolbar

Formatting tables

Manually formatting a table to best convey its data can be a process of trial and error. With Word 2013, you can quickly get started by applying one of the table styles available in the Table Styles gallery on the Design tool tab. The table styles include a variety of borders, colors, and other attributes that give the table a very professional appearance.

Auto formatting table

If you want to control the appearance of a table more precisely, you can use the commands on the Design and Layout tool tabs to format the table elements. You can also separately format the table content. As you saw in the previous exercise, you can apply character for- matting to the text in tables just as you would to regular text, by clicking buttons on the Mini Toolbar and in the Font, Paragraph, or Quick Styles groups on the Home tab.

6.3 Inserting Charts

When you create a new chart from within a Word document, Word and Excel work together to provide some pretty fancy functionality. A generic chart appears in the document, and a worksheet containing the sample data opens in Excel. You can then edit the sample data to create the chart that you want. You don't have to save the Excel file; Word maintains its data with the document and it is available to you whenever you want to update it.
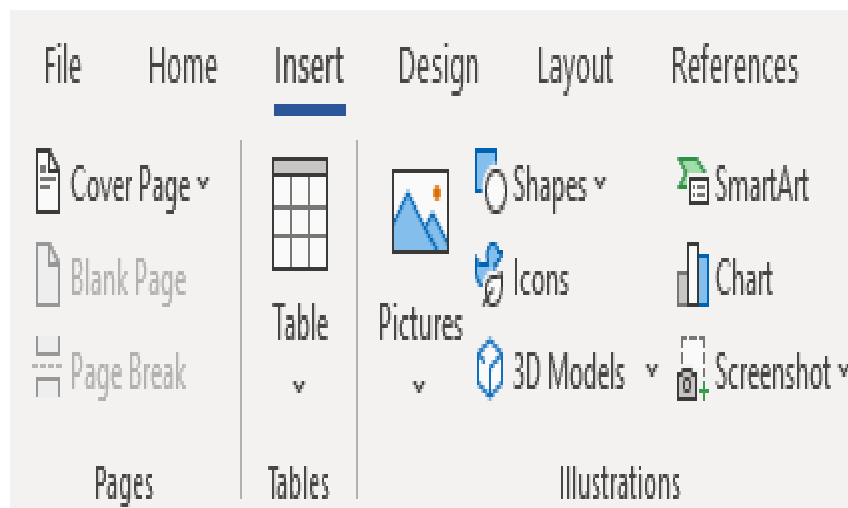
Charts option from Illustration
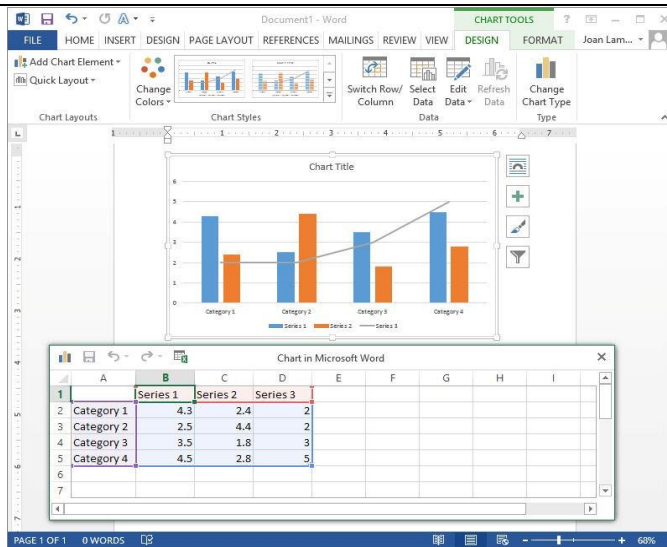
The Excel worksheet is composed of rows and columns of cells that contain values, which in charting terminology are called data points. Collectively, a set of data points is called a data series. As with Word tables, each worksheet cell is Figure 80 Chart option from Illustration 104 identified by an address consisting of its column letter and row number—for example, A2 is the first cell in the second row. A range of cells is identified by the address of the cell in the upper-left corner and the address of the cell in the lower-right corner, separated by a colon—for example, A2:D5 is the range of cells from the first cell in the second row to the fourth cell in the fifth row.

To customize the chart, you replace the sample data in the Excel worksheet with your own data. Because the Excel worksheet is linked to the chart, when you change the values in the worksheet, the chart changes as well. To enter a value in a cell, you click the cell to select it, or move to the cell by pressing the Tab key or arrow keys, and then enter the data. You can select an entire column by clicking the column header—the shaded box containing a letter at the top of each column—and an entire row by clicking the row header—the shaded box containing a number to the left of each row. You can select the entire worksheet by clicking the Select All button—the box at the junction of the column and row headers.

6.4 Correcting spelling and grammatical errors

In the days of handwritten and typewritten documents, people might have tolerated a typographical or grammatical error or two because correcting such errors without creating a mess was difficult. Word-processing programs such as Word have built-in spelling and grammar checkers, so now documents that contain these types of errors are likely to reflect badly on their creators.

. Word provides these three tools to help you with the chore of eliminating spelling and grammar errors:

▪ **AutoCorrect**: This feature corrects common spelling and grammatical errors, replaces text codes with mathematical symbols, and automatically applies formatting based on text cues. AutoCorrect has a built-in list of frequently misspelled words and their correct spellings. If you frequently misspell a word that AutoCorrect doesn't change, you can add it to the list in the AutoCorrect dialog box. If you deliberately enter a word that is on the AutoCorrect list and don't want to accept the AutoCorrect change, you can reverse the correction by clicking the Undo button before you enter anything else, or by pointing to the bar that appears below the word and then clicking Undo.

▪ **Error indicators**: Word indicates possible spelling errors with red wavy underlines, possible grammatical errors with green wavy underlines, and possible formatting errors with blue wavy underlines. You can right-click an underlined word or phrase to display suggested corrections and links to proofing resources.

▪ **Spelling and grammar checker:** To check the spelling or grammar of selected text or the entire document, click the Spelling & Grammar button in the Proofing group on the Review tab. Word then works its way through the selection or the document and displays the Spelling pane or Grammar pane if it encounters a potential error.

KEYBOARD SHORTCUT Press F7 to start checking the spelling and grammar from your current location in the document.

If you prefer to use the keyboard to review the results, press the underlined letter found on the buttons in the task pane. For example, to [Ignore All] instances of a word, press g.

The pane that appears displays an explanation of the likely problem and suggests corrections. You can implement a suggestion by double-clicking it.

Check spelling and Grammar

All Microsoft Office programs can check the spelling and grammar of your files. In Microsoft Word 2013 you'll find the Spelling & Grammar options here:

• Click Review > Spelling & Grammar (or press F7) to start the spelling and grammar checker and see the results in the Spelling and Grammar task pane.

All instances of a word, press g. Choose from these options as the spelling and grammar checker goes through each word:

1. Check the spelling and grammar all at once.

2. Check spelling and grammar automatically, as you type.

3. Recheck the words you previously checked and chose to ignore (but changed your mind).

Check spelling and grammar all at once:

Checking all the spelling and grammar in your document is useful when you want to quickly proof your text. You can check for possible mistakes and then decide if you agree with the spelling and grammar checker.After you click Spelling & Grammar (or press F7) you can fix each error that Word finds in different ways. In the task pane at the right of your document, you will see the spelling and grammar choices:

• Fix the error using Word's suggestions If you want to fix the error by using one of the suggested words, select the word in the list of suggestions and click **Change.** (You can also click **Change** All if you know you've used this incorrectly spelled or used word throughout the document so that you don't have to address it each time it pops up.)

• Create a dictionary entry If the word is a real word that you use and one that you want Word — and ALL of the Office programs — to recognize too, click Add

. • Ignore the word Maybe you want to ignore this misspelled word (for whatever reason): Click Ignore or Ignore All.
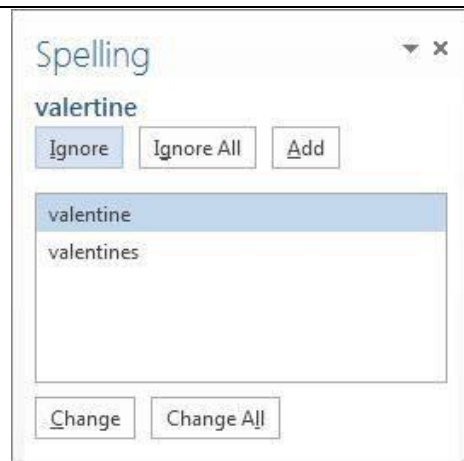
Check spelling and grammar automatically:

Checking spelling and grammar while you type may be a preferred way for you to save time: You make the necessary corrections and changes while you're writing, not waiting until after (you think) your document is complete.

1. First, to turn on (or off) automatic spelling and grammar checking, **click File > Options > Proofing.**

2. As you can see in the picture above, you can choose to automatically check spelling, grammar — one or the other, both, or neither — or even other options, such as contextual spelling.

3. Under **Exceptions** you can choose to hide grammar and spelling errors in your open document or, if you leave the options unchecked but keep any of the options above them checked, all of your new documents going forth will keep those settings.

Spelling and Grammar setting option

How the automatic spelling checking works

Word flags misspelled words with a red squiggly line under it as you work so that you can easily locate mistakes.
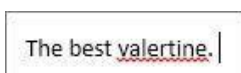
When you right-click the misspelled word, you'll see a menu where you can choose how you want to handle the mistake.
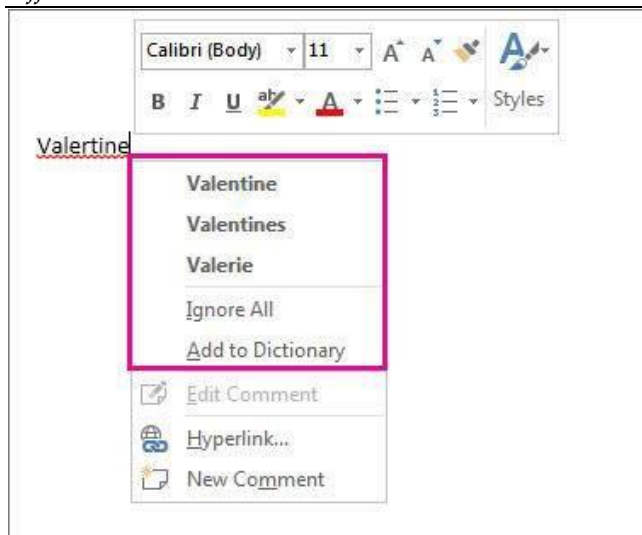
Option menu on right clicking.

Summary

- MS word tells us about specific functions, which we can use in the word documents.

• Find and Replace option of word is convenient way of searching for particular word in whole document.

• Numbering feature, it acts like the bullets only which used number instead of bullets in the text document.

• Spelling and grammar button is the standard Toolbars to check the spelling and any graphemically errors in the text document.

• Auto correct feature inserts text in the heard document automatically.

Keywords

- **AutoComplete**: AutoComplete is a feature in Microsoft Word that enables Word to guess what you are typing when you enter commonly used document words. This feature can save time if you know how to use it.
- **AutoCorrect:** AutoCorrect is best used for creating shortcuts for words, phrases, and even images. For example, if you often type Microsoft Word, you could create a shortcut such as "msw". Then any time you typed "msw", it would expand to Microsoft Word.
- **AutoText:** AutoText is best used for longer phrases or paragraphs (for example, "boilerplate" text for disclaimers or a standard closing for a letter). AutoText is also already setup with several standard AutoText entries.

Self-Assessment

1. Bullets and numbering falls under the category of which ribbon?
A. Font
B. Paragraph
C. Styles
D. Clipboard
2. If I have to create a Menu of restaurant which option, will you choose to make it?
A. Bullets
B. Numbering
C. Indent
D. None of the above

3. If I wish to create a list of students in a serial order which option, will you choose to do so?

A. Bullets

B. Numbering

C. Indent

D. None of these

4. When you type a number, a period, and then a space before a word, what happens when you press enter?

A. Word creates a numbered list.

B. Word asks if you want to create a numbered list.

C. If you are not already in outline view, you are switched to it.

D. None of the above.

5. Which procedure opens the symbol dialog box, allowing you to choose from every symbol available for creating bullets?

A. On the format menu, click font, and then click symbol.

B. Right click the selected text and click bullet symbol on the shortcut menu.

C. Click the bullets button on the formatting toolbar.

D. In the customize bulleted list dialog box, click bullet.

6. What are the horizontal sections of a table called?

A. Cells

B. Rows

C. Columns

D. None of these

7. What tool can you use to automatically format your table?

A. The magic right click button

B. The AutoFormat command.

C. The Edit Select All command.

D. None of these

8. What are the boxes or squares in a table called?

A. Cells

B. Square

C. Row

D. Column

9. What is the use of tables?

A. To organize the information

B. To hold clipart

C. To type paragraphs

D. None of these

10. What are the vertical sections of a table called?

A. Rows

B. Columns

C. Square

D. Cells

11. The spelling and grammar tool

A. Indicates grammatical errors.

B. Corrects spelling errors as you type.

C. Identifies words with capitalization problems.

D. All of the above

12. The thesaurus tool is used to _____

A. Finds repeated words in the document

B. Check for synonyms and antonyms.

C. Corrects misspelling word.

D. None of the above

13. The auto correct tool _____

A. Provided statistics about your document.

B. Displays words with the same or similar meaning.

C. Checks the grammar in the document.

D. Checks for misspelled words as you type and underling them.

14. Which option is used to convert a document into a different language?

A. Translate

B. Language

C. Restrict editing.

D. Read Aloud

15. _____ tool is used to read your document in a human built in voice.

A. Read Aloud

B. Word Count

C. Translate

D. Resume Assistant

Answer for Self Assessment

1.	B	2.	A	3.	B	4.	A	5.	D
6.	B	7.	B	8.	A	9.	A	10.	B
11.	D	12.	B	13.	D	14.	A	15.	A

Review Questions

1. In your document, you have typed the word file as "file" but you want to find and replace all the occurrences of this word to "File". How would you do this?
2. How will you create an AutoText entry?
3. What do you understand by AutoComplete feature of Word?
4. Briefly explain how would you search a particular character in the document and replace it with another.

Further Reading

Fundamental Computer Skills, Feng-Qi Lai, David R. Hofmeister

http://books.google.co.in/bkshp?hl=en

Unit 07: MS Word

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7.4   Screenshots
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Keywords
Self-Assessment
Answers for Self-Assessment
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Purpose and Objectives

- Understanding of handling Graphics in MS Word
- Explanation of setting page size and margins
- Understanding of printing document
- Discussion of mail merge
- Working of mail merge

Introduction

Microsoft Word is part of the Microsoft Office. Its main function is for producing documents that can includes text, graphics, table, clip art.

7.1 Handling Graphics

Adding graphics or picture to illustrate your documents makes them more appealing. Graphics format falls into two camps: bitmap and vector. Bitmap graphics are composed of small dots, called pixels. Each pixel is represented by one or more bits in the computer's memory that define colour and intensity. Vector graphics, in contrast comprise of a set of drawing instructions that describe the dimension and shape of every line, circle, arc, or rectangle. Word allows you to do much more than simply insert or place graphics. For our fourth lesson in this series, we will focus on the graphic design functions in Word such as pictures, SmartArt, screenshots, and other items that can be found on the "Insert" tab.

These functions really breathe life into your drab black and white text documents. With a simple picture or chart, you can turn your term paper from meh to yeah! Luckily, there's a whole range of ways you can add images to better illustrate (no pun intended) your point.

We'll wrap the lesson by changing gears a bit and discussing how to use more than one language in Word 2013.

7.2 Image and Multimedia

You don't have to think of Word as simply a word processing program. It has requisite tools for doing some pretty nifty page layout. While it's not a feature-complete or robust as a professional

page layout program such as Adobe InDesign. You can still get very professional looking results if you know what's in your toolbox and how to use it.
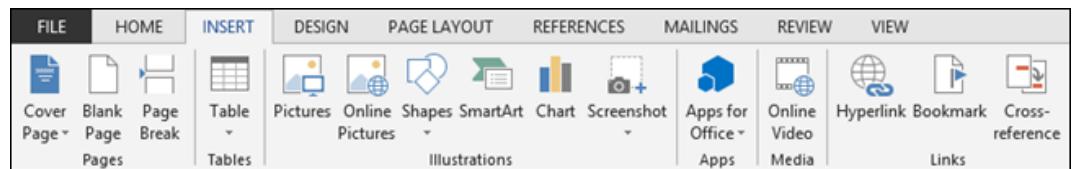
Pictures and Online Pictures

Both "Pictures" and "Online Pictures" accomplish the same goal. The only difference is that "Pictures" means you can insert pictures locally, while "Online Pictures" allows you to insert images from an internet-based source such as clip art from Office.com, Bing, or OneDrive (formerly SkyDrive). You can also insert pictures from your Facebook profile or Flickr although you could always just save the pictures you want to insert to your computer and then insert them from there if you don't want to connect Office to these profiles.
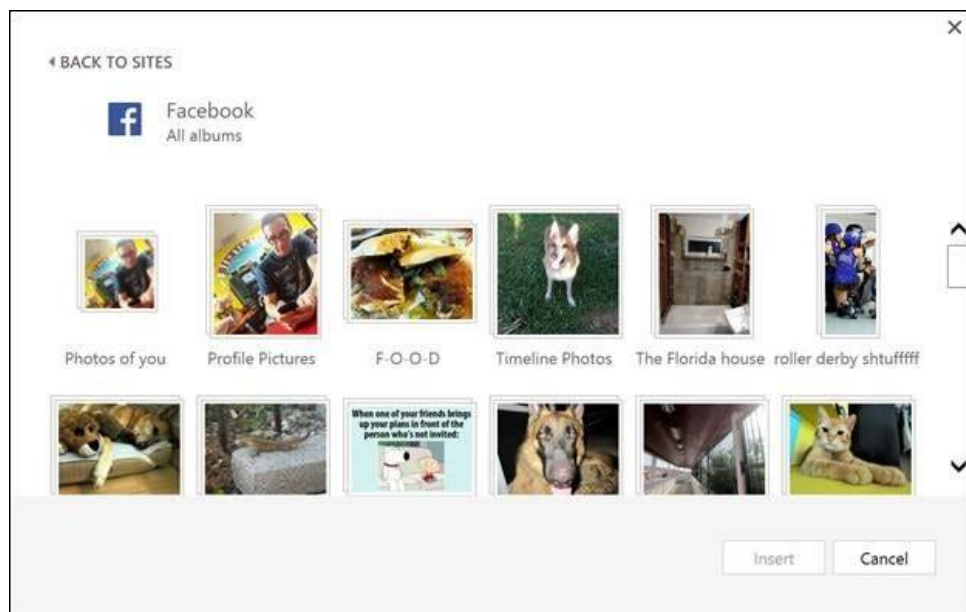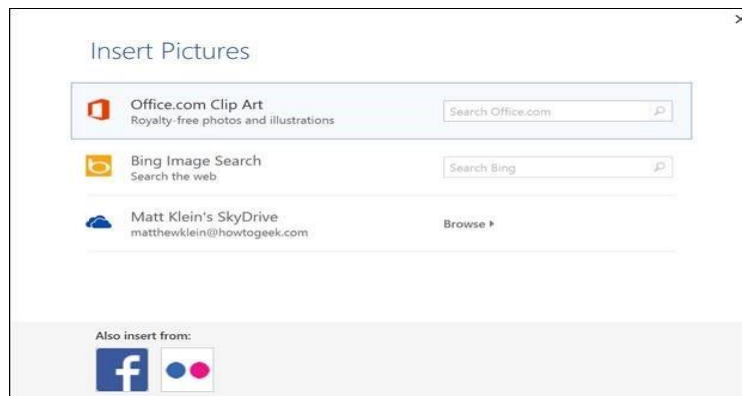
Picture Tools

As always, when you want to edit a picture or any element place in a Word document, you can click on it and the appropriate tab will appear on the Ribbon.

With pictures, that tab is "Picture Tools." Here we see you can make all kinds of corrections to the picture on-the-fly. For example, you can correct brightness and contrast, the color, add a border.
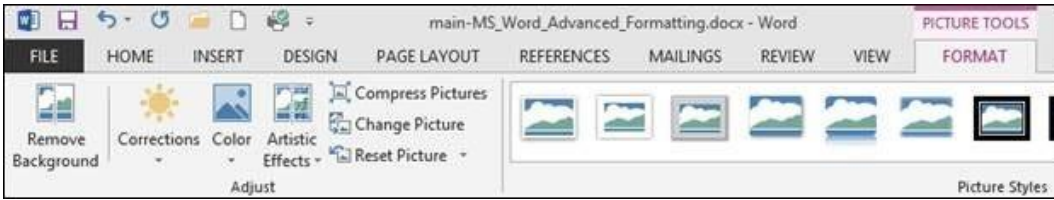
Where you position and how you wrap text will also play a large role in formatting your documents.
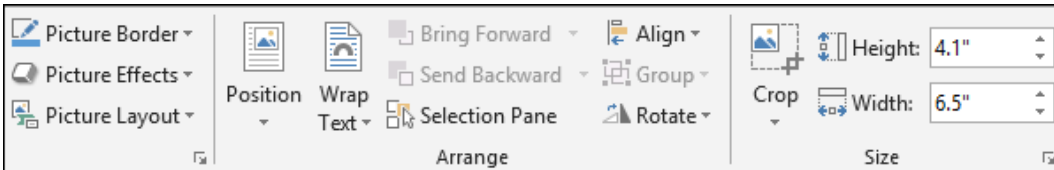
Here we see those controls. In our documents, we don't worry so much about word wrapping or positioning because Word isn't the final step toward publishing online. However, if you're going to produce something WYSIWYG (What You See is What You Get), such as for a PDF or print publication, then these things will definitely matter.
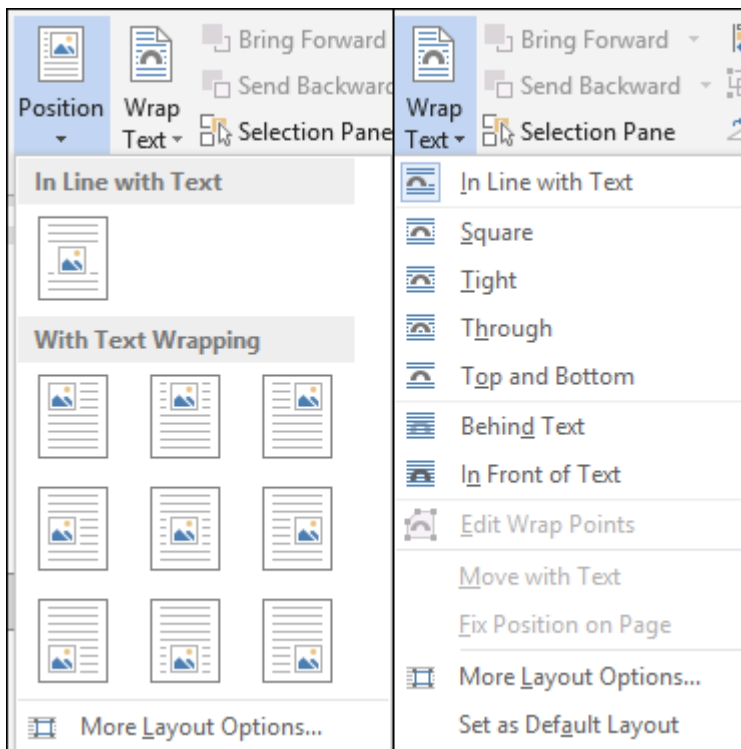
Also, there are a couple ways you make changes to your pictures inline, such as resizing, rotating, and moving them. In the following image, you see these controls, many of which you will likely be familiar with.
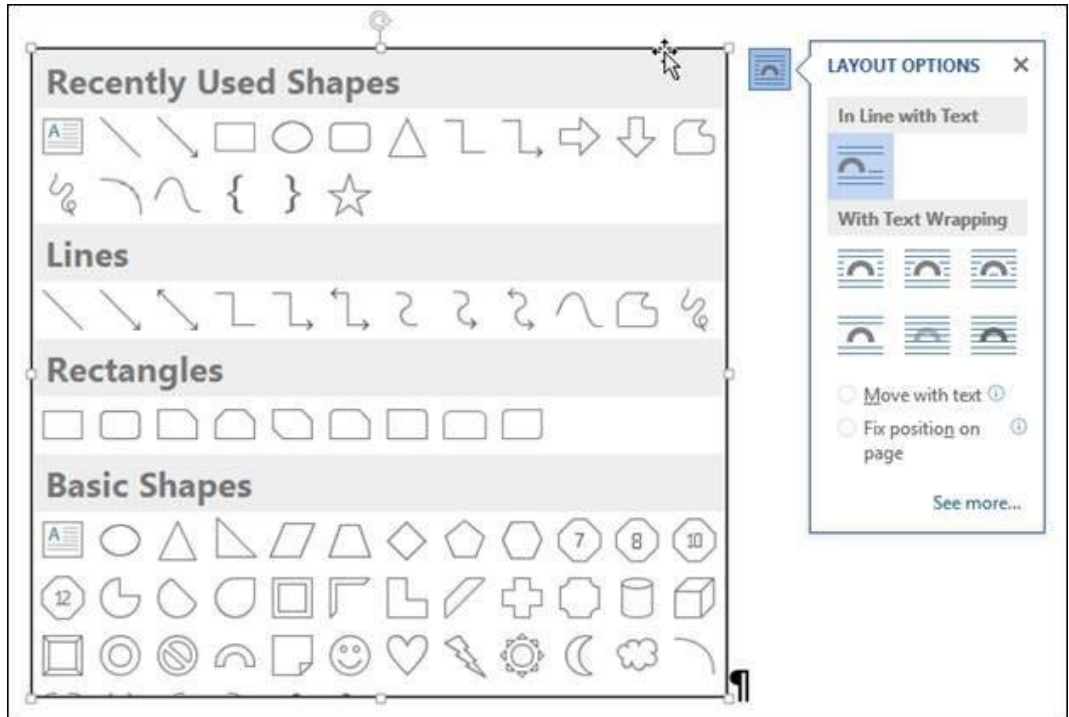
When you click on an image in your document, you get a box on each corner, which will let you resize a picture. At the top, in the middle, is a circular arrow, grab this to freely rotate your picture. To move the image, hover the mouse over the image until the pointer is the four arrows, you can then click and drag the image anywhere you like.

Finally, if you click on the little "Layout Options" button, you can change your text wrapping without going to the Ribbon.

Clicking on "See more…" at the bottom of the "Layout Options" opens the full-blown "Layout" dialog.

When you click on an image in your document, you get a box on each corner, which will let you resize a picture. At the top, in the middle, is a circular arrow, grab this to freely rotate your picture. To move the image, hover the mouse over the image until the pointer is the four arrows, you can then click and drag the image anywhere you like.

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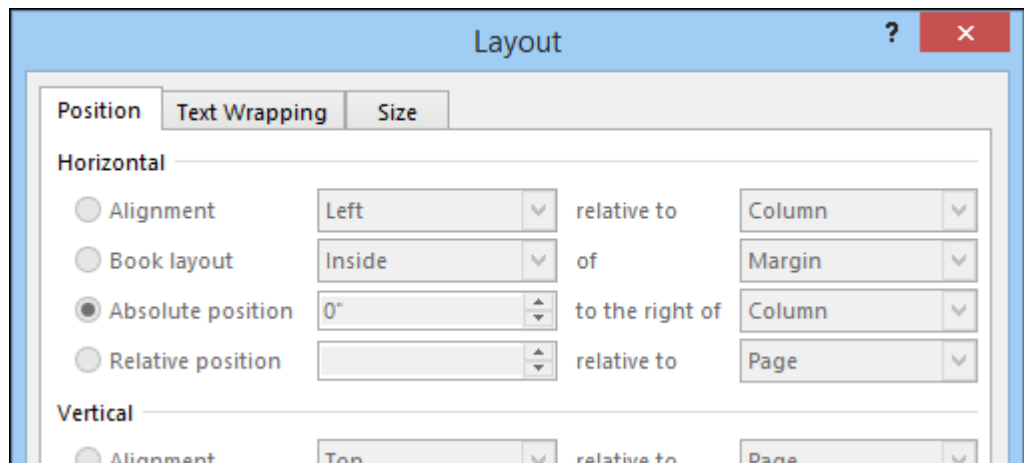
Note, the size tab both on the Ribbon the "Layout" dialog allows you to specifically resize, rotate, and scale your pictures, rather than relying wholly on winging it:
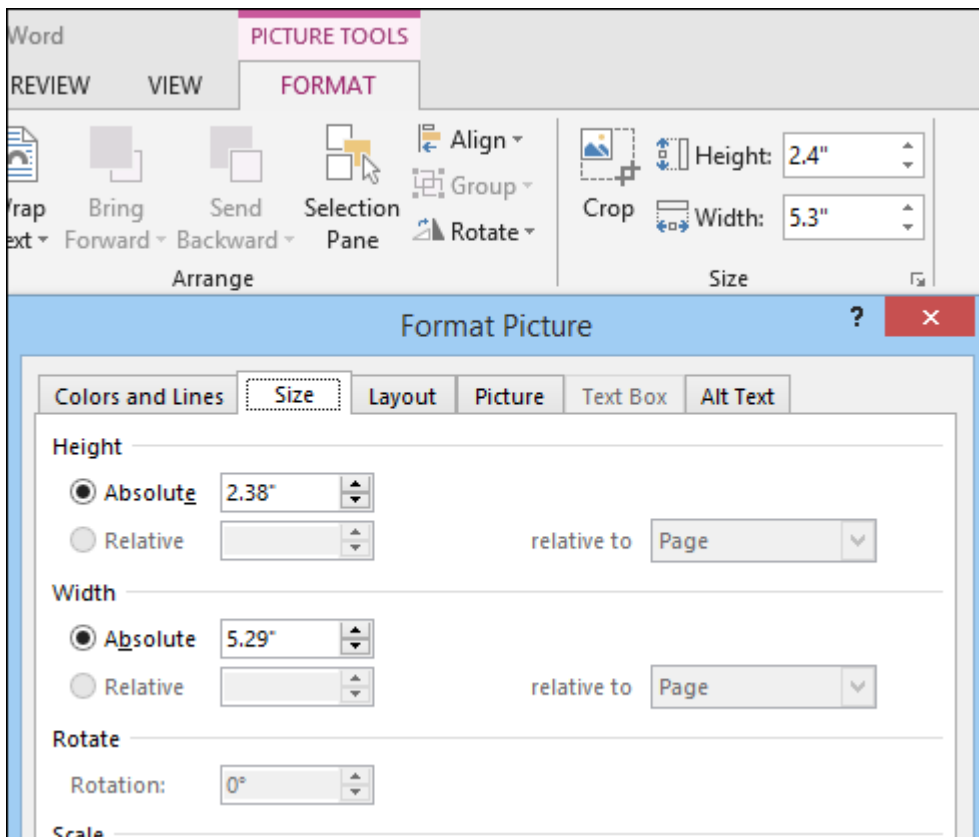
We'd like to spend the whole day talking about formatting images in Word, but as you can see, there's a ton of options at your disposal. Let's move on now to other objects you can insert into your documents, starting with "Shapes."

Shapes

Microsoft Word 2013 comes with an array of built-in shapes, which you can use to create callouts, boxes, stars, and other shapes.
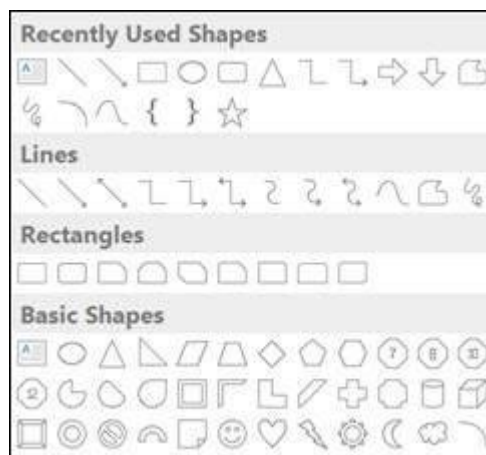
When you choose a shape, you simply draw it on a blank space on the page. It doesn't matter if you get it perfect or just the way you want it because you can adjust it to your heart's content once it is placed in your document.

Note in the screenshot, the previously mentioned little "handles" you can use to resize and rotate your shapes.
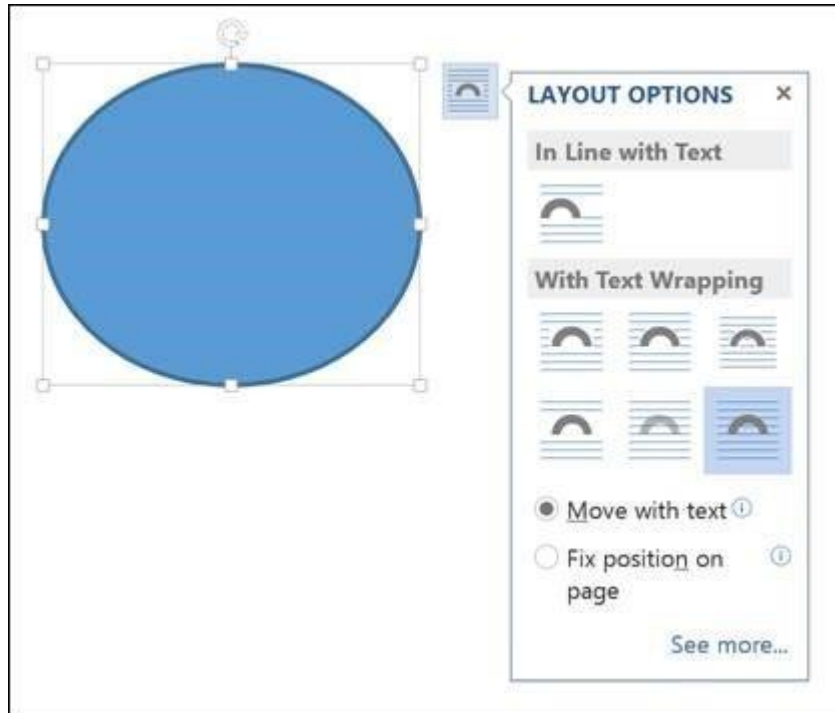
At the bottom of the "Shapes" menu, there's an option to create a "new drawing canvas." This will open, what is essentially a text box for shapes. With this drawing canvas, you can create drawings using these shapes allowing you to create things like diagrams and flowcharts.

SmartArt and WordArt

SmartArt and WordArt tend to have some overlap, particularly if you create something using WordArt and then customize any of the text within it. Of course, you can use one or the other and never the twain shall meet, but we're going to talk about them in the same section because one often leads to the other.

Think of SmartArt as premade drawing canvases that you can insert into your document and then customize as you like. Simply pick an arrangement, such as a list, process, or cycle.
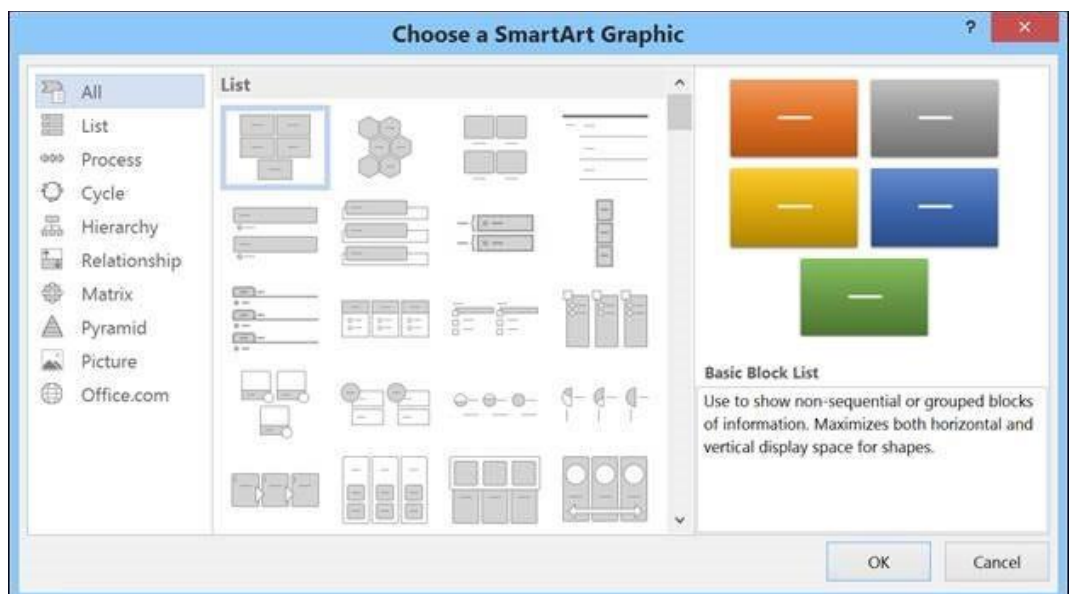
As you can see, we created a graphic based on a "Continuous Block Process." When we click on the text boxes, we can edit what is inside. There are also the usual grab handles needed to resize the image, and the "Layout Options" allowing you to wrap text to your preference.
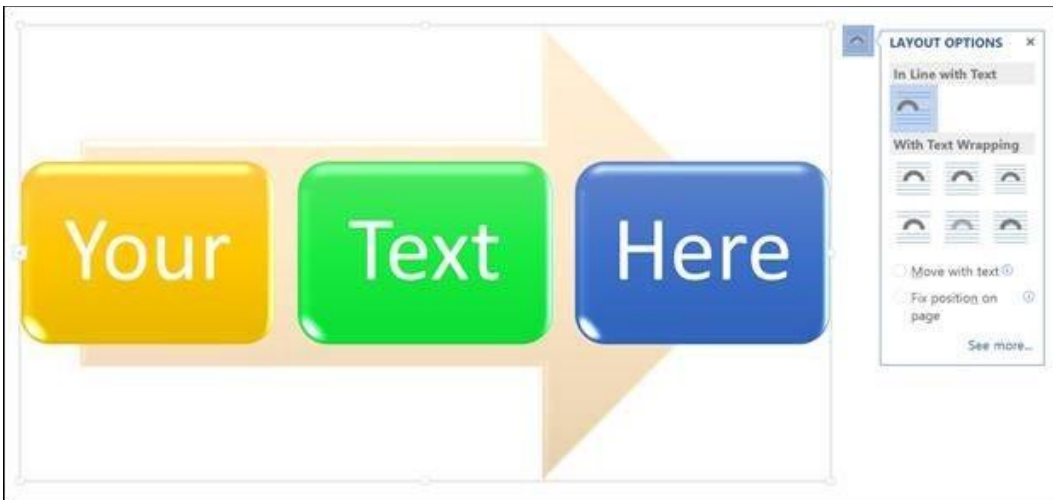
If you use SmartArt, note that the Ribbon changes to reflect this. The "SmartArt Tools" features two tabs: "Design" and "Format." Let's cover each one and its features.

The right half of the "Format" tab allows you to pick from a number of "SmartArt Styles" and you can also "Change Colors."

If you look at our previous example, you can see we applied an embossed, shiny effect and changed the colors of our text boxes and arrow.
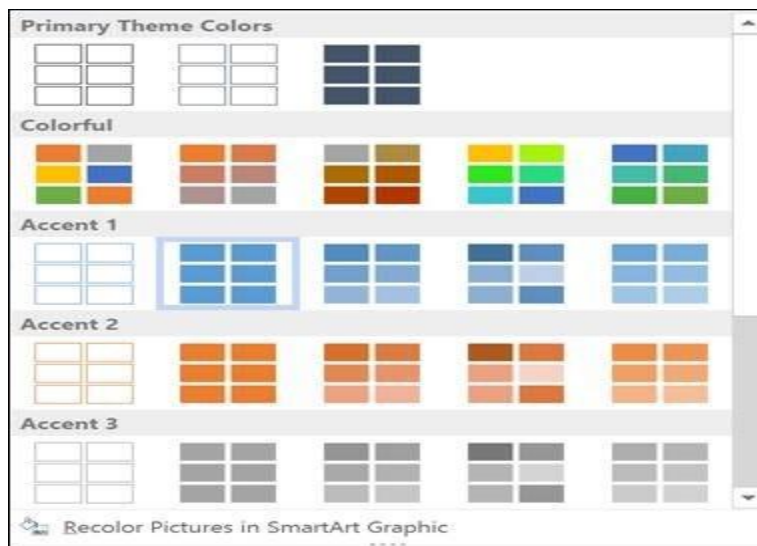
On the left half of the "Design" tab, you can "Create Graphic" so you can add shapes, bullets, text, and move things around.
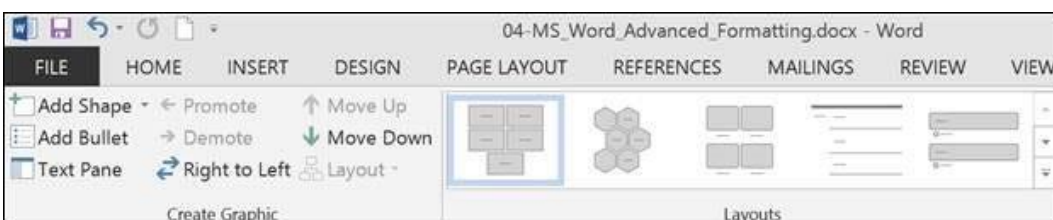
The "Layouts" section lets you change how your graphic looks on the fly. Simply hover over any of the built-in options to see how it would look utilizing a different layout. Changes to the layout are not applied unless you first click on a style.
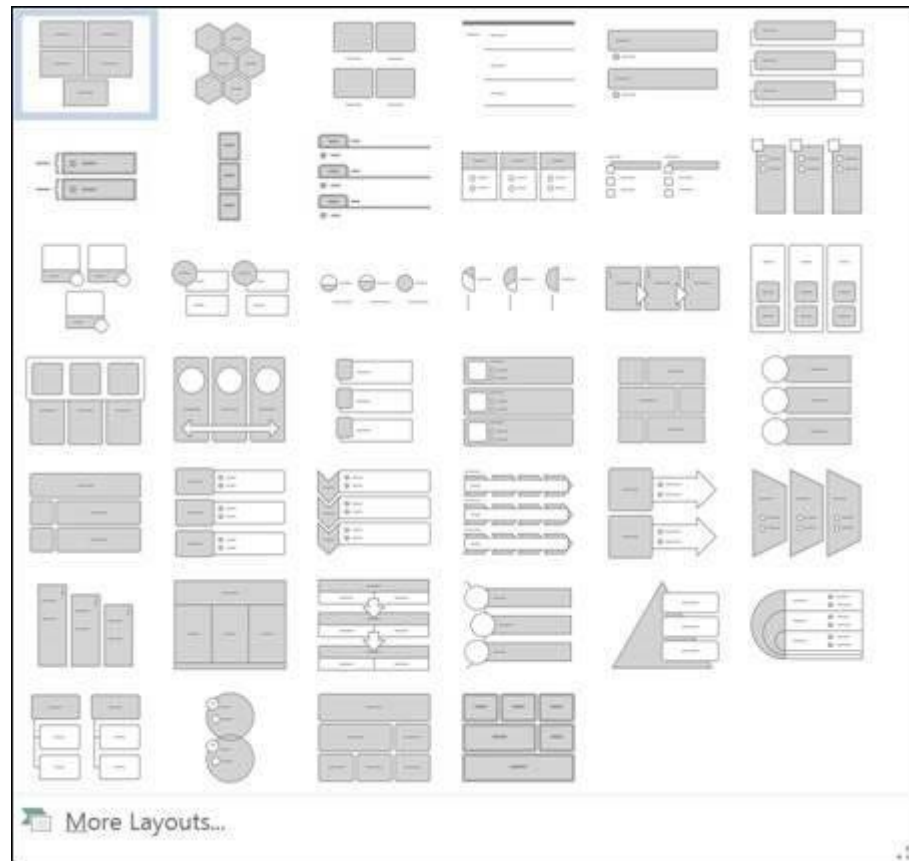
The right side of the "Format" tab is used for affecting changes to text. These include "WordArt Styles" and other effects such as fill and outline. Beyond that, you can arrange multiple layers by sending them forward and backward.
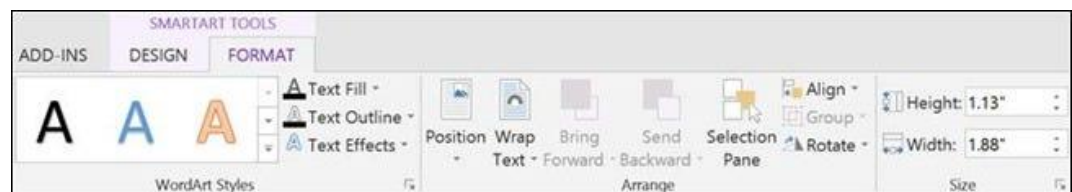
The "Layout" dialog pops out if you select the little arrow in the bottom-right corner of the "size" section or you can choose more options from any of the drop-down menus including "Position", "Align", and "Rotate."

On the left side of the "Format" tab you can select any of your shapes and change them to another, and also make them larger or smaller.
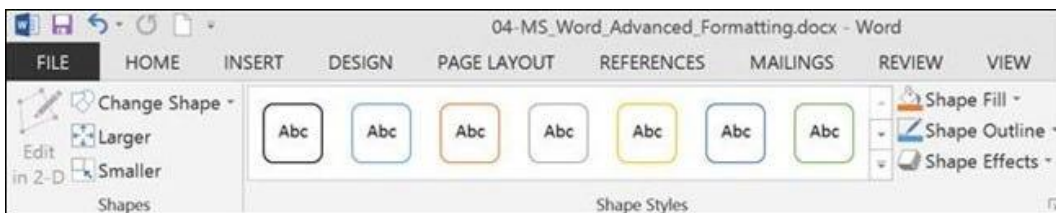
If you click on "Shape Styles" you will be able to choose from a selection of pre-defined shapes and colors.

Shift right just slightly and you will find controls to alter the fill. Choose from various "Theme Colors" or select your own. You can also use pictures, gradients, and textures for even more fill options.

7.3 Charts

Charts are a great way to visually display data sets and Word 2013 comes jam packed with a large assortment of Charts to choose from, including columns, pie, bar charts and much, much more. Check out the screenshot for an idea of just how many options there are:
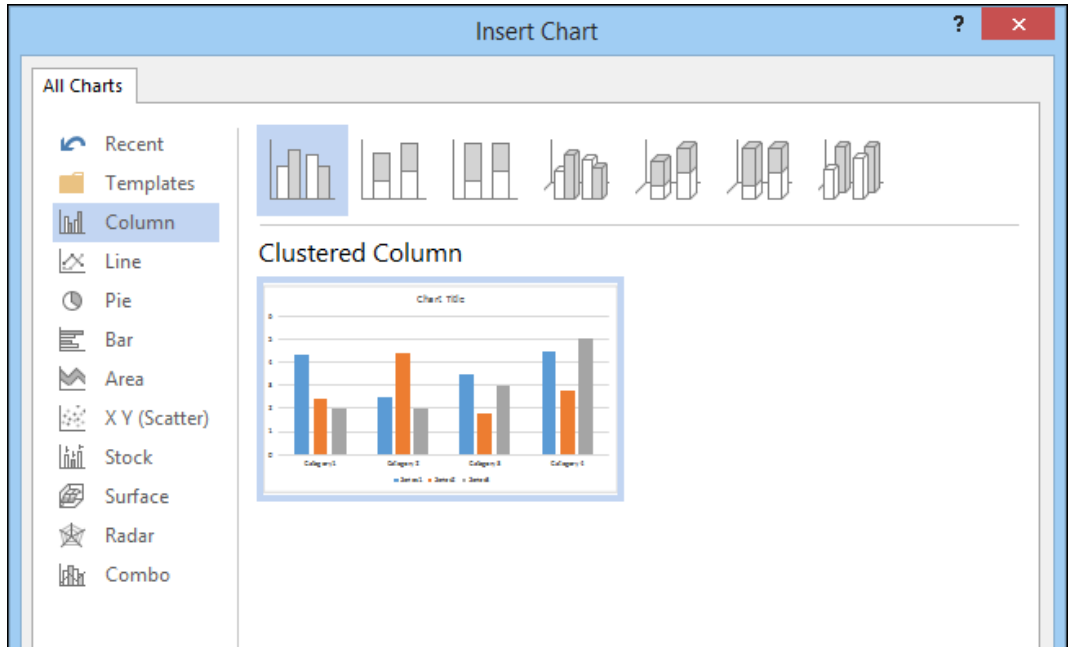
Using the "Design" tab, if you don't like the colors or style of your chart, you can instantly apply changes to it without having to generate a new one.

7.4 Screenshots

The "Screenshot" feature will allow you to take a screen clip, which is automatically pasted in you document.
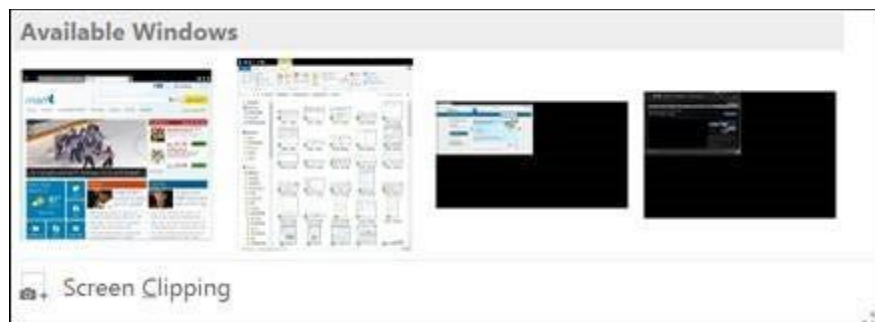
When you use the screenshot function, it will let you choose between any currently open windows, or you can select "Screen Clipping," which will minimize Word allowing you to take a selection or full shot of your desktop. So for example, if you want to simply insert a shot of your desktop and its icons, you would first need to minimize everything you have open.

There's a myriad of ways you can take and add screenshots, so we're not going to dwell on it. Just note this feature, if you're unfamiliar with adding screenshots, and you want an easy way to do it in Word.

Online Video

You can insert "Online Video" such as Bing, YouTube, or video embed code into your document.
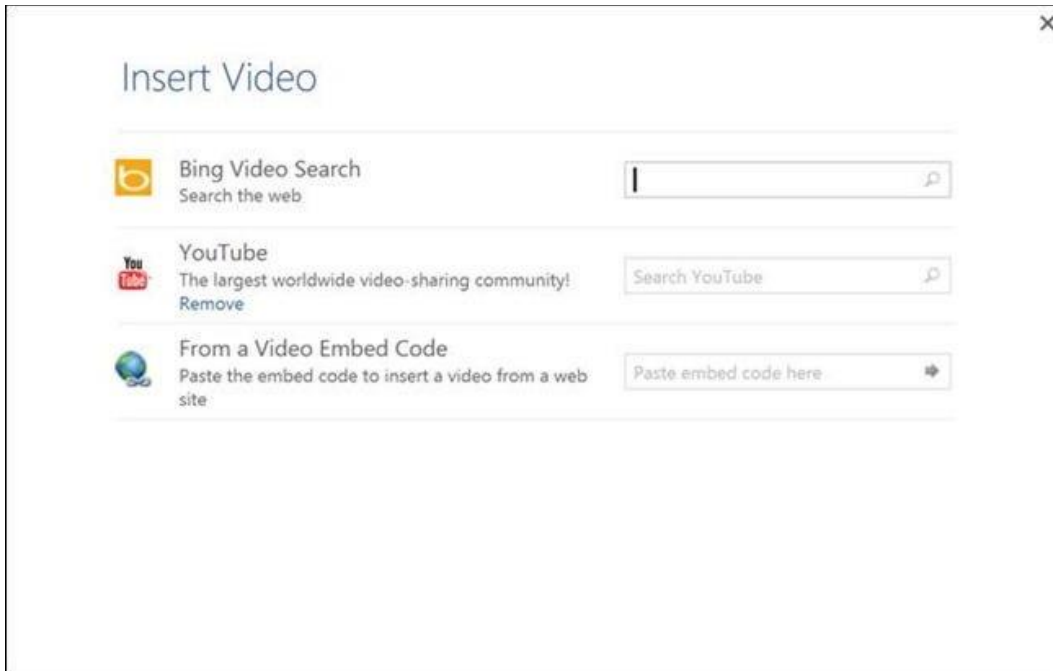
When you embed a video, it will appear as if it is a regular picture, complete with grab handles and text wrap controls.

Further, you can adjust how the emedded video thumbnail appears (as a picture) using the "Picture Tools" so you can make adjustments to the color, add a border, correct the contrast and brightness, and more.

So you see, we simply applied a "picture style" and add a purple border. This is only a fraction of the stuff you can do, so if you to add some really nice looking effects and create a nice looking document that really pops, you should take your time to familiarize yourself with everything.

7.5 <u>Mail Merge</u>

Mail Merge is a useful tool that allows you to produce multiple letters, labels, envelopes, name tags, and more using information stored in a list, database, or spreadsheet. When performing a Mail Merge, you will need a Word document (you can start with an existing one or create a new one) and a recipient list, which is typically an Excel workbook.

To use Mail Merge:

1. Open an **existing** Word document, or create a **new** one.

2. From the **Mailings** tab, click the **Start Mail Merge** command and select **Step-by-Step Mail Merge Wizard** from the drop-down menu.
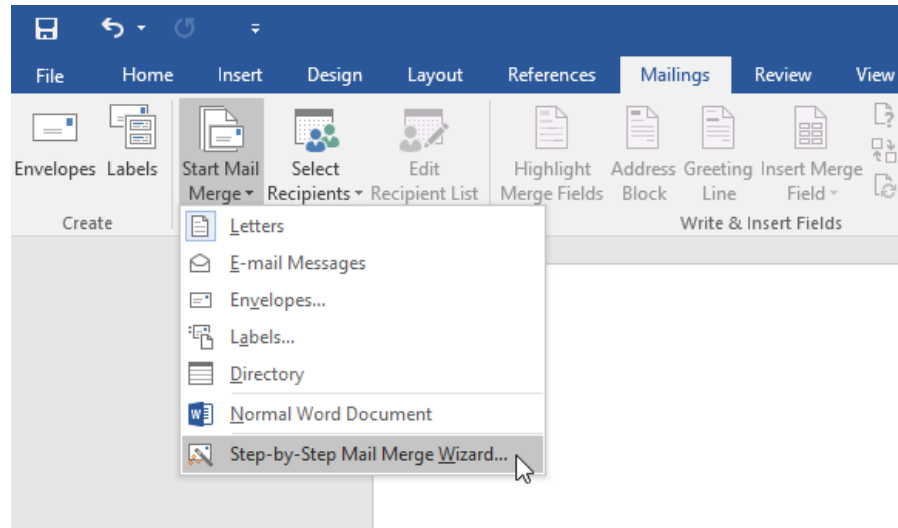
The Mail Merge pane will appear and guide you through the **six main steps** to complete a merge. The following example demonstrates how to create a form letter and merge the letter with a **recipient list**.

Step 1.

From the Mail Merge task pane on the right side of the Word window, choose the **type** of document you want to create. In our example, we'll select **Letters**.

Then click **Next: Starting document** to move to Step 2.
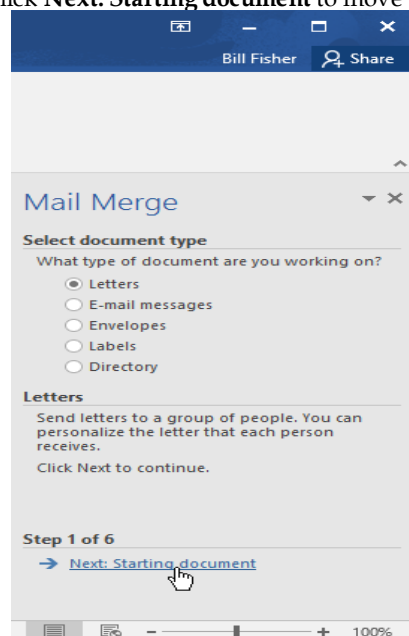
Step 2: Select Use the current document, then click Next: Select recipients to move to Step 3**.**
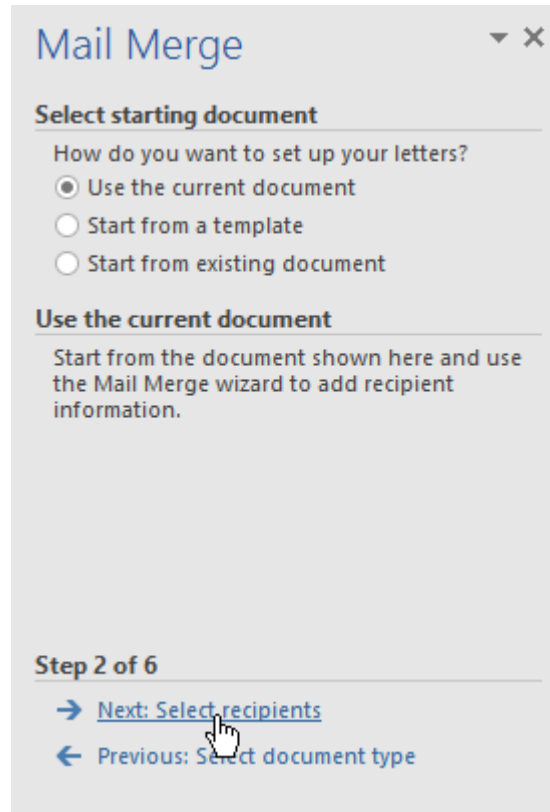
Step 3:

Now you'll need an address list so Word can automatically place each address into the document. The list can be in an existing file, such as an **Excel workbook**, or you can **type a new address list** from within the Mail Merge Wizard.

Select **Use an existing list**, then click **Browse** to select the file.
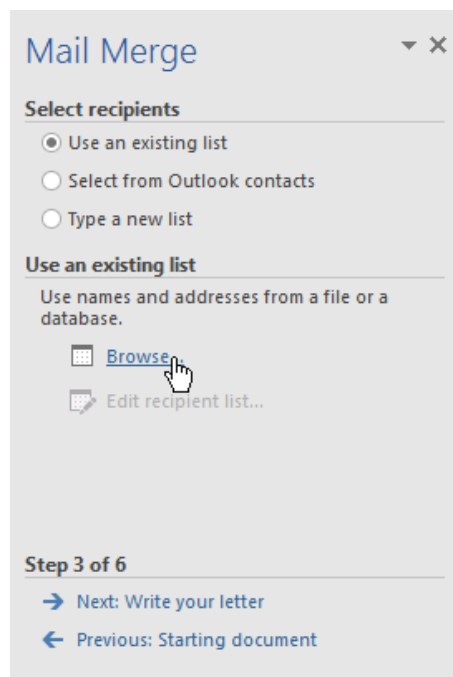
1. Locate your file, then click **Open**.
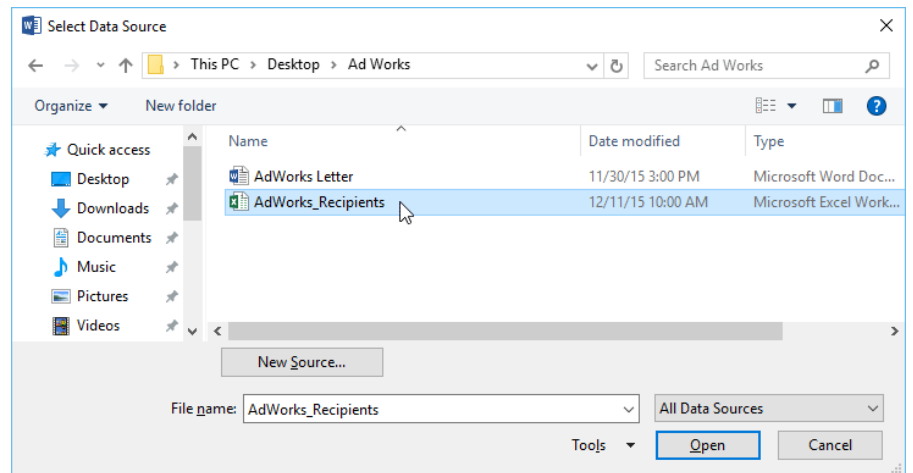
2. If the address list is in an Excel workbook, select the **worksheet** that contains the list, then click **OK**.
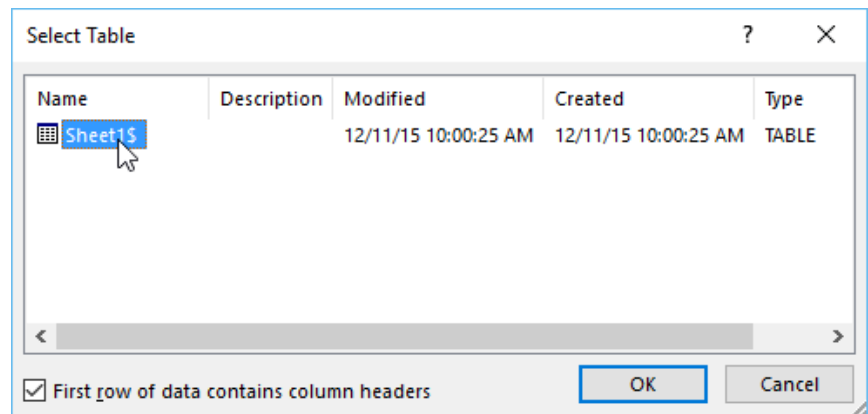
3. In the **Mail Merge Recipients** dialog box, you can **check** or **uncheck** each box to control which recipients are included in the merge. By default, all recipients should be selected. When you're done, click **OK**.
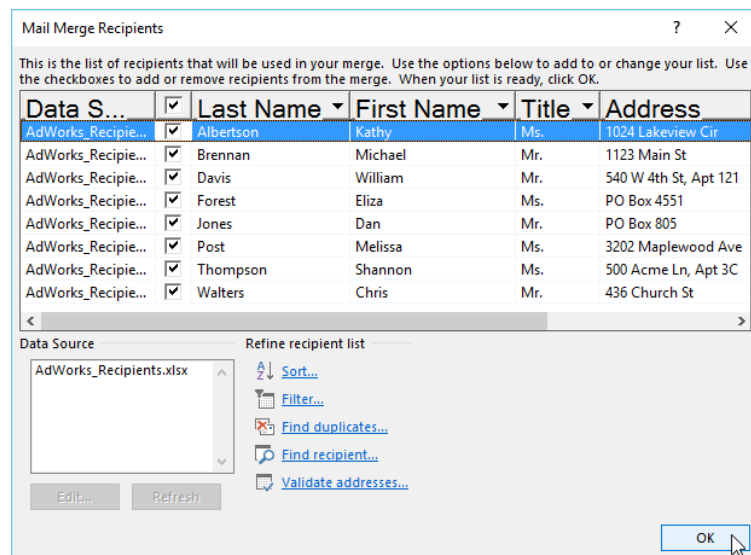
4. Click **Next: Write your letter** to move to Step 4**.**
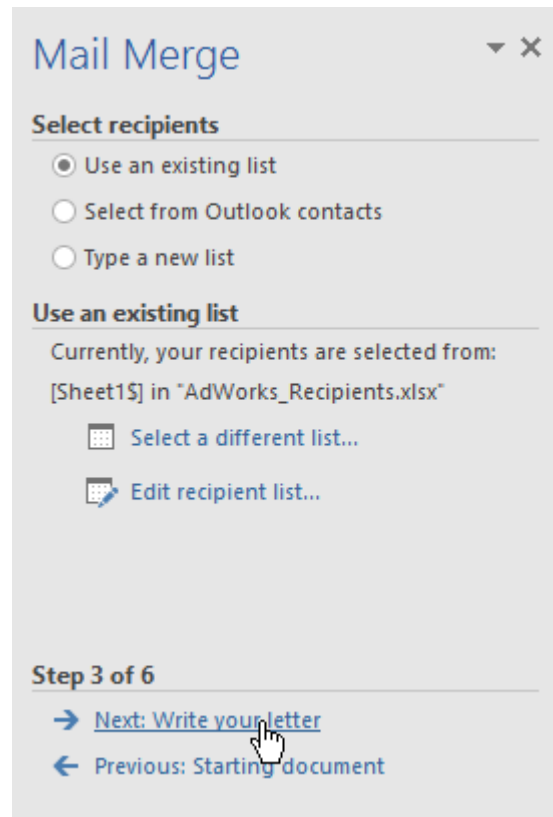
If you don't have an existing address list, you can click the **Type a new list** button and click **Create**, then type your address list manually.

Step 4:

Now you're ready to write your letter. When it's printed, each copy of the letter will basically be the same; only the **recipient data** (such as the **name** and **address**) will be different. You'll need to add **placeholders** for the recipient data so Mail Merge knows exactly where to add the data.

To insert recipient data:

1.   Place the insertion point in the document where you want the information to appear.
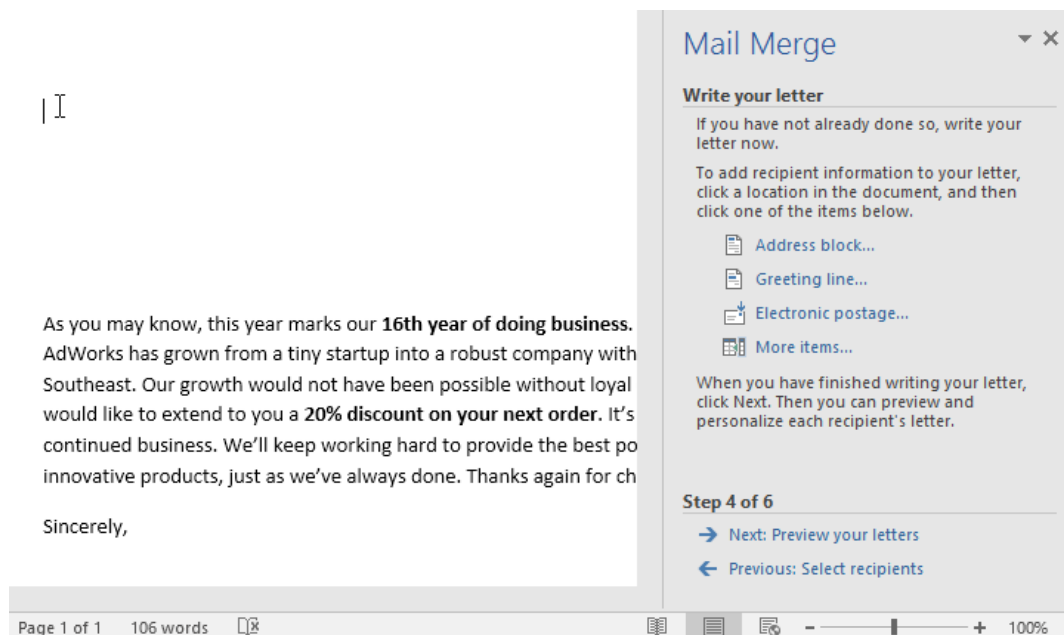
2.   Choose one of the **placeholder** options. In our example, we'll select **Address block**.
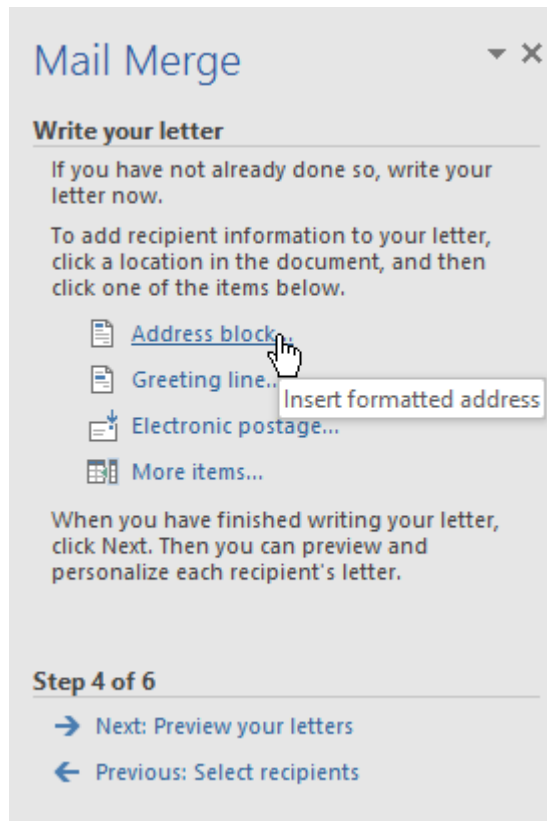
3. Depending on your selection, a dialog box may appear with various customization options. Select the desired options, then click **OK.**
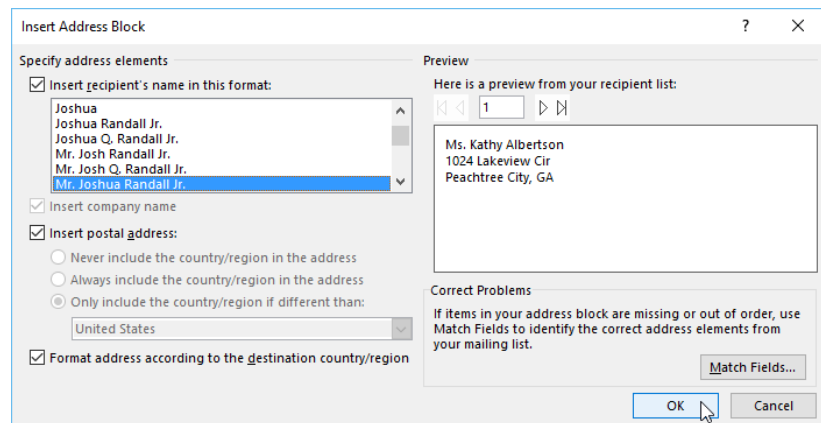
4. A placeholder will appear in your document (for example, **«AddressBlock»**).
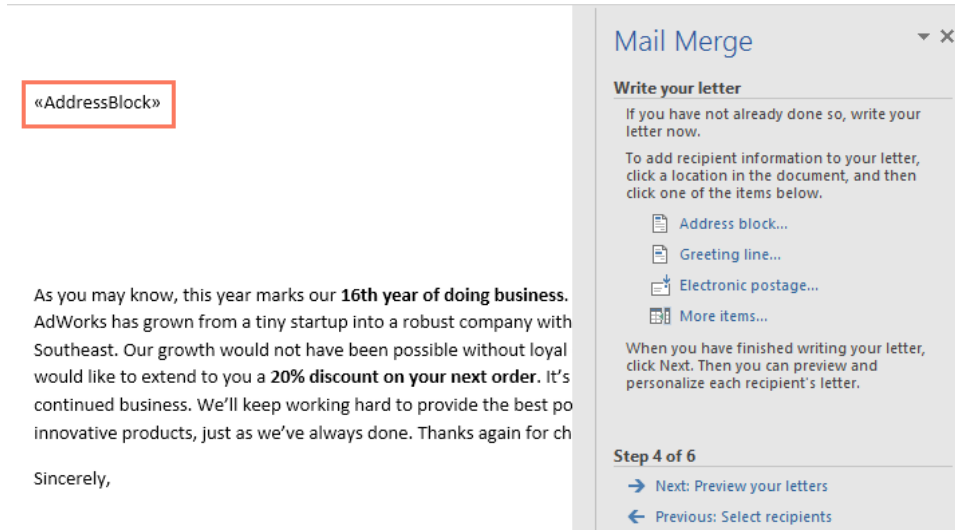
5. Add any other placeholders you want. In our example, we'll add a **Greeting line** placeholder just above the body of the letter.
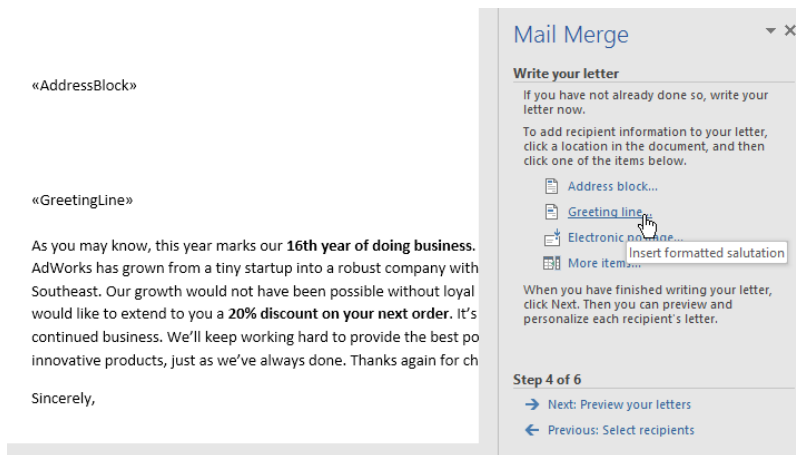
6. When you're done, click **Next: Preview your letters** to move to Step 5.
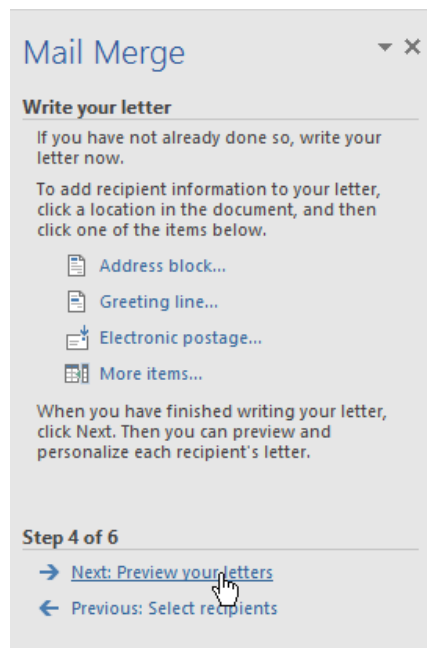
For some letters, you'll only need to add an **Address block** and **Greeting line**. But you can also add more placeholders (such as recipients' names or addresses) in the body of the letter to personalize it even further.

Step 5:

1. Preview the letters to make sure the information from the recipient list appears correctly in the letter. You can use the left and right scroll arrows to view each version of the document.
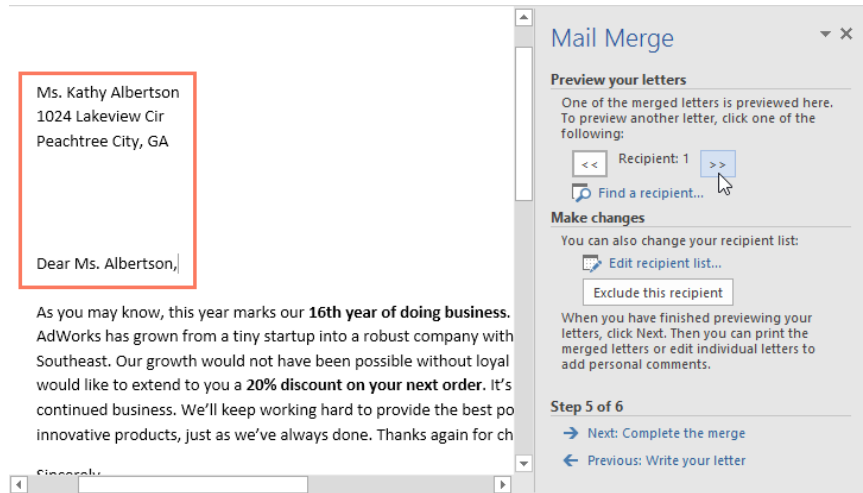
2. If everything looks correct, click **Next: Complete the merge** to move to Step 6.
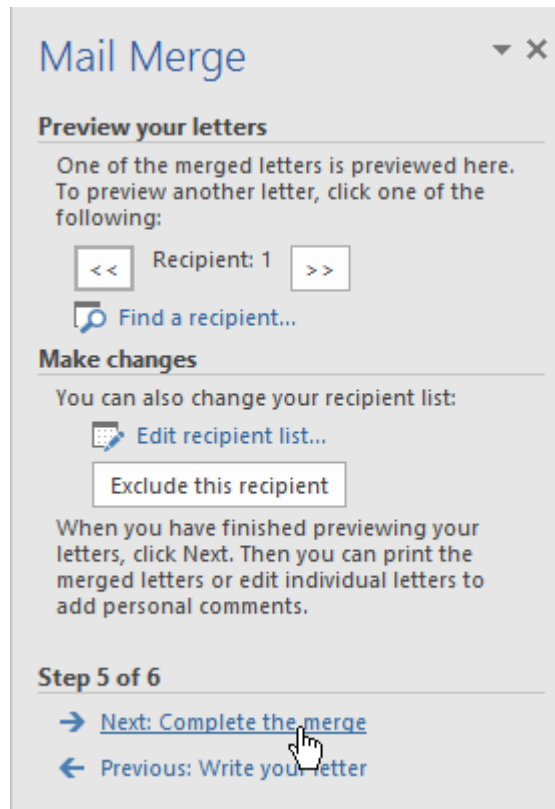
Step 6:

1.   Click **Print** to print the letters.
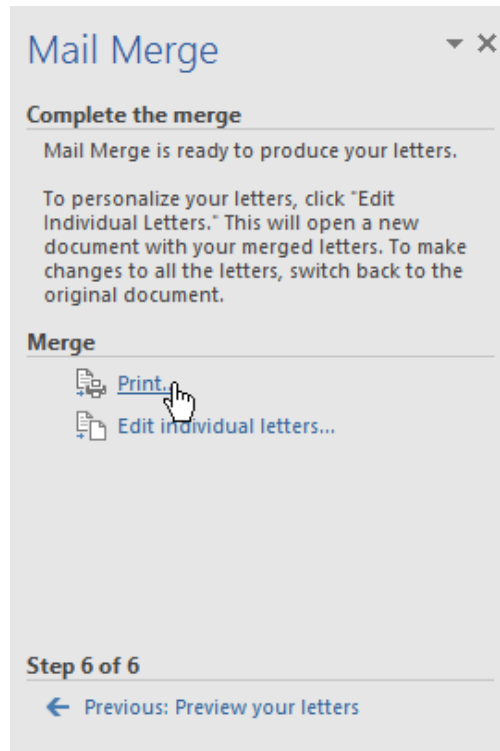
2.   A dialog box will appear. Decide if you want to print **All** of the letters, the current document (record), or only a select group, then click **OK**. In our example, we'll print all of the letters.
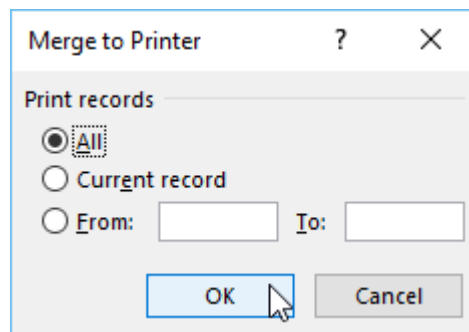
3.   The **Print** dialog box will appear. Adjust the print settings if needed, then click **OK**. The letters will be printed.
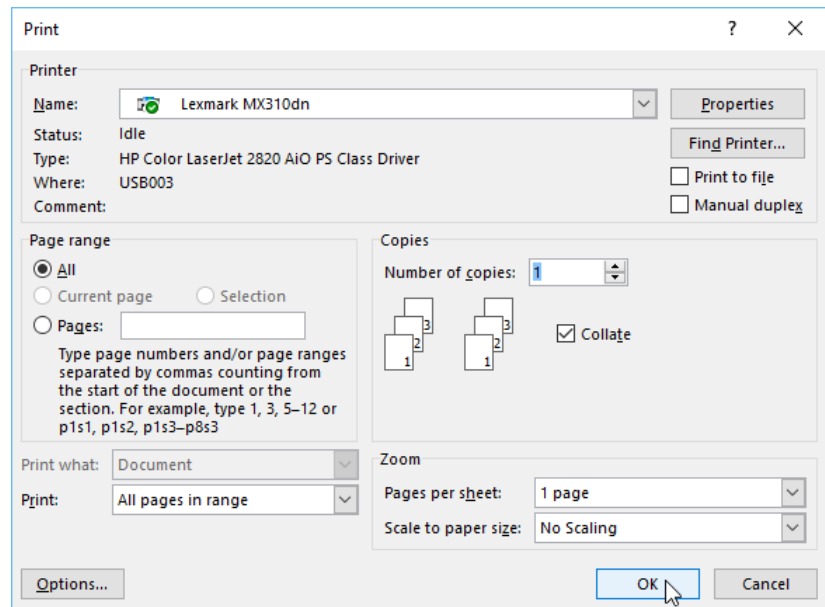
> **Lab Exercise**   Open our practice document and practice recipient list and perform mail merge

Summary

- Word is a word processor, created by Microsoft Corporation, US.
- The word screen contains the title bar, Menu bar, Toolbars, Ruler and etc.
- World 2013 presents a new user interface which is quite different than previous of word.
- The word's document views contains normal views, outline, print layout, web layout and print preview

Keywords

Mail Merge Tool: Word's Mail Merge feature allows you to quickly create personalized correspondence and other documents by combining (merging) information from two different files.

Self-Assessment

1. What makes your document attractive?
   A. Text
   B. Picture
   C. Captions
   D. Bullets

2. How to insert callouts to your document?
   A. Using shapes drop down list.
   B. Using mailing drop down list.
   C. Using table drop down list.
   D. None of these.

3. Which tab to click when we want to insert pictures, tables and clip art?
   A. Mailing
   B. Layout
   C. Insert
   D. File

4. What is CROP tool used for?
    A. To cut a picture
    B. To paste a picture
    C. To download picture
    D. To remove a picture

5. What is a predefined text format?
    A. Shapes
    B. WordArt
    C. ClipArt
    D. Bookmark

6. What happens when you click on Insert >> Picture?
    A. It inserts a picture into document.
    B. It lets you choose clipart to insert into document.
    C. It opens an option of adding picture as well as online picture taskbar.
    D. None of above

7. Under the Illustrations ribbon which of this option is not available?
    A. Shapes
    B. Icons
    C. Smart Art
    D. Orientation

8. If you want to draw a shape in your document, what steps you need to follow?
    A. Insert>> Shapes.
    B. Design>>Shapes
    C. Insert>> Picture>> Shapes.
    D. Not of these

9. Find the odd on out in the shape categories.
    A. Lines
    B. Basic Shapes
    C. Flow chart
    D. Smart chart

10. What is the name of the TOOLBAR that we must see BEFORE we can put in Word Art?
    A. View
    B. Standard
    C. Insert
    D. Mailing

11. What does the icon for Word Art look like?
    A. A blue letter "A"
    B. A blue letter "W"
    C. A black letter "A"
    D. A black letter "W"

12. Which of the following do you use to change margins?
    A. Layout Menu
    B. Design Menu
    C. View Menu
    D. Reference's menu

13. By default, what is the page orientation of a word document?
    A. Landscape
    B. Portrait
    C. Envelope
    D. Letter

14. What tab in MS Word you'll use to access Mail Merge options?
    A. Home tab
    B. Insert tab
    C. References tab
    D. Mailings tab

15. _____ enables us to send the same letter to different persons.
    A. Macros
    B. Template
    C. Mail merge
    D. None

Answers for Self-Assessment

1. B	2. A	3. C	4. D
5. B	6. C	7. D	8. A
9. D	10. C	11. A	12. A
13. B	14. D	15. C	

Further Reading

Fundamental Computer Skills, Feng-Qi Lai, David R. Hofmeister

http://books.google.co.in/bkshp?hl=en

Unit 08: MSExcel

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8.2   SAVING YOUR DOCUMENT

8.3   What is a Workbook?

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8.5   Formatting Rows and Columns

8.6   Functions in Formula

8.7   Formulas and Functions

Summary

Keywords

Self-Assessment

Review Questions

Answer for Self- Assessment

Further Reading

Purpose and Objective

- Discuss the starting of excel.
- Explain the excel window in worksheets.
- Discuss the creation of excel sheet and saving cash sheets in excel format.
- Discuss entering of data and explore number format.
- Explain the sort function and entering of dates.
- Explain cells and formality of cells.
- Discuss excel function, in date time, financial, logic, mathematical and trigonometric function.

Introduction

This application is one of the most useful tools to carry out most of the common scientific and statistical tasks in a faster way. The data once entered in to a worksheet can be manipulated to carry out many results and also using the same data or its output to plot a graph. This Application has a standard library of mathematical, scientific and statistical formulae and these facilities can be used to estimate the result. The following topics will describe how to use this application from first principles.

Microsoft Excel is one of the most popular spreadsheet applications that helps you manage data, create visually persuasive charts, and thought-provoking graphs. Excel is supported by both Mac and PC platforms. Microsoft Excel can also be used to balance a checkbook, create an expense report, build formulas, and edit them.

8.1 CREATING A NEW DOCUMENT

Opening Microsoft Excel

To begin Microsoft Excel, Go to Applications > Microsoft Excel (Figure 1). When opened a Dialogue box on the

screen, showing you a few templates and blank excel sheets (Figure 2.) if this does not happen click File > New Workbook.

Figure 1 opening of a workbook
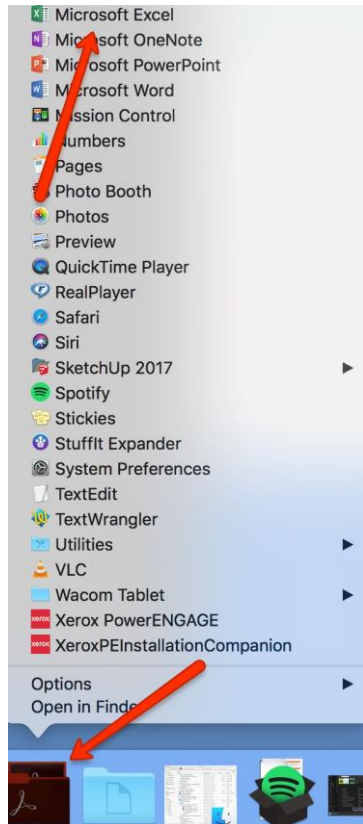
Figure 2 Navigate to Microsoft Excel
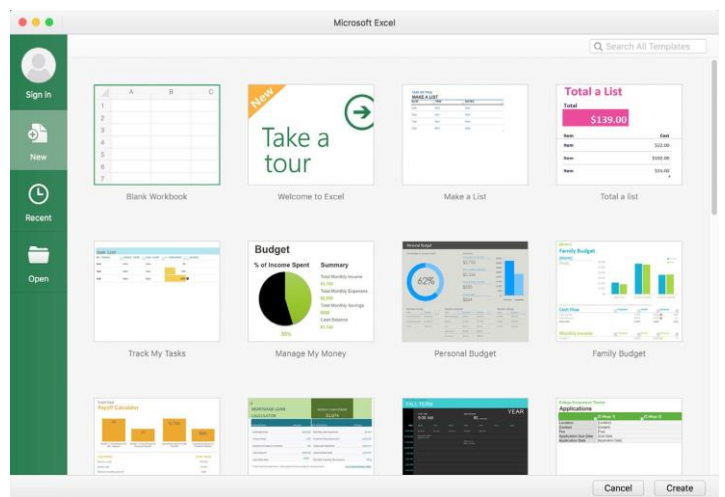
8.2 SAVING YOUR DOCUMENT

Computers crash and documents are lost all the time, so it is best to save often.

Saving Initially

Before you begin you should save your document. To do this, go to File > Save As. Microsoft Excel will open a dialog box (Figure 3) where you can specify the new file's name, location of where you want it saved, and format of the document. Once you have specified a name, place, and format for your new file, press the Save button.

Note: Specifying your file format will allow you to open your document on a PC as well as a Mac. To do this you use the drop down menu next to the Format option. Also, when you are specifying a file extension (i.e. .doc) make sure you know what you need to use.

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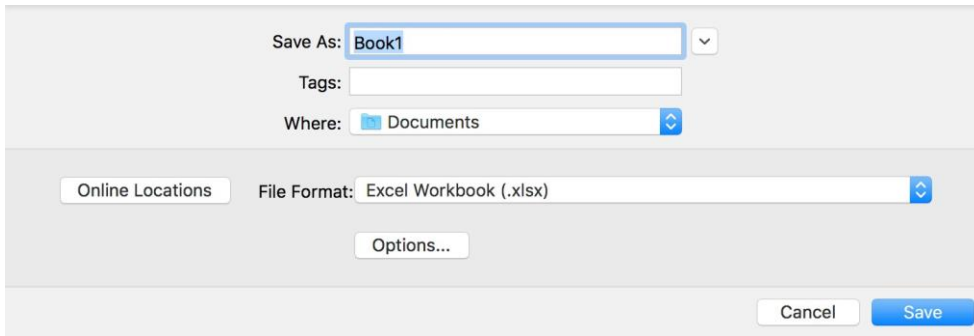
Figure 3 Saving a file dialog box

Saving Later

After you have initially saved your blank document under a new name, you can begin your project. However, you will still want to periodically save your work as insurance against a computer freeze or a power outage. To save, click File > Save

Ribbon

Microsoft Excel uses a ribbon toolbar to allow you to modify your document. Both Mac and Pc have the same ribbon toolbar. If you do not see these toolbars, or to open up other toolbars, go to View > Ribbon and place a checkmark by the toolbar you wish to open. Excel will also allow you to customize your toolbar by going to View > Customize Views.

On Mac, there is grey toolbar (figure above) located at the top of the green ribbon that contains any extra functions that is not in the main Excel ribbon. On Pc, excel has all of its functions in the main ribbon.

The Ribbon: (Figure 4). This toolbar contains tabs of Home, Insert, Page Layout, Formulas, Data, Review, and View. Each tab serves a different purpose in customizing your document or having access to specific tools to help aid in whatever you are working on.

Figure 4 standard tool bar

The Formatting Palette: (Figure 5) is on the Home tab of the Ribbon. This palette contains icons for

common formatting actions, such as Font Style, Font Size, Bold, Italic, Underline, Alignment, Borders, Shading, Orientation, Gridlines, and Margins.
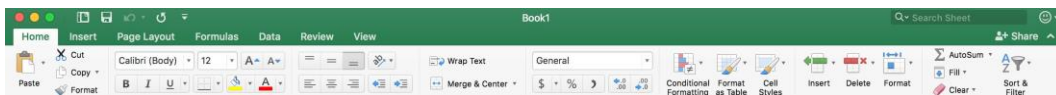
Figure 5 Formatting Palette

8.3 What is a Workbook?

In Excel 2016, when we open up a new workbook, it now includes only one worksheet. There can be the max of 1,048,576 rows and 16,384 columns in an excel worksheet.

Worksheet

Excel files are known as workbooks. Each workbook hold one or more worksheets (also called a "spreadsheets")Whenever we create a new Excel workbook, it will include one worksheet named Sheet1. A worksheet is a framework of columns and rows where column are identified by letters running across the top of worksheet, and rows are identified by numbers running down the left side of the worksheet.

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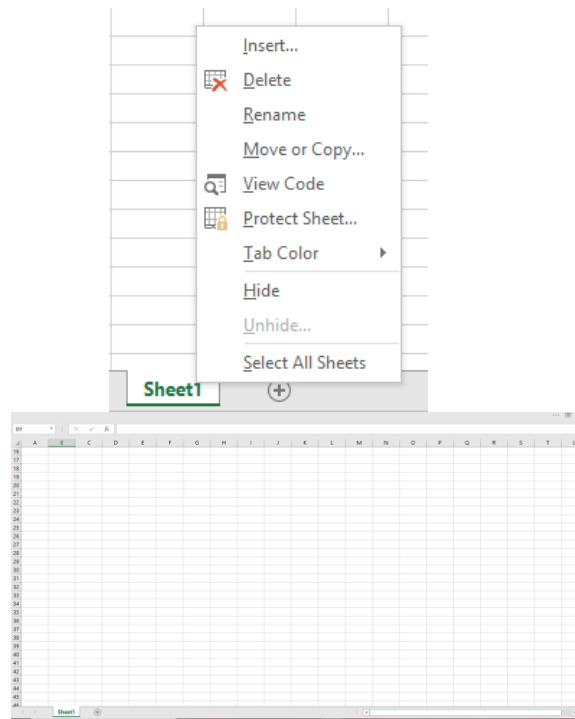
Figure 6 Worksheet

When working with a high amount of data, we can create multiple worksheets to help organize our workbook and make it easier to find content. We can also group worksheets to quickly add data to multiple worksheets at the same time.

To rename a worksheet

Whenever we create a new Excel workbook, it will include one worksheet named Sheet1. We can rename a worksheet to reflect its content better. In this example, we will develop a training log organized by month.

1. Right-click the worksheet we wish to rename, then select Rename from the worksheet menu.
2. Type the desired name for the worksheet.
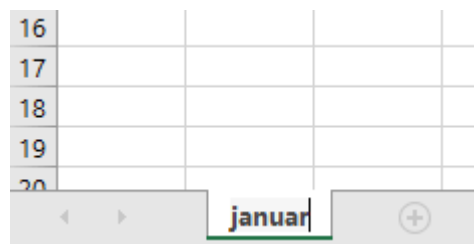
3. Click anywhere outside of the worksheets, or press the Enter on our keyboard. The worksheet will be renamed.

To insert a worksheet

1. Locate and select the new sheet button.

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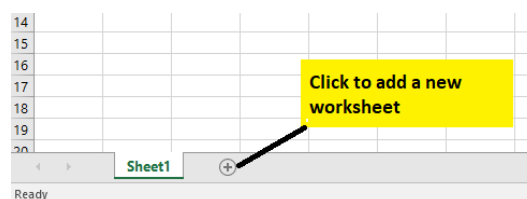
2. A new, blank worksheet will occur.

Note: To change the default number of worksheets, navigate to backstage view, click Options, and then choose the desired amount of worksheets to contain in each new workbook.
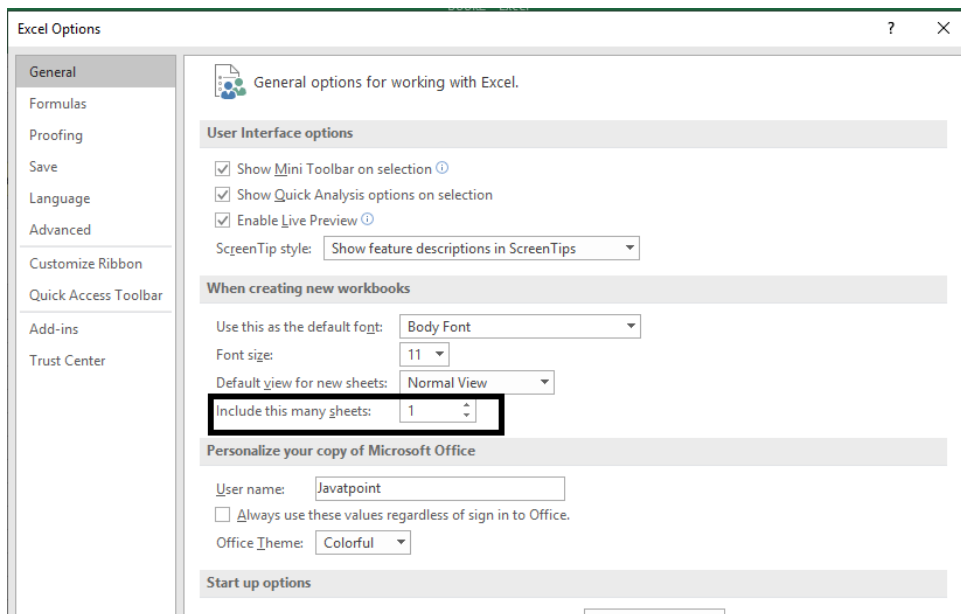
8.4 Formatting

Formatting the Spreadsheet

The default page view for Microsoft Excel spreadsheets displays all gridlines and open up in portrait orientation. To change the gridlines, look at the fifth tab on the Formatting Palette, under Sheet uncheck the view box. This will eliminate any gridlines from the spreadsheet. To change the page orientation, look at the fifth tab on the Formatting Palette, under Orientation and check Landscape (Figure 7).
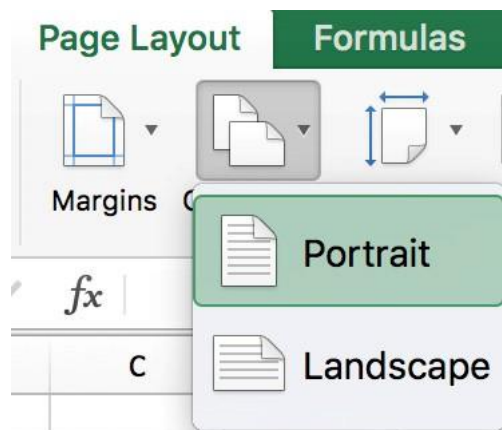
Working with cells

Cells are an important part of any project being used in Microsoft Excel. Cells hold all of the data that is   being used to create the spreadsheet or workbook. To enter data into a cell you simply click once inside of the desired cell, a green border will appear around the cell (Figure 9). This border indicates that it is a selected cell. You may then begin typing in the data for that cell.

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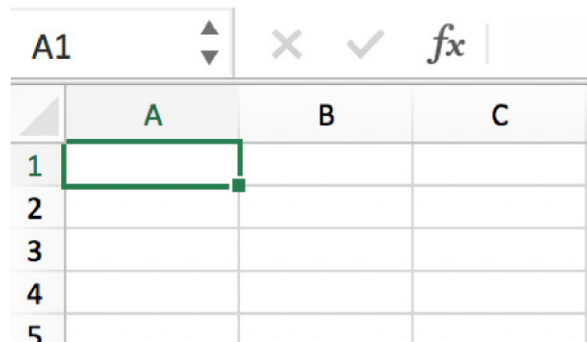
Figure 7 Entering data

Changing an Entry Within a Cell

You may change an entry within a cell two different ways:

•   Click the cell one time and begin typing. The new information will replace any information that was previously entered.

•   Double click the cell and a cursor will appear inside. This allows you to edit certain pieces of information within the cells instead of replacing all of the data.

Cut, Copy, and Paste

You can use the Cut, Copy and Paste features of Excel to change the data within your spreadsheet, to move data from other spreadsheets into new spreadsheets, and to save yourself the time of re-entering information in a spreadsheet. Cut will actually remove the selection from the original location and allow it to be placed somewhere else. Copy allows you to leave the original selection where it is and insert a copy elsewhere. Paste is used to insert data that has been cut or copied.

To Cut or Copy:

Highlight the data or text by selecting the cells that they are held within.

Go to Edit > Copy (Command-X) or Edit > Cut

Click the location where the information should be placed. Go to Edit > Paste

Formatting Cells

There are various different options that can be changed to format the spreadsheets cells differently. When changing the format within cells you must select the cells that you wish to format.

To get to the Format Cells dialog box select the cells you wish to change then go to Format > Cells. A box will appear on the screen with six different tab options (Figure 8). Explanations of the basic options in the format dialog box are bulleted below.

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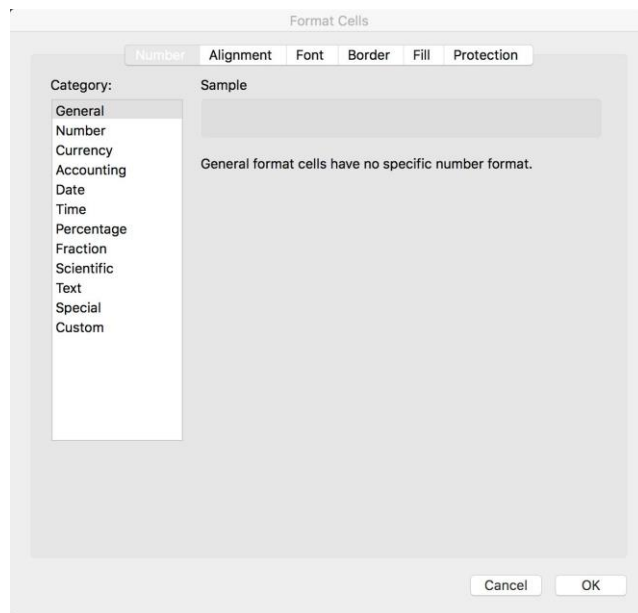
Number: Allows you to change the measurement in which your data is used. (If your data is concerned with money the number that you would use is currency)

Alignment: This allows you to change the horizontal and vertical alignment of your text within each cell. You can also change the orientation of the text within the cells and the control of the text within the cells as well.

Font: Gives the option to change the size, style, color, and effects.

Border: Gives the option to change the design of the border around or through the cells.

8.5 Formatting Rows and Columns

When formatting rows and columns you can change the height, choose for your information to autofit to the cells, hide information within a row or column, un-hide the information. To format a row or column go to Format > Row (or Column), or Home tab then format button for PC, then choose which option you are going to use (Figure 11). The cell or cells that are going to be formatted need to be selected before doing this.

Adding Rows and Columns

When adding a row or column you are inserting a blank row or column next to your already entered data. Before you can add a Row you are going to have to select the row that your wish for your new row to be placed in its place. (Rows are on the left hand side of the spreadsheet) once the row is selected it is going to highlight the entire row that you chose. To insert the row you have to go to **Insert > Row** (Figure 8). The row will automatically be placed on the spreadsheet and any data that was selected in the original row will be moved down below the new row. Another way is using the Insert in the Formatting Palette.
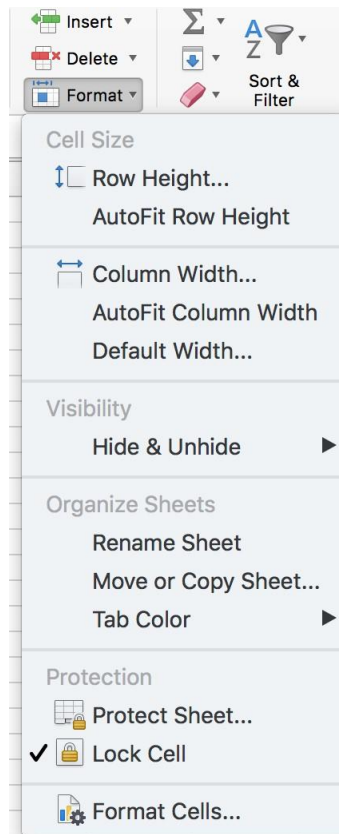
Figure 8 Formatting Palette.
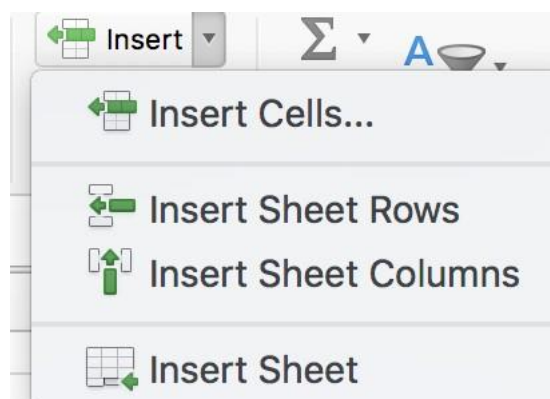
Figure 9 Inserting Column and row

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Before you can add a Column you are going to have to select a column on the spreadsheet that is located in the area that you want to enter the new column. (Columns are on the top part of the spreadsheet.) Once the column is selected it is going to highlight the entire row that you chose. To insert a column you have to go to **Insert > Column** (Figure 9). The column will automatically be place on the spreadsheet and any data to the right of the new column will be moved more to the right.

8.6 Functions in Formula

Many formulas you create use available worksheet functions. These functions enable you to greatly enhance the power of your formulas and perform calculations that are difficult if you use only the operators. For example, you can use the LOG or SIN function to calculate the Logarithm or Sin ratio. You can't do this complicated calculation by using the mathematical operators alone.

Using Functions

When you type = sign and then type any alphabet you will see the searched functions as below.
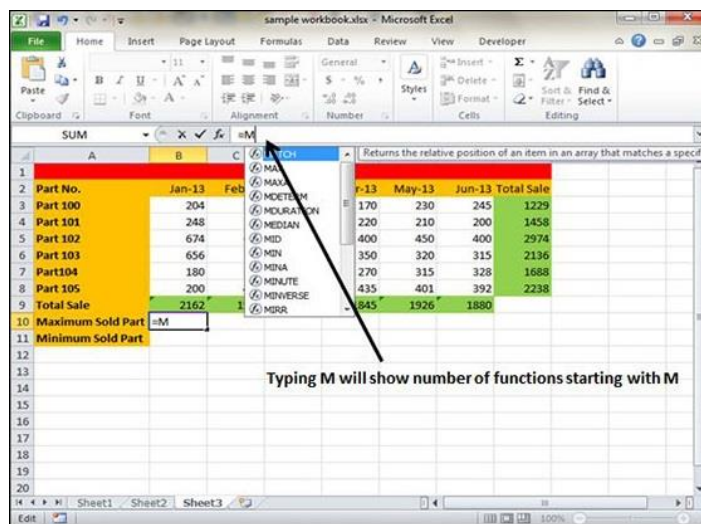
Suppose you need to determine the largest value in a range. A formula can't tell you the answer without using a function. We will use formula that uses the MAX function to return the largest value in the range B3:B8 as =MAX(A1:D100).
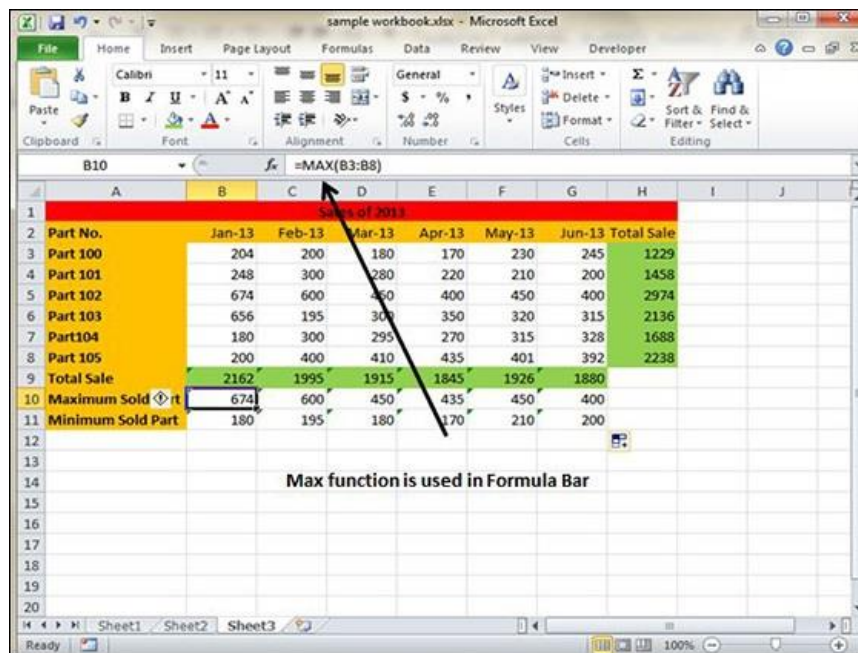
Another example of functions. Suppose you want to find if the cell of month is greater than 1900 then we can give Bonus to Sales representative. The we can achieve it with writing formula with IF functions as =IF(B9>1900,"Yes","No")
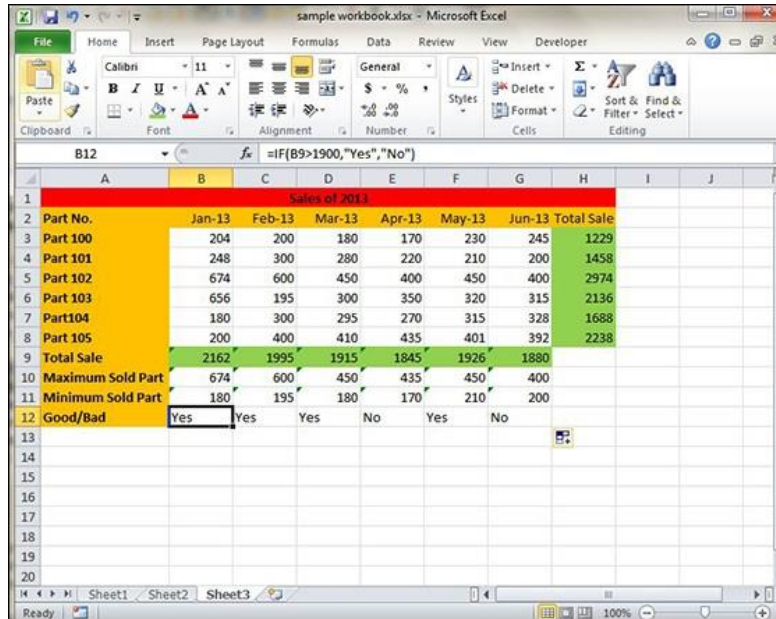
Function Arguments

In the above examples, you may have noticed that all the functions used parentheses. The information inside the parentheses is the list of arguments.

Functions vary in how they use arguments. Depending on what it has to do, a function may use.

No arguments – Examples – Now(), Date(), etc.

One argument – UPPER(), LOWER(), etc.

A fixed number of arguments – IF(), MAX(), MIN(), AVERGAGE(), etc.

Infinite number of arguments

Optional arguments

8.7 Formulas and Functions

A formula is an expression which calculates the value of a cell. Functions are predefined formulas and are already available in Excel.

For example, cell A3 below contains a formula which adds the value of cell A2 to the value of cell A1.

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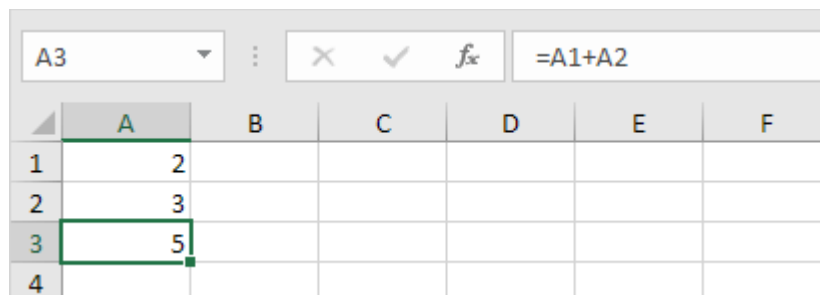
For example, cell A3 below contains the SUM function which calculates the sum of the range A1:A2.

A3	▼	⋮	✕	✓	*fx*	=SUM(A1:A2)	

	A	B	C	D	E	F
1	2					
2	3					
3	5					
4						

Enter a Formula:

To enter a formula, execute the following steps:

1. Select a cell.

2. To let Excel know that you want to enter a formula, type an equal sign (=).

3. For example, type the formula A1+A2.

A3	▼	⋮	✕	✓	*fx*	=A1+A2	

	A	B	C	D	E	F
1	2					
2	3					
3	5					
4						

A3	▼	⋮	✕	✓	*fx*	=A1+A2	

	A	B	C	D	E	F
1	2					
2	3					
3	5					
4						

Change the value of cell A1 to 3.

A1	▼	⋮	✕	✓	*fx*	3	

	A	B	C	D	E	F
1	3					
2	3					
3	6					
4						

📝 instead of typing A1 and A2, simply select cell A1 and cell A2.

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Excel automatically recalculates the value of cell A3. This is one of Excel's most powerful features!

Edit a Formula

When you select a cell, Excel shows the value or formula of the cell in the formula bar.

A3	▼	⋮	✕	✓	*f*x	=A1+A2

	A	B	C	D	E	F
1	2					
2	3					
3	5					
4						
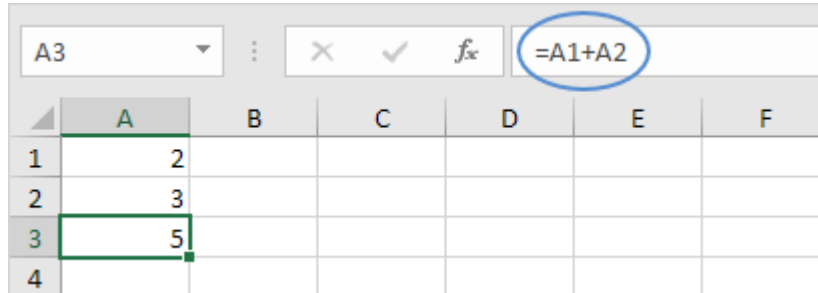
1. To edit a formula, click in the formula bar and change the formula.

SUMIF	▼	⋮	✕	✓	*f*x	=A1-A2

	A	B	C	D	E	F
1	2					
2	3					
3	=A1-A2					
4						

2. Press Enter.

A4	▼	⋮	✕	✓	*f*x	

	A	B	C	D	E	F
1	2					
2	3					
3	-1					
4						
5						
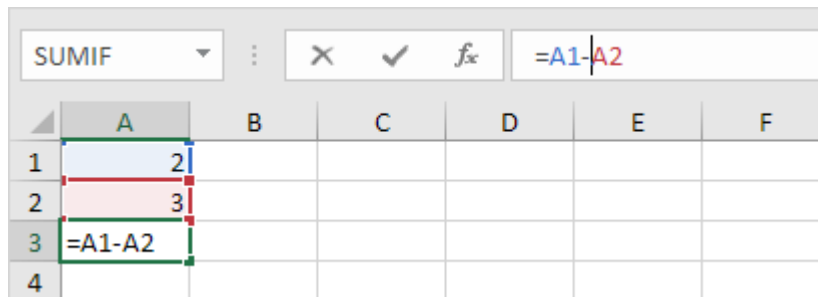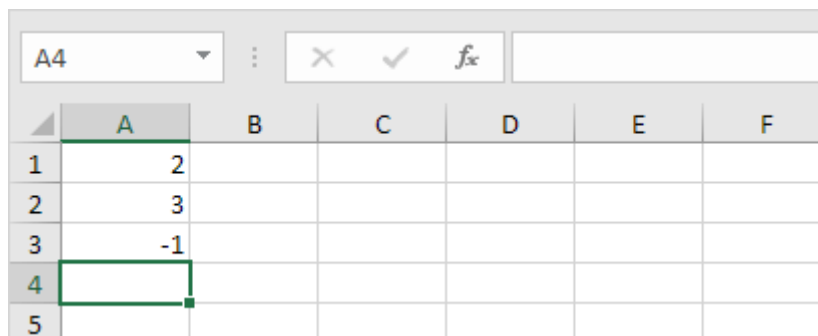
Operator Precedence

Excel uses a default order in which calculations occur. If a part of the formula is in parentheses, that part will be calculated first. It then performs multiplication or division calculations. Once this is complete, Excel will add and subtract the remainder of your formula. See the example below.

First, Excel performs multiplication (A1 * A2). Next, Excel adds the value of cell A3 to this result.

Another example,

First, Excel calculates the part in parentheses (A2+A3). Next, it multiplies this result by the value of cell A1.

Copy/Paste a Formula

When you copy a formula, Excel automatically adjusts the cell references for each new cell the formula is copied to. To understand this, execute the following steps.

1. Enter the formula shown below into cell A4.

2a. Select cell A4, right click, and then click Copy (or press CTRL + c)
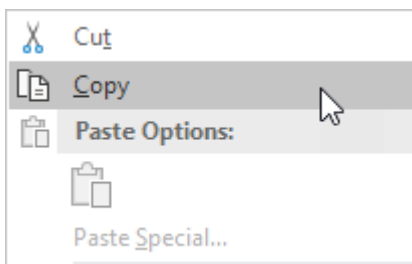
..next, select cell B4, right click, and then click Paste under 'Paste Options:' (or press CTRL + v).

Paste Options:

Paste (P)
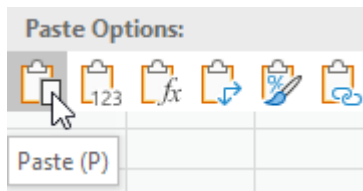
2b. You can also drag the formula to cell B4. Select cell A4, click on the lower right corner of cell A4 and drag it across to cell B4. This is much easier and gives the exact same result!

Result. The formula in cell B4 references the values in column B.

Insert Function

Every function has the same structure. For example, SUM(A1:A4). The name of this function is SUM. The part between the brackets (arguments) means we give Excel the range A1:A4 as input. This function adds the values in cells A1, A2, A3 and A4. It's not easy to remember which function and which arguments to use for each task. Fortunately, the Insert Function feature in Excel helps you with this.

To insert a function, execute the following steps.

1. Select a cell.

2. Click the Insert Function button.

The 'Insert Function' dialog box appears.

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3. Search for a function or select a function from a category. For example, choose COUNTIF from the Statistical category.
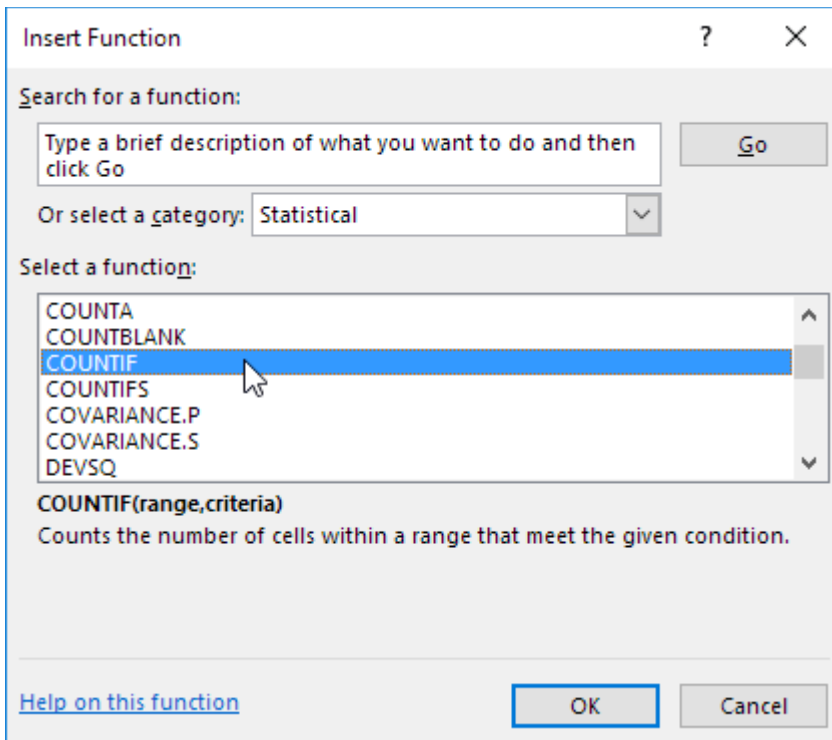
4. Click OK.

The 'Function Arguments' dialog box appears.

5. Click in the Range box and select the range A1:C2.

6. Click in the Criteria box and type >5.

7. Click OK.
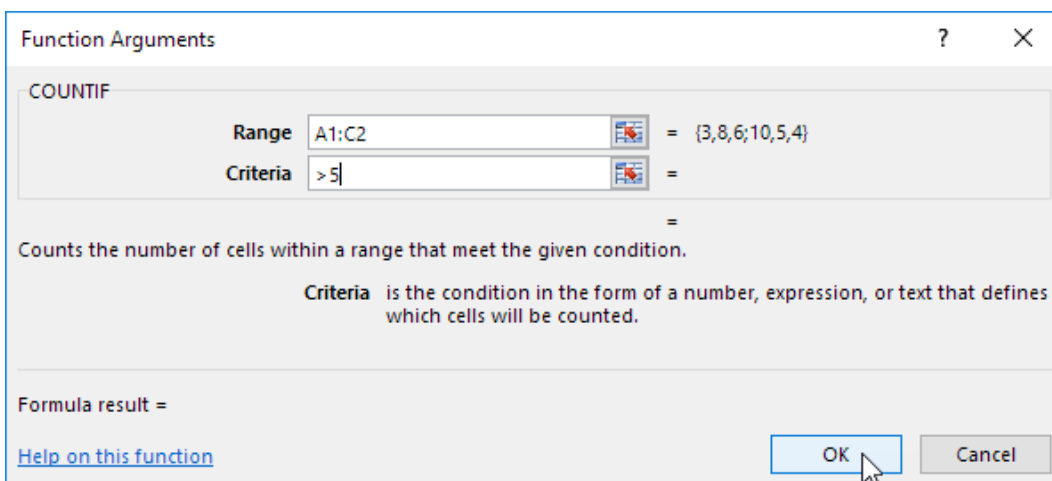
Result. The COUNTIF function counts the number of cells that are greater than 5.

instead of using the Insert Function feature, simply type =COUNTIF(A1:C2,">5"). When you arrive at: =COUNTIF(instead of typing A1:C2, simply select the range A1:C2.

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Functions

Below is the list of some functions which are very helpful in excel.

> **1 Count and Sum: The** most used functions in Excel are the functions that count and sum. You can count and sum based on one criteria or multiple criteria.
>
> **2 Logical**: Learn how to use Excel's logical functions, such as IF, AND, OR and NOT.
>
> **3 Cell References**: Cell references in Excel are very important. Understand the difference between relative, absolute and mixed reference, and you are on your way to success.
>
> **4 Date & Time:** To enter a date, use the "/" or "-" characters. To enter a time, use the ":" (colon).
>
> **5 Text:** Excel has many functions to offer when it comes to manipulating text strings.
>
> **6 Lookup & Reference:** Learn all about Excel's lookup & reference functions, such as VLOOKUP, HLOOKUP, MATCH, INDEX and CHOOSE.
>
> **7 Financial:** This chapter illustrates Excel's most popular financial functions.
>
> **8 Statistical:** An overview of some very useful statistical functions in Excel.
>
> **9 Round:** This chapter illustrates three functions to round numbers in Excel. ROUND, ROUNDUP and ROUNDDOWN.
>
> **10 Formula Errors:** This chapter teaches you how to deal with some common formula errors.
>
> **11 Array Formulas**: This chapter helps you understand array formulas in Excel. Single cell array formulas perform multiple calculations in one cell.

Most used functions

Let's check out the 10 most used Excel functions.

1. COUNT

To count the number of cells that contain numbers, use the COUNT function in Excel.

Figure 10 Count function

Note: use COUNTA to count all cells that are not empty. COUNTA stands for count all.

2. **SUM**

   To sum a range of cells, use the SUM function in Excel. The SUM function below sums all values in column A.

Note: you can also use the SUM function to sum an entire row. For example, =SUM(5:5) sums all values in the 5th row.

3. **IF**

   The IF function checks whether a condition is met, and returns one value if true and another value if false.

Explanation: if the score is greater than or equal to 60, the IF function shown above returns Pass, else it returns Fail. To quickly copy this formula to the other cells, click on the lower right corner of cell C2 and drag it down to cell C6.

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4. **AVERAGE**

    To calculate the average of a group of numbers, use the AVERAGE function (no rocket science here). The formula below calculates the average of the top 3 numbers in the range A1:A6.

A8			✕	✓	*fx*	=AVERAGE(LARGE(A1:A6,{1,2,3}))

	A	B	C	D	E	F	G	H	I
1	9								
2	15								
3	2								
4	10								
5	1								
6	20								
7									
8	15								
9									

Explanation: the LARGE function returns the array constant {20,15,10}. This array constant is used as an argument for the AVERAGE function, giving a result of 15.

5. **COUNTIF**

    The COUNTIF function below counts the number of cells that contain exactly star + a series of zero or more characters.

A9			✕	✓	*fx*	=COUNTIF(A1:A7,"star*")

	A	B	C	D	E	F	G	H	I
1	star								
2	moon								
3	stars								
4	9								
5	star								
6	star								
7	star12								
8									
9	4								
10									

    Explanation: an asterisk (*) matches a series of zero or more characters. Visit our page about the COUNTIF function for more information and examples.

6. **SUMIF**

    The SUMIF function below sums values in the range B1:B5 if the corresponding cells in the range A1:A5 contain exactly circle + 1 character.

Explanation: a question mark (?) matches exactly one character. Visit our page about the SUMIF function for more information and examples.

7.　VLOOKUP

The VLOOKUP function below looks up the value 53 (first argument) in the leftmost column of the red table (second argument). The value 4 (third argument) tells the VLOOKUP function to return the value in the same row from the fourth column of the red table.

8.　MIN

To find the minimum value, use the MIN function. It's as simple as it sounds.

9.　MAX

To find the maximum value, use the MAX function.

10. SUMPRODUCT

To calculate the sum of the products of corresponding numbers in one or more ranges, use Excel's powerful SUMPRODUCT function.

Explanation: the SUMPRODUCT function performs this calculation: (2 * 1000) + (4 * 250) + (4 * 100) + (2 * 50) = 3500.

Summary

• Exploring the Excel Window, in which when we start working, we begin using work is called worksheet.

• Creation of worksheet in which we can say the worksheet that worksheet is used for mummeries tasks.

• Excel function must commonly use excel functions are used by grasped.

Keywords

Documents: A document is a work of non-fiction writing intended to store and communicate information, thus acting as a recording. Documents are often the focus and concern of business administration and government administration. The word is also used as a verb as "documenting" describes the process of making a document.

Excel Worksheets: The worksheets are used for numerous tasks such as to collect and analyze information, including records, notes, activity budgets, professional organization information, data, financial reports, nutritional diaries, and legislative voting records.

Format Cell: When you enter data into a cell in Excel, it is handled differently depending on what type of formatting you have assigned to the cell. For example, if you choose Currency formatting, Excel will automatically convert 3 into $3.00; if you choose Date formatting, Excel would convert 3/1 to March 1, 2002; and if you choose Percent formatting, Excel would change 0.3 to 30%.

Self-Assessment

1. Which of the following is a selected cell?

    A. current command

    B. default option

    C. active cell

    D. default cell

2. Functions in MS Excel must begin with ___

    A. An () sign

    B. An Equal Sign

    C. A Plus Sign

    D. A > Sign

3. Which function in Excel checks whether a condition is true or not ?

    A. SUM

    B. IF

    C. COUNT

    D. AVG

4. In Excel, Columns are labelled as ___

    A. A, B, C, etc

    B. 1,2,3 etc

    C. A1, A2, etc.

    D. A1, A2, etc.

5. You want to calculate the number of nonblank cells in your worksheet. Which function should be used?

    A. SUM

    B. COUNTA

    C. MAX

    D. MIN

6. What is the intersection of a column and a row on a worksheet called?

    A. Column

    B. Value

    C. Address

    D. Cell

7. ____ appear at the bottom of the Excel window.

    A. Title bar

    B. Formula bar

    C. Work sheet tabs

    D. Name box

8. What are the basic rectangular building blocks of a spreadsheet?

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    A.   Cells

    B.   Zoom slider

    C.   Help button

    D.   All of these

9. Which of the following is not a term pertaining to spreadsheets?

    A.   Cell

    B.   Character

    C.   Browser

    D.   Formula

10. Excel is a program that is used to prepare a _____

    A.   Slide presentation

    B.   Spreadsheet

    C.   Text document

    D.   Database

11. This is not a function category in Excel.

    A.   Logical

    B.   Text

    C.   Financial

    D.   Data series

12. Which of the following is a bar near the top of the Excel window where you can enter or edit cell entries or formulas?

    A.   Cell pointer

    B.   Column marker

    C.   Fill handle

    D.   Formula bar

13. Each excel file is a workbook that contains different sheets. Which of the following cannot be a sheet in workbook?

    A.   work sheet

    B.   chart sheet

    C.   module sheet

    D.   data sheet

14. Long text can be broken down into many lines within a cell. You can do this through___

    A.   Wrap text

    B.   Merge text

    C.   Justify text

    D.   None of these

15. Which of these options are shown while formatting a cell?

    A.   Number

    B.   Alignment

    C.   Protection

    D.   All of the above

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Review Questions

1. What are some ways to use Excel?

2. How many rows and columns are there in an excel?

3. How many worksheets can an Excel workbook have?

4. What is the difference between Microsoft Excel and Microsoft Word?

5. What are the advantages of Microsoft Excel?

6. How do you explain a Microsoft Excel?

7. What do you mean by naming a cell?

8. What are functions?

Answer for Self- Assessment

1. C	2. B	3. B	4. A
5. B	6. D	7. C	8. A
9. C	10. B	11. D	12. D
13. D	14. A	15. D	

Further Reading

https://bookboon.com/en/excel-ebooks

https://www.javatpoint.com/excel-tutorial

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Unit 09: MS Excel, Printing

Purpose and Objectives

- Explanation of Graph and chart in Excel
- Understanding of Design corner
- Process of printing Excel sheet

Introduction

Excel is a Window-based spreadsheet created by Microsoft Corporation, US. It includes all standard features of a spreadsheet package like automatic recalculation, graphs, and functions. It also includes several advanced utilities like the facility to include other objects within a spreadsheet and pivot tables and form designing'. Excel can be used for a variety of applications. It is commonly used to automate financial statements, business forecasts, inventory control, and accounting. The package provides statistical, financial and scientific functions. Therefore, Excel can be used in many scientific and engineering environments to analyze numeric data. Excel is currently the best-selling Windows spreadsheet.

9.1 Cell References

Cell references in Excel are very important. Understand the difference between relative, absolute and mixed reference, and you are on your way to success.

Relative References

By default, Excel uses relative references. See the formula in cell D2 below. Cell D2 references (points to) cell B2 and cell C2. Both references are relative

1. Select cell D2, click on the lower right corner of cell D2 and drag it down to cell D5.

Cell D3 references cell B3 and cell C3. Cell D4 references cell B4 and cell C4. Cell D5 references cell B5 and cell C5. In other words: each cell references its two neighbors on the left.

Absolute Reference

1. To create an absolute reference to cell H3, place a $ symbol in front of the column letter and row number (H3) in the formula of cell E3.

2. Now we can quickly drag this formula to the other cells.

	A	B	C	D	E	F	G	H	I
COUNTIF				f_x	=C6*H3				
1									
2		Length (cm)	Width (cm)		Length (inch)	Width (inch)		Conversion rate	
3		1	10		0.3937008	3.937008		0.3937008	
4		5	10		1.968504	3.937008			
5		4	8		1.5748032	3.1496064			
6		2	10		0.7874016	=C6*H3			
7									

The reference to cell H3 is fixed (when we drag the formula down and across). As a result, the correct lengths and widths in inches are calculated.

Mixed References

Sometimes we need a combination of relative and absolute reference (mixed reference).

1. See the formula in cell F2 below.

	A	B	C	D	E	F	G	H
COUNTIF				f_x	=B2*(1-B6)			
1	Product	Price			Prices / Month	Jan	Feb	Mar
2	Jeans	80			Jeans	=B2*(1-B6)		
3	Shirts	30			Shirts			
4								
5	Month	Jan	Feb	Mar				
6	Reduction	20%	40%	80%				
7								

2. We want to copy this formula to the other cells quickly. Drag cell F2 across one cell, and look at the formula in cell G2.

	A	B	C	D	E	F	G	H
COUNTIF				f_x	=C2*(1-C6)			
1	Product	Price			Prices / Month	Jan	Feb	Mar
2	Jeans	80			Jeans		64 =C2*(1-C6)	
3	Shirts	30			Shirts			
4								
5	Month	Jan	Feb	Mar				
6	Reduction	20%	40%	80%				
7								

Do you see what happens? The reference to the price should be a fixed reference to column B. Solution: place a $ symbol in front of the column letter ($B2) in the formula of cell F2. In a similar way, when we drag cell F2 down, the reference to the reduction should be a fixed reference to row 6. Solution: place a $ symbol in front of the row number (B$6) in the formula of cell F2.

RESULT:

3. Now we can quickly drag this formula to the other cells.

NOTE: we don't place a $ symbol in front of the row number of $B2 (this way we allow the reference to change from $B2 (Jeans) to $B3 (Shirts) when we drag the formula down). In a similar way, we don't place a $ symbol in front of the column letter of B$6 (this way we allow the reference to change from B$6 (Jan) to C$6 (Feb) and D$6 (Mar) when we drag the formula across).

9.2 Working with Charts

Charts are an important part to being able to create a visual for spreadsheet data. In order to create a chart within Excel the data that is going to be used for it needs to be entered already into the spreadsheet document. Once the data is entered, the cells that are going to be used for the chart need to be highlighted so that the software knows what to include. Next, click on the Charts Tab that is located right above the spreadsheet. Once it is clicked the tab will highlight green and all of the various charts within Excel will appear.
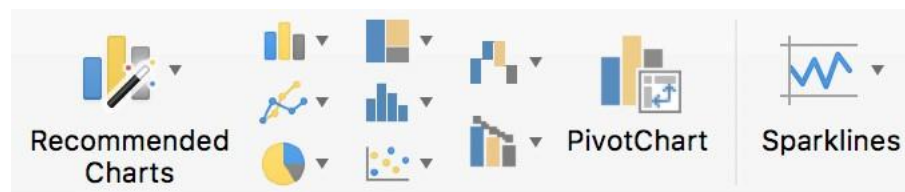
You may choose the chart that is desired by clicking the icons that are displayed. Once the icon is chosen the chart will appear as a small graphic within the spreadsheet you are working on. To move the chart to a page of its own select the border of the chart and Ctrl > Click. This will bring up a drop down menu, navigate to the option that says Move Chart. This will bring up a dialog box that says Chart Location.

From here you will need to select the circle next to As A New Sheet and name the sheet that will hold your chart. The chart will pop up larger in a separate sheet but in the same workbook as your entered data.

Chart Design
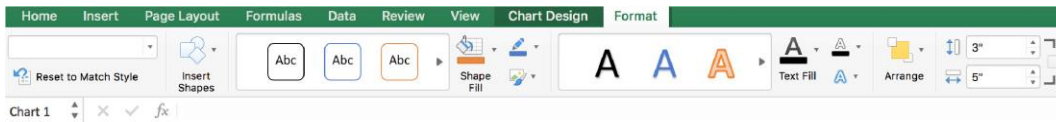
There are various different features that you can change to make your chart more appealing. To be able to make these changes you will need to have the chart selected or view the chart page that is within your workbook. Once you have done that the Formatting Palette will change to show features that were not there before. These features include:

Chart Options:

Titles: Here you can change the Chart Title, Vertical Axis Title, and Horizontal Axis Title by clicking the drop down menu and selecting which one you will change and entering the name into the empty box below.

Axes: You may change which axes are shown on the charts graph and which are not.

Gridlines: This feature allows you to change which gridlines (major and minor) are shown on the charts graph and which are not.

Chart Style:

Here you are able to change the color of the bars that are within your chart.

Quick Styles and Effects:

Here you can add gradients, fill, drop shadows, and reflections to your chart depending on what is

Charts and Graphs

Charts and graphs are used to make information clearer and easier to understand. A good picture is worth a thousand numbers. The most common place for people to see charts and graphs is in the news. News publishers use graphics all the time to show comparisons and explain important trends for things such as weather, gas prices, crime rate, or who is winning an election and by how much. Charts and graphs are also critical to engineers, scientists and financial analysts who use them to help visualize large amounts of information, make better decisions, and communicate their results to other people.

There are good reasons for learning to create graphs by hand, but there are also some great tools that everyone ought to learn how to use at some point, such as Excel. The purpose of this article is to highlight some of the common types of graphs and charts that you can create with Excel, explain when you might use the different types, and provide a great set of resources for learning about and teaching about charts and graphs.

Bar Graphs

A bar graph is a graph that shows you information about two or more discrete objects, events, locations, groups of people, etc. You can use the bar graph to make comparisons. For example, if you count the number of students in your class who are girls and the number who are boys, you could make a bar graph to compare the totals. One bar would represent the number of boys, and another bar would represent the number of girls.
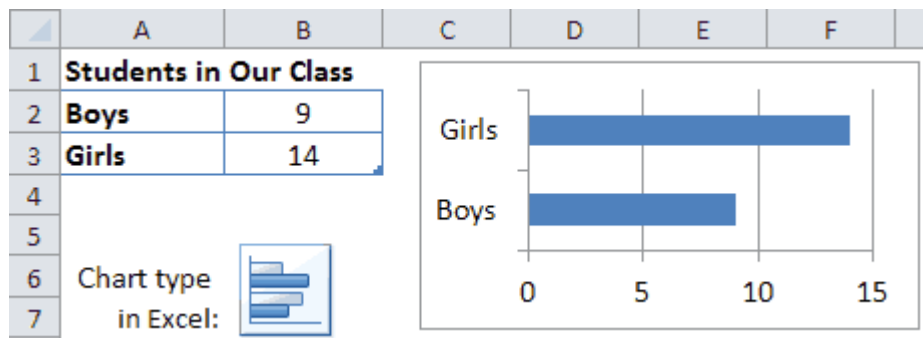
Figure 1 Example of a bar graph created with Excel.

Column Graphs

A column chart in Excel is just a bar graph where the bars are displayed as columns. Instead of the labels or categories listed on the left, they are listed on the bottom. The example below shows how you can set up the data table for creating a column chart showing the number of apples eaten in a particular month.
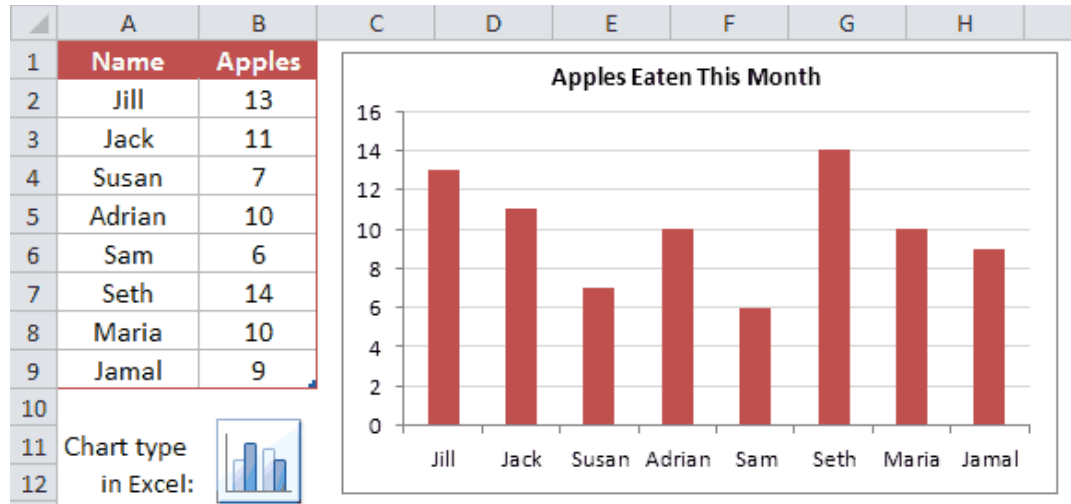
Figure 2 Example of a column chart created using Excel

Line Graphs

A line graph is great for showing continuous change over time. For example, you could use a line graph to watch the changes in temperature in the month of March. If it is hotter one day than on the day before, the line will go up. If it is cooler, it will go down. By analyzing the line graph, you can get a better idea of the changes that took place as time went on. You can also easily determine when the value you are graphing was highest or when it was lowest. Including 2 lines on the same graph lets you visualize comparisons, such as the difference between the High and Low temperatures for each day.
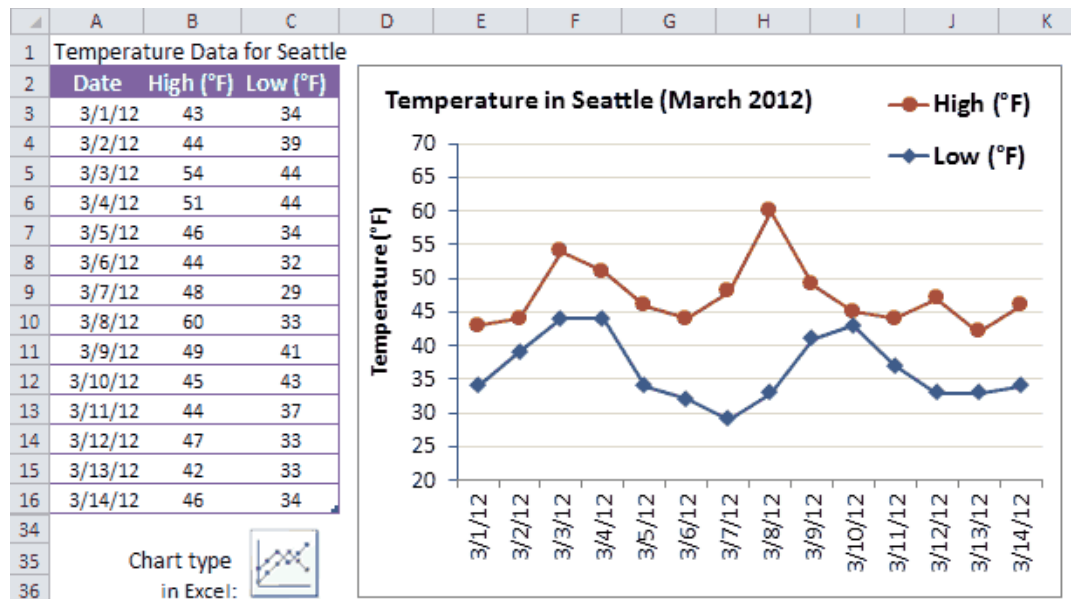
Figure 3 Example of a line graph in Excel

You can create a line graph from the same data table as a bar graph, and vice versa. But, what you decide to use should largely depend upon whether you are showing how something changes over time (line graph) or showing comparisons between discrete things (bar graph).

It is important to be aware of color choices when using graphs. People often associate meanings with different colors, such as red for hot and blue for cold, so in the example above it could be confusing

if the colors of the lines were switched. It makes more sense for red to be used for the High temperature and blue to be used for the Low temperature.

Pie Charts

A pie chart is a circular graph where the pieces of the pie are used to represent a percentage of a whole. For example, if you took a survey of the students in your class and asked them each about their favorite pizza, you could use the results to make a pie chart that would show what toppings earned the most votes. In this case, each triangle would represent a different topping. The triangle with the largest area would represent the topping that got the most votes, while the toppings that got the least votes would be represented by smaller triangles.
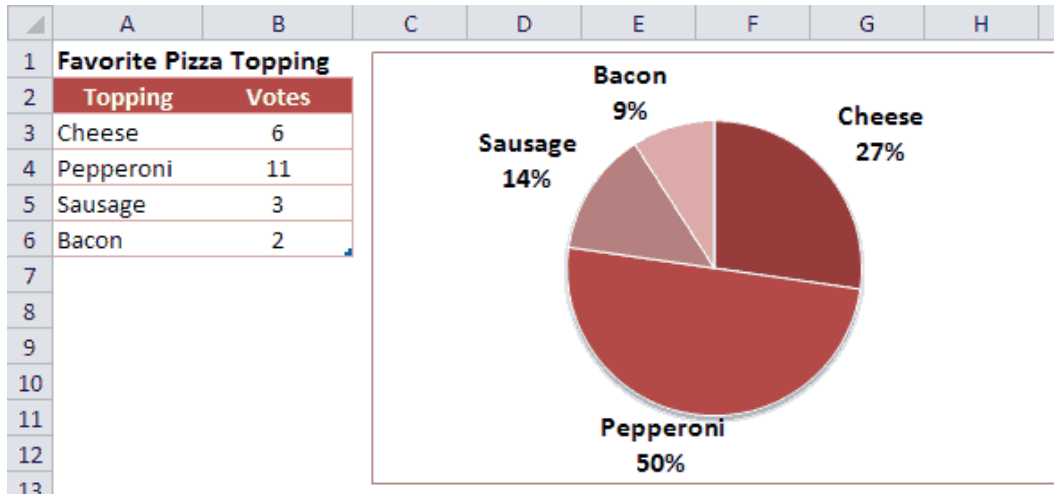
Figure 4 Example of a pie chart in Excel

In the example above, it is pretty easy to see that Pepperoni was the favorite. It is also easy to see that Pepperoni received the same amount of votes as all of the others combined. That would not be as easy to see if you were just staring at the numbers in the table. One problem with a pie chart is that it can take up a lot of space to show only a little bit of information.

Another major problem with pie charts is making comparisons between a lot of different things, and especially when you have a lot of little slices. To help with that, Excel provides a "Bar of Pie" graph that breaks out some of the pieces into a separate stacked bar graph like in the example below.
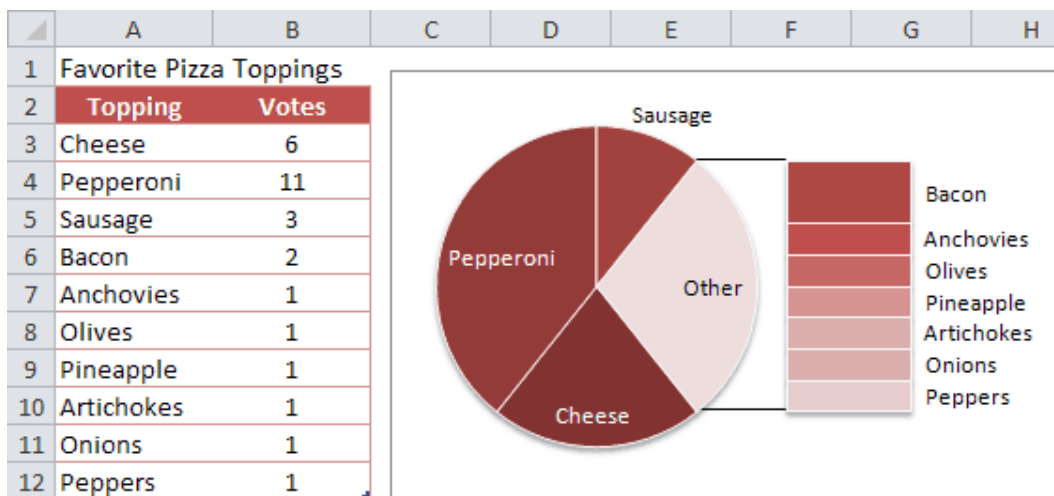
Figure 5 Example of a "bar of pie" graph in Excel

People already have a hard time comparing sizes of areas when they are fairly close in size. But, it is even harder when the areas are different shapes. If you tried to compare Sausage and Bacon in the above example (without using the data table), you could end up coming to an incorrect conclusion. Can you tell why? Is the Sausage slice larger or smaller than the Bacon? Without the numbers to help you, you probably couldn't tell for sure. In fact, the Sausage received 3 votes and the Bacon only received 2. It turns out that the sizes of the rectangles can only be compared within the stacked bar

chart. The size of the rectangles cannot be compared to the size of the pie slices - not only because of the difficulty between comparing rectangles and pie slices, but also because the total area of the stacked bar chart is not the same as the total area of the "Other" slice from which it was taken.

Area Charts

An area chart or area graph combines some of the characteristics of line graphs with the characteristics of bar graphs. It looks like a line graph with shading underneath the line. Sometimes, the shading can help add meaning to a line graph. For example, if a line graph represented the height of water in a reservoir over time, shading the area under the line could make the line graph look like actual water rising and falling.

Stacked area charts and stacked column charts provide a way to compare differences or proportions over time or between different locations or groups of people. The height of each of the areas as well as the total height of all the areas may change over time. If you had a series of pie charts that compared the same items from month to month, all of that information could be displayed in a single area chart. For example, let's say that a teacher offered the same pizza topping survey to each of her classes over a period of 10 years. You can display that information as an area chart like the image below.
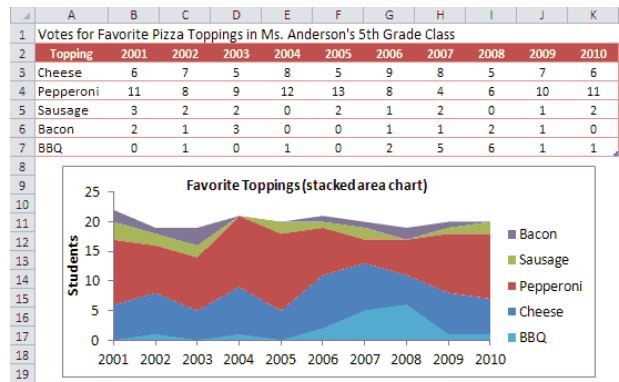
Figure 6 Example of a stacked area chart in Excel

This type of area chart is time-based (same survey offered year after year), but it's not truly continuous because the class stays the same throughout the entire year. So, this is a case where it might be more appropriate to show the graph as a stacked column chart (see below) which will depict the results as discrete events. Everything about the data table and the graph is pretty much the same. All you have to do is change the chart type.
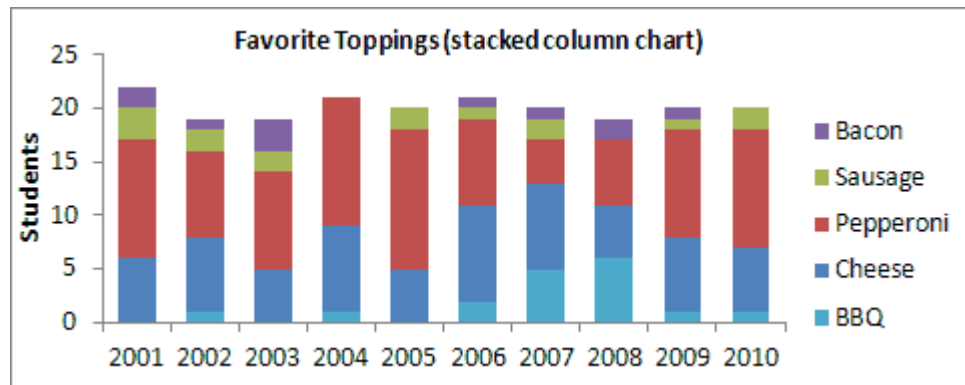
Figure 7 Example of a stacked column chart in Excel

XY Graph (Scatter Plot)

An X-Y graph, also called a coordinate graph or scatter plot, is a graph that shows different ordered pairs on an X-Y axis (Cartesian coordinate system). X-Y graphs are used to look at and find patterns in sets of data and to plot mathematical formulas. The points on the graph may form a straight line or a curved line, and may be connected with a line. Unlike bar graphs and line graphs, the line in an X-Y graph can curve back on itself, forming complex patterns such as the spirograph shown on the

right. In some cases, the points may not form a line at all. They might just be shown as a bunch of random dots scattered all over the place (thus the name).

To plot a point on graph paper, you first need to draw the coordinate system and then you simply find the point's x-coordinate, move straight up or down the line to its y-coordinate, and draw a point. To create a scatter plot in Excel, you first create a simple table with one column for listing the X-coordinates and a second column for the Y-coordinates, select the data table, then insert the scatter chart by choosing it from a menu.
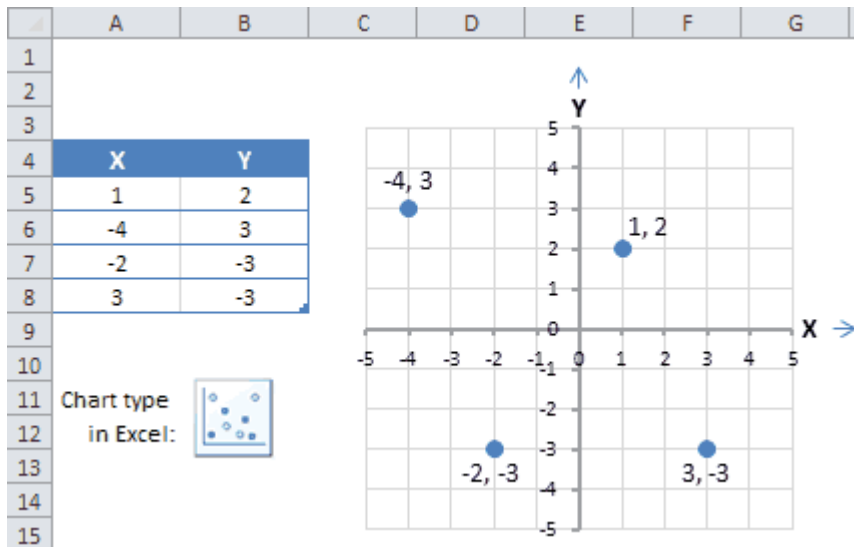
Figure 8 Example of a scatter plot in Excel

9.3 Page Orientation

Excel offers two page orientation options: landscape and portrait. Landscape orients the page horizontally, while portrait orients the page vertically. Portrait is especially helpful for worksheets with a lot of rows, while landscape is best for worksheets with a lot of columns. In the example below, portrait orientation works best because the worksheet includes more rows than columns.

Figure 9 Page Orientation

To change page orientation:

1. Click the Page Layout tab on the Ribbon.

2. Select the Orientation command, then choose either Portrait or Landscape from the drop-down menu.

3. The page orientation of the workbook will be changed.

To format page margins:

A margin is the space between your content and the edge of the page. By default, every workbook's margins are set to Normal, which is a one-inch space between the content and each edge of the page. Sometimes you may need to adjust the margins to make your data fit more comfortably on the page. Excel includes a variety of predefined margin sizes.

1. Click the Page Layout tab on the Ribbon, then select the Margins command.

2. Select the desired margin size from the drop-down menu. In our example, we'll select Narrow to fit more of our content on the page.
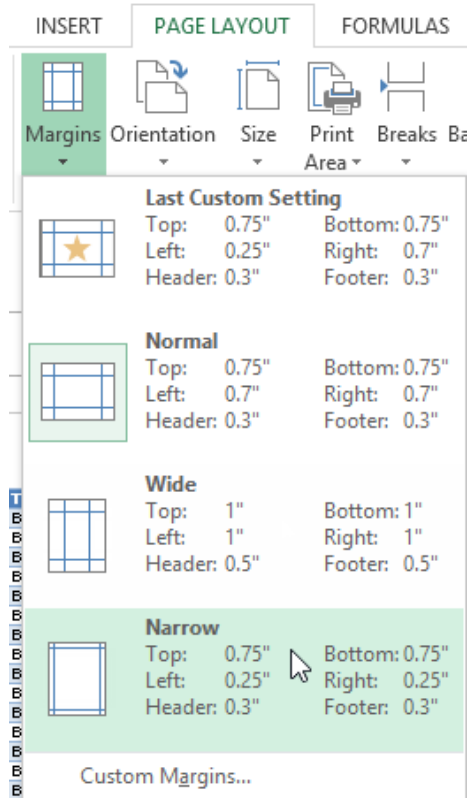
3. The margins will be changed to the selected size.

To include Print Titles:

If your worksheet uses title headings, it's important to include these headings on each page of your printed worksheet. It would be difficult to read a printed workbook if the title headings appeared only on the first page. The Print Titles command allows you to select specific rows and columns to appear on each page.

1. Click the Page Layout tab on the Ribbon, then select the Print Titles command.
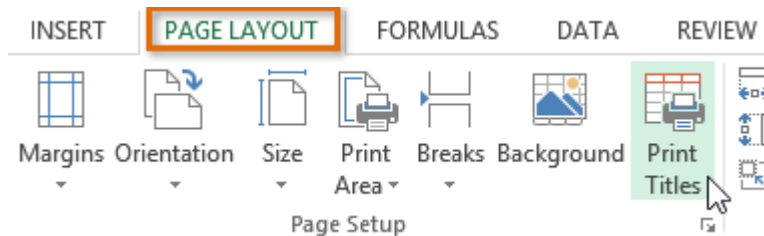
2. The Page Setup dialog box will appear. From here, you can choose rows or columns to repeat on each page. In our example, we'll repeat a row.

3. Click the Collapse Dialog button next to the Rows to repeat at top: field.

4. The cursor will become a small selection arrow and the Page Setup dialog box will be collapsed. Select the row(s) you want to repeat at the top of each printed page. In our example, we'll select row 1.
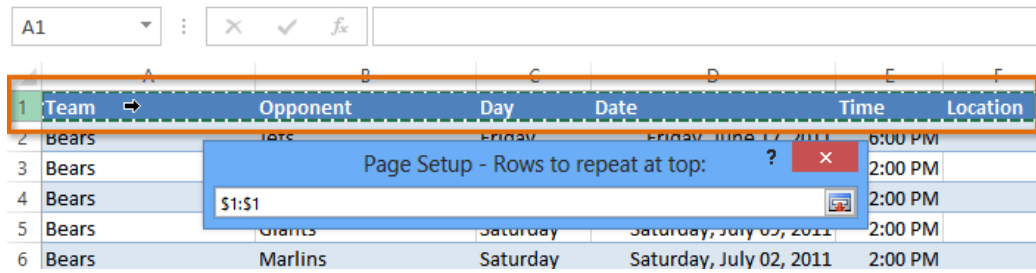
5. Row 1 will be added to the Rows to repeat at top: field. Click the Collapse Dialog button again.

6. The Page Setup dialog box will expand. Click OK. Row 1 will be printed at the top of every page.
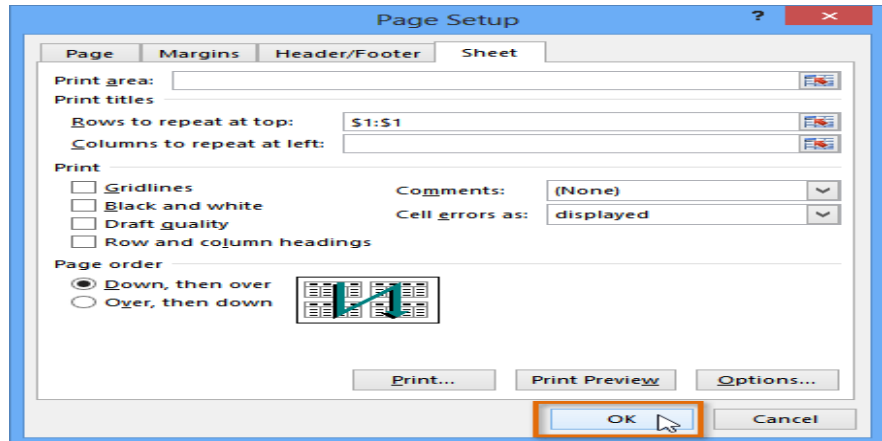
To insert header and footers

You can make your workbook easier to read and look more professional by including headers and footers. The header is a section of the workbook that appears in the top margin, while the footer appears in the bottom margin. Headers and footers generally contain information such as page number, date, and workbook name.

1. Locate and select the Page Layout view command at the bottom of the Excel window. The worksheet will appear in Page Layout view.

2. Select the header or footer you want to modify. In our example, we'll modify the footer at the bottom of the page.
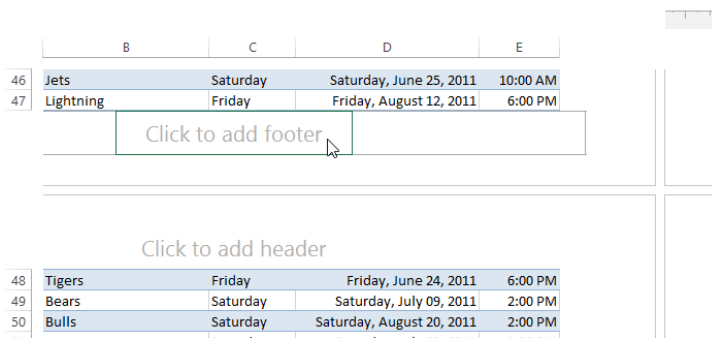
3. The Header & Footer Tools tab will appear on the Ribbon. From here, you can access commands that will automatically include page numbers, dates, and workbook names. In our example, we'll add page numbers.
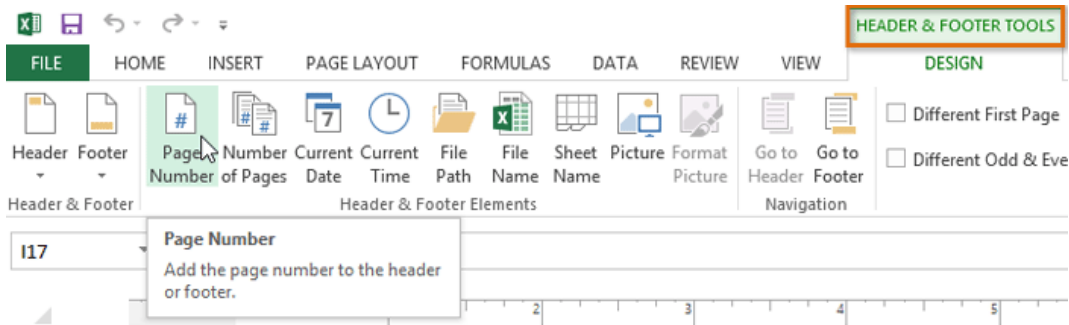
4. The footer will change to include page numbers automatically.

Open an existing worksheet change the orientation to landscape, try modifying the margins, try using print title command by adding row and column on each page of your workbook and insert Header and Footer.

9.4 Pivot Tables

A pivot table is essentially a dynamic summary report generated from a database. The database can reside in a worksheet (in the form of a table) or in an external data file. A pivot table can help transform endless rows and columns of numbers into a meaningful presentation of the data. Pivot tables are very powerful tool for summarized analysis of the data.

Pivot tables are available under Insert tab » PivotTable dropdown » PivotTable

Our data set consists of 213 records and 6 fields. Order ID, Product, Category, Amount, Date and Country.

Insert Pivot Table

To insert a pivot table, execute the following steps.

1. Click any single cell inside the data set.

2. On the Insert tab, in the Tables group, click PivotTable.
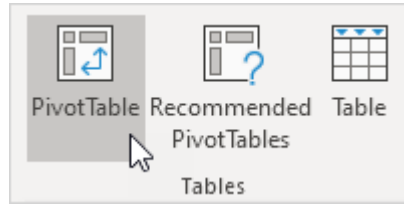
The following dialog box appears. Excel automatically selects the data for you. The default location for a new pivot table is New Worksheet.

3. Click OK.
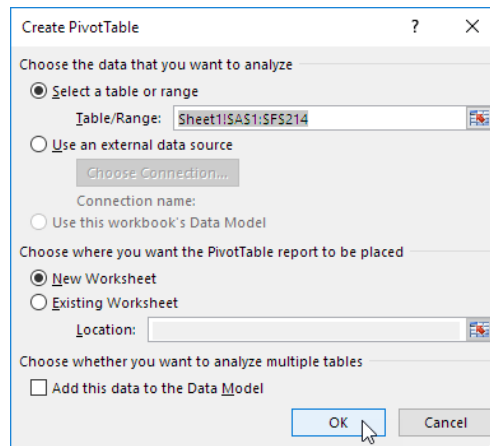
Drag Fields

The PivotTable Fields pane appears. To get the total amount exported of each product, drag the following fields to the different areas.

1. Product field to the Rows area.

2. Amount field to the Values area.

3. Country field to the Filters area.
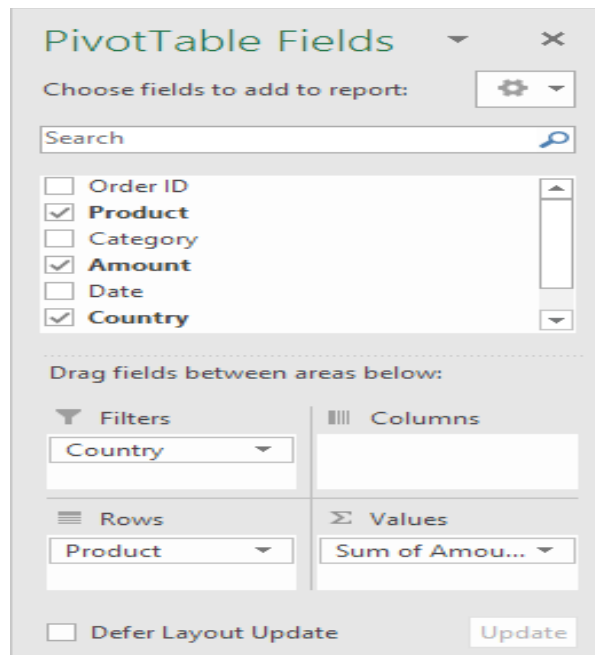
Below you can find the pivot table. Bananas are our main export product. That's how easy pivot tables can be!

Sort

To get Banana at the top of the list, sort the pivot table.

1. Click any cell inside the Sum of Amount column.

2. Right click and click on Sort, Sort Largest to Smallest.

Result:

9.5 Data Validation

Excel Data Validation is a feature that restricts (validates) user input to a worksheet. Technically, you create a validation rule that controls what kind of data can be entered into a certain cell.

Here are just a few examples of what Excel's data validation can do:

- Allow only numeric or text values in a cell.
- Allow only numbers within a specified range.
- Allow data entries of a specific length.
- Restrict dates and times outside a given range.
- Restrict entries to a selection from a drop-down list.
- Validate an entry based on another cell.
- Show an input message when the user selects a cell.
- Show a warning message when incorrect data has been entered.
- Find incorrect entries in validated cells.

Data Validation Example

In this example, we restrict users to enter a whole number between 0 and 10.

◢	A	B	C	D	E
1					
2		How many glasses of alcohol do you drink per day?			
3					

Create Data Validation Rules

To create the data validation rule, execute the following steps.

1. Select cell C2.

2. On the Data tab, in the Data Tools group, click Data Validation.
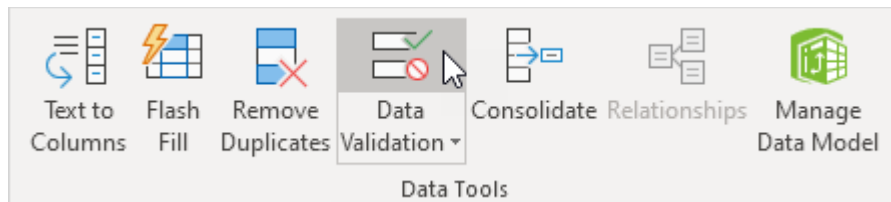
On the Settings tab:

3. In the Allow list, click Whole number.

4. In the Data list, click between.

5. Enter the Minimum and Maximum values.

Input Message

Input messages appear when the user selects the cell and tell the user what to enter.

On the Input Message tab:

1. Check 'Show input message when cell is selected'.

2. Enter a title.

3. Enter an input message.
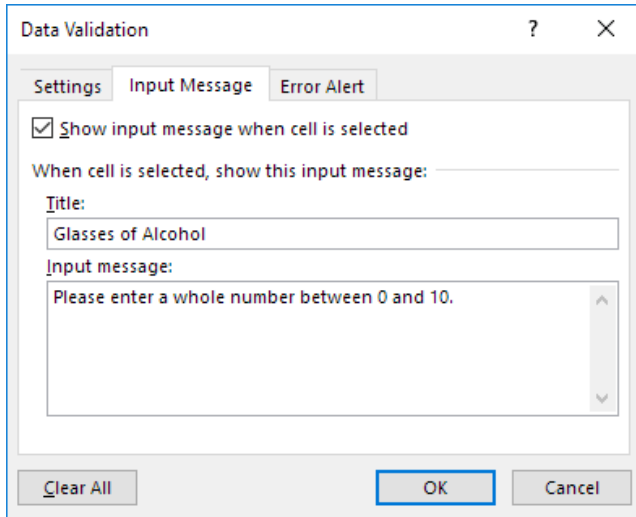
Error Alert

If users ignore the input message and enter a number that is not valid, you can show them an error alert.

On the Error Alert tab:

1. Check 'Show error alert after invalid data is entered'.

2. Enter a title.

3. Enter an error message.
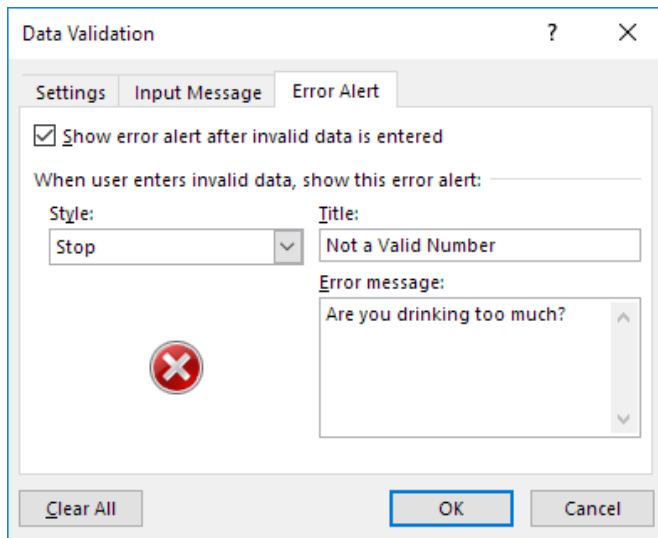
4. Click OK.

Data Validation Result

1. Select cell C2.

2. Try to enter a number higher than 10.

Result:
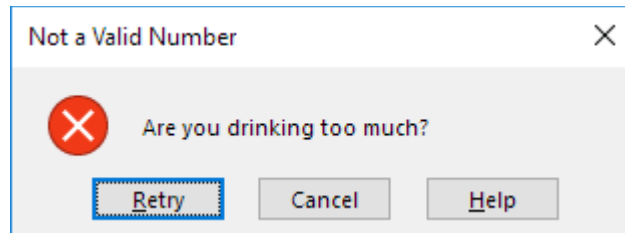
9.6 What-If Analysis

What-If Analysis in Excel allows you to try out different values (scenarios) for formulas. The following example helps you master what-if analysis quickly and easily.

Assume you own a book store and have 100 books in storage. You sell a certain % for the highest price of $50 and a certain % for the lower price of $20.

If you sell 60% for the highest price, cell D10 calculates a total profit of 60 * $50 + 40 * $20 = $3800.

Create Different Scenarios

But what if you sell 70% for the highest price? And what if you sell 80% for the highest price? Or 90%, or even 100%? Each different percentage is a different scenario. You can use the Scenario Manager to create these scenarios.

Note: You can simply type in a different percentage into cell C4 to see the corresponding result of a scenario in cell D10. However, what-if analysis enables you to easily compare the results of different scenarios.

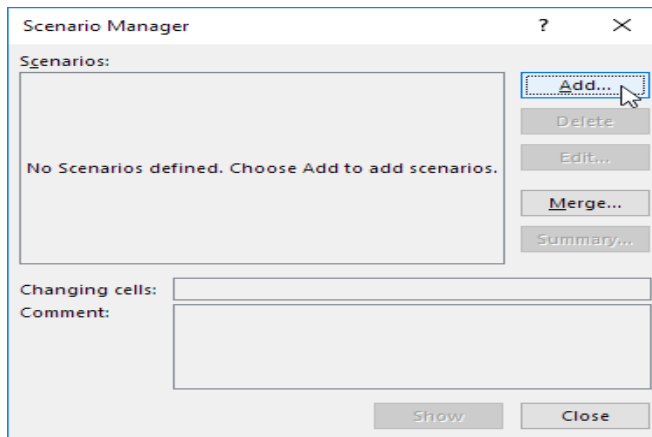1. On the Data tab, in the Forecast group, click What-If Analysis.
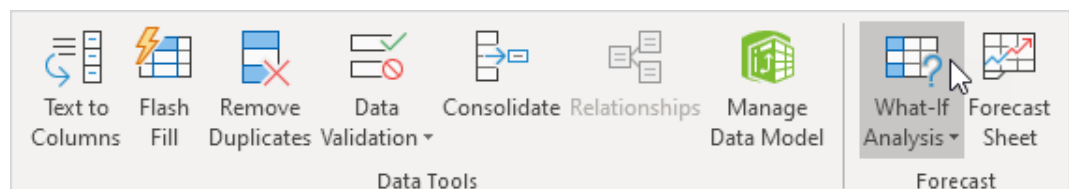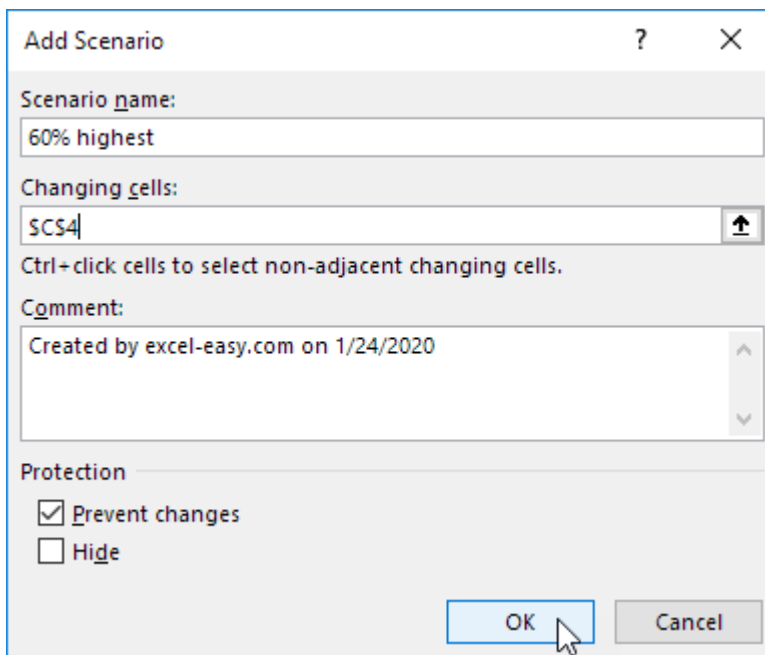

2. Click Scenario Manager.
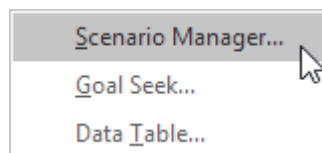
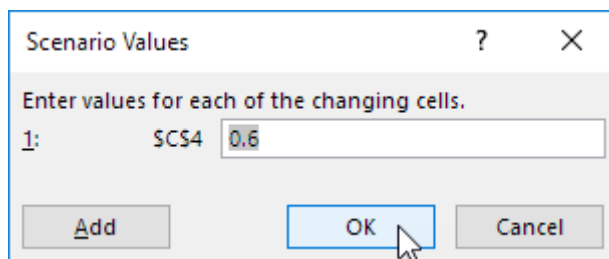The Scenario Manager dialog box appears.

3. Add a scenario by clicking on Add.

4. Type a name (60% highest), select cell C4 (% sold for the highest price) for the Changing cells and click on OK.
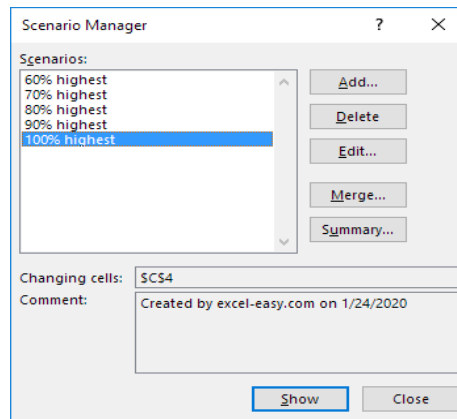

5. Enter the corresponding value 0.6 and click on OK again.

6. Next, add 4 other scenarios (70%, 80%, 90% and 100%).

Finally, your Scenario Manager should be consistent with the picture below:

Note: to see the result of a scenario, select the scenario and click on the Show button. Excel will change the value of cell C4 accordingly for you to see the corresponding result on the sheet.
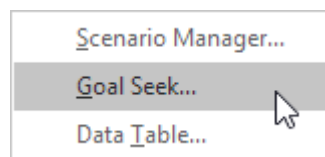
Goal Seek

What if you want to know how many books you need to sell for the highest price, to obtain a total profit of exactly $4700? You can use Excel's Goal Seek feature to find the answer.

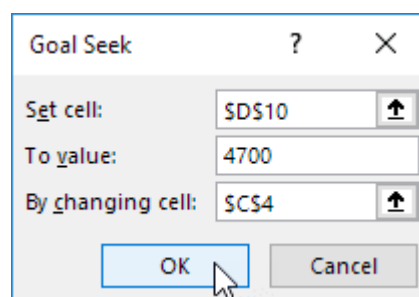1. On the Data tab, in the Forecast group, click What-If Analysis.
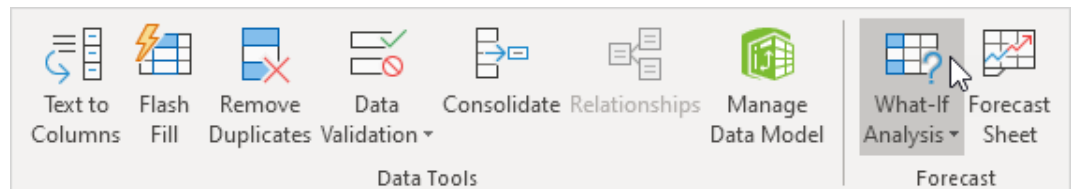
2. Click Goal Seek.

The Goal Seek dialog box appears.

3. Select cell D10.

4. Click in the 'To value' box and type 4700.

5. Click in the 'By changing cell' box and select cell C4.

6. Click OK.

Result. You need to sell 90% of the books for the highest price to obtain a total profit of exactly $4700.

9.7 Printing

To print your document, go to File > Print, select your desired settings, and then click Print. It is also possible to print by using the Print icon on the Standard toolbar, however this does not bring up the Print dialogue box that allows you to change your printing options, so it is advisable to use the other method.

To be able to change the orientation of your page for printing you can click on the Page Setup button under the option to Print.

Summary

- **Pivot tables:** Using this feature, the user can view the data in summarized table form.
- **Advanced analytical tools:** Goal seeking, a powerful Solver feature, and the analysis ToolPak add-in features, provides extensive statistical, financial, engineering, and scientific functions and procedures.
- **Great charts**: Excel's charting features enable the user to modify and augment a wide assortment of graph types.

Self- Assessment

1. There are three types of cell references. Relative and Mixed are two of them. What is the third?

   A. Static

   B. Solid

    C.   Absolute

    D.   None of these

2.   Which of the following is an absolute cell reference?

    A.   !A!1

    B. A1

    C.   #a#1

    D.   A1

3.   A visual representation of worksheet data.

    A.   Column

    B.   Data

    C.   Chart

    D.   Legend

4.   Under which ribbon menu or tab will you find the chart type commands?

    A.   File

    B.   Data

    C.   Insert

    D.   Charts and Graphs

5.   You want to track the progress of the stock market on a daily basis. Which type of chart should you use?

    A.   Pie chart

    B.   Row chart

    C.   Line chart

    D.   Column chart

6.   The chart wizard term data series refers to_____

    A.   A chart legend

    B.   A collection of chart data markers

    C.   A set of values you plot in a chart.

    D.   A data label.

7.   The Chart wizard term data categories refers to;

    A.   A chart plot area

    B.   A horizontal axis

    C.   The organization of individual values with a chart's data series

    D.   The data range that supply chart data.

8.   Page layout view displays

    A.   the page in normal view

    B.   pages exactly as they will appear when printed.

    C.   preview of where pages will break when printed.

    D.   none of the above

9.   Sheet properties include_____

    A.   sheet size

     B.   title

     C.   categories

     D.   all of the above

10. Portrait and Landscape are two types of what?
    A.   Arrangements
    B.   Orientation
    C.   Margins
    D.   Page Breakas

11. What dialog box allows you to change a field name in a PivotTable?
    A.   Field Options
    B.   Field Pane
    C.   Field Settings
    D.   Field Structure

12. Under which tab and in which function group will you find the option to insert a Pivot Table?
    A.   Under the Insert tab in the Tables group or Pivot table menu
    B.   Under the Formulas tab in the Data Analysis group.
    C.   In the Data group in the Pivot Tables group
    D.   In the Data group in the Tables group

13. Which of the following is NOT a box in the PivotTable Fields List?
    A.   Column Labels
    B.   Report Filter
    C.   Values
    D.   Formulas

14. Excel is a good application for What IF analysis. Which of the following tool help you for this?
    A.   Formul Auditing
    B.   Research
    C.   Trach Change
    D.   Goal Seek

15. To apply Goal Seek command your cell pointer must be in____
    A.   The Changing cell whose value you need to find.
    B.   The Result Cell where formula is entered.
    C.   The cell where your targeted value is entered.
    D.   None of the above

Review Questions

1.   How will you make the cell address in a formula absolute?
2.   How is relative addressing different from absolute addressing?
3.   Discuss the different kinds of errors that could occur while working in Excel.
4.   Briefly explain the AutoSum tool available in Excel.
5.   What are Excel Headers and Footers?

6. How to add headers and footers to a worksheet?
7.

Answer for Self-Assessment

1. C	2. B	3. C	4. C
5. C	6. B	7. B	8. C
9. D	10. B	11. C	12. A
13. D	14. D	15. B	

Further Reading

https://bookboon.com/en/excel-ebooks

https://www.javatpoint.com/excel-tutorial

UNIT 10: MS PowerPoint

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Purpose and Objectives

- Explanation of starting of MS PowerPoint .
- Understand the starting power point slides.
- Process of applying different color schemes
- Explain enhancing text in MS PowerPoint.

Introduction

MS PowerPoint is a very powerful means of making an effective presentation. lt generates presentation slides rich in graphics Audio and Video. The slides generated on power point can be played on a PC or their print-outs cab be projected on an over head projector. When played on a PCit works more like a web-page in an easy-to-move-around way. The slides generated in PowerPoint are stored in files of extension <.ppt>. There are, although. Various way to create a PowerPoint presentation e.g. generate the slides from MS Word or MS Excel and develop a presentation from PowerPoint itself. Microsoft PowerPoint is one of the most popular presentation programs supported by both Mac and PC platforms. Microsoft PowerPoint can be used to create interactive presentations for classroom, business, or personal use.

10.1　What is a PowerPoint?

PowerPoint is a graphical presentation program used to organize and presentinformation. PowerPo int presentations consist of a number of individual pages or "slides." Slides may contain text, graphi cs, sound, movies, and other objects that can be freely arranged.

Presentations can be printed, displayed live on a computer, or navigated through at the command o f the presenter. For larger audiences, the presentation is often projected onto
a large screen. Handouts, speaker notes, or outlines can also be produced from the slides.

10.2　PowerPoint 2016 Editing Window (Normal View)

The Normal View in PowerPoint features several commonly used Tabs, Panes, and Tools. We'll use
Normal View as we create and design our presentation.

The Ribbon

The Ribbon replaces the menu bar seen in previous versions of PowerPoint. The Ribbon groups ite ms that are most likely to be used together. There are several frequently used tabs, such as File, Home, Insert, Design and View. Clicking on each tab activates a group of relative commands, menus, and buttons. There are also contextual tabs that only show up only when needed, such as Text Box Tools, Picture Tools, Drawing Tools and Chart Tools. To activate those tools, click on the associated object.
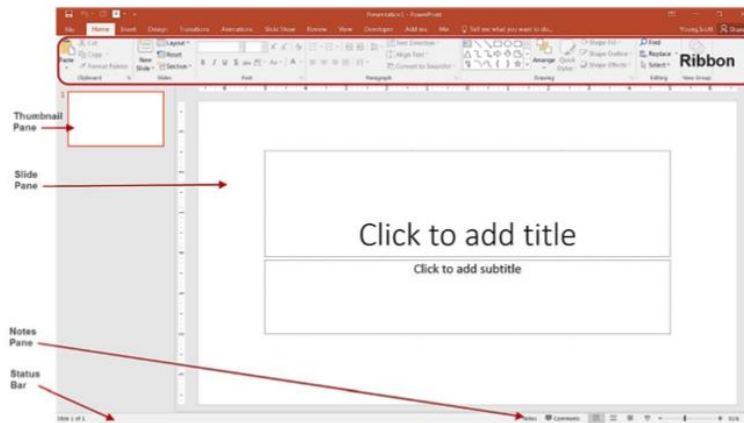

Figure 1 The Ribbon

Microsoft PowerPoint uses several tabs to allow you to modify your document. When you first open PowerPoint, usually the tabs discussed below will open. If you do not see these tabs, go to **View > Ribbon.**

The Menu bar: (Figure 2). This is constructed solely of word commands and not icons (pictures). The Menu bar contains all the options available to you in Microsoft PowerPoint.

Figure 2 The Menu bar

On the **Ribbon** under the Home Tab, contains a text editor and the new slide icon. The Home Tab contains icons such as **Paste, Cut, Copy, Format and Layout** (Figure 3).
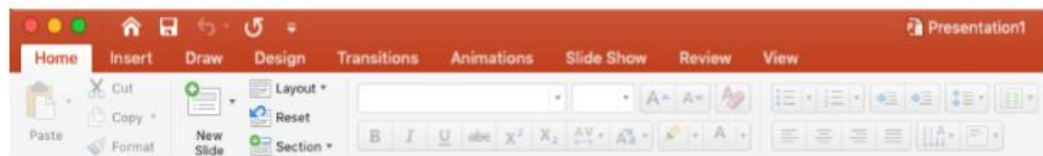

Figure 3 Home Tab

The **Insert Tab** on the Ribbon toolbar contains several categories for formatting the design and elements of your presentation. These include: **New Slide, Table, Charts, and Word Art**(Figure 4)

Figure 4 Insert Tab

Opening a PowerPoint

To open a PowerPoint 2016 presentation, click on the File tab in the upper left corner.

The most common choices for opening a presentation are:

- **New** - allows you to open a Blank presentation or you may choose from a selection of Tem plates and Themes.
- **Open** - lets you navigate to an existing file to view and/or modify a presentation that has already been created.
- **Recent** – displays a list of your most recently created presentations and their file locations.

Creating New Presentation

The New selection gives you several options:

- **Blank presentation** creates a new presentation using default settings for text and colo r. Theses slides will not include content or design elements.
- **Templates and Themes** are used to create a new presentation based on predesigned s lide styles. These options also do not include content.
- **New from existing** will use the formatting of a previously created presentation.

For this exercise, we'll start with a Blank presentation. **Select New,choose**   **Blank presentation and click on the Create icon.**
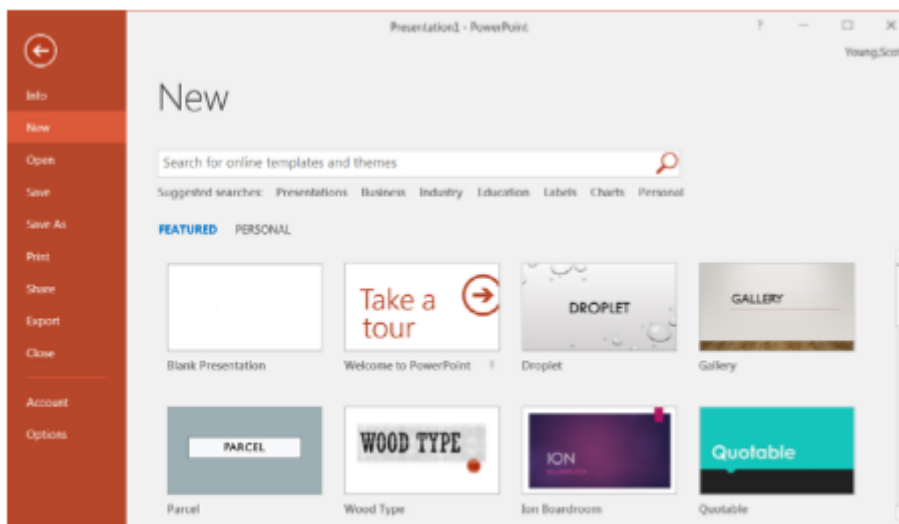

10.3   PowerPoint Slide

When you choose to create a blank presentation, PowerPoint will open a presentation with a Title Slide. Once the Title Slide is open, you'll see a slide with two placeholder text boxes for a title and a subtitle. Click inside the placeholder box and type to add the title. If you want a subtitle, click and type inside the smaller placeholder. If you don't want a subtitle, you can just ignore its placeholder box.
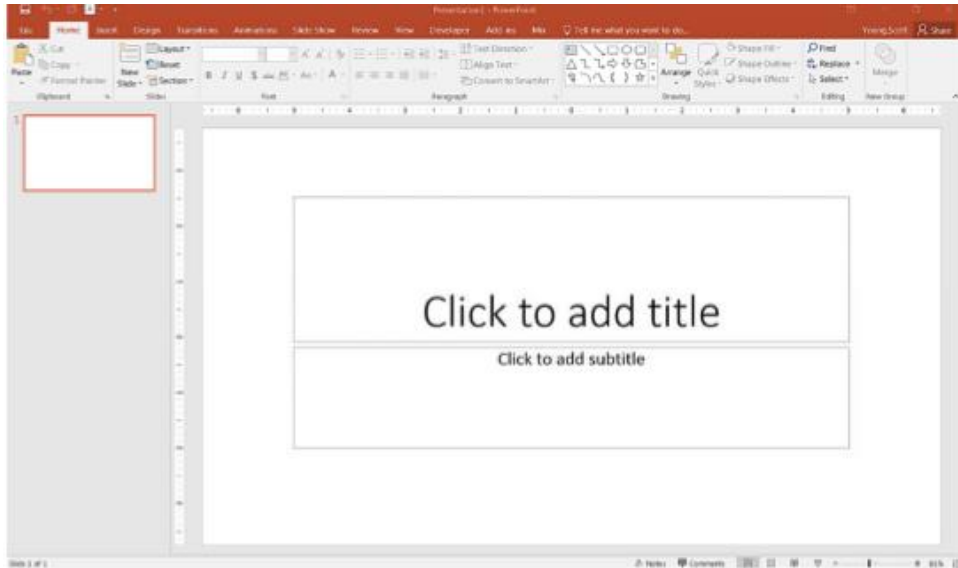
To add a New Slide, make sure you're on the Home tab. The New Slide button will add slides to your presentation.
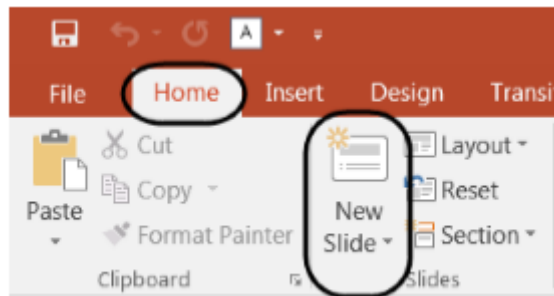
The New Slide button has two parts:

Clicking on the top part will automatically insert a new slide. If you have just created a Title slide, t he new default layout will be a **Title and Content slide** (for
details, see the section on slide layouts).

Clicking on the bottom will give you a choice of layouts. You can choose which layout you want for your next slide. Select a slide layout by clicking on its image in the **Office The me** gallery.

Slides Layout

There are several standard slide layouts to choose from when adding new slides.
A unique layout can be chosen by clicking on the bottom half of the New Slide button in the Home tab. When the layout gallery opens, click on the style you want and a new slide with that layout wil l appear in your presentation. Each layout caption describes the layout type. Content can be text, ta bles, charts,graphics, pictures, clip art, or video.   If you decide later that the layout you choose doesn't work well for a particular slide, select the slide by clicking on it in the **Thumbnail pane**. Next, click on the **Layout button** in the Slides group of the Home tab.

Click on a new layout and it will change the layout of the slide.
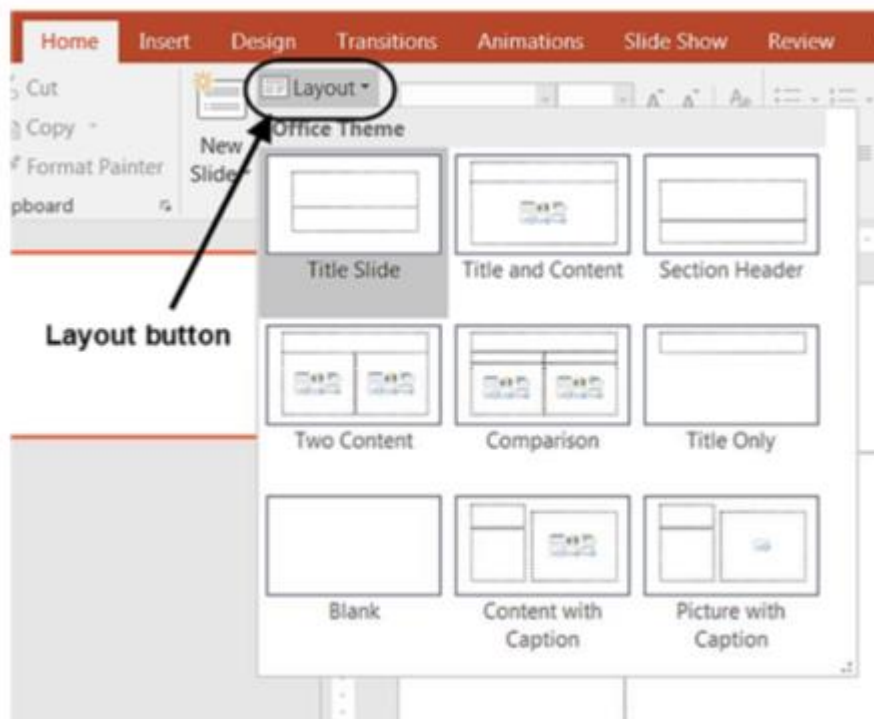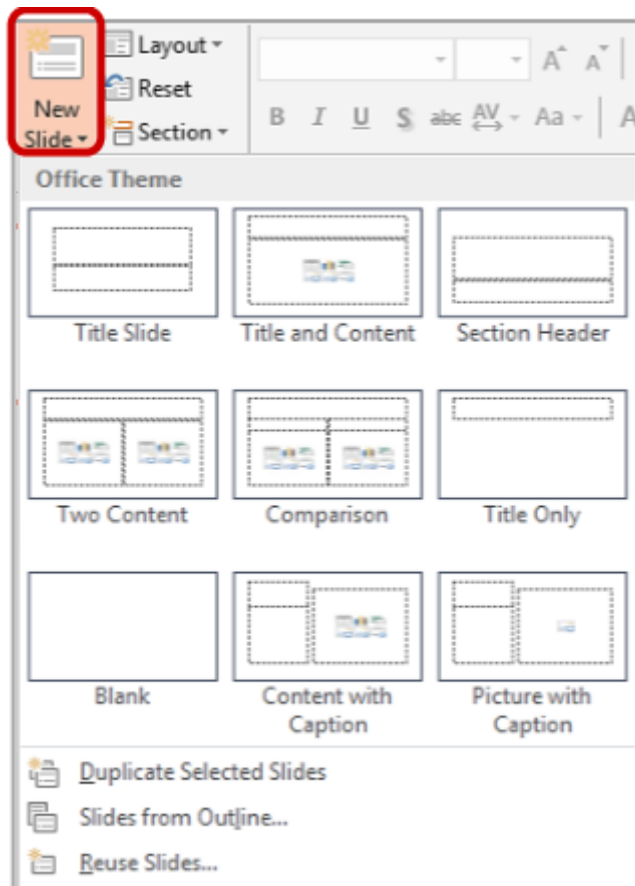
10.4   Applying a Theme

Once a new presentation has been created, a design or color scheme can be added.

Remember to use color carefully to enhance your presentation, not detract from it. You will want to

maintain good contrast between the background color and the text color.
Consider using a light colored background and dark text (or vice versa), but avoid busy
backgrounds and primary colors. Use sans serif fonts like Arial, Calibri, and Helvetica for titles and
size them between 44 – 60 points. Subheadings should be between 32 – 40 points, and body text bet
ween 18 – 32 points. Try not to use more than two fonts. PowerPoint has many preset designs and t
hemes that include complimentary colors and
fonts. To add a theme to a presentation, go to the Design tab in the ribbon. There are
several themes immediately available. To use one of the built-in themes, just click on its thumbnail.


On the right side of the Theme thumbnails, there's a scroll bar and an Arrow Down
button, which will offer more designs, as seen below. If you're online, you can get more
themes from Microsoft Office Online. (Your office program must be a genuine Office
product to get online templates).
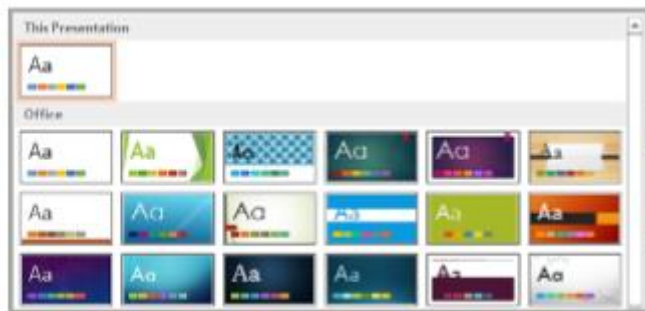
If you don't want to use a theme, you can add Background Styles.

From this selection,
you can add some preset background styles that change according to the colors you've chosen.
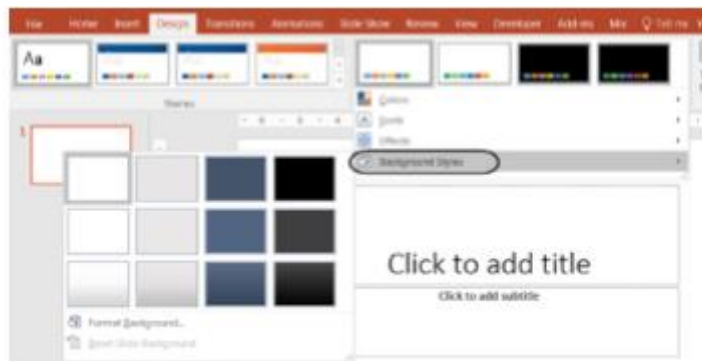

Using the Format Background feature, you can choose fill colors,
gradients, transparencies, textures, or pictures for your background.When you have the desired bac
kground fill effect, select Close to   apply it to the selected slide or choose Apply to All to add the
background to all of the slides in the presentation. Designs can be added to all of the slides or to sel
ected slides. To select multiple   slides,   click   on   a   slide   in   the   Thumbnail   pane   of   the
navigation bar and then hold down the control key and click on any
other slides you want to apply the design to.

10.5   TEXT

Formatting Bulleted List

In PowerPoint, you can easily modify a slide's default bulleted list. Click inside the text box, and the Format tab will automatically be highlighted. Click on the drop down triangle next to the Bullets button in the Paragraph group.
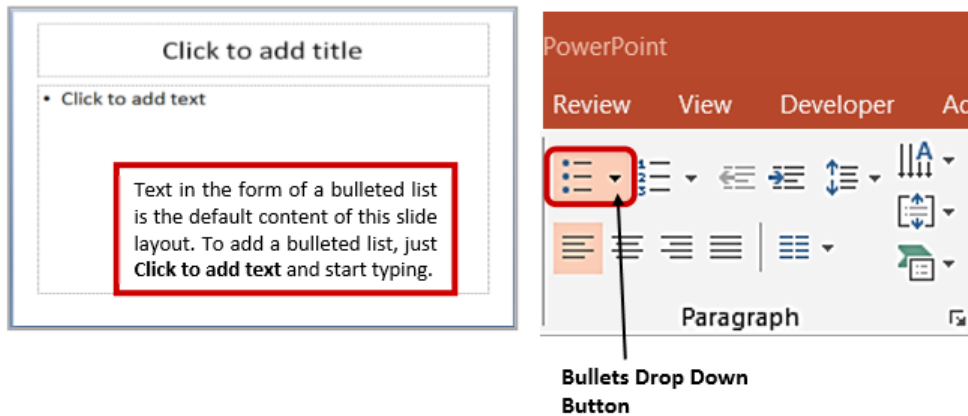
From the Bullets and Numbering menu you can make various changes to your list:

- The bullet size relative to the text
- The color of the bullet
- The shape of the bullet using either a picture or a character.

  You may also want to adjust line spacing between paragraphs or lists. You can do this through the Paragraph group of tools by clicking the Line Spacing button and selecting Line Spacing Options. **Indents and Spacing** controls will open in a separate dialog box.
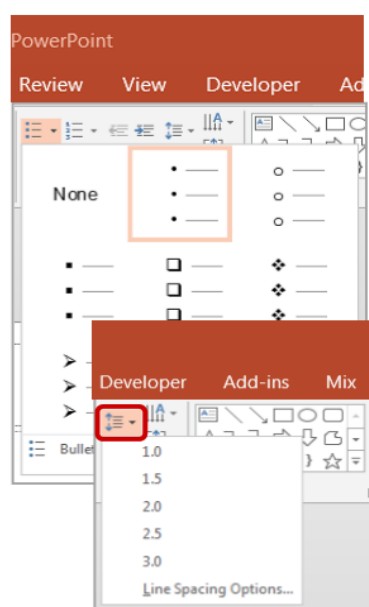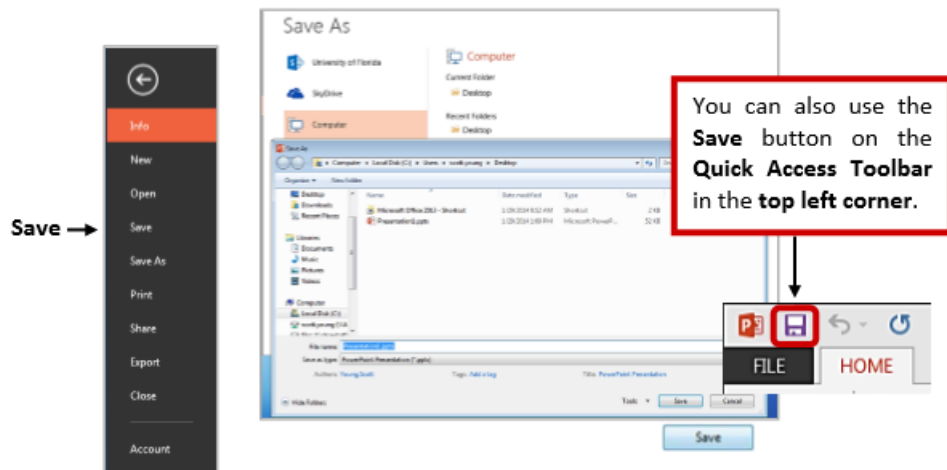
📋 **Task**   Give the steps for adding the Power point wizard and add bullets and numbering to it by using any built in template.
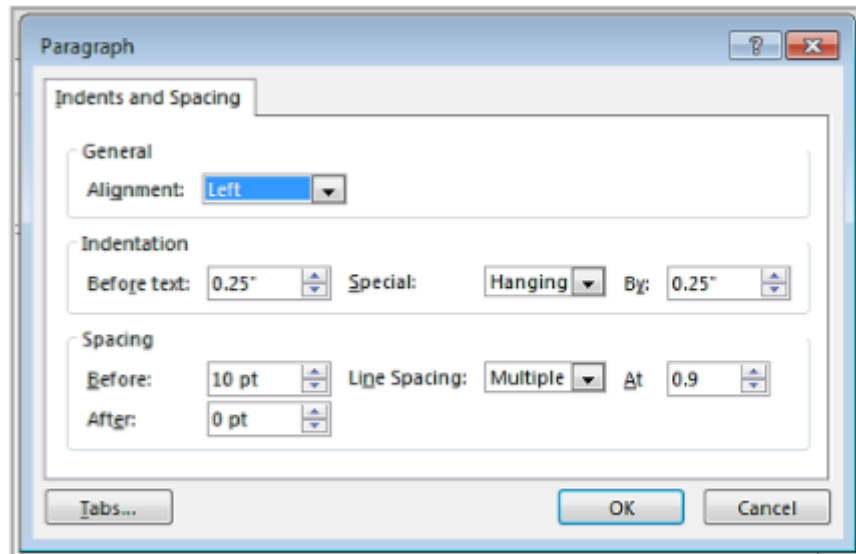
10.6   Saving a Presentation

You can save a file by clicking the File tab, choosing Save, typing a descriptive name into the File Name window, and then clicking the Save button.

If others will need to open your file with previous versions of PowerPoint, use the Save As option and select PowerPoint 97 – 2003 Presentation from the Save as type menu.

Save and Send to Others

If you need to send your presentation to someone else, the best way to is to use the Save & Send option. You can send an attachment of your file using Send Using Email, but if you have large media files, such as videos, you'll need to compress those first to make a smaller file. On the Home Select the Info tab and click the Compress Media button and choose Presentation Quality. Note: Only available if you have inserted media.

You also have the option to Package Presentation for CD.

This allows you to add other files or to add a PowerPoint Viewer so that the presentation can be run on a computer
that does not have the PowerPoint program. You can also add any linked files such as
video or audio.

Summary

- PowerPoint is a powerful presentation package of Microsoft.
- Power point's build in templates can used as the basis for the presentation.

Keywords

Blank presentation: From the General tab select Blank Presentation to build the presentation from scratch with no preset graphics or formatting. Or else select Open.

Auto layout: After selecting the presentation type, it will prompt to choose the layout of the new slide. These layouts include bulleted lists, graphs and/or images.

Explain different ways to view slides in PowerPoint.
Lab Exercise

Self-Assessment

1. Material consisting of text and numbers is best presented as_____
A. A table slide
B. A bullet slide
C. A title slide
D. All of the above

2. From which menu you can access Picture, text box, chart etc?
A. File
B. Edit
C. Insert
D. View

3. Which of the following should be used when you want to add a slide to an existing presentation?
A. File, add a new slide
B. Insert, New slide
C. File Open

D.   File, New

4.   In which menu can you find features like Slide themes, Slide variants etc.?

A.   Insert Menu

B.   Format Menu

C.   Tools Menu

D.   Design Menu

5.   _____ is a presentation program.

A.   U-torrent

B.   Mozilla Firefox

C.   MS PowerPoint

D.   Slide Panel

6.   In PowerPoint, the header and footer button can be found on the insert tab in what group?

A.   Tables group

B.   Text group

C.   Object group

D.   Illustrations group

7.   The slide that is used to introduce a topic and set the tone for the presentation is called the_____

A.   Title slide

B.   Bullet slide

C.   Table slide

D.   Graph slide

8.   Which tab is not available on left panel when you open a presentation?

    A.   Outline

    B.   Slides

    C.   Notes

    D.   All of above are available.

9.   Which of the following statements is not true?

    A.   You can type text directly into a PowerPoint slide but typing in text

box is more convenient.

    B.   From Insert menu choose Picture and then File to insert your

images into slides.

    C.   You can view a PowerPoint presentation in Normal, Slide Sorter or

Slide Show view.

    D.   You can show or hide task pane from View >> Toolbars

10. PowerPoint presentations are widely used as _____

    A.   note outlines for teachers.

    B.   project presentations by students

    C.   communication of planning

    D.   All of above

11. A new presentation can be created from_____

    A.   Blank Presentation

    B.   From Existing Presentation

    C.   From Design Template

    D.   All of above

12. What lets you to create new presentation by selecting readymade font color and graphics effects?

    A. Presentation Template

    B. Master Slide

    C. Design Template

    D. Animation Scheme

13. Which short cut key inserts a new slide in current presentation?

    A. Ctrl+N

    B. Ctrl+S

    C. Ctrl+V

    D. Ctrl+X

14. Which of the following method can insert a new slide in current presentation?

    A. Right click on the Slide panel and choose New Slide.

    B. From Insert menu choose New Slide

    C. Click on New Slide button on toolbar.

    D. All of above.

15. What is the best way to create another copy of a slide?

    a. Click the slide then press Ctrl+A and paste in new slide.

    b. From Insert Menu choose Duplicate Slide

    c. Redo everything on a new slide that you had done on previous Slide.

    d. None of above

Review Questions

1. What is MS PowerPoint?
2. How can you run a presentation? Write down the steps.
3. Explain the steps of creating a new presentation and saving it.

Answers for Self-Assessment

1.	B	2.	C	3.	B	4.	D	5.	C
6.	B	7.	A	8.	C	9.	A	10.	D
11.	D	12.	C	13.	A	14.	D	15.	B

Further Readings

A Study of Computer Fundamental, Shu-Jung Yi.

http://books.google.co.in/bkshp?hl=en

Unit 11: MS PowerPoint

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Objectives

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12.1   PowerPoint view

12.2   Adding Auto shapes and Flowcharts

12.3   Transitions and Multimedia

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12.6   Adding audio content to slides

Summary

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Answers for Self-Assessment

Further Reading

Objectives

- Understand graphics.
- Explain the auto shapes.
- Understand the printing presentation.
- Explain the process of adding multimedia content.

Introduction

PowerPoint supports multiple views to allow users to gain the maximum from the features available in the program. Each view supports a different set of functions and is designed accordingly.

PowerPoint views can be accessed from two locations:

- Views can be accessed quickly from the bottom bar just to the left of the zoom settings.

Quick Access to Presentation Views
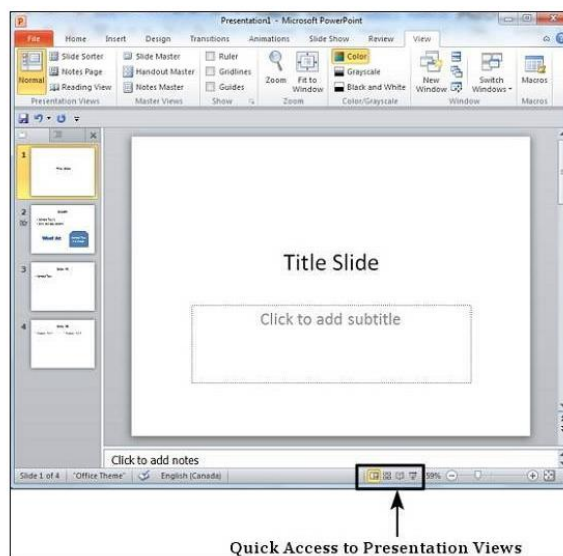
- Views can also be accessed from the Presentation Views section in the View ribbon

11.1   PowerPoint view

PowerPoint provides you several views to look through your presentations. Each of these views is discussed in detail here. The view buttons are available at the lower left corner of the screen. The group of four buttons located to the left of the Zoom control, near the bottom of the screen, lets you switch between PowerPoint views.
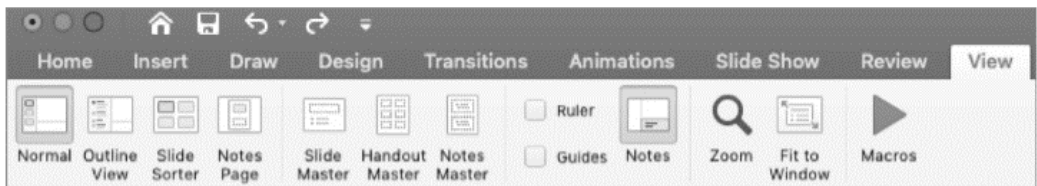

Figure 1 View Dialog Box

Normal View

Normal view is the most common view available to you. It is the default view of PowerPoint. It displays slide contents in the left pane while the present slide is displayed in the right pane. It shows a combination of slide, outline, and notes page views. This view is helpful when one has to work in multiple areas at once; add text in outline and see how it appears on the slide; type the notes that will remain with the current slide.

Step 1: Select the slide to be moved.

Step 2: Left click on the slide and drag it to the position in the sequence where you want to place it. PowerPoint will indicate the insert position with a line in-between existing slide.
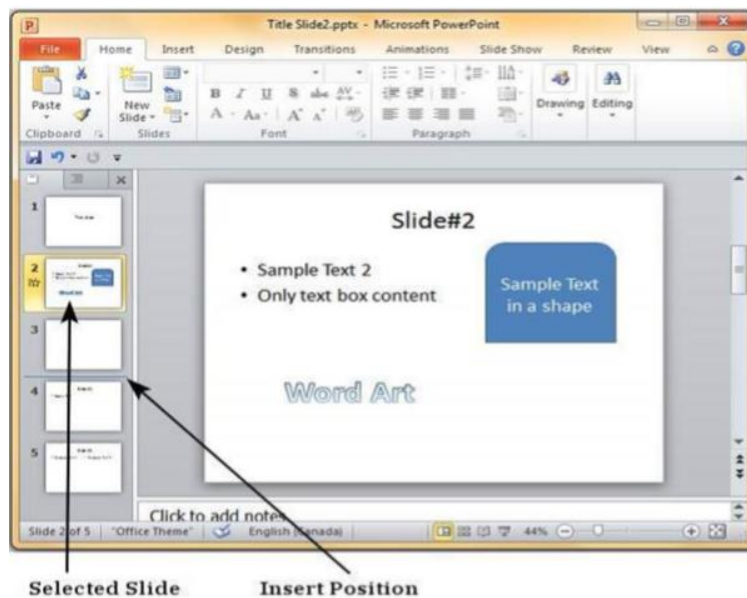
Step 3: When you get to the right position release the left click button to insert the slide. Alternately you can also cut the selected slide and paste it back in the sequence as shown below.
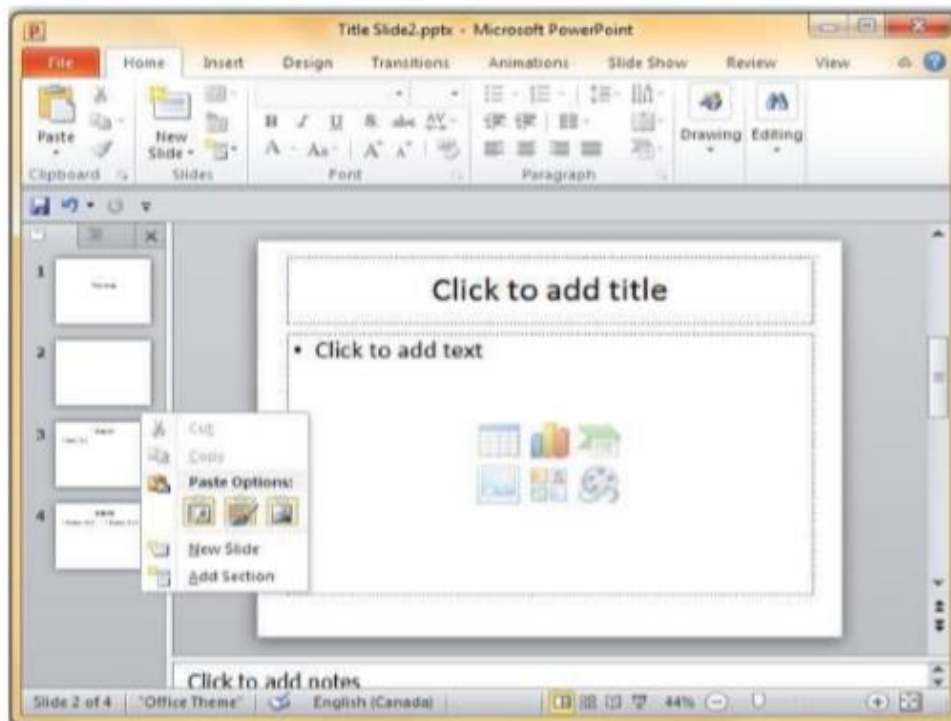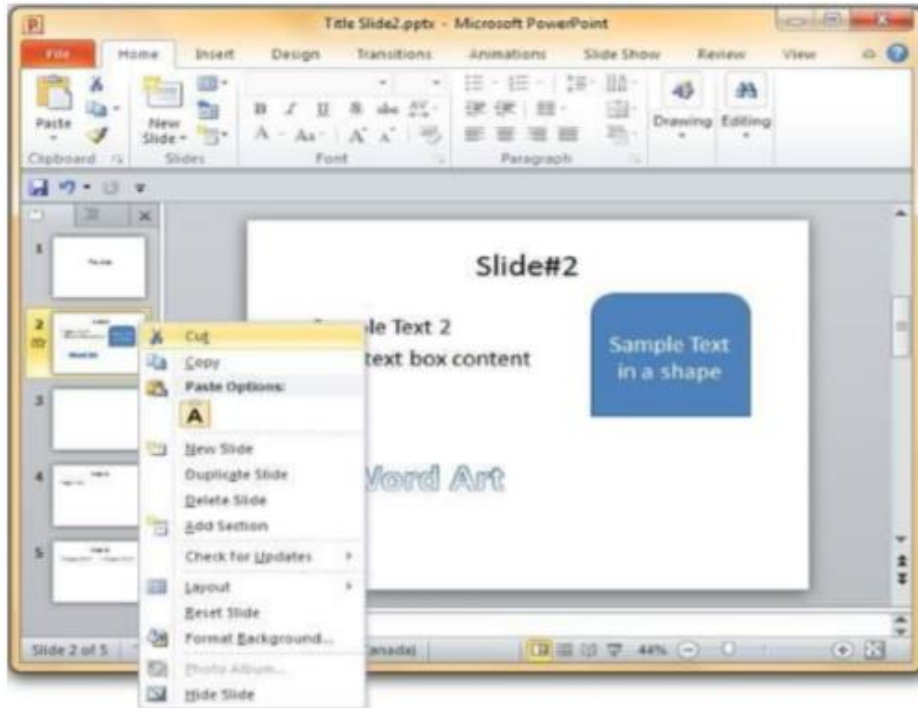
Outline View

This view allows for you to change the order of the slides in which they appear(Figure 2). To do this click the desired slide and drag. Once you start dragging a grey line will appear. Drag the slide up or down until you see the grey line to the right of the correct slide where you would like to move it.
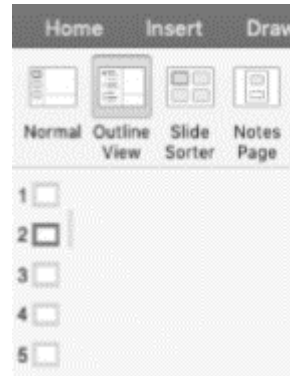
Figure 2 Outline View

Slide Sorter

This feature allows you to see thumbnails of your slides in a horizontal view. This view allows for you to make easy changes to several slides at once. If you had recorded timing for your slides, Slide Sorter will also show you your recorded times below the particular slide(Figure 3)

Figure 3 Slide Sorter
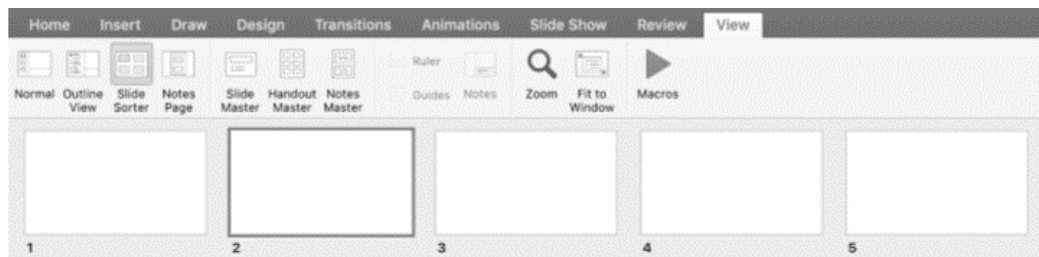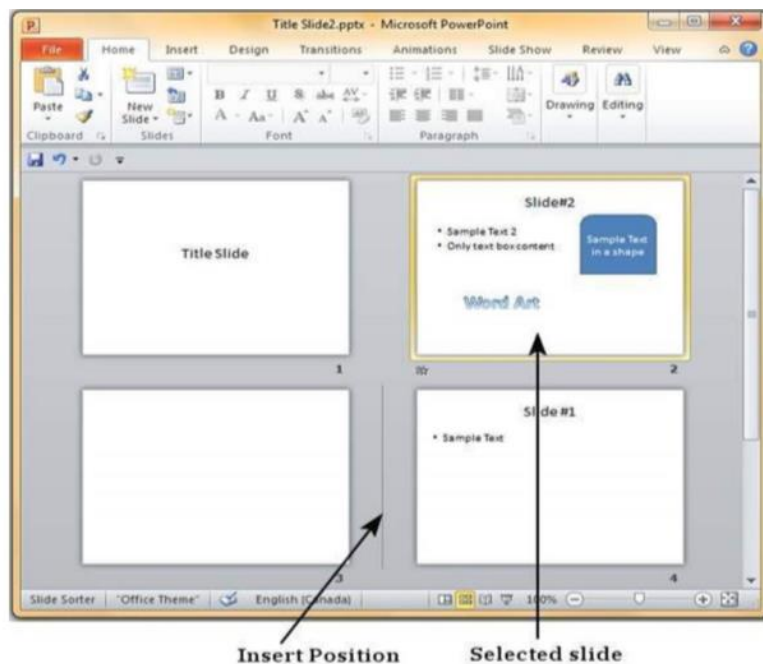
Let us now understand how the Slide Sorter View works.

Step 1: Select the slide to be moved.

Step 2: Left click on the slide and drag it to the position in the sequence where you want to place it. PowerPoint will indicate the insert position with a line in-between existing slide.

Step 3: When you get to the right position, release the left click button to insert the slide.

Alternately you can also cut the selected slide and paste it back in the sequence as shown below.
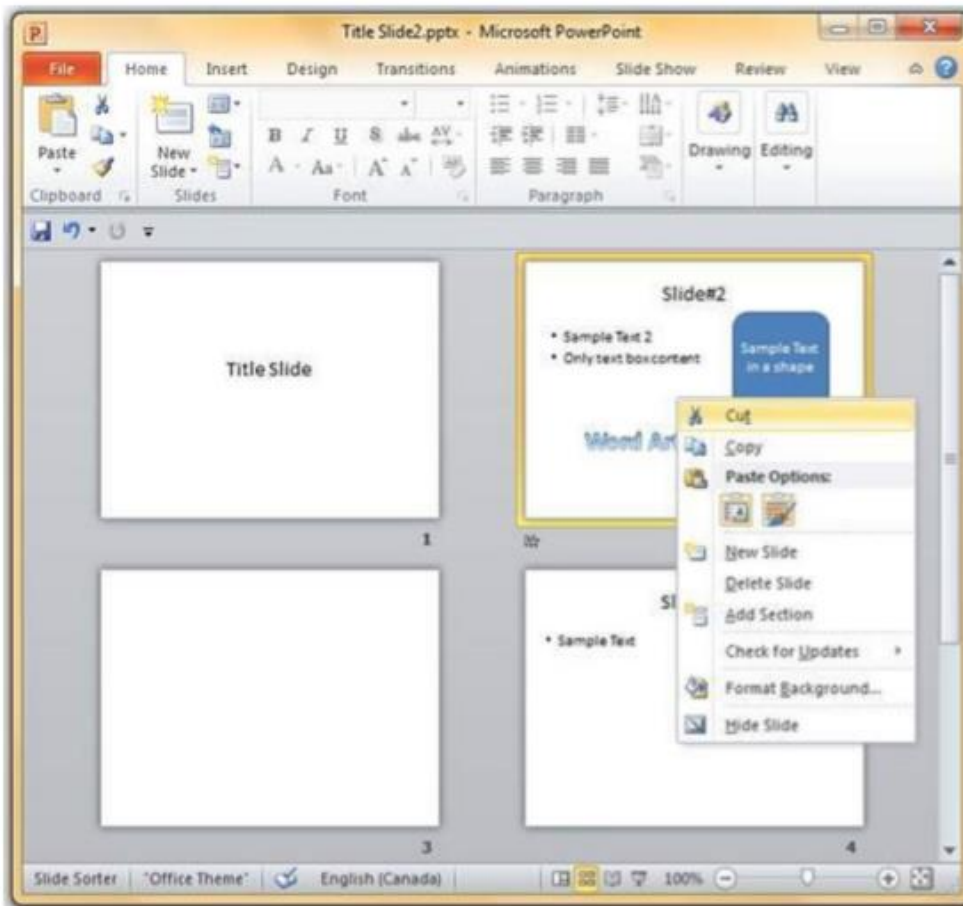
Notes

This section allows you to add notes for the presentation. These notes will not be displayed on the screen during the presentation; these are just quick reference for the presenter. The Notes Page allows for you to add notes to any slide you want. This comes in handy to where you are visually able to see slide notes while giving your presentation.

To access this, click on Notes Page located under the View Tab (Figure 4). Then a text box will appear with a slide number that has been selected. Type your Notes. Then, go back to Normal and you should see your Notes located under the slide preview.
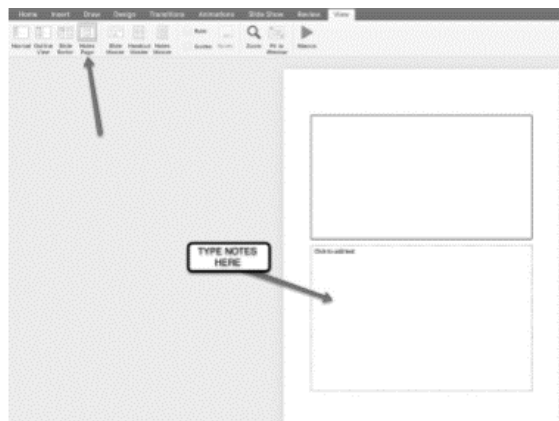

Figure 4 Notes page

Slide Master

The Slide Master is where all the information such as background, color, and theme are stored. Every PowerPoint has at least one Slide Master. In the Slide Master, you can change any of these particular things. Once you have selected Slide Master in the View Tab, (Figure 5) you will be given different types of layouts to choose from.
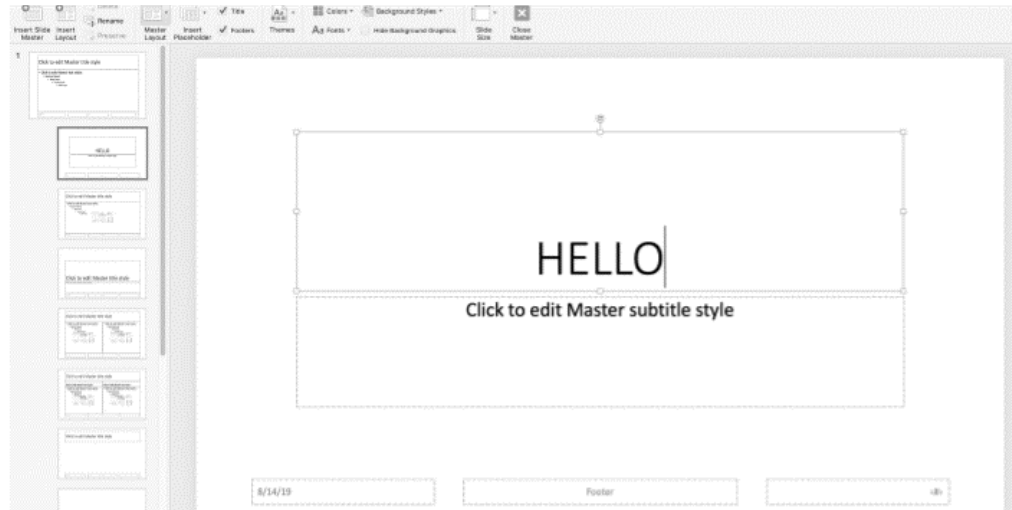
Figure 5 Slide Master

11.2   Adding Auto shapes and Flowcharts

Auto shapes

To emphasize important points in your presentation, you might want to include PowerPoint auto shapes in addition to text. The Shapes you draw in PowerPoint are objects that can be sized, moved, copied, and formatted in a variety of ways to suit your needs.

PowerPoint provides several tools for creating several types of shapes including arrows, banners, stars, rounded rectangles, circles, squares, and more. Shapes can be worked with individually or they can be grouped and treated as one shape. To create almost any shape in PowerPoint, you click on a tool from the Drawing toolbar or from the PowerPoint AutoShapes menu and then drag in the location where you want the shape to appear.
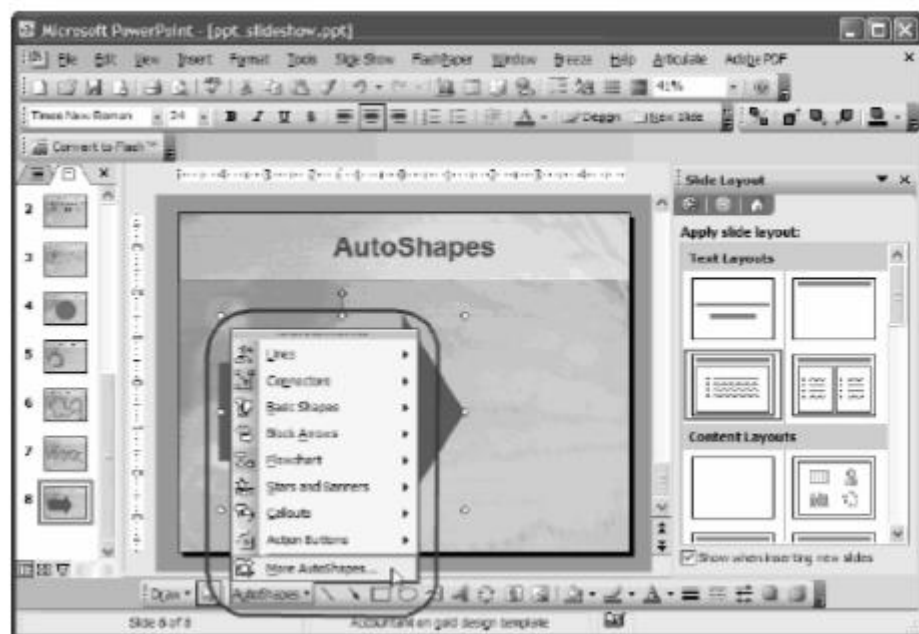
Flowcharts

Flowcharts are used to create diagrams in Microsoft PowerPoint.

To insert a Flowchart in PowerPoint: click Insert Tab > SmartArt. (Figure 6). Once the SmartArt button is expanded, you will have several options to choose from, such as List, Process, Hierarchy, etc. To insert Shapes, click the Insert Tab > Shapes (Figure 7). SmartArt Shapes will allow you to manipulate the shapes in Flowchart, as well as in text boxes. To resize the Shapes, simply click and drag any of the four corners on the object.
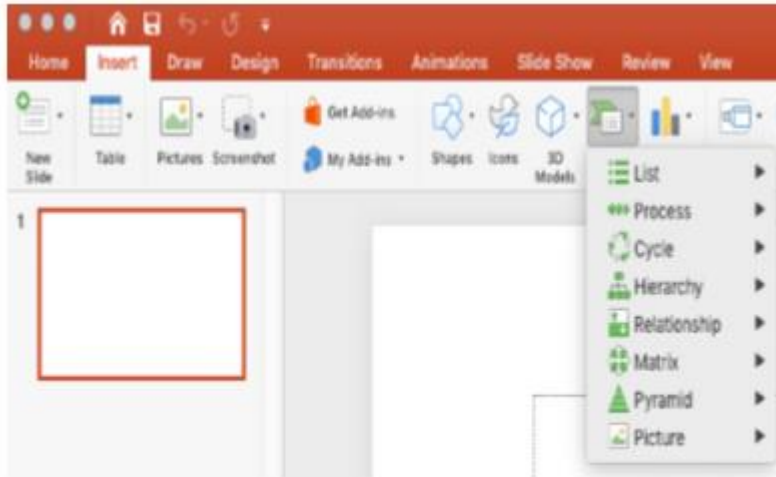
Figure 6 Flowcharts
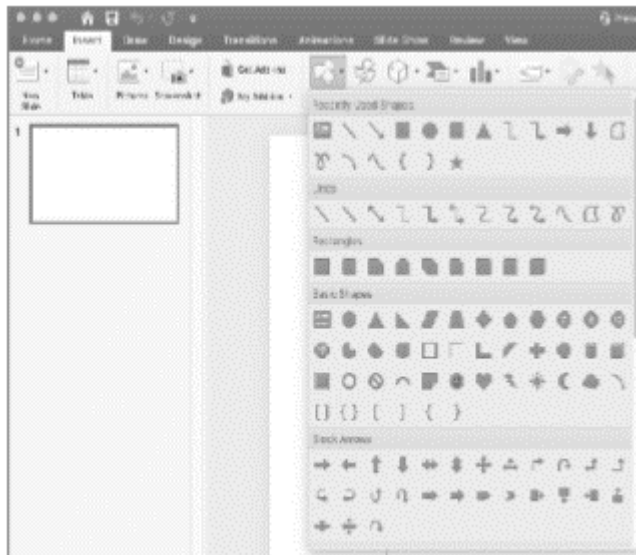
Figure 7 Auto shapes

11.3   Transitions and Multimedia

A PowerPoint presentation might be designed to provide ancillary information for a live presentation, or to stand alone as an information source. Regardless of the method of delivery, a presentation has no value if it does not keep the attention of the audience. An element that can make the difference between an adequate presentation and a great presentation is the judicious use of animated content, sound, and videos. By incorporating these dynamic effects, you can grab and keep the attention of your audience. You can emphasize key points, control the focus of the discussion, and entertain in ways that will make your message memorable. With PowerPoint 2016, you have so many opportunities to add pizzazz to your slides that it is easy to end up with a presentation that looks more like an amateur experiment than a professional slide show. When you first start adding

animations, sound, and videos to your slides, it is best to err on the conservative side. As you gain more experience, you'll learn how to mix and match effects to get the results you want for a particular audience. This chapter guides you through procedures related to animating text and pictures on slides, customizing animation effects, adding audio and video content to slides, compressing media to decrease file size, and adding and managing slide transitions.

Animate text and pictures on slides

In the context of PowerPoint, animation refers to the movement of an element on a slide. When used appropriately, animated slide elements can both capture the audience's attention and effectively convey information. You can animate any individual objects on a slide, including text containers, pictures, and shapes. (You can't animate objects that are part of the slide background or slide master, other than as part of the transition between slides.)

Thoughtfully designed animations can be very informative, particularly for audience members who are more receptive to visual input than to auditory input. Animations have the added benefit of providing a consistent message with or without a presenter to discuss or externally illustrate a process.
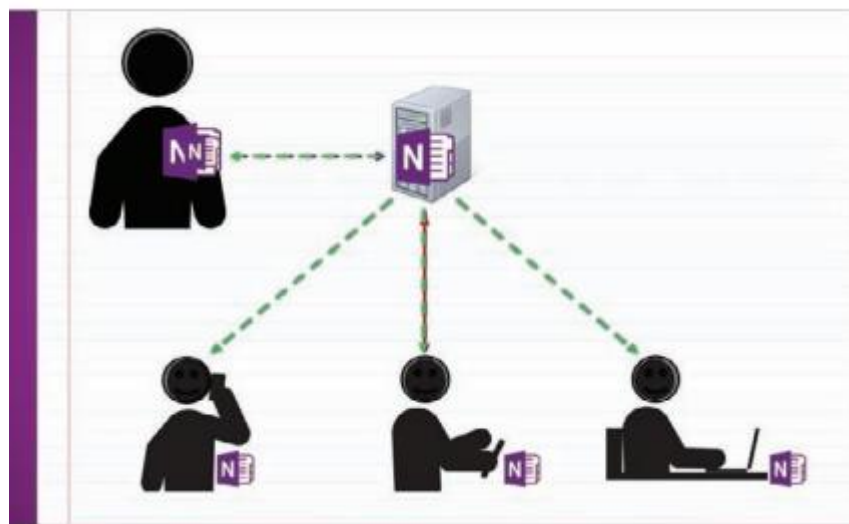
Figure 8 Elements of multipart animations

You can configure four types of animations: the appearance, movement, emphasis, and disappearance of objects on the slide. There are multiple options within these four categories. The options are categorized as Basic, Subtle, Moderate, and Exciting (although you might have a different concept of "exciting" than the PowerPoint developer who categorized the effects). A few more animation effects are available for text than for other slide objects.

Here's a breakdown of the animation effects that are available in PowerPoint 2016

- *Entrance animations*: An object with an animated entrance is not visible when the slide first appears. (It is visible during the development process, but not when you present the slide show.) It then appears on the slide in the manner specified by the entrance effect. Some entrance effects are available in the Animation gallery. They're illustrated in green, and their icons provide some idea of the movement associated with the effect.

Have fun experimenting with the different effects

- *Emphasis animations:* These effects animate an object that is already visible on the slide to draw attention to it, without changing its location. The emphasis effects that are available in the Animation gallery are illustrated in yellow.

Effects range from subtle to bold

- *Motion Path animations:* These effects move an object along a path that you specify, over a period of time that you specify. A few simple motion paths are available from the Animation gallery, but a surprisingly large variety is available from the dialog box that opens when you click More Motion Paths at the bottom of the Animation menu.
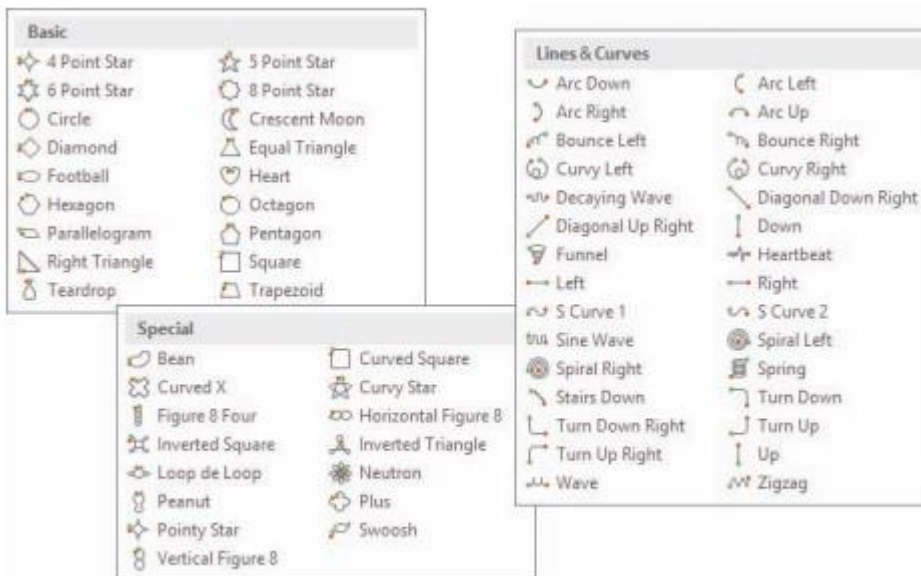
The motion path animations available for text

- *Exit Animations:* These effects take an existing object through a process that results in the object no longer being visible on the slide. The exit effects that are available in the Animation gallery are illustrated in red.

Choose an effect that suits the style of your presentation

The exit animations available for text

Animations can be very simple, or very complex. Many animations have options that you can configure, such as the direction, speed, size, or color. For example, when you configure an entrance effect for a bulleted list, you can specify whether to have the entire list enter the slide at the same time, or to have only one bulleted item enter at a time. After you choose an effect, the applicable options are available on the Effect Options menu.
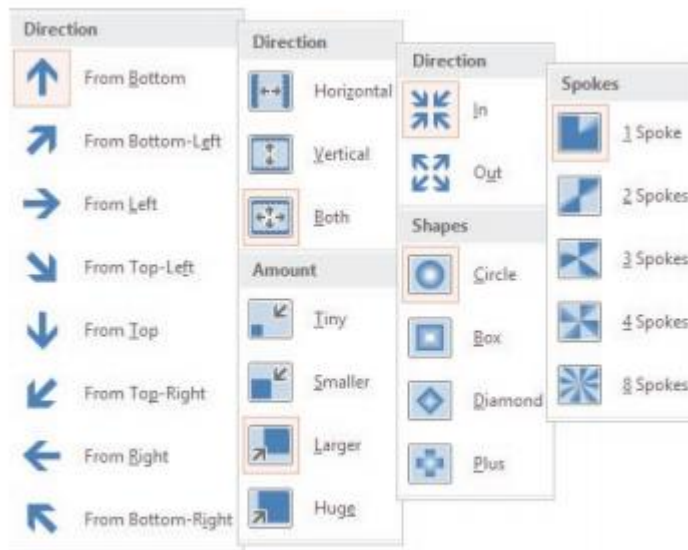
Some animations have options, and others don't

11.4   Adding Transition between Slides

To add a Transition into your presentation select the Transitions Tab (Figure 9). You are then given a variety to choose from. i.e., "Fade". When you select a Transition it will show a preview on the existing slide. You must have text or an image within the slide to see a preview.

Figure 9 Transition Tab

Duration

Along the right-hand side of the Transitions options you will see Duration (Figure 10.) This allows you to modify the Duration of the Transition that is present on the slide. This also features an ability to play a sound and to control whether to change to the next slide by "On Mouse Click".
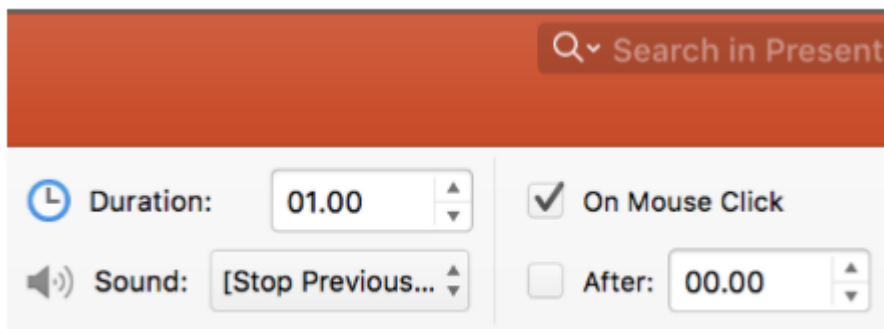
Figure 10 Duration

11.5   Slide Show

To access Slide Show, select the Slide Show Tab (Figure 11). The purpose of the Slide Show Tab is for the presenter to have an easy access to the full screen presentation mode as well as Rehearse Timings and Record Slide Show.

Figure 11 Slide Show Tab with Rehearse Timings and Record Slide Show

Rehearse Timing

Rehearse Timing can be a very useful tool that allows you to set up your presentation to play at a certain speed without having to click through the slides yourself. Also, this allows you to practice your talking points. This feature allows you to save timings for each slide and transition, and will start the PowerPoint automatically.

Figure 12 Pause Button
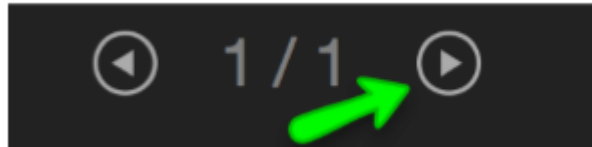
Figure 13 Next Arroe Button

Once you have Rehearse Timings selected under the Slide Show Ribbon the timing will immediately begin. To stop the timing, simply click the pause button located at the top left (Figure 12). To save this timing, click the next arrow button located below the slide preview. (Figure 13) Then, a box will pop up asking if you would like to save the time. Click yes.

Record Slide Show

Record Slide Show (Figure 11) is very similar to the Rehearse Timing. The only primary difference is that you can have the option to start recording at any given slide, rather than the beginning.

11.6   Adding audio content to slides

You can enhance presentations by adding sound to slide transitions, to animated content, to an individual slide, or to the presentation as a whole. For example, you could run a presentation that provides basic information and icebreakers during the time leading up to your actual presentation. You can add a pleasant royalty-free soundtrack that loops while the presentation plays, to avoid the discomfort of a room full of people who don't want to break the silence. If you plan to distribute a presentation electronically for people to watch on their own, you might want to add audio narration to an animation, or provide narration for the entire presentation.

You can add prerecorded audio content to a presentation, or record your own content directly within PowerPoint. PowerPoint supports the most common audio formats— MP3, MP4, Windows audio (.wav) and Windows Media audio (.wma), and more specialized formats such as ADTS, AU, FLAC, MIDI, and MKA audio.

📝 The Insert Online Audio feature that was present in earlier versions of PowerPoint is not available in PowerPoint 2016. However, you can download royalty-free audio music and sound effects from many online sources. Some of these require that you credit the website as the source, so be sure to read the website fine print. When you locate an audio clip that you want to use, you can download it to your computer and follow the instructions in this topic to use it in a PowerPoint presentation.

When you add audio to a slide (rather than to an animation or transition), the audio icon (shaped like a speaker) and an accompanying trigger icon appear on the slide, and the trigger event appears in the Animation Pane.
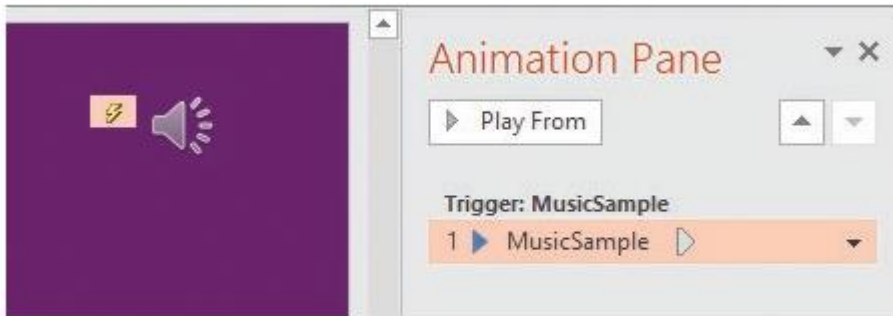
The trigger is created and added to the Animation Pane automatically

When the audio icon is selected, the Audio Tools tab group, which includes the Format and Playback tool tabs, appears on the ribbon, and audio playback controls appear on the slide.
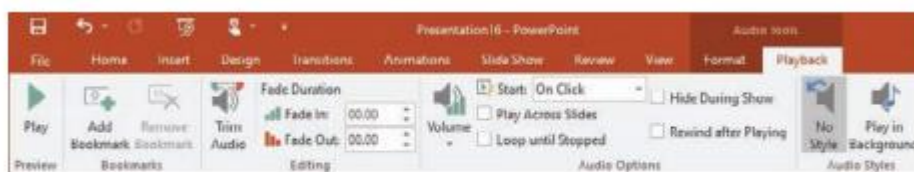
The playback controls are simple but provide sufficient options

You can start audio content on a slide automatically or from the playback controls. The playback controls are visible only when the audio icon is selected. The icon isn't obtrusive, but you can disguise or hide it if you want to. You can change the size or angle of the audio icon by using the sizing handles or rotation handle.
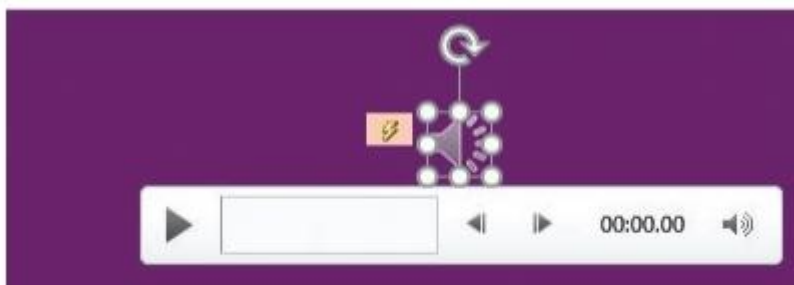
You can change the size or angle of the audio icon by using the sizing handles or rotation handle

To insert an audio clip onto a slide

1. Save the audio clip on your computer or on a network-connected location.

2. On the Insert tab, in the Media group, click the Audio button, and then click. Audio on My PC to open the Insert Audio dialog box.

3. In the Insert Audio dialog box, browse to and select the audio file, and then click the Insert button.

   Or

   1. In File Explorer, open the folder that contains the audio file.

   2. Arrange the File Explorer and PowerPoint windows on your screen so that both are visible.

   3. Drag the audio file from File Explorer to the slide.

To record audio directly onto a slide

1. On the Insert tab, in the Media group, click the Audio button, and then click Record Audio to open the Record Sound dialog box.

2.   In the Name box, enter a name to uniquely identify the recording. Then click the Record button (labeled with a red circle).
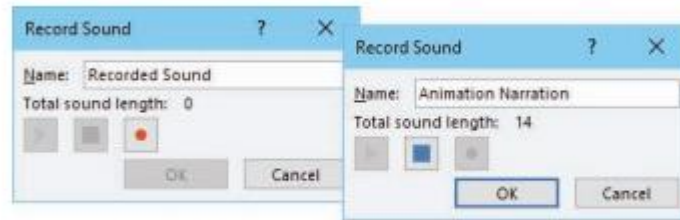
The Record Sound dialog box

3.   Speak or otherwise provide the audio that you want to record. When you finish, click the Stop button (labeled with a blue square). The audio icon and an accompanying trigger icon appear in the center of the slide, and the trigger event appears in the Animation Pane.

To insert Video content onto a slide

1.   On a slide that includes a content placeholder, click the Insert Video button in the content placeholder to display the Insert Video window that contains links to all the video sources you've configured Office to connect to.
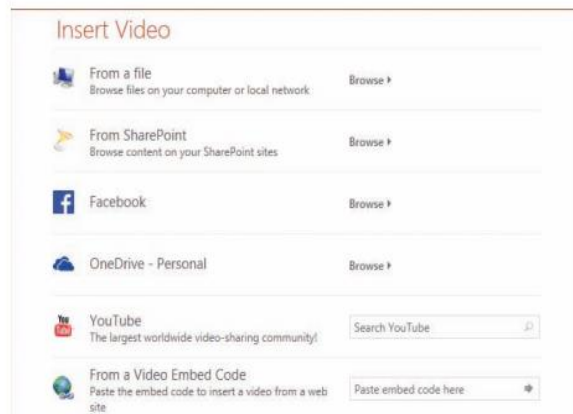
You can insert video clips from a variety of sources

2.   In the Insert Video window, click the source of the video that you want to insert, and then follow the process to insert a video from the selected source.

OR

1.   On any slide, on the Insert tab, in the Media group, click the Insert Video button, and then do either of the following:

● Click Online Video to open the Insert Video window. In the Insert Video window, click the source of the video that you want to insert, and then follow the process to insert a video from the selected source.

● Click Video on My PC to open the Insert Video dialog box. In the Insert Video dialog box, browse to and select the video file, and then click the Insert button.

Create a presentation of your choice and add animations and audio clip to your slides.

Summary

- The normal view is the default view of power point which shows a combination of slides, outline, and notes page view.
- Outline view displays the presentation in outline form making it easy to copy, move or delete slides.
- The slide view offers one slide at time for editing.

Self- Assessment Questions

1. Which of the following is used to see all slides at once?
   - A. Using slide sorter view
   - B. Using slide view
   - C. Using normal view
   - D. None of the above

2. Which of the following is not a type of view in PowerPoint?
   - A. Slide show
   - B. Slide sorter
   - C. Normal
   - D. None of the above

3. In which of the following menu, the slide sorter view is available in PowerPoint?
   - A. Insert
   - B. View
   - C. Design
   - D. Animations

4. Which of the following view in PowerPoint is used to add comments?
   - A. Slide sorter view
   - B. Notes page view
   - C. Normal view
   - D. None of the above

5. Is it allowed to make a PDF of the powerpoint presentation?
   - A. Yes
   - B. No
   - C. May be.
   - D. Can't say.

6. What term will be used when you hold the left key of the mouse on an object and move it on the slide?
   - A. Dragging
   - B. Moving
   - C. Highlighting
   - D. None of the above

7. Which term is related with decorative text?
   - A. Cross- reference
   - B. Hyperlink
   - C. Clipart
   - D. Wordart

8. Special effects used to introduce slides in a presentation are called_____
    A. Present animations
    B. Transitions
    C. Custom animations
    D. Effects

9. The auto shapes tool provides you with_____
    A. Fancy text to place on your slide.
    B. Commonly found shapes.
    C. Any shape you want to add on a slide.
    D. Clip art that is related to your presentation.

10. Which of the following tool enables you to add text to a slide without using the standard placeholders?
    A. Text tool box
    B. Line tool
    C. Drawing tool
    D. Auto shapes tool

11. how would you create the following diagram in PowerPoint
    A. Use auto shapes and the drawing toolbar to create the diagram and design it
    B. Open the diagram gallery from the drawing toolbar and choose this diagram type
    C. Use the chart command on the insert menu to import the diagram.
    D. All of above.

12. _____ are presentations that include various types of media such as: text, images, videos, animations, or sound.
    A. Multimedia Presentations
    B. Music Presentations
    C. Image Presentations
    D. Sound Presentations

13. _____ are special visual and sound effects contained in presentation graphics file.
    A. Animations
    B. Attractions
    C. Simulations
    D. Graphics

14. Which of these multimedia operations can be performed on a presentation?
    A. Adding video
    B. Recording video
    C. Screen recording
    D. All of the above

15. What is the slide transition?
    a. Letters
    b. Overheads
    c. It is a special effect used to introduce a slide in a slide show.

      d.   None of the above

Review Questions

1. Explain different ways to view slides in PowerPoint.
2. Explain slide layouts in PowerPoint.
3. What is the difference between Notes Page and Slide Sorter view?

Answers for Self-Assessment

1. A	2. D	3. B	4.B	5.A
6. A	7. D	8. B	9.B	10. A
11. B	12. A	13. A	14. D	15. C

Further Reading

A Study of Computer Fundamental, Shu-Jung Yi.

https://www.tutorialspoint.com/powerpoint/index.htm

<h1 align="center">Unit 12: Internet</h1>

Objectives

After studying this unit, you will be able to:

- explain the brief history for internet and Web page
- discuss about the Web page its features
- explain browsers and URL
- discuss various HTML data types and ISP's

Introduction

Internet has become a prominent way of communication in today's information technology environment. It has infiltrated every aspect of existence. Anyone can access information on the internet, with a minimum of financial resources, wherever in the globe. The Internet is a network of millions of computers. Phone lines or other means of communication were used to connect them. Ethernet ISDN or cable modems, for example, are used to share data. The internet is an enormous network. Because of its size and strength, one of the experts likened to the Internet as a "ocean." Some people are said to' surf,' 'ride,' or 'navigate' the 'internet.' Most individuals begin to 'swim' across the Internet until they discover their own method, which is probably more realistic. The options are unlimited when it comes to the Internet. A few of them are listed below. Schoolchildren in Delhi, for example, can 'talk' to their classmates in Mumbai.

Teachers and administrators can hold a conference with peers from all around the world. A business traveler can use her or his home or office computer to send hundreds of messages with a few easy clicks. Students may acquire knowledge on any subject via the Internet at any time.

12.1   Internet history

The United States Department of Defense launched the Internet as an experiment in 1969. The US military need a method for its researchers to interact and exchange programs over the internet.

Office Automation Tools

ARPANET (Advanced Research Projects Agency—Network) was the first long-distance computer network created by defense computer scientists. Then, via telephone connections, remote military outposts were able to communicate with one another. Long-distance networking was recognized as a benefit by universities and scientists. They started connecting to ARPANET and to each other. Businesses and private individuals began to connect through the computer network.

Today, no individual, no corporation and no government own the Internet—it is owned, operated and maintained by all of those who use it. The Internet was first started as an experiment by the United States Department of Defense in 1969. The United States military needed a way for its researchers to communicate and share programs with one another over their computers. The defense computer researchers developed the first long distance network of computers, which was called ARPANET (Advanced Research Projects Agency—Network). Remote military sites were then 'connected' to one another, via telephone lines. Universities and scientists saw the advantage of long distance networking. They began to connect with ARPANET as well as to each other. Businesses and private individuals then started connecting through the network of computers. Eventually the massive network of networks developed, known as Internet. Today, no individual, no corporation and no government owns the Internet—it is owned, operated and maintained by all of those who use it.

12.2 Internet

Internet is defined as an Information super Highway, to access information over the web. However, it can be defined in many ways as follows:

- Internet is a world-wide global system of interconnected computer networks.
- Internet uses the standard Internet Protocol (TCP/IP).
- Every computer in internet is identified by a unique IP address.
- IP Address is a unique set of numbers (such as 110.22.33.114) which identifies a computer location.
- A special computer DNS (Domain Name Server) is used to give name to the IP Address so that user can locate a computer by a name.
- For example, a DNS server will resolve a name http://www.abc.com to a particular IP address to uniquely identify the computer on which this website is hosted.
- Internet is accessible to every user all over the world.
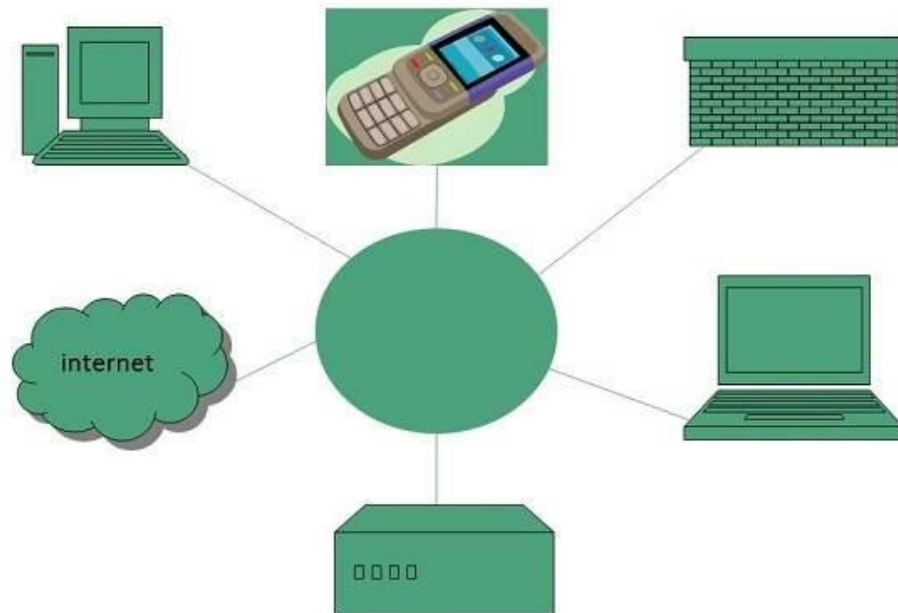
12.3 Evolution

The concept of Internet was originated in 1969 and has undergone several technological & Infrastructural changes as discussed below:

- The origin of Internet devised from the concept of Advanced Research Project Agency Network (ARPANET).
- ARPANET was developed by United States Department of Defense.
- Basic purpose of ARPANET was to provide communication among the various bodies of government.
- Initially, there were only four nodes, formally called Hosts.
- In 1972, the ARPANET spread over the globe with 23 nodes located at different countries and thus became known as Internet.
- By the time, with invention of new technologies such as TCP/IP protocols, DNS, WWW, browsers, scripting languages etc., Internet provided a medium to publish and access information over the web.

Advantages

Internet covers almost every aspect of life, one can think of. Here, we will discuss some of the advantages of Internet:
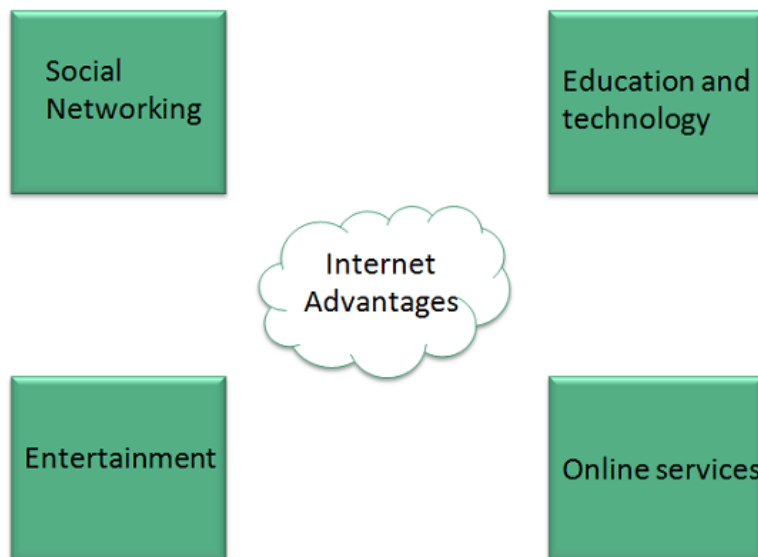
- Internet allows us to communicate with the people sitting at remote locations. There are various apps available on the wed that uses Internet as a medium for communication. One can find various social networking sites such as:

    o Facebook

    o Twitter

    o Yahoo

    o Google+

    o Flickr

    o Orkut

- One can surf for any kind of information over the internet. Information regarding various topics such as Technology, Health & Science, Social Studies, Geographical Information, Information Technology, Products etc can be surfed with help of a search engine.

- Apart from communication and source of information, internet also serves a medium for entertainment. Following are the various modes for entertainment over internet.

    o Online Television

    o Online Games

    o Songs

    o Videos

    o Social Networking Apps

- Internet allows us to use many services like:

  o Internet Banking

  o Matrimonial Services

  o Online Shopping

  o Online Ticket Booking

  o Online Bill Payment

  o Data Sharing

  o E-mail

- Internet provides concept of **electronic commerce**, that allows the business deals to be conducted on electronic systems.

Figure 1What Happens in an Internet Minute?

Disadvantage

However, Internet has proved to be a powerful source of information in almost every field, yet there exists many disadvantages discussed below:

- There are always chances to loose personal information such as name, address, credit card number. Therefore, one should be very careful while sharing such information. One should use credit cards only through authenticated sites.

- Another disadvantage is the **Spamming**. Spamming corresponds to the unwanted e-mails in bulk. These e-mails serve no purpose and lead to obstruction of entire system.

- **Virus** can easily be spread to the computers connected to internet. Such virus attacks may cause your system to crash or your important data may get deleted.

- Also a biggest threat on internet is pornography. There are many pornographic sites that can be found, letting your children to use internet which indirectly affects the children healthy mental life.

- There are various websites that do not provide the authenticated information. This leads to misconception among many people.

12.4   World Wide Web(WWW)

The World Wide Web is abbreviated as WWW. The World Wide Web is defined as all resources and users on the Internet who employ the Hypertext Transfer Protocol (HTTP) (HTTP).

The World Wide Web Consortium, which Web creator Tim Berners-Lee helped form, provides a larger description (W3C).

The World Wide Web (WWWW) is a universe of network-accessible information that represents human knowledge.

In its most basic form, the World Wide Web is a method of transmitting information between computers connected to the Internet, resulting in a massive collection of interactive multimedia resources.

⚠️ Internet and Web is not the same thing: Web uses internet to pass over the information.
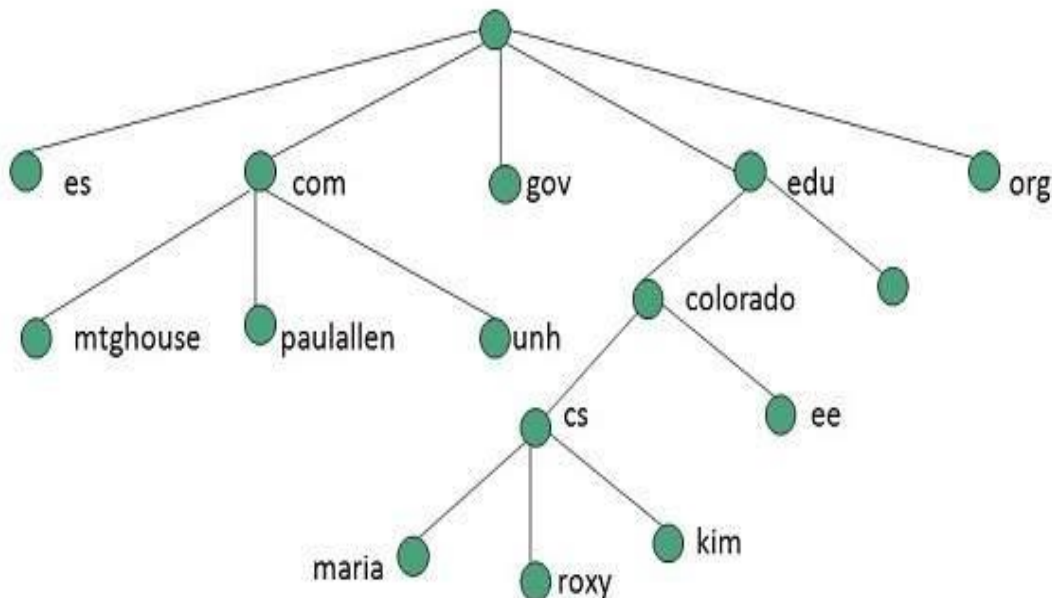
Evolution of WWW

Timothy Berners Lee invented the World Wide Web in 1989 at CERN in Geneva. He proposed the World Wide Web as a way for researchers at CERN to collaborate more effectively and efficiently. It was eventually renamed the World Wide Web.

The evolution of the World Wide Web is depicted in the graphic below:
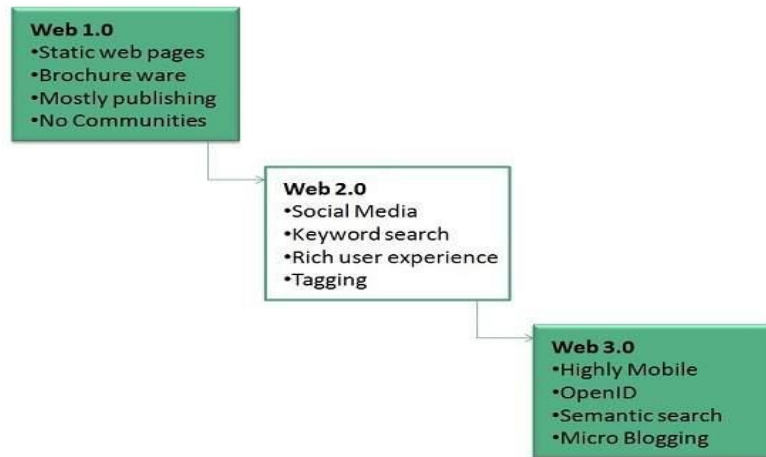
Figure 2 WWW Evolution

WWW Architecture

WWW architecture is divided into several layers as shown in the following diagram:
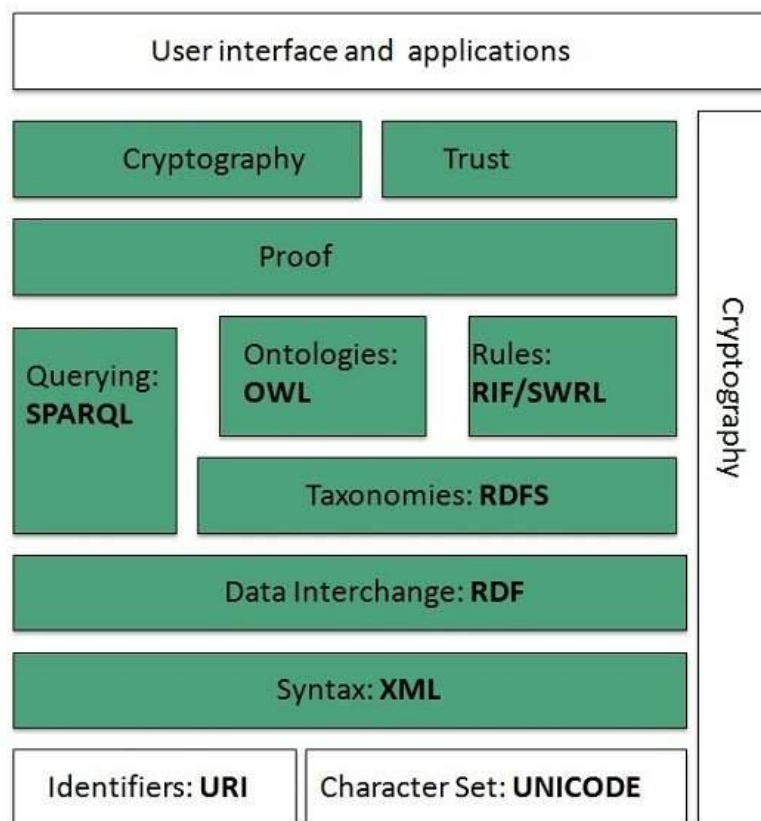
Identifiers and Character Set

Uniform Resource Identifier (URI) is used to uniquely identify resources on the web and **UNICODE** makes it possible to built web pages that can be read and write in human languages.

Syntax

XML (Extensible Markup Language) helps to define common syntax in semantic web.

Data Interchange

Resource Description Framework (RDF) framework helps in defining core representation of data for web. RDF represents data about resource in graph form.

Taxonomies

RDF Schema (RDFS) allows more standardized description of **taxonomies** and other **ontological** constructs.

Onto logies

Web Ontology Language (OWL) offers more constructs over RDFS. It comes in following three versions:

- OWL Lite for taxonomies and simple constraints.

- OWL DL for full description logic support.

- OWL for more syntactic freedom of RDF

Rules

RIF and **SWRL** offers rules beyond the constructs that are available from **RDFs** and **OWL.** Simple Protocol and **RDF Query Language (SPARQL)** is SQL like language used for querying RDF data and OWL onto logies.

Proof

All semantic and rules that are executed at layers below Proof and their result will be used to prove deductions.

Cryptography

Cryptography means such as digital signature for verification of the origin of sources is used.

User Interface and Applications

On the top of layer **User interface and Applications** layer is built for user interaction.

WWW Operations

The World Wide Web is based on a client-server model. The steps below will explain how the internet works:

1. In the address bar of the web browser, the user types the URL of the web page (for example, http://www.abc.com).
2. After then, the browser asks the Domain Name Server for the IP address for www.abc.com.
3. After receiving IP address, browser sends the request for web page to the web server using HTTP protocol which specifies the way the browser and web server communicates.
4. Then web server receives request using HTTP protocol and checks its search for the requested web page. If found it returns it back to the web browser and close the HTTP connection
5. Now the web browser receives the web page, It interprets it and display the contents of web page in web browser's window.
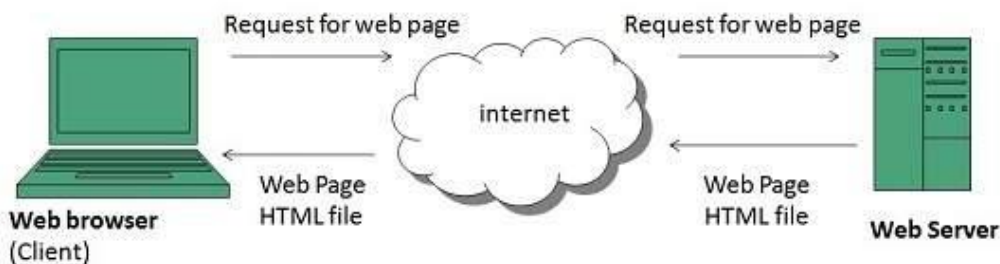
Future

There had been a rapid development in field of web. It has its impact in almost every area such as education, research, technology, commerce, marketing etc. So the future of web is almost unpredictable.

Office Automation Tools

Apart from huge development in field of WWW, there are also some technical issues that W3 consortium has to come up with.

User Interface

Work on higher quality presentation of 3-D information is under development. The W3 Consortium is also looking forward to enhancing the web to full fill requirements of global communities which would include all regional languages and writing systems.

Technology

Work on privacy and security is under way. This would include hiding information, accounting, access control, integrity, and risk management.

Architecture

There has been huge growth in field of web which may lead to overload the internet and degrade its performance. Hence better protocol is required to be developed.

12.5   Website Overview

Website is a location on web and is hosted on a web server. It is a set of related web pages. It is accessed using Internet address known as Uniform Resource Locator

Static Website

Websites that are static are sometimes referred to as flat or stationary websites. They are loaded precisely as they are on the web server into the client's browser. These websites simply have static information on them. The user can only read the information; he or she cannot change it or interact with it.

Only HTML is used to make static webpages. Static websites are only utilized when the information does not need to be updated any more.
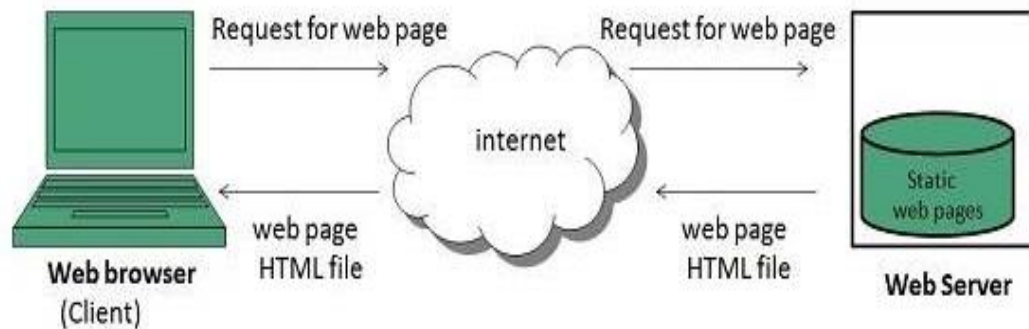
Figure 3 How Static Websites work?

Dynamic Website

Various information is displayed on dynamic webpages at different times. It is possible to modify a piece of a web page without having to reload the full page. It was made feasible through the use of Ajax technology.

Server-side dynamic web page

Server-side scripting is used to generate it. There are server-side scripting settings that control how a new web page is built, as well as how further client-side processing is set up.

Client-side dynamic web page

Client-side scripting, such as java script, is used to process it. Then it's sent to Document Object Model (DOM)
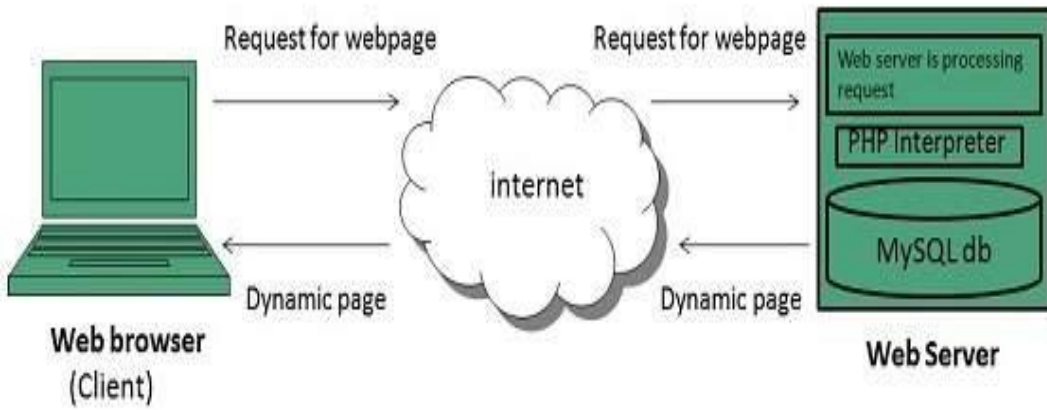
Figure 4 How Dynamic Website works?
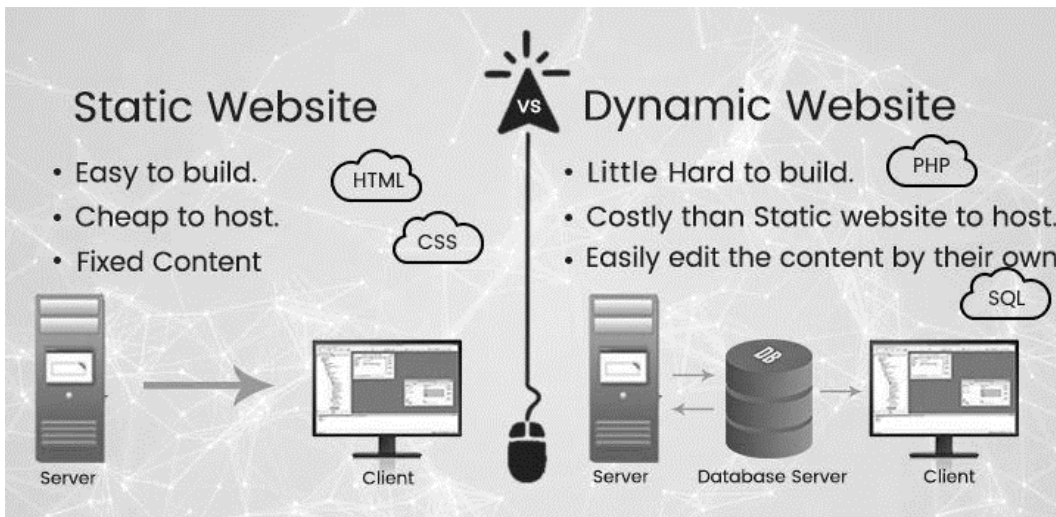
Web pages

web page is a document available on world wide web. Web Pages are stored on web server and can be viewed using a web browser.

A web page can contain huge information including text, graphics, audio, video and hyperlinks. These hyperlinks are the link to other web pages.

The website is a document that usually appears in a web browser, generally authored in HTML. By entering a URL address in the address bar of a browser, a web page may be visited. You may include text, pictures and hyperlinks on a web page to other web pages and files.

A website is frequently used to give users with information, including images or videos, to highlight key issues. The sale of items or services to the viewers is also permitted through an internet page. Many online sites, such as our Computer Hope site, make up a web site.

You reach a web page by clicking on a link supplied by a search engine. There are millions of websites in the Internet and more are added earlier.

Figure 5 Sample Web pages

Web Browser

Web Browser is an application software that allows us to view and explore information on the web. User can request for any web page by just entering a URL into address bar.

Web browser can show text, audio, video, animation and more. It is the responsibility of a web browser to interpret text and commands contained in the web page.

Earlier the web browsers were text-based while now a days graphical-based, or voice-based web browsers are also available. Following is the most common web browser available today:

Browser	Vendor
Internet Explorer	Microsoft
Google Chrome	Google
Mozilla Firefox	Mozilla
Netscape Navigator	Netscape Communications Corp.
Opera	Opera Software
Safari	Apple
Sea Monkey	Mozilla Foundation
K-meleon	K-meleon

Table 1 Different Web browsers along with the vendor

Architecture of Web Browser

There are a lot of web browsers available in the market. All of them interpret and display information on the screen however their capabilities and structure vary depending upon

implementation. But the most basic component that all web browsers must exhibit are listed below:

- Controller/Dispatcher

- Interpreter

- Client Programs

Controller works as a control unit in CPU. It takes input from the keyboard or mouse, interpret it and make other services to work on the basis of input it receives.

Interpreters receive the information from the controller and execute the instruction line by line. Some interpreters are mandatory while some are optional. For example, HTML interpreter program is mandatory and java interpreter is optional.

Client Program describes the specific protocol that will be used to access a particular service. Following are the client programs that are commonly used:

- HTTP

- SMTP

- FTP

- NNTP

- POP
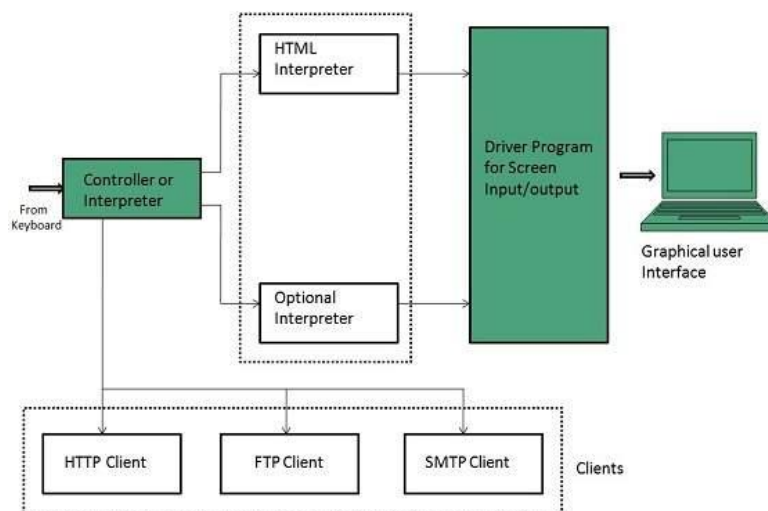
Web Server

Web server is a computer where the web content is stored. Basically, web server is used to host the web sites but there exist other web servers also such as gaming, storage, FTP, email etc.

📝 Web site is collection of web pages while web server is a software that respond to the request for web resources.

Web Server Working

Web servers respond to the client request in either of the following two ways:

- Sending the file to the client associated with the requested URL.
- Generating response by invoking a script and communicating with database.
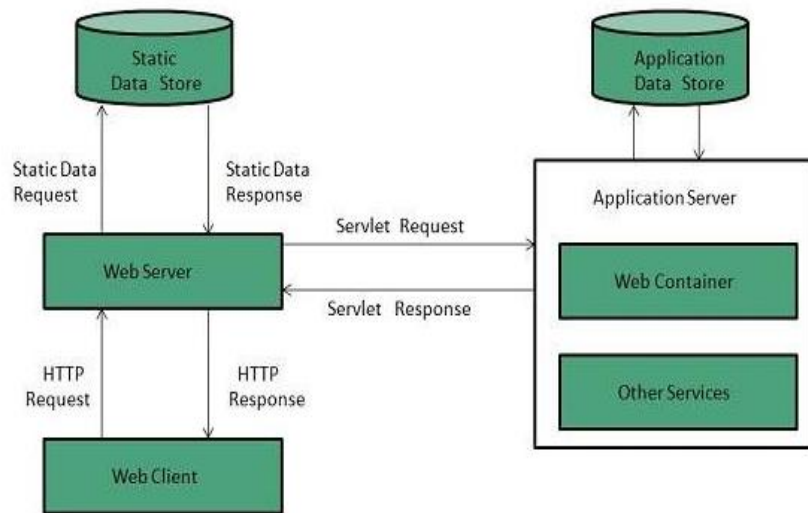
Key Points

- When client sends request for a web page, the web server search for the requested page if requested page is found then it will send it to client with an HTTP response.

- If the requested web page is not found, web servers will the send an **HTTP response: Error 404 Not found.**

- If client has requested for some other resources, then the web server will contact to the application server and data store to construct the HTTP response.

Architecture

Web Server Architecture follows the following two approaches:

1. Concurrent Approach

2. Single-Process-Event-Driven Approach.

Concurrent Approach

Concurrent approach allows the web server to handle multiple client requests at the same time. It can be achieved by following methods:

- Multi-process

- Multi-threaded

- Hybrid method.

Multi-processing

In this a single process (parent process) initiates several single-threaded child processes and distribute incoming requests to these child processes. Each of the child processes are responsible for handling single request.

It is the responsibility of parent process to monitor the load and decide if processes should be killed or forked.

Multi-threaded

Unlike Multi-process, it creates multiple single-threaded process.

Hybrid

It is combination of above two approaches. In this approach multiple process are created and each process initiates multiple threads. Each of the threads handles one connection. Using multiple threads in single process results in less load on system resources.

12.6 URL(Uniform Resource Locator)

A URL (Uniform Resource Locator) is a reference to an online resource which defines the location of the web resource on the computing network and the methodology used to locate the web resource. A Uniform Resource Identification URL(URI) is a specific type but many people interchange these two phrases. URls are most often used for web pages of reference (http), but are also used for the transfer of files (ftp), e-mail (mailbox), access to databases (JDBC), etc.

Most web browsers display the URL of a web page above the page in an address bar. A typical URL could have the form http://www.example.com/index.html, which indicates a protocol (http), a hostname (www.example.com), and a file name (index.html).

The URL sends users to a specific resource online such as video, webpage, or other resources. When you search any query on Google, it will display the multiple URLs of the resource that are all related to your search query. The displayed URLs are the hyperlink to access the webpages.

A URL (Uniform Resource Locator) contains the information, which is as follows:

- o The port number on the server, which is optional.
- o It contains a protocol that is used to access the resource.
- o The location of the server
- o A fragment identifier
- o In the directory structure of the server, it contains the location of the resource.

The additional information about the URL is described below with the help of an example:

Let's take an example: https://www.abc.com/jtp.htm, it indicates the jtp.htm is a file located on the server with the address of javatpoint.com.

http:// or https://

The http is a protocol that stands for Hypertext Transfer Protocol. It tells the browser to which protocol will be preferred to use for accessing the information that is specified in the domain.

The https (Hypertext Transfer Protocol Secure) is an enhanced protocol as compared to http as it concerned with security. It provides the surety that the information, which is transmitted over HTTP is secure and encrypted. The colon (:) and two forward slashes (//) are used to separate the protocol from the rest of the part of the URL.

www.

The www is used to distinguish the content, which stands for World Wide Web. This portion of the URL can be left out many times, as it is not required. For instance, if you type "http://abc.com," you will still get the abc website. For an important subpage, this portion can also be substituted, which is known as a sub domain.

abc.com

The abct.com is the domain name for the website, and the .com is called TLD or suffix. It helps to identify the location or type of the website. For example, ".org" stands for an organization, ".co.uk" stands for the United Kingdom, and ".com" is for commercial. There are various types of domain suffixes available; you are required to register the name through a domain registrar to get a domain.

jtp.htm

The jtp.htm is the name of the web page, and the .htm is the file extension of the web page, which describes the file is an HTML file. There are many other file extensions available on the internet such as .php, .html, .xml, .jpg, .gif, .asp, .cgi, etc.

These are some examples of the URLs that you may have come across:

- **http://www.google.com**
- **http://www.yahoo.co.uk**
- **http://www.amazon.com**

If you type these URLs into your browser, you will go to the exact site you wanted without having to use a search engine.

You can break a URL down into three sections.

http://www.amazon.co.uk

- The www is short for World Wide Web.
- The www in the URL does not really do anything, it simply grew out of popular use. You will now find many websites which do not have 'www' in their URL

http://www.amazon.co.uk

- amazon.co.uk is called the Domain name.
- It is part of the URL.
- However, it also tells you which organization owns the site.
- In this case, a company called Amazon.

http://www.amazon.co.uk

- Notice that part of the URL contains the word .co

- This can tell you a lot about the type of website that you will be visiting.

- In this instance, it means that the website belongs to a company or business.

http://www.amazon.co.uk
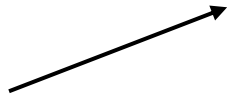
- Finally, notice that this URL ends with '.uk'

- This means that the website is registered in the United Kingdom.

- A website which ended with:

    - '.fr' would mean it was registered in France

    - '.cn' would be registered in China

Other Endings You Might Come Across

Ending	What does it Specify???
.gov	Government Site
.com	International Company
.co	Company
.org	Organization (Often a Charity)
.ac	Academic (Often a University)
.sch	School
.ed	Education
.net	Network of Websites

12.7   ISP(Internet Service Provider)

ISP stands for Internet Service Provider. It is a company that provides access to the internet and similar services such as Website designing and virtual hosting. For example, when you connect to the Internet, the connection between your Internet-enabled device and the internet is executed

through a specific transmission technology that involves the transfer of information packets through an Internet Protocol route.

Data is transmitted through different technologies, including cable modem, dial-up, DSL, high speed interconnects. Accordingly, based on the method of data transmission, the Internet access provided by ISPs can be divided into many types, some of which are as follows:

Dial-up Internet access: It is the oldest technology to provide Internet access by modem to modem connection using telephone lines. In this method, the user's computer is connected to a modem with a telephone line. This method has become outdated today due to slow connection speed. However, in remote areas, this method can be used where the broadband network is not available.

DSL: DSL, which stands for 'digital subscriber line' is an advanced version of the dial-up Internet access method. It uses high frequency to execute a connection over the telephone network and allows the internet and the phone connection to run on the same telephone line. This method offers an Asymmetric Digital Subscriber (ADSL), where the upload speed is less than the download speed, and a Symmetric Digital Subscriber Line (SDSL), which offers equal upload and download speeds. Out of these two, ADSL is more popular among users and is popularly known as DSL.

Wireless Broadband (WiBB): It is a modern broadband technology for Internet access. It allows high-speed wireless internet within a large area. To use this technology, you are required to place a dish on the top of your house and point it to the transmitter of your Wireless Internet Service Provider (WISP).

Wi-Fi Internet: It is the short form for "wireless fidelity," which is a wireless networking technology that provides wireless high-speed Internet connections using radio waves. To use the internet, you are required to be within the range of wi-fi network. It is commonly used in public places such as hotels, airports, restaurants to provide internet access to customers.

ISDN: It is a short form of Integrated Services Digital Network. It is a telephone system network which integrates a high-quality digital transmission of voice and data over the same standard phone line. It offers a fast upstream and downstream Internet connection speed and allows both voice calls and data transfer.

Ethernet: It is a wired LAN (Local Area Network) where computers are connected within a primary physical space. It enables devices to communicate with each other via a protocol (a set of rules or common network language). It may provide different speeds such as 10 Mbps, 100 Mbps and 10 Gbps.

EXAMPLES OF ISPs

Figure 6 Examples of some ISP

Summary

- In this we discuss about the role of internet and its user in various different fields as referred by scientists as an 'ocean' to 'rurf', 'side' or 'navigate' the net.
- Web page may be retrieved from a local computer or from remote web senses.
- Record of web page address is a book marking.
- In elements web page, can contain numerous types of information, which is able to be sun.
- Graphical web browser are user friendly web browsing programs.

Keywords

Bookmark: In web terminology, a bookmark is a record of Web page address.

Browsers: The web browser is a medium that enable to use on's computer to look at World Wide Web (WWW) documents. Graphical.

Web browser: It is a program which allows one to access World Wide Web with graphic.

HTML: It stands for Hyper Text Markup Language, is the predominant markup language for web pages. It is the basic building block of webpages.

ISP: ISP or internet service provider is a company that provides access to the Internet; host data's or does both.

Self Assessment

1. Which of the following is a correct format of Email address?
A. name@website@info
B. www.nameofebsite.com
C. name@website.info
D. name.website.com

2. A program that is used to view websites is called a _____
A. Browser
B. Web viewer
C. Spreadsheet
D. Word processor

3. Internet is _____
A. A worldwide interconnected network of computers which use a common protocol to communicate with one another.
B. A worldwide network of computers
C. An interconnected network of computers
D. A local computer network.

4. The process of connecting to the internet account is_____
A. Sing in
B. Sing out
C. Login
D. Logout

5. URL is _____
A. web address
B. source code
C. user's address
D. an attribute

6. Internet explorer falls under :
A. Operating System
B. Compiler
C. Browser
D. IP address

7. What is the full form of WWW in web address?
A. World Wide Web
B. World Wide Word
C. World Wide Wood
D. None of these

8. Full form of HTML is:
A. Hyper Text Markup Language
B. Hyper Text Manipulation Language
C. Hyper Text Managing Links
D. Hyper Text Manipulating Links

9. To join the internet, the computer has to be connected to a _____
A. internet architecture board
B. internet society
C. internet service provider
D. different computer

10. The third component of URL is:
A. Protocol
B. Server name
C. Domain name
D. Website name

11. The domain extension .org refers to a type of website__
A. Commercial
B. Government
C. Non-Profit Organization
D. Educational

12. What is a search engine?
A. a program that searches engines
B. a web site that searches anything
C. a hardware component
D. a machinery engine that search data.

13. It is an application that stores the Web pages requested by users. What is it?
A. Web page

B. Internet
C. WWW
D. Web server

14. ISP stands for _____
A. Intranet Service Provider
B. Internet Service Provider
C. Inter Service Provider
D. International Special Products

15. A search engine can be defined as a software program that provides the required information in the form of a lists of related websites, based on search criterion defined by the user. Some commonly used search engines are:
A. Google
B. Bing
C. Yahoo!
D. All of these

Answer for Self Assessment

1.	C	2.	A	3.	A	4.	C	5.	A
6.	C	7.	A	8.	A	9.	B	10.	C
11.	C	12.	A	13.	D	14.	B	15.	D

Review Questions

1. What are the commonly used browsers?
2. Explain the difference between Lynx and Internet Explorer.
3. Explain how a banner of IE classified.
4. What is the function of a location bar in a browser?
5. Explain the significance of Book Marking.
6. How can you search for computer books available on the internet in India?
7. What are the main components of Internet browsers?

Further Reading

Excellence in Computer Education by Dr. C. K. Seth.

www.webopedia.com/index.php/TERM/I/internet.html

Unit 13: Applications

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13.1   Web Sever

13.2   WWW(World Wide Web)

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Summary

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Objectives

- understand the Web Server
- explain the use and concept of E-mail
- discuss instant messaging
- explain internet telephony
- understand video conference

Introduction

The machine and the software installed on a web server. The web server uses a web browser to interface with the client. They supply web pages via the Web browser and HTTP protocols to the customer and application. Also we may set a web server for downloading the required files using the File Transfer Protocol and for providing e-mail, web pages creating and published applications on an intranet or Internet-connected computer with the help of the File Transfer Protocol. On a client server model a web server functions. A server application must be provided to a computer connected to the internet or intranet.

13.1   Web Sever

A web server is software and hardware that uses HTTP (Hypertext Transfer Protocol) and other protocols to respond to client requests made over the World Wide Web. The main job of a web server is to display website content through storing, processing and delivering webpages to users. Besides HTTP, web servers also support SMTP (Simple Mail Transfer Protocol) and FTP (File Transfer Protocol), used for email, file transfer and storage.

Web server hardware is connected to the internet and allows data to be exchanged with other connected devices, while web server software controls how a user accesses hosted files. The web server process is an example of the client/server model. All computers that host websites must have web server software.

Web servers are used in web hosting, or the hosting of data for websites and web-based applications -- or web applications.

How it works?

The Web Server software is accessed via the websites' domain names and provides the content of the site to the requested user. There are also various components on the software side, with at least one HTTP server. The HTTP server has HTTP and URL comprehensions. A web server is a physical machine that holds software for websites and other online-related data, such as HTML texts, photos and JavaScript files.

When the browser wants a file that is hosted on a web server, such as Google Chrome or Firefox, the browser requires HTTP for the file. The HTTP server will accept the request, retrieve the contents and send I if the request is received by the web server.

Examples of Webserver uses

Web servers are frequently included as part of a larger package of internet and intranet-related tools that are used for things like

- sending and receiving emails.
- downloading requests for File Transfer Protocol (FTP) files.
- creating and publishing sites.

Server-side scripting, which is used to utilize scripts on a web server that may adapt the response to the client, is supported by many basic web servers. Server-side scripting operates on the server computer and offers a wide range of capabilities, including database access. Active Server Pages (ASP), Hypertext Preprocessor (PHP), and other scripting languages will be used in the server-side scripting process.

13.2   WWW(World Wide Web)

The World Wide Web, sometimes known as a Web, is a collection of websites or web pages maintained on web servers and accessible through the internet by local computers. Text pages, digital photos, audios, and videos, among other things, can be found on these websites. Users may access the content of these sites through the internet utilizing devices such as computers, laptops, and cell phones from anywhere in the globe. The WWW, in conjunction with the internet, allows you to retrieve and display text and media on your device.

Web pages, which are formatted in HTML and connected by connections known as "hypertext" or hyperlinks and accessible over HTTP, are the building blocks of the Web. These are electronic linkages that connect relevant bits of information so that users may easily get what they need. The

advantage of hypertext is that it allows you to choose a word or phrase from a text and then go to other sites that provide further information on that word or phrase. A Uniform Resource Locator (URL) is an Internet address given to a web page (URL). A website is a collection of online pages that belong to a given URL, such as www.facebook.com, www.google.com, and so on. As a result, the World Wide Web resembles a huge electronic book whose pages are stored on multiple servers across the world.

Small websites keep all of their WebPages on a single server, but large websites or organisations store their WebPages on many servers in various countries so that when people from that location search their site, the information may be rapidly retrieved from the nearest server.

As a result, the web serves as a platform for users to retrieve and share data through the internet. Unlike in a book, where we go from one page to the next in a sequential order, on the World Wide Web, we visit a web page and then travel from that web page to other network sites by following a web of hypertext connections. To access the Internet, you'll need a browser installed on your computer.

## Different between WWW and Internet

The phrases 'internet' and 'World Wide Web' are sometimes used interchangeably. They believe they are the same, although this is not the case. The Internet is not the same as the World Wide Web. It's a global network of computers, laptops, tablets, and other gadgets. It allows users to exchange emails and interact with other people online. When you send an email or speak with someone online, for example, you are utilizing the internet.

However, when you access information from a website such as google.com, you are utilising the World Wide Web, which is a network of servers connected by the internet. When you use a browser to request a site from your computer, the server produces that page for you. Your PC is referred to as a client.
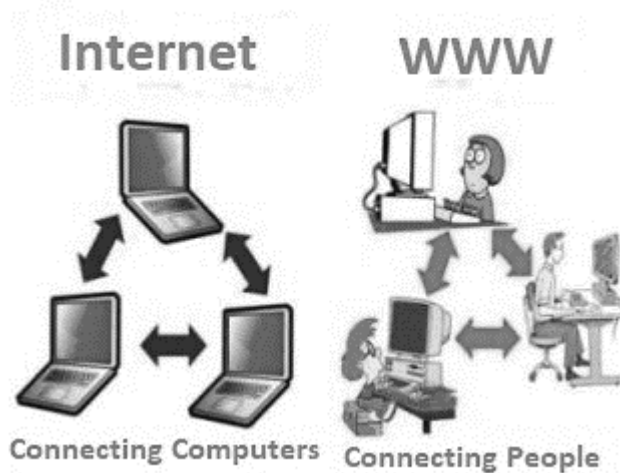

How the World Wide Web Works?

Now, we have understood that WWW is a collection of websites connected to the internet so that people can search and share information. Now, let us understand how it works!
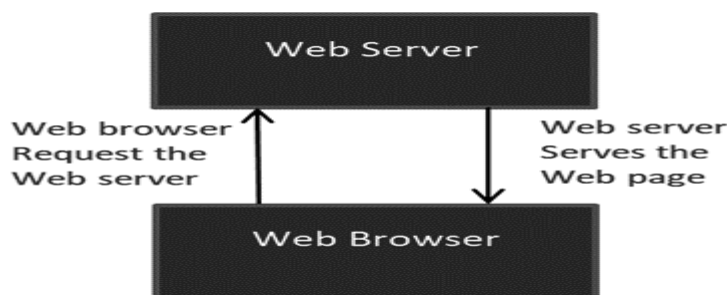
The internet's core client-server format, as represented in the accompanying graphic, governs how the Web functions. When users request web pages or information, the servers store and transport it to their computers on the network. A web server is a computer program that provides web pages to people who access them using a browser. A client is the computer of a user who requests documents from a server. Users can access the papers that have been obtained using a browser that has been installed on their machine.
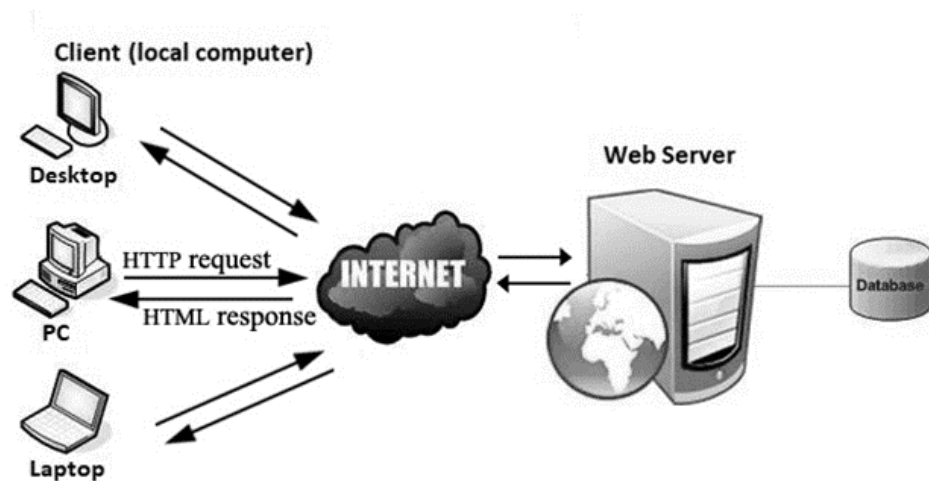
Web servers hold all of the websites. A website, like a person who rents a house, takes up space on a server and is kept there. When a user requests a website's WebPages, the server hosts it, and the website owner is responsible for paying the hosting fee.

The WWW starts operating the instant you open your browser and put a URL into the address bar or search for anything on Google. In order to send information (web pages) from servers to clients, three basic technologies are used (computers of users). Hypertext Markup Language (HTML), Hypertext Transfer Protocol (HTTP), and Web browsers are examples of these technologies.

13.3   Hypertext Markup Language (HTML):

HTML is a markup language that is commonly used to create web pages. It uses HTML elements or tags to define the structure of online pages. These tags are used to arrange material like 'header,' 'paragraph,' 'table,' 'Image,' and others. When you view a site, you won't see HTML tags since browsers don't show them and only utilise them to produce the text. HTML is a markup language that allows text, graphics, and other resources to be displayed in a Web browser.

Hyper Text Markup Language is the abbreviation for Hyper Text Markup Language. It's a markup language that's used to create web pages. HTML is a markup language that combines hypertext with markup. The term "hypertext" refers to the connection between online pages. The text document within the tag that specifies the structure of web pages is defined using a markup language. This language is used to annotate (add notes to) text so that a computer can comprehend it and alter it appropriately. The majority of markup languages (such as HTML) are understandable by humans. Tags are used in the language to specify what type of text processing is required.

HTML is a markup language that the browser uses to transform text, pictures, and other material so that it may be displayed.HTML was created by Tim Berners-Lee in 1991. The first-ever version of HTML was HTML 1.0, but the first standard version was HTML 2.0, published in 1999.
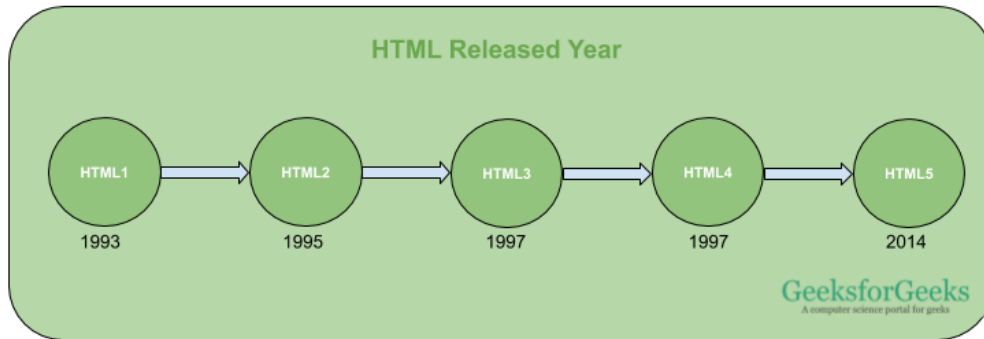
Elements and tags

HTML uses predefined tags and elements which tell the browser how to properly display the content. Remember to include closing tags. If omitted, the browser applies the effect of the opening tag until the end of the page.

HTML page structure:

The basic structure of an HTML page is laid out below. It contains the essential building-block elements (i.e. doctype declaration, HTML, head, title, and body elements) upon which all web

pages are created.

HTML Page Structure
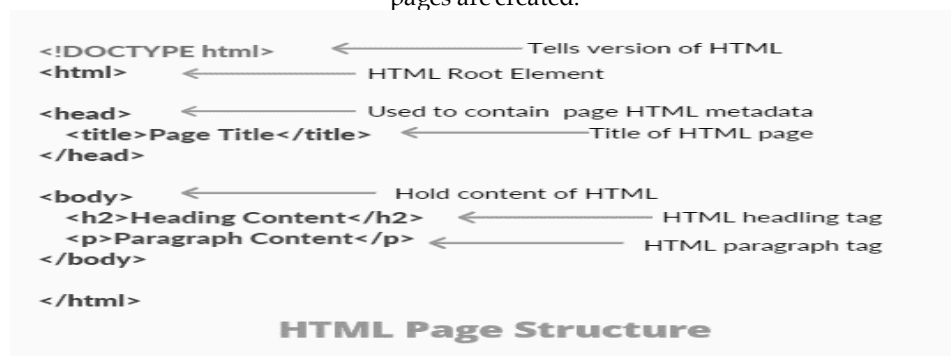
<DOCTYPE! html>: This is the document type declaration (not technically a tag). It declares a document as being an HTML document. The doctype declaration is not case-sensitive.

<html>: This is called the HTML root element. All other elements are contained within it.

<head>: The head tag contains the "behind the scenes" elements for a webpage. Elements within the head aren't visible on the front-end of a webpage. HTML elements used inside the <head> element include:

- <style>
- <title>
- <base>
- <noscript>
- <script>
- <meta>
- <link>

<body>: the body tag is used to enclose all the visible content of a webpage. In other words, the body content is what the browser will show on the front-end.

An HTML document can be created using any text editor. Save the text file using **.html** or **.htm**. Once saved as an HTML document, the file can be opened as a webpage in the browser.

NOTE: Basic/built-in text editors are Notepad (Windows) and Text Edit (Macs). Basic text editors are entirely sufficient for when you're just getting started. As you progress, there are many feature-rich text editors available which allow for greater function and flexibility.

Features of HTML:

- It is easy to learn and easy to use.

- It is platform independent.

- Images, videos, and audio can be added to a web page.

- Hypertext can be added to text.

- It is a markup language.

Advantages:

- HTML is used to build websites.
- It is supported by all browsers.
- It can be integrated with other languages like CSS, JavaScript, etc.

Disadvantages:

- HTML can only create static web pages. For dynamic web pages, other languages have to be used.
- A large amount of code has to be written to create a simple web page.
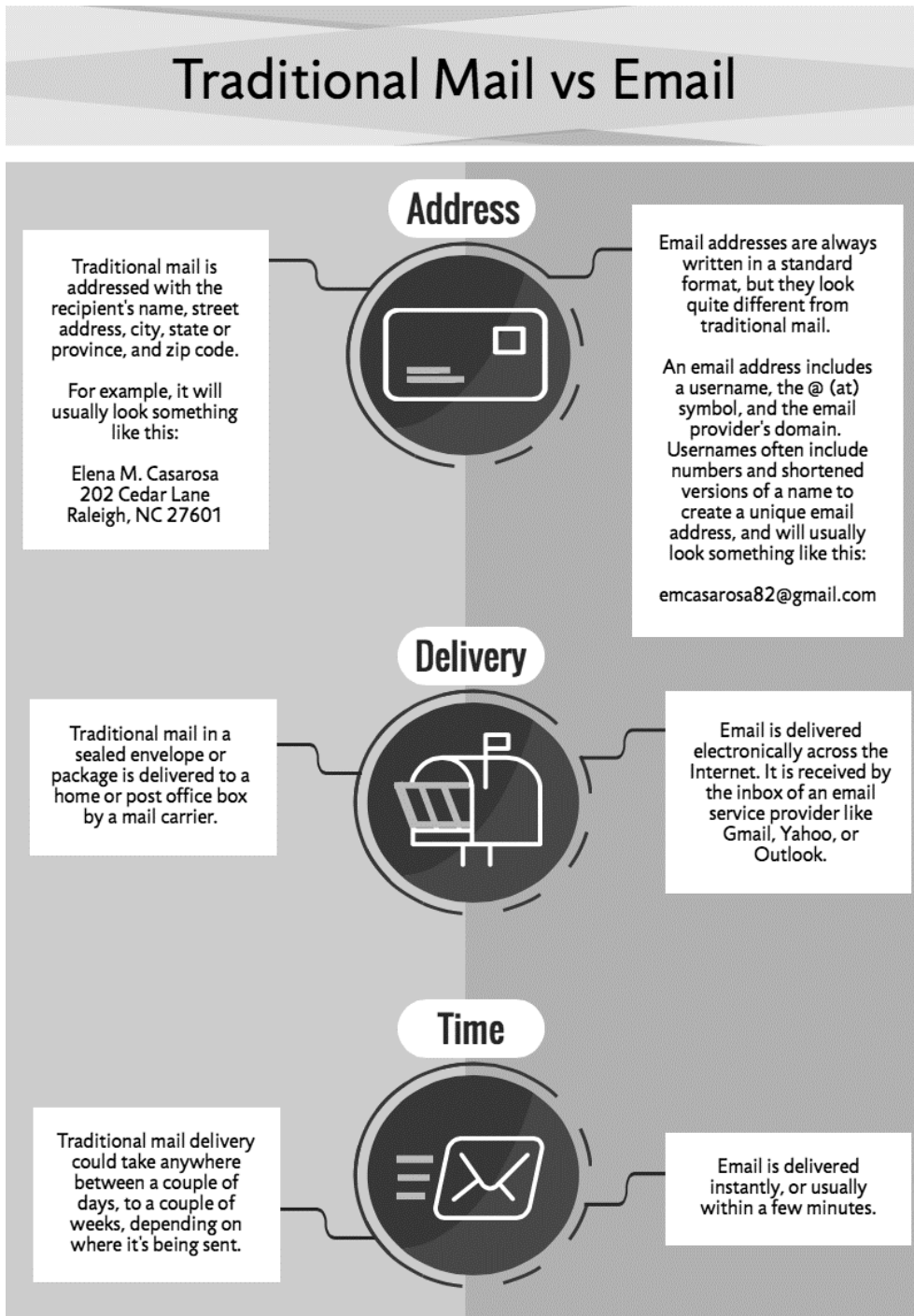- The security feature is not good.

13.4 Email

Do you ever feel like the only person who doesn't use email? You don't have to feel left out. If you're just getting started, you'll see that with a little bit of practice, email is easy to understand and use.

In this lesson, you will learn what email is, how it compares to traditional mail, and how email addresses are written. We'll also discuss various types of email providers and the features and tools they include with an email account.

Getting to know email:

Email (electronic mail) is a method of communicating through the Internet. It's comparable to regular mail, but there are a few important distinctions. Take a look at the info graphic below to have a better sense of what email is all about and how you may profit from it.

Traditional Mail vs Email

Address

Traditional mail is addressed with the recipient's name, street address, city, state or province, and zip code.

For example, it will usually look something like this:

Elena M. Casarosa
202 Cedar Lane
Raleigh, NC 27601

Email addresses are always written in a standard format, but they look quite different from traditional mail.

An email address includes a username, the @ (at) symbol, and the email provider's domain. Usernames often include numbers and shortened versions of a name to create a unique email address, and will usually look something like this:

emcasarosa82@gmail.com

Delivery

Traditional mail in a sealed envelope or package is delivered to a home or post office box by a mail carrier.

Email is delivered electronically across the Internet. It is received by the inbox of an email service provider like Gmail, Yahoo, or Outlook.

Time

Traditional mail delivery could take anywhere between a couple of days, to a couple of weeks, depending on where it's being sent.

Email is delivered instantly, or usually within a few minutes.

Email Advantages

- **Productivity tools**: Email is usually packaged with a calendar, address book, instant messaging, and more for convenience and productivity.
- **Access to web services**: If you want to sign up for an account like Facebook or order products from services like Amazon, you will need an email address so you can be safely identified and contacted.
- **Easy mail management:** Email service providers have tools that allow you to file, label, prioritize, find, group, and filter your emails for easy management. You can even easily control spam, or junk email.
- **Privacy**: Your email is delivered to your own personal and private account with a password required to access and view emails.
- **Communication with multiple people**: You can send an email to multiple people at once, giving you the option to include as few as or as many people as you want in a conversation.
- **Accessible anywhere at any time:** You do not have to be at home to get your mail. You can access it from any computer or mobile device that has an Internet connection.

13.5 Understanding Email Address

To receive emails, you will need an email account and an email address. Also, if you want to send emails to other people, you will need to obtain their email addresses. It's important to learn how to write email addresses correctly because if you do not enter them exactly right, your emails will not be delivered or might be delivered to the wrong person.

Email addresses are always written in a standard format that includes a user name, the @ (at) symbol, and the email provider's domain.

The user name is the name you choose to identify yourself.

The email provider is the website that hosts your email account.
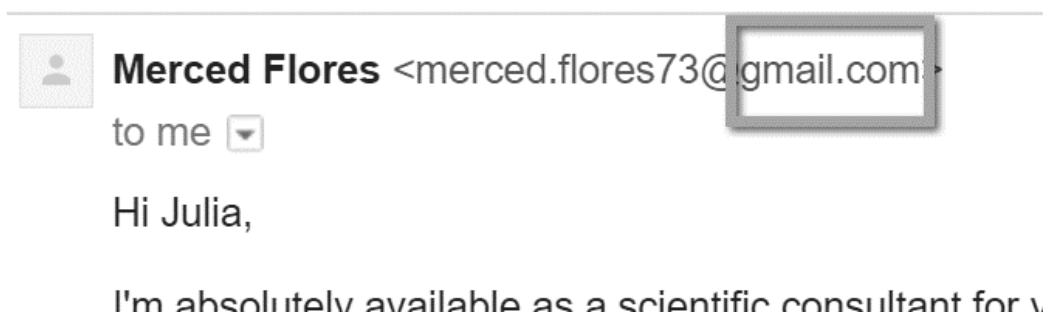
Some businesses and organizations use email addresses with their own website domain.

LOVELY PROFESSIONAL UNIVERSITY

About Email Providers

People used to get their email accounts from the same firms that supplied their Internet connection in the past. If AOL offered your Internet service, for example, you'd have an AOL email address. While this is still true for some people, using a free web-based email service, commonly known as webmail, is becoming more widespread. These services are available to anybody, regardless of who supplies their Internet access.

Webmail Providers

Today, the top three webmail providers are Yahoo!, Microsoft's Outlook.com (previously Hotmail), and Google's Gmail. These providers are popular because they allow you to access your email account from anywhere with an Internet connection. You can also access webmail on your mobile device.

Other email providers

Many people also have an email address hosted by their company, school, or organization. These email addresses are usually for professional purposes. For example, the people who work for this website have email addresses that end with @gcflearnfree.org. If you are part of an organization that hosts your email, they'll show you how to access it.

Many hosted web domains end with a suffix other than .com. Depending on the organization, your provider's domain might end with a suffix like .gov (for government websites), .edu (for schools), .mil (for military branches), or .org (for nonprofit organizations).

13.6   Email Productivity Features

In addition to email access, webmail providers offer **various tools and features**. These features are part of a **productivity suite**—a set of applications that help you work, communicate, and stay organized. The tools offered will vary by provider, but all major webmail services offer the following features:
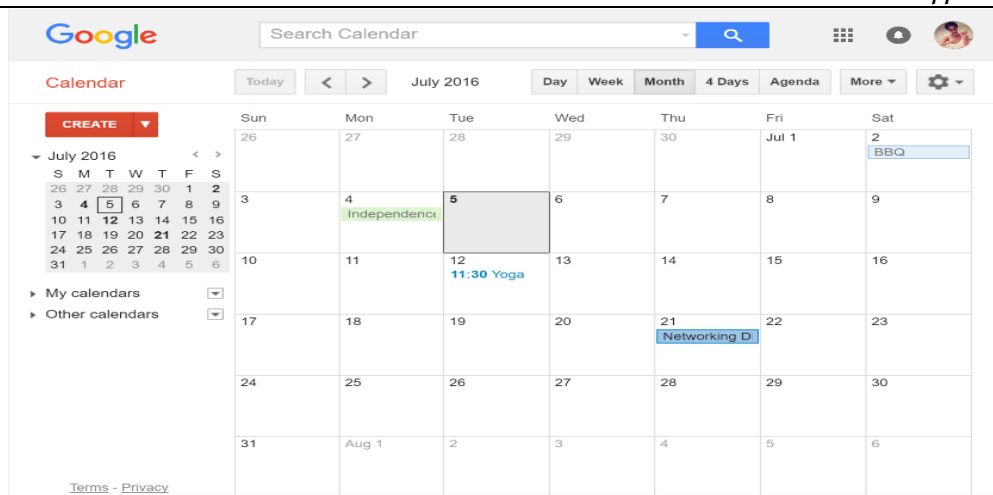
- **Instant messaging**, or **chat**, which lets you have **text-based conversations** with other users (check out our **Beyond Email** lesson to learn more about the basics of instant messaging)
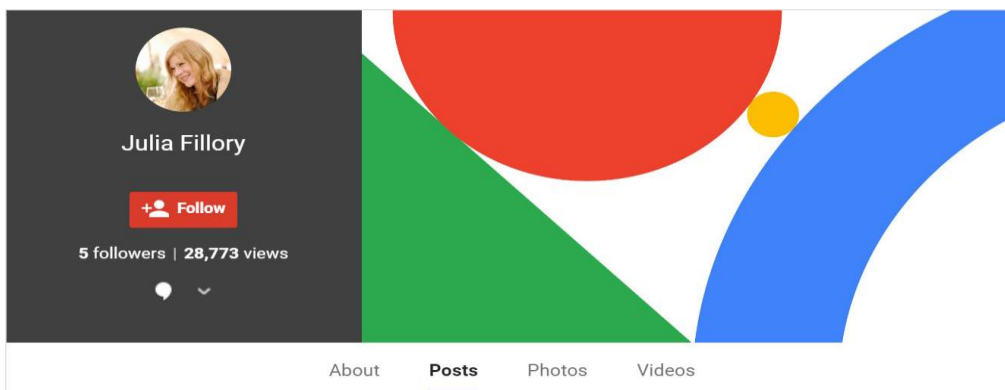

- An **online address book**, where you can store **contact information** for the people you contact frequently
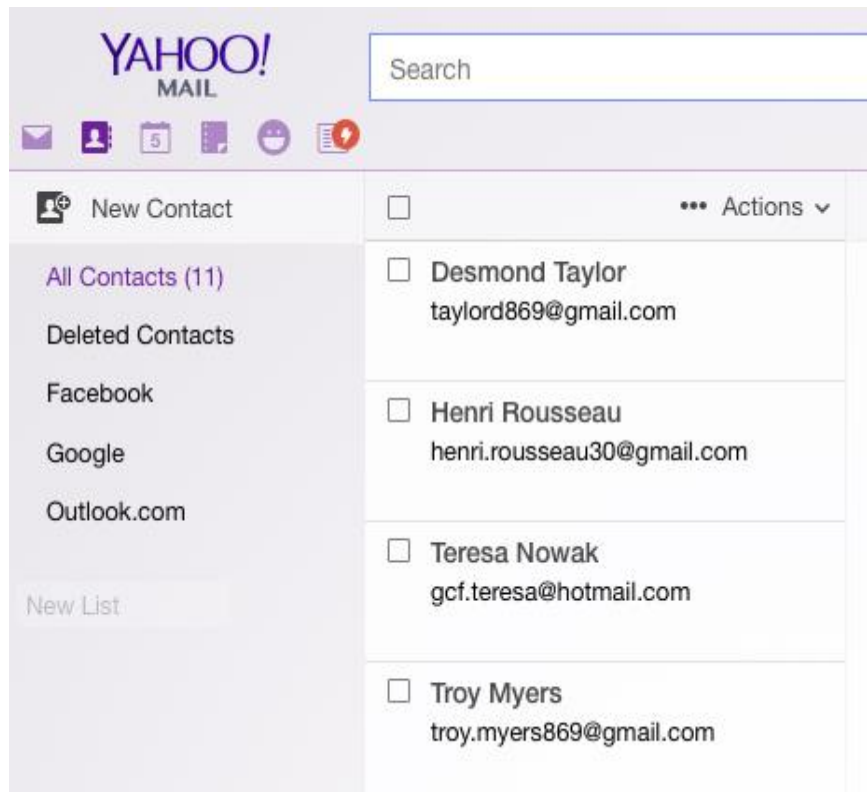
- An **online calendar** to help **organize your schedule** and **share it** with others.

- A **public profile** that you can use for basic social networking purposes, like sharing photos, previous work or school history, and status updates, among other things

In addition, each provider offers some unique features. For instance, when you sign up for Gmail you gain access to a full range of Google services, including Google Drive, Google Docs, and more. Outlook, on the other hand, offers connectivity with One Drive and Microsoft Office Web Apps. You can visit our tutorials on Google Drive, Google Docs and One Drive and Office Online to learn more.
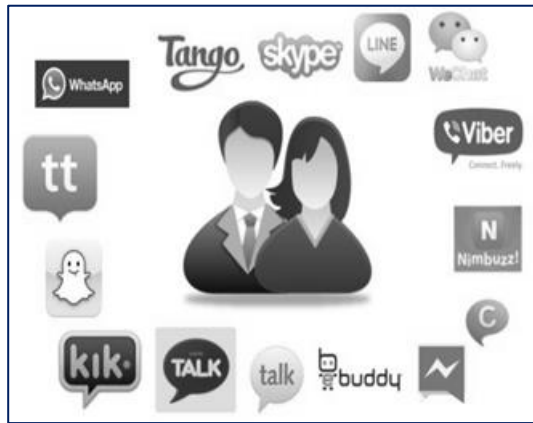
13.7 Instant Messaging (IM)

Instant messaging (IM) is a sort of online chat that allows users to send and receive text messages in real time via the Internet. Over a local area network, a LAN messenger works similarly. When each user completes an idea and selects "send," short messages are often sent between two individuals. Push technology may be used by some IM systems to give real-time text, which sends messages character by character as they are produced. File transmission, clickable hyperlinks, Voice over IP, and video chat are all options in more complex instant messaging.

Instant messaging (IM) is a type of Internet communication that allows senders and receivers to send and receive text-based communications quickly. Instant messaging is a type of internet chat that allows users to communicate in real time using written language. The text of the user is sent through a network, such as the Internet.

Examples

- Face book

- Twitter

- instant messaging

- E-mail

- chat rooms

- Whatsapp

Chat rooms

- The primary **use** of a **chat room** is to share information via text with a group of other users. Generally speaking, the ability to converse with multiple people in the same conversation differentiates **chat rooms** from instant messaging programs, which are more typically designed for one-to-one communication.

SMS

- Short Message Service (SMS) is a text messaging service component of phone, web, or mobile communication.

- SMS is the most widely used data application in the world, with 3.6 billion active users, or 78% of all mobile phone subscribers. SMS is the user activity itself in many parts of the world. SMS is also being used as a form of direct marketing known as SMS marketing.

Uses of IM

1. Communicate Instantly

2. Improve Efficiency and Productivity

3. People Like Using It

4. Save Money

5. Communicate with Remote Workers

6. It's Full of Features

7. Easy to Implement and Administer

Search some others IM software's which are being used on Internet / Which are you using at your home.

13.8   Internet Telephony

- IP telephony uses the Internet to send audio, video, fax etc between two or more users in real time, so the users can converse. Digital Voice encapsulated into packets transmitted over packet switched IP network.

➢ Main motivation:

▪ Integration of new services,

▪ cost effectiveness

Difference between Internet Telephony and Voice over IP

- Internet Telephony and Voice over IP (VoIP) are often used synonymously, but in reality, VoIP is a subset of Internet Telephony that refers to voice traffic only.

- While Internet Telephony is a general term for the IP packet-switching technology used by Internet phone systems to exchange any type of information,

- Voice over IP is the specific method for carrying voice calls over an IP network.

The simplest IP telephone system uses two basic components:

- **IP telephone:** end device allowing humans to place and receive calls**.**

- **Media Gateway Controller:** providing overall control and coordination between IP phones; allowing a caller to locate a called (e.g., call forwarding)

13.9   Video Conferencing

- Video conference tools have become incredibly popular in the last months. They allow you to keep in touch with your team, contact potential customers and investors, and do pretty much everything you could do in person. You can record and save conversations you have through video conferencing. You don't have to rely on someone taking notes, or your memory to know exactly what you said. Video conferences offer the possibility of directly sharing audiovisual complements that will illustrate your points.

Advantages

- It's More Engaging than Audio Conferencing.

- It's Efficient

- It Saves on Travel Money

- It Improves Communication

- It Connects Teams

- It Improves Productivity

- It Improves Attendance

Disadvantages

- Lack of Personal Connection. Some customers may feel that video conferencing takes away from the personal touch provided by in-person meetings. ...

- Time Zone Differences. ...

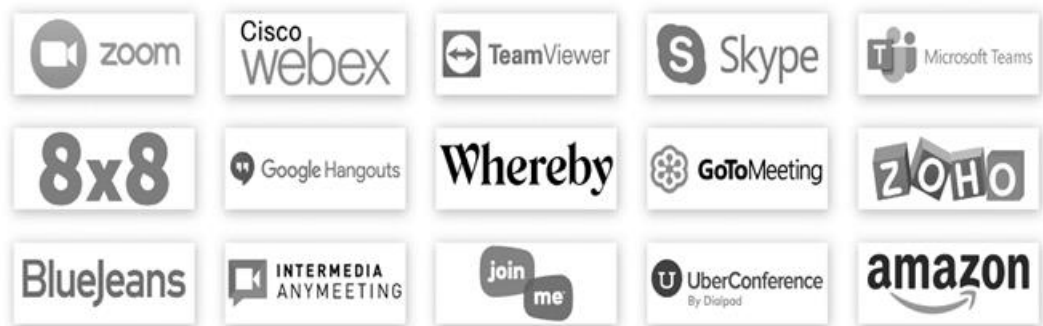- Unreliable Technology. ...

- Too Much Required Training.

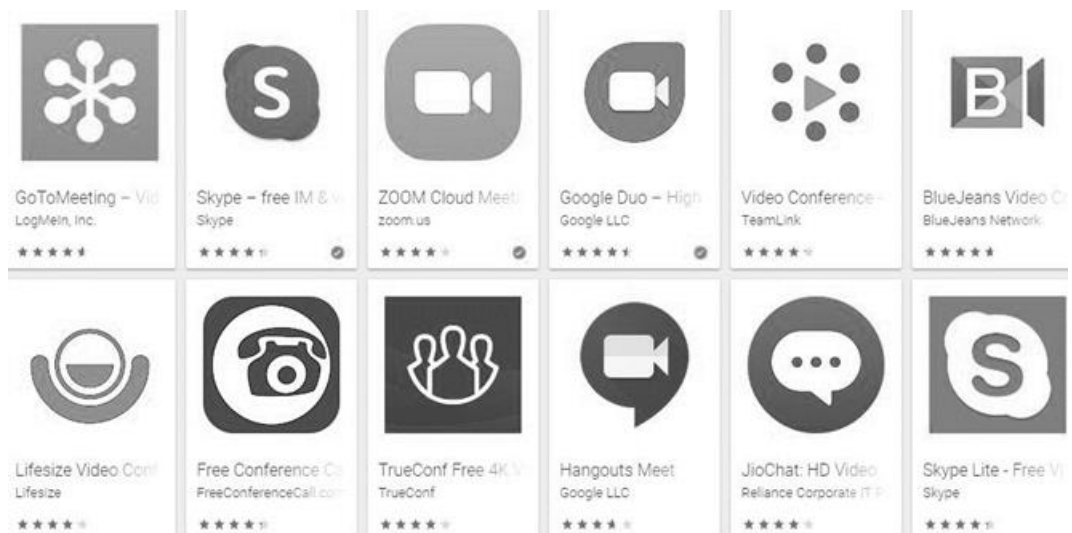*Figure 1Popular Video Conference Tools for Businesses*

Figure 2 Other Apps

Summary

- The Web server have such feature like Web sorting, Web working.
- A Web server can be referred to as other the hardware (the computer) or the software that helps to deliver content.
- Internet telephony use in web server.
- E-mail application is used Web Server.
- Videoconferencing differs from video phone calls in that it is designed to save a conference ratter than individuals.

Keywords

E-mail: Electronic mail, commonly called email, is a method of exchanging digital messages from an author to one or more recipients.

Instant Messaging (IM): Instant messaging is a form of real time direct text-based communication between two or more people using personal computers or other devices, along with shared clients.

Internet Telephony: It is a category of hardware and software that enables people to use the Internet as the transmission medium for telephone calls.

Video Conference: A video conference is a set of interactive telecommunication technologies which allow two or more locations to interact via two way video and audio transmissions simultaneously.

Web server: A web server can be referred to as either the hardware (the computer) or the software (the computer application) that helps to deliver content that can be accessed through the Internet.

Self Assessment

1. A piece of icon or image on a web page associated with another webpage is called _____
   - A. url
   - B. hyperlink
   - C. plugin
   - D. extension

2. Dynamic web page _____
   - A. is same every time whenever it displays.
   - B. generates on demand by a program or a request from browser.
   - C. both is same every time whenever it displays and generates on demand by a program or a request from browser.
   - D. is different always in a predefined order.

3. Collection of documents stored on a computer which is permanently connected with internet around the world is called _____
   - A. telnet
   - B. WWW
   - C. LAN
   - D. FTP

4. The internet also known simply as _____
   - A. NAT
   - B. NOT
   - C. NET
   - D. NFT

5. Which of the following is an example of connectivity?
   - A. Floppy Disk
   - B. Data
   - C. Internet
   - D. Power card

6. The process of transferring files from a computer on the Internet to your computer is called _____
   - A. Uploading
   - B. Forwarding
   - C. FTP
   - D. Downloading

7. A Web site's front page /main page is called _____
   - A. Browser Page
   - B. Search Page
   - C. Home Page
   - D. Bookmark

8. Which of these is not a medium for e-mail?
   - A. Intranet
   - B. Internet
   - C. Extranet
   - D. Paper

9. Which of these is the easiest way of communication?
    A. E-mail
    B. Telephone
    C. Fax
    D. Letter

10. Which of these do not provide free E-mail?
    A. Hotmail
    B. Rediff
    C. WhatsApp
    D. Yahoo

11. Which of the following feature is supported by Skype application?
    A. Message logging
    B. Instant messaging
    C. File transfers
    D. All of the mentioned

12. Viber is an instant messaging and VoIP app for smartphones. What is the acronym of VoIP?
    A. Video over Internet Protocol
    B. Visual over Internet Protocol
    C. Voice over Internet Protocol
    D. Volume over Internet Protocol

13. The collection of links throughout the Internet creates an interconnected network called the _____
    A. Pie chart
    B. Slide Presentation
    C. Bookmark
    D. Plotter

14. There are how many types of Internet telephony___?
    A. 2
    B. 3
    C. 4
    D. 5

15. Which of these is true in the context of Video Conference?
    A. You can record and save conversations you have through video conferencing.
    B. You don't have to rely on someone taking notes, or your memory to know exactly what you said.
    C. Video conferences offer the possibility of directly sharing audiovisual complements that will illustrate your points.
    D. All of these

Answers for Self Assessment

1.	B	2.	B	3.	B	4.	C	5.	C
6.	D	7.	C	8.	D	9.	A	10.	C
11.	D	12.	C	13.	C	14.	B	15.	D

Review Questions

1. How can you download a particular information from the web?

2. What are the common features of a Web server?

3. Explain significance of video conference and how it is used.

4. Explain some different Applications used for IM.

Further Reading

Excellence in Computer Education by Dr. C. K. Seth.

www.webopedia.com/index.php/TERM/I/internet.html

Unit 14: Cloud Computing and IoT

Objective

- learn about the concept of cloud computing along with its services.
- learn about different deployment models.
- understand the concept of virtualization in cloud computing.
- understand how cloud storage works.
- understand the basic concept of IoT and sensors.

Introduction

A network or the internet is referred to as the cloud. It is a system that stores, manages, and accesses data online rather than on local discs using distant servers on the internet. Files, pictures, documents, audio, video, and other types of data are all examples of data.

The following operations may be performed utilizing cloud computing:

- New apps and services are being developed.
- Data storage, backup, and recovery
- Blog and website hosting
- Software delivery on demand
- Data examination
- Video and audio streaming

14.1 What is Cloud Computing?

Anything that includes offering hosted services via the internet is referred to as cloud computing. Infrastructure as a service (IaaS), platform as a service (PaaS), and software as a service are the three primary kinds of these services (SaaS). Cloud Computing refers to manipulating, configuring, and accessing the hardware and software resources remotely. It offers online data storage, infrastructure, and application.Cloud computing offers platform independency, as the software is not required to be installed locally on the PC. Hence, the Cloud Computing is making our business applications mobile and collaborative.

It is possible to have a private or public cloud. Anyone on the internet may buy services from a public cloud. A private cloud is a closed network or data centre that provides hosted services to a small group of individuals with specific access and permissions. The objective of cloud computing, whether private or public, is to give simple, scalable access. to computer resources and IT services. The hardware and software components needed to establish a cloud computing architecture are referred to as cloud infrastructure. On-demand computing or utility computing are other terms for cloud computing.
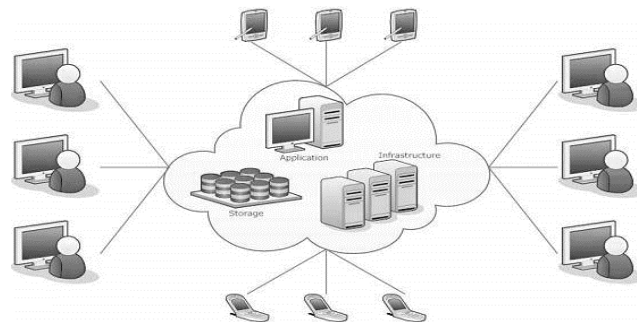
What is a Cloud?

A network or the internet is referred to as a cloud. To put it another way, a cloud is anything that exists at a faraway location. Cloud services can be delivered through public and private networks, such as WANs, LANs, and VPNs.

Cloud-based applications include e-mail, online conferencing, and customer relationship management (CRM).

Characteristics of Cloud Computing

The characteristics of cloud computing are given below:

1) Agility

The cloud works in a distributed computing environment. It shares resources among users and works very fast.

2) High availability and reliability

The availability of servers is high and more reliable because the chances of infrastructure failure are minimum.

3) High Scalability

Cloud offers "on-demand" provisioning of resources on a large scale, without having engineers for peak loads.

4) Multi-Sharing

With the help of cloud computing, multiple users and applications can work more efficiently with cost reductions by sharing common infrastructure.

5) Device and Location Independence

Cloud computing enables the users to access systems using a web browser regardless of their location or what device they use e.g. PC, mobile phone, etc. As infrastructure is off-site (typically provided by a third-party) and accessed via the Internet, users can connect from anywhere.

6) Maintenance

Maintenance of cloud computing applications is easier, since they do not need to be installed on each user's computer and can be accessed from different places. So, it reduces the cost also.

7) Low Cost

By using cloud computing, the cost will be reduced because to take the services of cloud computing, IT company need not to set its own infrastructure and pay-as-per usage of resources.

8) Services in the pay-per-use mode

Application Programming Interfaces (APIs) are provided to the users so that they can access services on the cloud by using these APIs and pay the charges as per the usage of services.

14.2   Cloud Computing Architecture

The cloud computing architecture is made up of a number of loosely connected cloud components. The cloud architecture may be divided into two parts:

- Front-end development
- In the backend

Each end is connected to the other through a network, most often the Internet. The figure below depicts a graphical representation of cloud computing architecture:
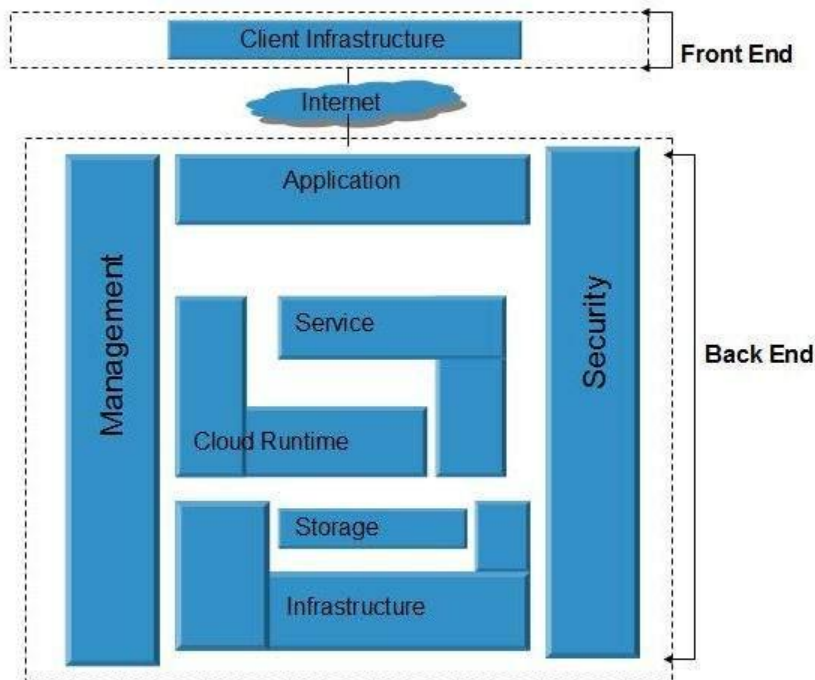

Figure 1 Cloud Computing Architecture

Front End

The front end refers to the client part of cloud computing system. It consists of interfaces and applications that are required to access the cloud computing platforms, Example - Web Browser.

Back End

The back End refers to the cloud itself. It consists of all the resources required to provide cloud computing services. It comprises of huge data storage, virtual machines, security mechanism, services, deployment models, servers, etc.

14.3   Cloud Computing Infrastructure

Cloud infrastructure consists of servers, storage devices, network, cloud management software, deployment software, and platform virtualization.

Cloud Infrastructural Components
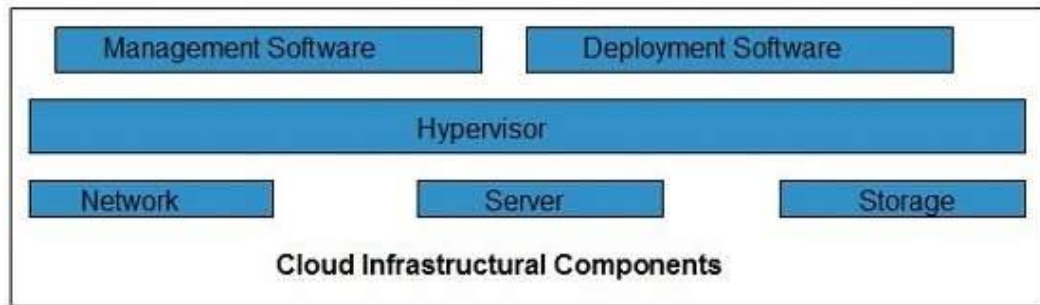
Hypervisor

Hypervisor is a Virtual Machine Manager that is implemented as firmware or a low-level software. It allows several tenants to share a single physical instance of cloud resources.

Management Software

It helps to maintain and configure the infrastructure.

Deployment Software

It helps to deploy and integrate the application on the cloud.

Network

It is the key component of cloud infrastructure. It allows to connect cloud services over the Internet. It is also possible to deliver network as a utility over the Internet, which means, the customer can customize the network route and protocol.

Server

The server helps to compute the resource sharing and offers other services such as resource allocation and de-allocation, monitoring the resources, providing security etc.

Storage

Cloud keeps multiple replicas of storage. If one of the storage resources fails, then it can be extracted from another one, which makes cloud computing more reliable.

How does cloud computing work?

Assume you are a senior executive at a major business. Your specific responsibilities include ensuring that all your workers have the necessary hardware and software to do their duties. Purchasing computers for everyone is insufficient. You must also acquire software and software licenses, which you must subsequently distribute to your staff as needed. When you recruit a new employee, you'll either need to purchase more software or double-check that your current software licensing permits for another user. You must spend a lot of money because it is so stressful.

However, for CEOs like you, there may be another option. As a result, rather of installing a suite of applications on each machine, you just need to run one program. Employees will be able to log in to a Web-based service that will have all of the programs that the user will need to do his or her work. Remote servers, which would handle everything from e-mail to word processing to complicated data analysis applications, will be controlled by another business. It's known as cloud computing, and it has the potential to revolutionize the computer industry.
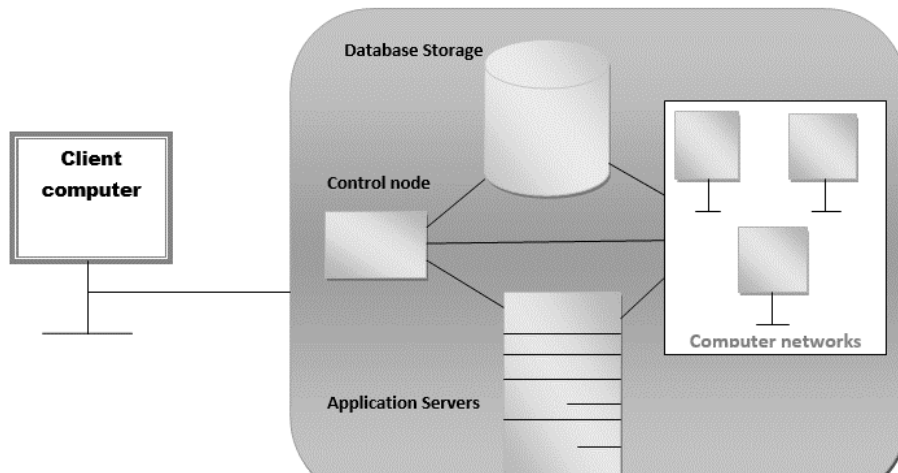
There is a considerable workload change in a cloud computing system. When it comes to running apps, local PCs no longer have to perform all of the hard lifting. Cloud computing, on the other hand, can simply and automatically handle such a large load. The user's hardware and software requirements reduce. The user's computer just has to be able to run the system's cloud computing interface software, which can be as basic as a Web browser, and the cloud's network will take care of the rest.

14.4 Cloud Service Models

There are the following three types of cloud service models -

1. Infrastructure as a Service (IaaS)
2. Platform as a Service (PaaS)
3. Software as a Service (SaaS)
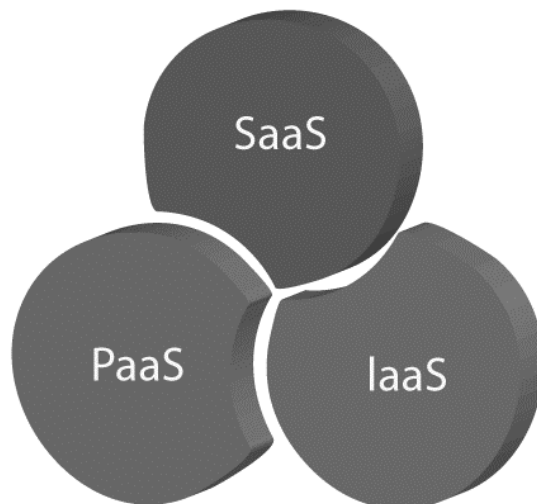
Infrastructure as a Service (IaaS)

Hardware as a Service is another name for IaaS. (HaaS). It's a computer network that's administered through the internet. The major benefit of utilising IaaS is that it saves consumers money and time by allowing them to avoid the cost and complexity of acquiring and operating physical servers.

IaaS Characteristics

The following are the features of IaaS:

▪ As a service, resources are provided.
▪ The services are extremely scalable.
▪ Adaptable and dynamic

- Access via a graphical user interface (GUI) or an API
- Administrative duties that are automated

Example: Digital Ocean, Linode, Amazon Web Services (AWS), Microsoft Azure, Google Compute Engine (GCE), Rack space, and Cisco Meta cloud.

Platform as a Service (PaaS)

Platform-as-a-Service provides the application runtime environment. It also includes the development and deployment tools needed to create apps. Non-developers may construct web apps with the help of point-and-click technologies in PaaS.

Google's App Engine and Force.com are two examples of PaaS providers. Developers may access these websites and develop web-based apps using the built-in API.

However, adopting PaaS has the disadvantage of tying the developer to a single provider. For example, a Python programme that uses Google's API and runs on Google's App Engine is likely to operate solely in that environment.

The figure below depicts how PaaS
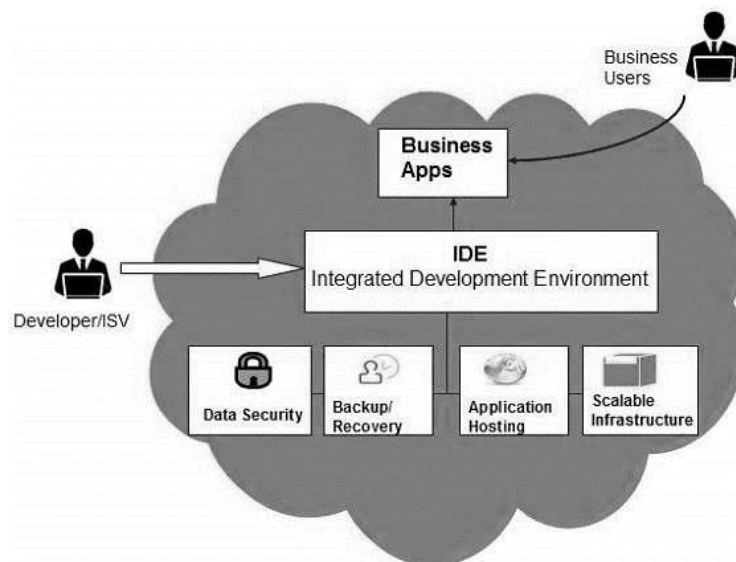
Characteristics of PaaS

There are the following characteristics of PaaS -

- o Accessible to various users via the same development application.
- o Integrates with web services and databases.
- o Builds on virtualization technology, so resources can easily be scaled up or down as per the organization's need.
- o Support multiple languages and frameworks.
- o Provides an ability to "**Auto-scale**".

Example: AWS Elastic Beanstalk, Windows Azure, Heroku, Force.com, Google App Engine, Apache Stratos, Magento Commerce Cloud, and OpenShift.

Cloud Computing Software as a Service (SaaS)

The Software-as-a-Service (SaaS) paradigm enables end users to access software applications as a service. It's a piece of software that's installed on a server and accessible through the Internet. The following are some SaaS apps to consider:

- System for billing and invoicing

- CRM (Customer Relationship Management) software

- Applications for help desks

- Solutions for Human Resources (HR)

Some SaaS products, such as Microsoft Office Suite, are not configurable. However, SaaS supplies us with an Application Programming Interface (API) that allows us to create a customized application.

Characteristics of SaaS

There are the following characteristics of SaaS -

- Managed from a central location.
- Hosted on a remote server.
- Accessible over the internet
- Users are not responsible for hardware and software updates. Updates are applied automatically.
- The services are purchased on the pay-as-per-use basis.

Example: BigCommerce, Google Apps, Salesforce, Dropbox, ZenDesk, Cisco WebEx, ZenDesk, Slack, and GoToMeeting.

14.5 Cloud Deployment Models

There are the following 4 types of cloud that you can deploy according to the organization's needs-
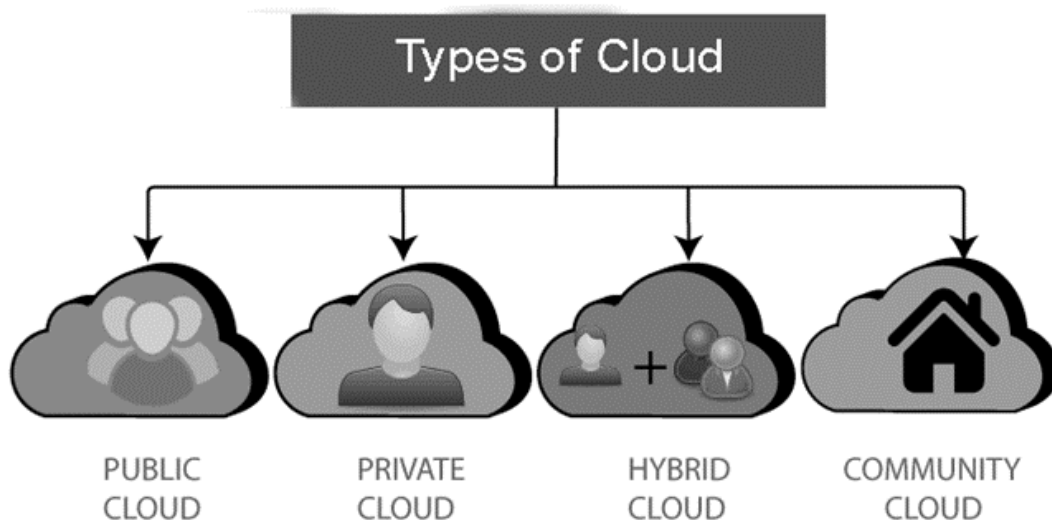
Public Cloud

The public cloud is a pay-per-use service that allows anybody to store and retrieve information through the Internet.

The Cloud Service Provider manages and operates computer resources in the public cloud (CSP).

Example: Amazon Elastic Compute Cloud (EC2), IBM SmartCloud Enterprise, Microsoft, Google App Engine, and Windows Azure Services Platform are all examples of cloud computing platforms.

Advantages of Public Cloud

There are the following advantages of Public Cloud -

- Public cloud is owned at a lower cost than the private and hybrid cloud.
- Public cloud is maintained by the cloud service provider, so do not need to worry about the maintenance.
- Public cloud is easier to integrate. Hence it offers a better flexibility approach to consumers.
- Public cloud is location independent because its services are delivered through the internet.
- Public cloud is highly scalable as per the requirement of computing resources.
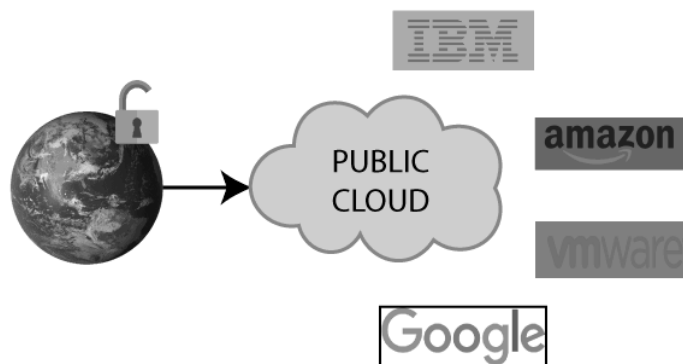- It is accessible by the general public, so there is no limit to the number of users.

Figure 2 Public Cloud

Private Cloud

Within a company, a private cloud allows systems and services to be accessed. The Private Cloud is only used within a single company. It can, however, be handled either internally by the company or externally by a third-party. The graphic below depicts the private cloud model.
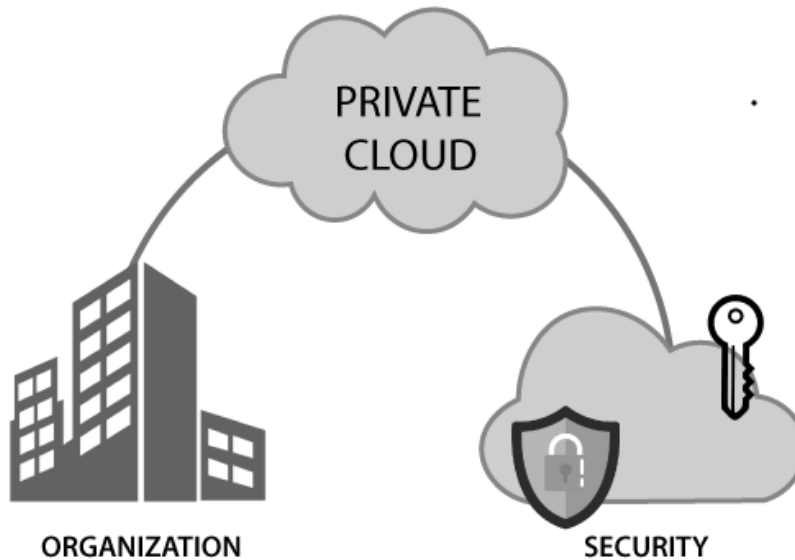
Advantages of Private Cloud

There are the following advantages of the Private Cloud -

- Private cloud provides a high level of security and privacy to the users.
- Private cloud offers better performance with improved speed and space capacity.
- It allows the IT team to quickly allocate and deliver on-demand IT resources.
- The organization has full control over the cloud because it is managed by the organization itself. So, there is no need for the organization to depends on anybody.
- It is suitable for organizations that require a separate cloud for their personal use and data security is the priority.

Hybrid Cloud

A hybrid cloud combines public and private cloud services. The public cloud is used for non-critical operations, whereas the private cloud is used for crucial activities. In the figure below, the Hybrid Cloud Model is depicted.
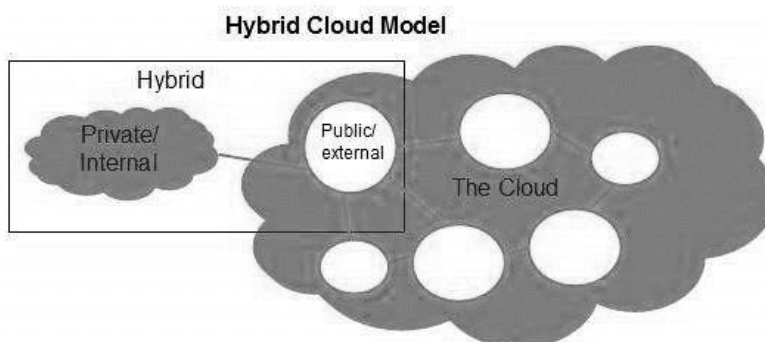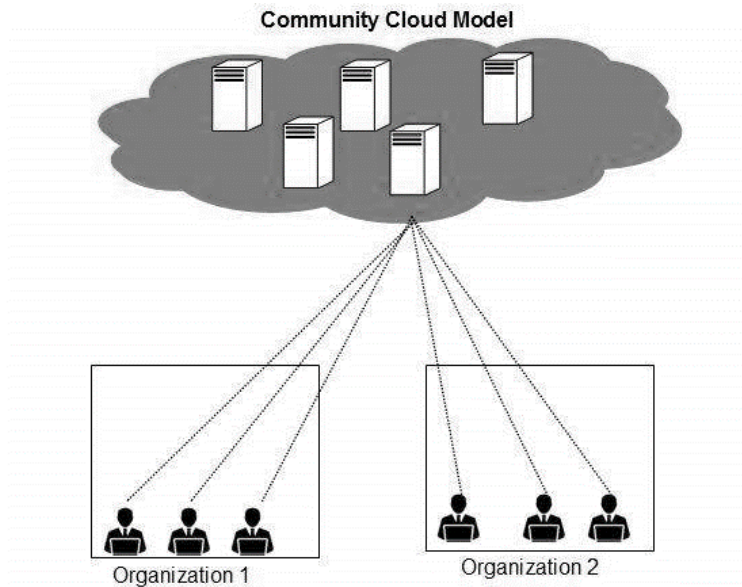

Advantages of Hybrid Cloud

There are the following advantages of Hybrid Cloud -

- Hybrid cloud is suitable for organizations that require more security than the public cloud.
- Hybrid cloud helps you to deliver new products and services more quickly.
- Hybrid cloud provides an excellent way to reduce the risk.

- Hybrid cloud offers flexible resources because of the public cloud and secure resources because of the private cloud.

14.6 Community Cloud Model

The Community Cloud allows a collection of organizations to access the same infrastructure and services. It distributes infrastructure among a group of organizations in a particular community. It can be maintained by organizations internally or by a third-party. In the figure below, the Community Cloud Model is depicted.

Example: Health Care community cloud.

Advantages of Community Cloud

There are the following advantages of Community Cloud -

- Community cloud is cost-effective because the whole cloud is being shared by several organizations or communities.
- Community cloud is suitable for organizations that want to have a collaborative cloud with more security features than the public cloud.
- It provides better security than the public cloud.
- It provides collaborative and distributive environment.
- Community cloud allows us to share cloud resources, infrastructure, and other capabilities among various organizations.

14.7 Cloud Computing Virtualization

Virtualization is a technique, which allows to share single physical instance of an application or resource among multiple organizations or tenants (customers). It does so by assigning a logical name to a physical resource and providing a pointer to that physical resource on demand.

Virtualization Concept

Creating a virtual machine over existing operating system and hardware is referred as Hardware Virtualization. Virtual Machines provide an environment that is logically separated from the underlying hardware.

The machine on which the virtual machine is created is known as host machine and virtual machine is referred as a guest machine. This virtual machine is managed by a software or firmware, which is known as hypervisor.

Hypervisor

The hypervisor is a firmware or low-level program that acts as a Virtual Machine Manager. There are two types of hypervisor:

Type 1 hypervisor executes on bare system. LynxSecure, RTS Hypervisor, Oracle VM, Sun xVM Server, VirtualLogic VLX are examples of Type 1 hypervisor. The following diagram shows the Type 1 hypervisor.
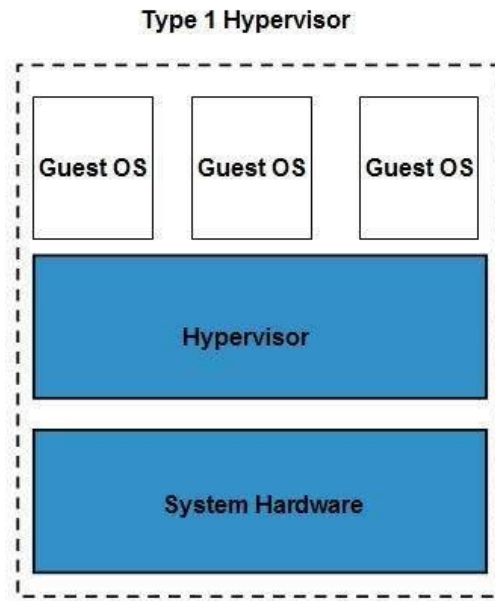
Because they are placed on a bare machine, type 1 hypervisors do not have a host operating system.

A Type 2 hypervisor is a software interface that simulates the devices with which a system interacts on a regular basis. Type 2 hypervisors include Containers, KVM, Microsoft Hyper V, VMWare Fusion, Virtual Server 2005 R2, Windows Virtual PC, and VMWare Workstation 6.0. The Type 2 hypervisor is depicted in the diagram below.
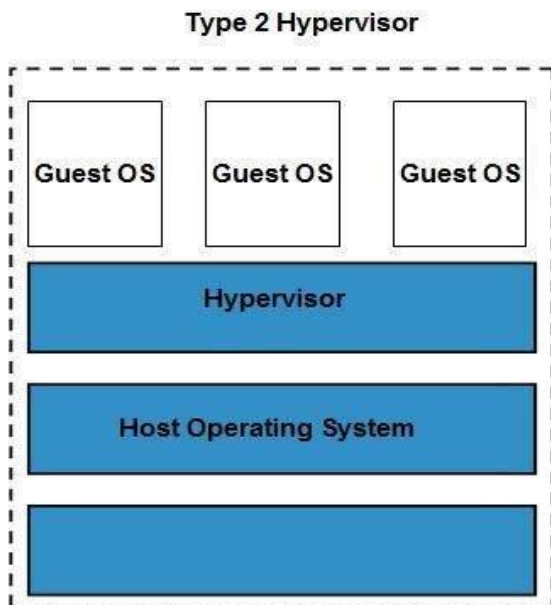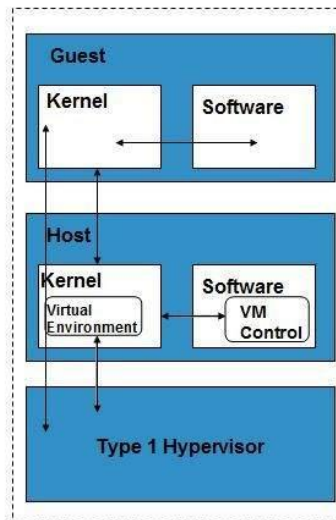
Types of Hardware Virtualization

Here are the three types of hardware virtualization:

- Full Virtualization
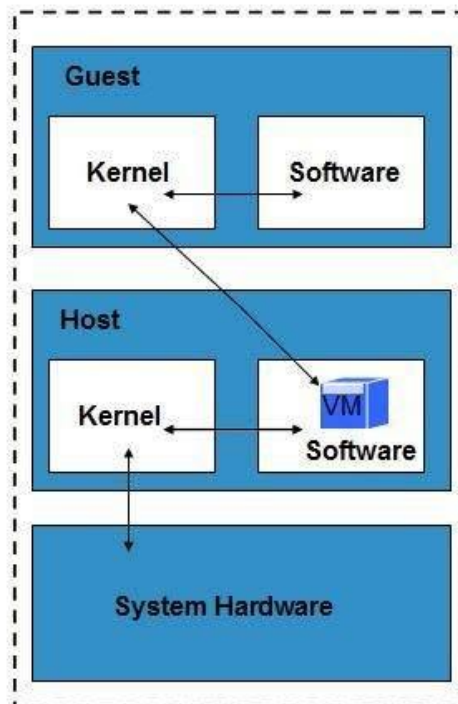- Emulation Virtualization
- Paravirtualization

Full Virtualization

In full virtualization, the underlying hardware is completely simulated. Guest software does not require any modification to run.
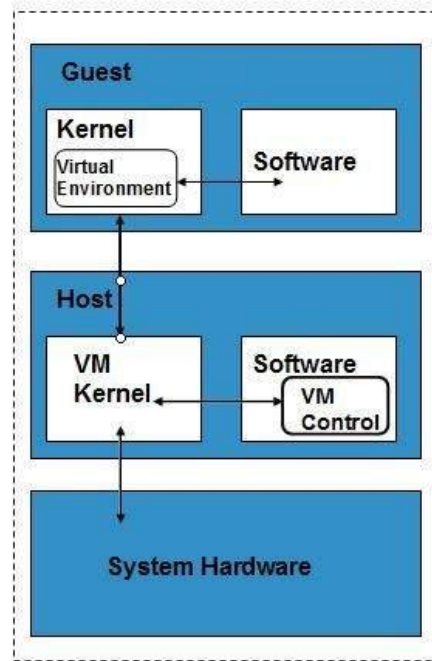

Emulation Virtualization

The virtual computer replicates the hardware via emulation and therefore becomes independent of it. The guest operating system does not need to be changed in this case.

Paravirtualization

In Paravirtualization, the hardware is not simulated. The guest software run their own isolated domains.

VMware vSphere is highly developed infrastructure that offers a management infrastructure framework for virtualization. It virtualizes the system, storage and networking hardware.

14.8 Cloud Computing Data Storage

Cloud Storage is a service that allows to save data on offsite storage system managed by third-party and is made accessible by a web services API.

Storage Devices

Storage devices can be broadly classified into two categories:

- Block Storage Devices
- File Storage Devices

Block Storage Devices

The block storage devices offer raw storage to the clients. These raw storage are partitioned to create volumes.

File Storage Devices

The file Storage Devices offer storage to clients in the form of files, maintaining its own file system. This storage is in the form of Network Attached Storage (NAS).

Cloud Storage Classes

Cloud storage can be broadly classified into two categories:

- Unmanaged Cloud Storage
- Managed Cloud Storage

Unmanaged Cloud Storage

Unmanaged cloud storage means the storage is preconfigured for the customer. The customer can neither format, nor install his own file system or change drive properties.

Managed Cloud Storage

Managed cloud storage offers online storage space on-demand. The managed cloud storage system appears to the user to be a raw disk that the user can partition and format.

Creating Cloud Storage System

Various copies of data are stored on numerous servers in multiple locations by the cloud storage system. If one of the systems fails, all that is necessary is to update the reference to the object's storage location.

Storage virtualization technologies such as Storage GRID can be used by the cloud provider to combine storage assets into cloud storage systems. It builds a virtualization layer that collects data from many storage devices and consolidates it into a single management system. It can also use the Internet to handle data from CIFS and NFS file systems. The figure below illustrates how Storage GRID virtualizes storage into storage clouds:
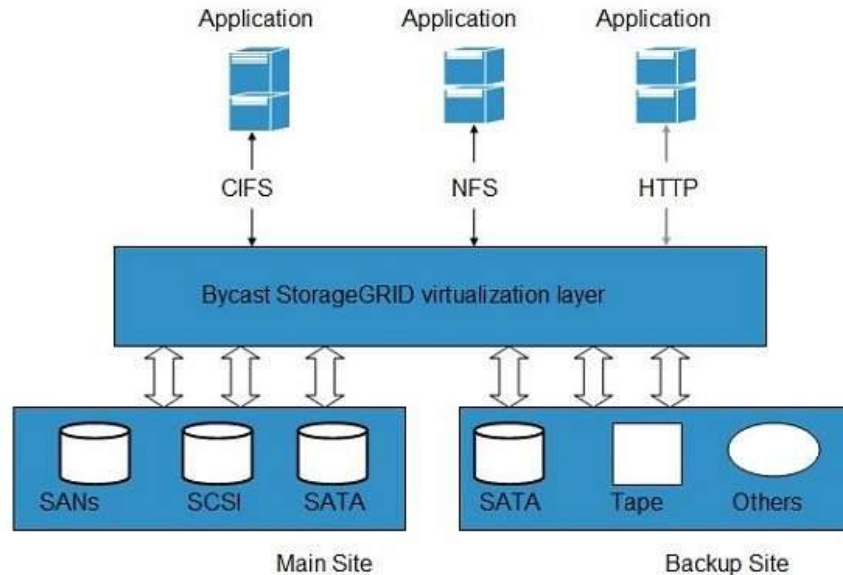

14.9   Basics of IoT and sensors

What is IoT?

The Internet of Things (IoT) is a network of physical items or people referred to as "things" that are equipped with software, electronics, networks, and sensors to gather and share data. The objective of the Internet of Things is to expand internet connectivity beyond typical devices such as computers, smartphones, and tablets to relatively simple items such as toasters.

Virtually everything becomes "smart" as a result of the Internet of Things, which uses the power of data collecting, AI algorithms, and networks to improve parts of our lives. A human with a diabetes monitor implant, an animal with tracking devices, and so on are examples of things in the Internet of Things. This IoT lesson for beginners covers all of the fundamentals of the Internet of Things.
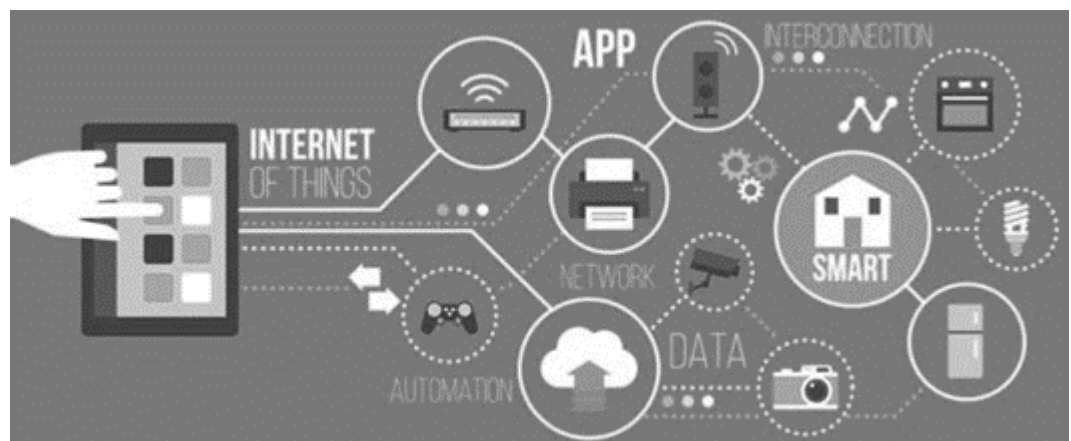
How IoT works?

The IoT process begins with the devices themselves, such as smartphones, smartwatches, and electronic appliances such as televisions and washing machines, which allow you to connect with the platform.

In this IoT lesson, we'll go through the four basic components of an IoT system:

1) **Sensors/Devices**: Sensors and devices are essential components for collecting real-time data from the environment. All of this information might be complicated in some way. It might be as basic as a temperature monitoring sensor or as complex as a video stream.

A gadget may have a variety of sensors that perform activities other than sensing. A mobile phone, for example, is a gadget with many sensors such as GPS and a camera, but your smartphone is unable to detect these things.

2) **Data transmission:** All gathered data is transferred to a cloud infrastructure. The sensors should be linked to the cloud via a variety of communication channels. These modes of communication in mobileor satellite networks, Bluetooth, WI-FI, WAN, etc.

3) **Data Processing**: Once that data is collected, and it gets to the cloud, the software performs processing on the gathered data. This process can be just checking the temperature, reading on devices like AC or heaters. However, it can sometimes also be very complex like identifying objects, using computer vision on video.

4)**User Interface:** The information needs to be available to the end-user in some way which can be achieved by triggering alarms on their phones or sending them notification through email or text message. The user sometimes might need an interface which actively checks their IoT system. For example, the user has a camera installed in his home. He wants to access video recording and all the feeds with the help of a web server.

However, it's not always one-way communication. Depending on the IoT application and complexity of the system, the user may also be able to perform an action which may create cascading effects.

For example, if a user detects any changes in the temperature of the refrigerator, with the help of IoT technology the user should able to adjust the temperature with the help of their mobile phone.

IoT Applications

Now in this IoT tutorial, we will see various IoT applications:

IoT solutions are widely used in numerous companies across industries. Some most common IoT applications are given below:

Application type	Description
Smart Thermostats	Helps you to save resource on heating bills by knowing your usage patterns.
Connected Cars	IoT helps automobile companies handle billing, parking, insurance, and other related stuff automatically.
Activity Trackers	Helps you to capture heart rate pattern, calorie expenditure, activity levels, and skin temperature on your wrist.
Smart Outlets	Remotely turn any device on or off. It also allows you to track a device's energy level and get custom notifications directly into your smartphone.
Parking Sensors	IoT technology helps users to identify the real-time availability of parking spaces on their phone.
Connect Health	The concept of a connected health care system facilitates real-time health monitoring and patient care. It helps in improved medical decision-making based on patient data.
Smart City	Smart city offers all types of use cases which include traffic management to water distribution, waste management, etc.
Smart home	Smart home encapsulates the connectivity inside your homes. It includes smoke detectors, home appliances, light bulbs, windows, door locks, etc.

Smart supply chain	Helps you in real time tracking of goods while they are on the road, or getting suppliers to exchange inventory information.

Challenges of Internet of Things (IoT)

IoT is now confronted with a slew of issues, including:

- Testing and upgrading are insufficient.
- Data security and privacy are both a source of concern.
- Complexity of software
- Volumes of data and their interpretation
- Automation and AI integration
- Devices require a continuous power source, which is difficult to achieve.
- Short-range communication and interaction.

Advantages of IoT

Technical Optimization: IoT technology aids in the advancement and improvement of technologies. A manufacturer, for example, can collect data from numerous automobile sensors using IoT. They are analysed by the manufacturer in order to enhance the design and make them more efficient.

Improved Data Gathering: Traditional data collection has flaws and is designed to be used passively. IoT allows for quick data action.

Reduced Waste: The Internet of Things (IoT) provides real-time data that allows for better resource management and decision-making. For example, if a manufacturer discovers a problem with numerous vehicle engines, he may follow their manufacturing plans and resolve the problem with the manufacturing team.

Improved Customer Engagement: IoT allows you to improve customer experience by detecting problems and improving the process.

Disadvantages of Iot

Now, let us see some of the disadvantages of IoT in this Internet of Things tutorial:

Security: IoT technology creates an ecosystem of connected devices. However, during this process, the system may offer little authentication control despite sufficient security measures.

Privacy: The use of IoT, exposes a substantial amount of personal data, in extreme detail, without the user's active participation. This creates lots of privacy issues.

Flexibility: There is a huge concern regarding the flexibility of an IoT system. It is mainly regarding integrating with another system as there are many diverse systems involved in the process.

Complexity: The design of the IoT system is also quite complicated. Moreover, it's deployment and maintenance also not very easy.

Compliance: IoT has its own set of rules and regulations. However, because of its complexity, the task of compliance is quite challenging.

Summary

- Introduction to Internet of Things (IoT): The Internet of Things (IoT) is a network of physical objects or people called "things" that are embedded with software, electronics, network, and sensors which allows these objects to collect and exchange data.
- The actual idea of connected devices was proposed in 1970

- Four Key components of IoT framework are 1) Sensors/Devices, 2) Connectivity, 3) Data Processing, 4) User Interface
- Various applications of IoT are Smart Thermostats, Connected Cars, Activity Trackers, Smart Outlets, Connect Health, etc
- Technical Optimization, Improve Data Collection, Reduced Waste, Improved Customer Engagement are key benefits of IoT
- Security, Privacy, Complexity, Compliance, are key challenges of IoT.

Keywords

IoT: The Internet of Things (IoT) is a network of physical objects or people called "things" that are embedded with software, electronics, network, and sensors which allows these objects to collect and exchange data.

Data Processing: Once that data is collected, and it gets to the cloud, the software performs processing on the gathered data. This process can be just checking the temperature, reading on devices like AC or heaters. However, it can sometimes also be very complex like identifying objects, using computer vision on video.

Virtualization: Virtualization is a technique, which allows to share single physical instance of an application or resource among multiple organizations or tenants (customers). It does so by assigning a logical name to a physical resource and providing a pointer to that physical resource on demand.

Self Assessment

1. Cloud computing is a kind of abstraction which is based on the notion of combining physical resources and represents them as _____resources to users.
A. Real
B. Cloud
C. Virtual
D. none of the mentioned

2. Which one of the following cloud concepts is related to sharing and pooling the resources?
A. Polymorphism
B. Virtualization
C. Abstraction
D. None of the mentioned

3. Which of the following is a type of Service Models?
A. Public-as-a-Service
B. Platform-as-a-Service
C. Community-as-a-Service
D. Public-as-a-Service

4. Which of the following is the working models for cloud computing?
A. Deployment Models
B. Configuring Model
C. Collaborative Model
D. All of the above

5. How many types of Cloud are there in Deployment Models?

A. 2

B. 3

C. 4

D. 5

6. The _____ allows systems and services to be accessible by a group of organizations.

A. Private cloud

B. Public cloud

C. Community cloud

D. Hybrid cloud

7. Which one of the following can be considered as a utility is a dream that dates from the beginning of the computing industry itself?

A. Computing

B. Model

C. Software

D. All of the mentioned

8. Which of the model involves the special types of services that users can access on a Cloud Computing platform?

A. Service

B. Planning

C. Deployment

D. Application

9. Which one of the following options can be considered as the Cloud?

A. Hadoop

B. Intranet

C. Web Applications

D. All of the mentioned

10. Which of the following type of virtualization is also characteristic of cloud computing?

A. Storage

B. Application

C. CPU

D. All of the above

11. Point out the correct statement:

A. A client can request access to a cloud service from any location.

B. A cloud has multiple application instances and directs requests to an instance based on conditions.

C. Computers can be partitioned into a set of virtual machines with each machine being assigned a workload.

D. All of the mentioned.

12. _____ provides the runtime environment for applications, development and deployment tools, etc
   A. IaaS
   B. PaaS
   C. SaaS
   D. XaaS

13. IoT stands for?
   A. Introduction of Things
   B. Internet of Things
   C. Internet of Tracking
   D. Interaction of Things

14. Which of the following is true about IoT?
   A. The term Things of the Internet of Things refers to anything and everything in day to day life
   B. IoT has greater transparency, control, and performance.
   C. Both are true.
   D. None of the above

15. Which one of the following is not an IoT device?
   A. Amazon echo voice controller
   B. Google Home
   C. Nest Smoke Alarm
   D. None of these

Answers for Self Assessment

1.	C	2.	B	3.	B	4.	A	5.	C
6.	C	7.	A	8.	A	9.	A	10.	D
11.	D	12.	B	13.	B	14.	C	15.	D

Review Questions

1. What is Cloud?
2. What is Cloud Computing?
3. Explain the Architecture of Cloud.
4. Explain the concept of Virtualization.
5. What do you understand by the term IoT?
6. Give examples of some IoT devices that you use in real life.

📖 **Further Reading**

http://www.freebookcentre.net/Networking/Cloud-Computing-Books.html

🌐 **Web Links**

https://azure.microsoft.com/en-in/overview/what-is-cloud-computing/