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Computer Application

Computer Application

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ROLE OF SELF INSTRUCTIONAL MATERIAL IN DISTANCE LEARNING

The need to plan effective instruction is imperative for a successful distance teaching repertoire. This is due to the fact that the instructional designer, the tutor, the author (s) and the student are often separated by distance and may never meet in person. This is an increasingly common scenario in distance education instruction. As much as possible, teaching by distance should stimulate the student's intellectual involvement and contain all the necessary learning instructional activities that are capable of guiding the student through the course objectives. Therefore, the course / self–instructional material are completely equipped with everything that the syllabus prescribes.

To ensure effective instruction, a number of instructional design ideas are used and these help students to acquire knowledge, intellectual skills, motor skills and necessary attitudinal changes. In this respect, students' assessment and course evaluation are incorporated in the text.

The nature of instructional activities used in distance education self–instructional materials depends on the domain of learning that they reinforce in the text, that is, the cognitive, psychomotor and affective. These are further interpreted in the acquisition of knowledge, intellectual skills and motor skills. Students may be encouraged to gain, apply and communicate (orally or in writing) the knowledge acquired. Intellectual– skills objectives may be met by designing instructions that make use of students'prior knowledge and experiences in the discourse as the foundation on which newly acquired knowledge is built.

The provision of exercises in the form of assignments, projects and tutorial feedback is necessary. Instructional activities that teach motor skills need to be graphically demonstrated and the correct practices provided during tutorials. Instructional activities for inculcating change in attitude and behavior should create interest and demonstrate need and benefits gained by adopting the required change. Information on the adoption and procedures for practice of new attitudes may then be introduced.

Teaching and learning at a distance eliminates interactive communication cues, such as pauses, intonation and gestures, associated with the face–to–face method of teaching. This is particularly so with the exclusive use of print media. Instructional activities built into the instructional repertoire provide this missing interaction between the student and the teacher. Therefore, the use of instructional activities to affect better distance teaching is not optional, but mandatory.

Our team of successful writers and authors has tried to reduce this. Divide and to bring this Self Instructional Material as the best teaching and communication tool. Instructional activities are varied in order to assess the different facets of the domains of learning.

Distance education teaching repertoire involves extensive use of self–instructional materials, be they print or otherwise. These materials are designed to achieve certain pre–determined learning outcomes, namely goals and objectives that are contained in an instructional plan. Since the teaching process is affected over a distance, there is need to ensure that students actively participate in their learning by performing specific tasks that help them to understand the relevant concepts. Therefore, a set of exercises is built into the teaching repertoire in order to link what students and tutors do in the framework of the course outline. These could be in the form of students' assignments, a research project or a science practical exercise. Examples of instructional activities in distance education are too numerous to list. Instructional activities, when used in this context, help to motivate students, guide and measure student's performance (continuous assessment).

PREFACE

We have put in lots of hard work to make this book as user–friendly as possible, but we have not sacrificed quality. Experts were involved in preparing the materials. However, concepts are explained in easy language for you. We have included many tables and examples for easy understanding.

We sincerely hope this book will help you in every way you expect.

All the best for your studies from our team!

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BLOCK-1 INTRODUCTION TO COMPUTER

UNIT 1

IMPACT AND HISTORY OF COMPUTERS

UNIT 2

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UNIT 3

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BLOCK 1 : Introduction to Computer

Block Introduction

This block covers fundamental of computer and gives insight in impact of computer technology on society, education, industry, government and business. Learner will get introduction to computer hardware as well as software and different types of software. It also covers file and data management in windows operating system.

Block Objectives

The objective of this block is to :

1. Examine the impact of computer technology on society, education, industry, government and business.

2. Operate a personal computer and computer peripherals.

3. Explain effective file and directory in windows operating system.

Block Structure

Unit–1 : Impact and History of Computers

Unit–2 : Computer Hardware

Unit–3 : Software

Unit–4 : File and Data Management

Unit 1 IMPACT AND HISTORY OF COMPUTERS

: UNIT STRUCTURE :

1.0 Learning Objectives :

After studying this unit learner should be able to :

• Define terms and explain characteristics associated with computer technology.

• Discuss the influence of computer technology in a society.

• Discuss the contributions of computer technology to education.

• Discuss the contributions of computer technology to business.

• Discuss the contributions of computer technology to everyday living.

• Define information technology.

• Explore the main uses of computers in society.

• Describe the impact of computers on society, education, industry, government and business.

• Identify the advantages and disadvantages of computer technology in various aspects of society.

• Discuss the man–machine connection.

1.1 Introduction :

Technology influences different areas of society and business, whether it is a particular age group or gender, or the entire population. We may be resistant to its influences, whether in the long or short term, until we are more aware on how this change impacts our lives, families, work, entertainment, or daily living.

This unit explains terms associated with computer technology, explains its influence, and contributions to various aspects of work and play. Then it briefly reviews the development of the technology and explains the different categories of computer systems.

1.2 Computer Technology :

Let us start by understanding the concept of computer technology. Quickly, in 30 seconds, calculate the answer to 12 + 54 + 23.65 + 12.89 + 23¼ + 90 + 12 + 980 + 234 + 567 in your head or on paper. Did you complete it in time ? See the next page for the answer.

You may be surprised to learn that people were the first computers! The term computer means someone who computes or performs calculations. Centuries ago, people were called computers. They were usually women who worked out mathematical problems such as tidal charts or navigational tables, and so 'Computer' was actually a job title.

However, as you can imagine, performing mathematical tasks every day, every week, every month would eventually cause boredom which would cause errors in the calculations.

Therefore, the computer became a machine which automated these repetitive tasks.

A computer therefore is a machine which:

- accepts data (called INPUT);

- follows instructions given on what to do with the data (called PROCESSING);

- stores the results for future use (called STORAGE); and

- display the results (called OUTPUT).

Answer : 2008.79

By applying technology to different problems and work environments we can enhance situations or events that would have been almost inconceivable without it. For example, voice mail, satellite television or cell phones are all examples of technology that use a computer to operate the system. Computer technology therefore involves any machine, tool or piece of equipment that is essentially controlled by a computer chip that is able to make calculations.

The role of computers and computer technology is the ability to manipulate data into

information or commands. Data can be in many forms, such as text, pictures or sound and can also be retrieved from the environment. An air conditioner which monitors the temperature in a room to keep it cool at a specific temperature, or turning on lights outside a building at dusk are both examples of a computer–controlled environment that requires input to produce a specific result or output.

	Air Conditioner	Automated Lights
Input	Current Temperature	Dusk
	Desired Temperature	
Output	AC adjusts temperature to desired temperature	Lights On

Computer Technology is Everywhere

Information has become very important as a result of the computer technology which provides it. Computer driven technology is an integral part of our daily routines, however we tend not be aware of its presence. Many of our daily tasks are automated; such as our answering machines, televisions, cable boxes, vehicles that use this technology. Similarly, as a cashier prints out our receipt for a purchased item or the mail, we receive that was stamped by a machine, computer technology supported the creation of the receipt or the delivery of our mail automatically.

We therefore say that computer technology is ubiquitous, or everywhere (almost!) once information is present. To summarize, many utility companies are now recording our usage to prepare monthly bills, which will be printed by a machine, while a local or overseas phone company record voice messages and the calls we missed. Also, our banks' automated systems are automatically charging us every time we use the debit or credit card. The automated systems are controlled by a computer process based on the input from your retailer, the machine itself or from the scanner.

Generating Information

Remember that computers store the results or output of processing the data. Well computer technology has enabled us to access information at our "finger tips"; from many places, in many places, at any time, and in many different forms whether printed or stored.

Hence as more information is requested, more information is generated and more data stored. It seems like a never–ending cycle of information growing exponentially!

Unfortunately, there is a drawback to generating information on every transaction. Imagine how one minor error can mushroom into major problems because of your computer technology, and this can have a negative impact on businesses and customers alike. In addition, most people who are not in the computer field may believe that whatever the computer produces is correct. Consider the consequences of transposing (switching) two digits in a bank account number or entering the wrong data in payroll system. This can cause embarrassment to the persons involved if deposits are made to the wrong account or employees do not receive the correct pay. Even so, it is also more difficult to locate someone who is willing to accept responsibility for an error made by a computerized system. This lack of accountability for the error would be better addressed if the software glitch was corrected as soon as possible!

We should also realize that since information is constantly generated, then it should be possible to store it over a long period of time. It is reasonable to assume therefore that information cannot be entirely destroyed or lost.

Accessing Information

Much of the computer information that is generated and held in a database is available online. For example, customers can use the telephone or Internet to access current bank balances and perform transactions. Access to your banking information can be made from almost anywhere in the world. This has led to a new work ethic where computer technology has enabled employees to work from various geographic locations, or time zones. Computer technology has provided people with increased mobility while talking with someone on the phone, or receiving a fax.

Information can be retrieved and sent in many forms including text, voice, graphics, photos and video. Additionally, the "information superhighway" has increased the availability of these forms of information delivery methods. One major concern of the recording industry is the ability to reproduce digital material such as video tapes and DVDs, which are indistinguishable from the original. This technology has caused headaches to the industry's composers and performers since any digital file can be easily duplicated and shared.

With access to information, and digital voice and smart technologies automated voices have replaced operators who traditionally greeted customers and initially responded to their queries. It is now commonplace to call businesses and hear an automated switching system and voice–mail system instead of an actual person who can assist you.

Surveillance

Computer technology has certainly allowed surveillance or the gathering of information for different of purposes. Surveillance software allows individuals, companies and government to monitor you in a variety of locations including other countries. Surveillance equipment such as cameras and key pads now include transactional data which is collected from virtually all types of transactions, including cash purchases and the acquisition of services to analyze trends. One example is the use of Google Earth to capture topographical pictures of different locations on the earth and more recently Google has released their street view software that allows you to wander the streets of your city using 3D technologies.

Changing the Way, We Communicate

With the use of the computer and its technology used extensively throughout our society, you are probably aware of how computer technology has changed the way we communicate with another person or among groups of people. The use of email, instant messenger and text messages have modified the usual visual and verbal signs when communicating with someone else. This of course can be both a benefit and a detriment to the communication process. For example, the use of computer tools such as

email, instant messenger and text messages mask features such as gender, race, age, and physical disability, social or marital status.

Even distance learning has changed the way people are educated, as this manual and your online activities illustrate! Your relationship with the facilitator is remote and you may only hear a voice or read the words on a page written by your instructor. Much of the distance or blended learning materials and content are delivered through the use of databases, audio or video feeds and other means such as Moodle or Blackboard. This has become a reality for many who wish to further their education while employed full–time or those who are unable to access a physical campus at a local institution.

1.3 Information Technology (IT) – The Concepts :

As noted in Topic 1.2 computers play a major role in our daily lives. Business demands the use of computers to support business operations. As an entrepreneur it is important that you understand and use computer technologies effectively to help grow your business.

Before exploring the details of a business computer environment, you need to understand what we mean by information technology and how it influences society.

What is information technology ?

Let's first look at some key terms before we define the concept information technology. Let's start with the term information. Information refers to data that has been put into a meaningful and useful context.

Information systems refer to a set of people, procedures and resources that collects, transforms, and disseminates information in an organization. Information systems are implemented within an organization for the purpose of improving the effectiveness and efficiency of that organization.

As an entrepreneur you will need to use a system to provide for the flow of information within your business. Computers is playing a vital part in obtaining, processing and sharing information within a business which means that an entrepreneur will have to make use of a computer–based information system.

This requires that you must have an understanding technology used in computer–based information systems – use of hardware, software and people resources to transform data resources into information.

Back to our question : What is meant by Information Technology ?

Information Technology (IT) is the area of managing technology and spans a wide variety of areas that include but are not limited to things such as processes, computer software, information systems, computer hardware, programming languages, and data constructs. In short, anything that renders data, information or perceived knowledge in any visual format whatsoever, via any multimedia distribution mechanism, is considered part of the domain space known as Information Technology (IT) (Wikipedia).

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TechAmerica defines IT as the study, design and implementation of computer–based information systems, particularly software applications and computer hardware. IT deals with the use of electronic computers and computer software to convert, store, protect, process, transmit and securely retrieve information (www.answer.com).

The discipline of Information Systems can best be described as the effective analysis, design, construction, delivery, management and use of information and information technology in organizations and society. An Information System, per se, is an organized collection of people, procedures, data, machines and services that work together to deliver information (http://www.is.ru.ac.za/?q=content?2). So, we can conclude that:

> *Information technology (IT) refers to the different ways (electronic computers and computer software) of obtaining, processing, storing, and transmitting data in the form of voice, pictures and words.*

The term Information Technology (IT) is also known as Information Communication

Technology (ICT), and we shall continue to use that term henceforth because it combines computing and communications. The computer is a key feature of ICT and the key to an effective business is how the entrepreneur uses his or her ICT resources to grow and manage the business.

It is clear from our brief discussion that computer technology plays a vital role in everyday life.

IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) ON SOCIETY

Today's society is referred to as the 'digital age'. Computers and ICT devices have become an integral part of our lives and are used everywhere. Be it the desktop computers, laptop computers or more recently tablet computers, all contribute to the activities we experience in our daily life. We use these devices in schools, at home, hospitals, institutions, businesses and even in government offices.

In general, the impact of computers on society and how we live our lives is as follows:

- You can use computers to communicate with your family and friends, create a household budget, book travel and movie tickets, or manage your business. The internet has also tremendously increased people's ability to communicate with others from all over the world efficiently and relatively cheaply.

- In business and industry, you use computers to maintain accounts, create personnel records, track inventory, prepare presentations and reports, manage projects, and communicate by e–mail. You can use computers to design any type of publication ranging from simple newsletters to fashion magazines, marketing materials, books, or newspapers.

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- In the field of education, trainers can use computers to deliver training through audio–visual learning aids, maintain student records to track performance, search for information on different topics, and create or submit assignments.

- In government organizations, you use computers to organize information by storing and updating records. Computers are also used for providing services to citizens. For example, you can view information on current policies and government issues on a computer.

- In the field of medicine, doctors use computers to review medical records of patients. Doctors also use computers to find information about the latest drugs available to treat a disease.

- Doctors can also use computer technology to discuss and share information about various diseases.

- You can use computers to view the details of your bank account. Traders use computer technology to get instant information on stock markets, to trade stocks, and to manage investments.

- Scientists use computers for scientific research, and to gather and analyze information. For example, they use computers to view images from space and to publish information on their recent research.

- You can also use computers to create drawings and paintings. Photographers use computers to edit and enhance pictures. Writers use computers to write content for their books and to also create illustrations. By using computers, writers can make changes in the content easily and save a lot of time.

- In the field of entertainment, you can use computers to listen to music, watch movies, store and print photographs, send greetings, and play games.

[Source : Microsoft Corporation]

Threats to Information Systems

Computer–based information systems are much more vulnerable to crime and abuse, natural disaster, and even human error than manual systems that they have replaced.

A. **Computer Crime :** Computer Crime ranges from the use of information technology to commit an act that would be criminal no matter how committed (such as the theft of money or other property) to activities more specifically related to computers, such as the unauthorized access and use of information systems, theft of computer and telecommunications services, and the theft, intentional alteration, or destruction of data or programs. The protection of customer data and business confidential information is an issue that faces all entrepreneurs.

B. **Theft of Money :** As financial institutions become more and more reliant on computers, new opportunities have arisen for criminals to

use computers to steal or siphon off money. Password protection and other security tools must be used to protect bank accounts, investments and other financial resources.

C. **Theft of Computers and Computer Parts :** As computers and the various computer parts have become smaller and smaller, it has become easier to steal. Microprocessor chips, memory chips, motherboards, modems, disk drives, and power supplies are all frequent targets. They can be removed relatively easily and sold to a readily available underground market. Physical security and effective inventory control measures should be implemented.

D. **Alteration or Destruction of Data and Programs :** Another form of computer crime involves the alteration or destruction of data and programs. Motives for this crime may include monetary gain, revenge or just being malicious. This tie in with computer viruses, which are a set of illicit instructions implanted within a program that passes itself onto other programs with which it comes into contact. Appropriate software must be used to protect your business files, data and other online resources from external and internal attacks by cyber criminals and hackers.

E. **System Disasters :** In addition to computer crime, information systems are susceptible to natural disasters (Rain, earthquakes, fire and floods), terrorist attack, electrical power and telecommunications line failure, hardware and software malfunction, even human error. Off–site backups and in some cases backups to computers in another island or nation is recommended when your region is subjected to regular national disasters.

1.4 Computer Technology in Work and Play :

Now that we have understood some terminology and features of computer technology, let us look more closely at various aspects of work and play, and how technology affects each one.

This section will allow discussion on some of the impacts in the last, and thoughts on the next decade.

Inventions already introduced into society through computer technology, have caused the society to change, with the cellular phone (or cell phone) being the most recent to reach the populations. It is now an everyday occurrence to reach anyone, anywhere with the use of a cellular phone. Not as openly known, but still commonplace however, is the use of the smart prosthesis on someone who previously could not walk after an accident. Simulations of people walking or running for example have furthered the invention of essential types of prostheses.

Science, Medicine, Health and Technology

Simulation and simulators are often used in scientific research to mimic the event that is being studied. These programs quickly perform number crunching calculations, so that the event can be accelerated, slowed

or changed to help predict and test certain outcomes. Therefore, programs can assist with the simulation of training in dangerous situations, without using expensive resources.

Since health care matters to everyone, it is not surprising that computer technology has become a natural part of our health and wellbeing, but its use and relevance has implications in everything we do…and not do! If you would like to explore how medical organizations are using simulation and other computer technologies to provide professional development to health care professionals and support science education in the schools go to the Howard Hughes Medical Institute, Bio–interactive site.

Computer technology is integral part of the health and wellness sector. CTI scanners and other diagnostic tools are driven by computer technology. Our health records are placed into databases to be used and retrieved when you visit the hospital or your local doctor.

Science has had an incredible impact within the last century. Toffler in his book "The Third Wave" has identified computer technology as a new phase in the evolution of society. Technology has made the following medical procedures possible. Many of these procedures have generated considerable debate about the ethics of these procedures.

Some of these procedures include the use of technology to support:

- test tube babies;
- organ transplants;
- cloning;
- nuclear radiation;
- limb replacement;
- gene therapy; and
- nerve regeneration.

Telemedicine

Some of you may have previously seen or heard the terms teleconferencing or telecommuting. The Greek word 'tele' means 'distance', so teleconferencing provides opportunities to have a conference without all persons having to be in the same room, city or country. Similarly telecommuting or the less popular term, 'tele–working', was first offered in the 1960s by the information technology industry. This arrangement allowed employees to work at home and communicate with the office by methods such as phone, fax and computer.

So, we now have yet another term 'telemedicine', where 'medicine'. Telemedicine involves telecommunications, where medical personnel and their patients are separated by some physical distance but are connected through technology so the professional can complete a medical procedure. Some of the services offered by telemedicine include medical diagnoses,

pathology, radiology, and consultation, so that expertise can be made available in rural and remote areas.

Medical Self–Diagnoses

Many people are using knowledge–based database systems to research cures and

symptoms of ailments, probably for self–diagnoses. These database systems, called expert systems perform tasks that would otherwise be performed by someone with expertise in the field. Expert systems can be used, not only to diagnose human illnesses, but also to make financial forecasts, and schedule routes for delivery vehicles. However, it is important to note that while some expert systems replace human experts, there are others designed to assist them.

Having a medical complaint which is embarrassing should not be the sole reason to avoid consulting a doctor. Although there are well–documented and researched medical expert systems (such as WebMD) being able to access a website on the Internet to diagnose symptoms does not automatically validate the authenticity or correctness of the online diagnosis. Only a doctor can do this.

Database technologies are now used to store dental records, x–rays, medical insurance forms and other records for administrative, management and cross referencing. Here are some further examples of the development of database systems with associated technologies which are used as expert systems and have become tools for medical research.

Research

Research on genetics has discovered entire sets of genetic instructions in the cells of our body, their sequences and any possible unique features or abnormalities. Using computer technology has afforded:

The discovery of a gene which has the pre–disposition to develop colon cancer can save a life if genetic screening is done early. In contrast, persons in the early 1970s were either denied insurance coverage or were asked to pay increased premiums if they carried the gene for sickle cell anaemia.

Forensic personnel used computer technology to assist in the identification of people missing at the World Trade Centre. Tools were used to compare the victims' DNA with an item used by the victims, such as a toothbrush.

Education and Technology

Computer technology has moved the classroom from a teacher using a 'chalk and blackboard' to deliver passive instruction to student centred, discovery learning environments that employ a variety of computer and Internet technologies. Computer technology has allowed disenfranchised students in places like rural areas who at one time could not participate in traditional instruction to benefit from an anywhere, anyplace philosophy for the delivery of educational programs.

In Barbados, technology is now becoming a part of the classroom with the assistance of a government sponsored educational initiative called Edutech 2000. This programme is providing training in Information and Computer Technologies (ICTs) for teachers and students alike in order to develop the country's future workforce and ensure the country has suitable skills to compete in the international market.

In most countries today the typical public–school program includes some instruction in computer technology, computer literacy skills and software familiarization. Most public schools throughout the Caribbean and parts of Africa have access to computers within their schools. Technology is being used to support instruction and increase student and teacher technical knowledge and skills.

The introduction of computers to support classroom instruction has met mixed reactions. Some teachers embrace it, but many resists it because they don't have the pre–requisite skills to properly employ the technologies. Change will take time, resources and more teacher professional development. The Commonwealth of Learning is supporting the Open School Movement and the use of ICT to support instruction and student learning. Check it out.

Computer technologies and the advent of the Internet have allowed online universities to flourish. Examples of fully online universities include Indira Gandhi National Open University, National Open University of Nigeria, Athabasca University and the Open University of the United Kingdom Online universities and similar organizations around the world provide opportunities for millions of students to study anywhere and at any time.

Working professionals are now able to further their education without having to travel while maintaining full–time employment and an appropriate quality of life.

There are some disadvantages however with online activities, which include the lack of opportunity for human interaction and socialization. Many online students experience the feeling of isolation. Although the inclusion of online discussion forums and chat capabilities have somewhat alleviated this problem, there is still an issue with misinterpretation and miscommunication associated with text messages and phrases.

The online learning environment is slowly embracing new technologies like Podcasts, social networking software like Facebook, instant messaging technologies like Skype and web conferencing systems like Elluminate. Web 2.0 tools are helping close the social divide and providing more opportunities to interact with peers learners and others in the educational communities.

Business and Technology

Computer technology has had a major impact on day–to–day business operations. Today companies that have failed to incorporate technology are viewed as being 'not–up–to–date' or archaic. Today organizations must

have a presence on the Internet. Their company's goods and services must be marketed online. Prolific use of electronic mail (or email) and electronic forms have replaced paper–based forms and traditional snail mail (letters mailed through a post office). It is now the norm for business professionals to use technology to produce every memo, envelope, label and document using a word processer. Effective marketing materials require the use of graphic software and more to create and produce the layouts. Business presentations are created using computer software and delivered via laptop computers and projectors. Electronic payments and business banking accounts require the use of e–commerce software and secure Internet connections. The computer revolution has allowed traditional businesses to reduce infrastructure costs by allowing their employees to work from home. In North America over 40 million employees work from home using different types of Information and Communications Technologies (ICTs).

As traditional business practices become automated business leaders and HR personnel now demand that their current and future employees be computer literate. In the many parts of the developing world, it is proving to be a challenge for those who are unable to reach the required standard thus impacting their employability.

Social Interactions and Relationships

The ability to text chat in a real time environment with your peers is known as Internet Relay Chat (IRC). IRC tools to support chat are available through your cell phone provider or on the Internet. Some of the more popular real time chat tools include Microsoft Live Messenger, Yahoo Messenger and others. These tools are becoming the norm for social interaction (especially among younger computer users) and it challenges in how people have traditionally interacted with each other – face to face discussions vice text chats with its own sub–culture language.

Man–Machine Connection

I would hope by now that you would agree much of the world cannot live without having some form of computer technology in their lives. Does this mean that we are controlling computer technology or is the technology controlling us–During the late 1980s and 1990s, the Internet invaded our lives. Movies and TV shows included the Internet and sophisticated computers to entertain us. Some interesting ones were the 1982–1986 weekly television crime fighter series 'Knight Rider' which portrayed a modern–day hero who drove a high–tech smart car equipped with artificial intelligence. Sandra Bullock's 1995 movie 'The Net', involved an Alfred Hitchcock style drama about having her identity electronically erased and replaced with a stranger's information. Then in 1998, there is Will Smith starring in 'Enemy of the State' which speaks about the use of satellites to track people, as well as in 'I Robot' in 2004 about a 'humanoid' robot that is suspected to have murdered its creator. Whether you have seen these movies or not, the implicit use of computer technology in each of them sends the message that whether to help or hinder, that technology is

everywhere. Today it is digitally generated 3D movies and animations like Avatar have caught our attention. These movies would not be possible without computer generated images and human machine interactions to capture life like character movement.

Technology has advanced so fast that more and more computers have an incredibly high fault tolerance, with robots automating the repair process, without any human intervention. One example are the robots that are used by NASA to repair the International Space Station. Seriously, we are not that far away from computers repairing themselves.

Let us now consider computer logics. Do "they" have the capability of handling complex thought processes like human ones ? Almost!

An Example – Man Machine Practical Application

In 1998, a technology entrepreneur in northeastern Washington was implanted with a Radio Frequency Identification (RFID) chip into his hand in order to experiment with the technology. The chip and supporting computer technology were used to gain keyless entry to his car and home, turn on lights, logon to his and other remote and repetitive applications. The experiment was successful and led to other applications for RFID technology.

An implantable RFID chip is a minuscule capsule containing a microchip and an antenna, all enclosed in glass. The chip is about the size of a grain of rice. RFID chips work by storing a unique identification number in the microchip. This number can be retrieved by a special RFID reader that is held within close proximity. Today there are most often implemented in animals to track their whereabouts and to include owner information that can be retrieved by a scanner used by a vet or other animal agency Although RFID technology is relatively old, it is still considered a controversial technology.

Privacy advocates fear that the technology might be abused by governments and used to track people. Microchip implants have been used for years for tracking lost pets. Further European research in the area was recently dealt a blow when the European Group on Ethics in Science and New Technologies made a presentation to the European Union raising privacy concerns over the potential for such chips to be used to track members of the public.

When employing different technologies, we must be aware of not only the technical issues, but issues of privacy, morality, society norms and ethical practices.

Check Your Progress :

1. What is computer ?

2. Define: Information Technology

3. List Threats to Information Systems

4. Data should be

(a) Relevant   (b) Complete   (c) Accurate   (d) All of these

5. _____ often used in scientific research to mimic the event that is being studied.

(a) Simulation   (b) Simulators

(c) Simulation and simulators   (d) None of these

6. The ability to text chat in a real time environment with your peers is known as

(a) Internet Relay Chat   (b) Interactive Relay Chart

(c) Internet Response Chat   (d) Interactive Relay Chat

7. _____provides opportunities to have a conference without all persons having to be in the same room, city or country

(a) Telecommuting   (b) Teleconferencing

(c) Telemedicine   (d) Expert System

8. What is full form of RFID ?

(a) Radio Frequency Identification

(b) Receiver Frequency Identification

(c) Radio Frequency Incidence

(d) Reciever Frequency Incidence

1.5 Let Us Sum Up :

After reviewing this unit, reading the suggested articles and exploring the different links you should have concluded that:

• It seems that computer technology is largely responsible for the 'emergency' attitude of modern society. The perception that everything must be done faster, arrive sooner, or be available immediately has pushed services and information to be frequently available on a 24–hour basis.

• With computer technology, the types of negative impacts and the number of people directly affected by a single system error has grown enormously to where millions can be directly affected.

• There is unprecedented accessibility to information and communications, available to large numbers of people from nearly anywhere we happen to be.

• A computer is a machine which accepts data (called input), follows instructions given on what to do with the data (called processing), stores the results for future use (called storage) and displays the results (called output).

• The main role of computers and computer technology is the ability to manipulate data into information

- Computer technology is ubiquitous, or (almost) everywhere.

- Computer technology has enabled us to access information at our 'finger tips', from many places, in many places, at any time, and in many different forms whether printed or stored.

- Information can be retrieved in many forms such as text, voice, graphics, and video

- Computer technology has allowed surveillance to be made easier with the additional software that can monitor locations in other countries.

- Computer technology has changed the way we communicate with another person or among groups of people

- Computer technology can improve our lives in health and medicine such as research in cures for diseases

- Teleconferencing provides opportunities to have a conference without all persons having to be in the same room, city or country

- Telecommuting allows employees to work at home and communicate with the office by methods such as phone, fax and computer.

- Telemedicine involves telecommunications, where medical personnel and the patient are separated by some physical distance

- Expert systems perform tasks that would otherwise be performed by someone with expertise in the field

- Databases are now used to store dental records, x–rays, medical, insurance and other records for searches and purposes of cross referencing

- Computer technology has not completely replaced previous inventions; rather it is enhancing and improving on previous ones

- Businesses have felt most of the impact of computer technology, such that if there is little technology incorporated then the business may be frowned upon as being 'not–up–to–date' or archaic.

- Internet relay chat (also known as messenger), is a common method of chatting with someone either next to you in class, or is a local phone call away

- Many of us cannot live without having some form of computer technology in our lives

This unit introduced the general ideas associated with the impact of technology on different sectors of our society. Are you explored these impacts, you should have noted that they range from the practical and necessary to what may be regarded as leading edge or radical ?

However, in all eras of human history, (a subtle change from 'revolution', as in the Industrial Revolution!), our different societies have been faced with change in almost every aspect of their life. This change has been accelerated by the intervention and adoption of computer

technologies. It is hoped that this unit caused you to reflect upon the advantages and disadvantages of technology and how it impacts all of us.

1.6 Answers for Check Your Progress :

1. A computer therefore is a machine which :

    accepts data (called INPUT);

    follows instructions given on what to do with the data (called PROCESSING);

    stores the results for future use (called STORAGE); and

    display the results (called OUTPUT).

2. Information technology (IT) refers to the different ways (electronic computers and computer software) of obtaining, processing, storing, and transmitting data in the form of voice, pictures and words.

3. Following are the threats to information system

    *   Computer Crime
    *   Theft of Money
    *   Theft of Computers and Computer Parts
    *   Alteration or Destruction of Data and Programs
    *   System Disasters

    4. d   **5.** c   **6.** a   **7.** b   **8.** a

1.7 Glossary :

Computer : A computer therefore is a machine which accepts data (called INPUT); follows instructions given on what to do with the data (called PROCESSING), stores the results for future use (called STORAGE); and display the results (called OUTPUT).

Surveillance : The gathering of information for different of purposes.

Information Systems : A set of people, procedures and resources that collects, transforms, and disseminates information in an organization.

Information Technology : It refers to the different ways (electronic computers and computer software) of obtaining, processing, storing, and transmitting data in the form of voice, pictures and words.

1.8 Assignments :

1. Explain characteristics associated with computer technology.

2. Discuss the influence of computer technology in a society.

3. Discuss the contributions of computer technology to education.

4. Discuss the contributions of computer technology to business.

5. Define information technology.

6. Describe the impact of computers on society, education, industry, government and business.

7. Discuss the man–machine connection.

1.9   Activity :

1.   Identify the advantages and disadvantages of computer technology in various aspects of society.

2.   Explore the main uses of computers in society.

1.10   Case Study :

•   Study the contributions of computer technology to everyday living.

•   Describe how computer technology is integrated in the following sectors :

    o Agriculture

    o Education

    o Theatre or the Arts

1.11   Further Readings :

1.   Introduction to Computers, Roger Powley, CD PhD, Wilhelmina Louw, Glenda Gaye, commonwealth of learning.

2.   Linux for IT Managers Course Guide, commonwealth of learning.

3.   Business Information Systems, Derrick Thompson, Commonwealth of Learning.

Unit 2   COMPUTER HARDWARE

2.0   Learning Objectives :

At the end of this unit, you should be able to :

• Explore the history and evolution of computer technology.

• Explain the events that occurred in different the computer generations

• Evaluate the various types of computer systems that have evolved since 1985.

• Describe the basic components of a computer system.

• Explain how a computer processes data.

• Describe the major developments in each generation of computer development.

• Evaluate the need for different types of computer systems

• Distinguish between different hardware components of a computer.

• Explain the functions/uses of the different components.

• Distinguish between a computer and a computer system.

• Explain the term general computer system.

• Explain the term embedded system.

• Show diagrammatically the components of a computer system.

- Describe a central processing unit (CPU).

- Explain arithmetic and logic unit (ALU).

- Define primary memory and how it functions.

- Describe the function of the machine cycle.

- Describe how data moves through the Central Processing Unit (CPU).

- Define megabyte.

- Explain the difference between RAM and ROM.

- Describe the machine cycle.

- Describe what happens in the instruction and execution phase.

- Define memory addressing.

2.1 Introduction :

This unit discusses the evolution of computer hardware, provides an introduction the basic components of computer system and explains how a computer processes data that executes different computer instructions.

2.2 The Evolution of Computer Technology :

Today many jobs mainly depend on the either the creation or collection, and distribution of information. This topic addresses the different advancements in computer technology and the various types of computers and their critical components.

Computer Generations

As each new computer generation improves on its previous generation, there have been a corresponding reduction in size (or miniaturization) of computer circuitry. In contrast to this miniaturization, the speed, power, and memory of computers have proportionally increased. Although this Topic will describe the major developments of each computer generation, it is more important to consider how the technology has influenced the development of current computer systems.

The computer generations are summarized in Table 2.1 below :

Generation	Denoted by	Approximate range of years
1	Vacuum tube	1940s – 1950s
2	Transistor	Mid 1950s – early 1960s
3	Integrated circuit	Early 1960s – Early 1970s
4	Very Large–Scale Integration/Microprocessor	Early 1970s – Mid 1980s
5	Parallel processing	Mid 1980s – Early 1990s
6	Reduced Instruction Set Chip (RISC) and more inventions to date	Mid 1990s to Present

The First–Generation Computer (1940s – 1950s)

Vacuum Tubes

These early computers comprised huge vacuum tubes (similar to light bulbs) whose main purpose was to strengthen weak signals for transmission. The vacuum tubes acted as switches to start and stop the instant flow of electricity. The concept underlying the on/off switch was the idea of ones and zeros. The combination of ones and zeros or on and off created a type of machine language that could be used to process information.

The first computer, the Mark 1, was so huge that it filled a typical stadium field and was said to have used more than 500 miles of wire. Its success however was its processing power, such as a mathematical problem that normally took 40 hours to solve, only took the Mark 1, 20 seconds to produce a result. It was used by the U.S. Navy during World War II, to help solve strategic military mathematical problems such as cracking secret codes and creating complex fire tables for naval guns and artillery. Scientists used the computer to predict weather patterns and for analyzing problems in airplane design. As noted earlier the language of this first generation was called machine language, which comprised zeros and ones for programming the computer.

The next computer, the ENIAC (Electronic Numerical Integrator and Computer) was an improvement on the Mark 1, since its processing power was about 1,000 times faster. The ENIAC was about 80 feet (24.4 m) long by 3 feet (0.9 m) wide, and used about 18,000 vacuum tubes. Unfortunately, the tubes were very hot, had to be replaced frequently, and were costly in using much electricity to keep them cool. The UNIVAC (Universal Automatic Computer) soon replaced the ENIAC by containing a compact 5000 tubes, a reduction from the 18,000 used in the ENIAC.

The Second–Generation Computer (Mid 1950s – early 1960s)

Transistors

During this generation the significantly smaller transistors (a new technology) eventually replaced vacuum tubes as the processing component of the computer. This allowed engineers to dramatically reduce the size and space needed to house a computer. Transistors proved to be cheaper to produce and emitted no heat, thus reducing the costs of manufacturing and making the technology more reliable since they conducted electricity faster vacuum tubes and failed less often.

This generation was noted for making space travel possible, and for the development of more sophisticated programming languages that allowed programmers to use short specific terms (e.g., ADD) to represent certain computer processing instructions. Higher level programming languages such as FORTRAN, ALGOL and COBOL, which use short English–like words, were developed during this generation. During this generation computer hardware and software was created that allowed users to store and retrieve programming instructions.

The Third Generation Computer (Early 1960s – Early 1970s)

Integrated Circuits

This generation improved on the previous one by miniaturizing the transistor and building several onto a single chip of silicon. This compacting of millions of transistors in a small space, also called an integrated circuit, greatly increased the power of computer, the processing speed, lowered its production costs even more and reduced the size of the computer.

During this generation the creation of new input and output devices were created. Keyboards, monitors, and the mouse made the computer a more user–friendly environment and eliminated the need for huge stacks of punch cards to input data into a main frame computer. Output of the computer calculations could be read on screen vice printing out large amounts of paper with graphic symbols on them

The Fourth Generation Computer (Early 1970s – Mid 1980s)

The Microprocessor

Again, an improvement on the previous generation, this generation continued to reduce the size of the silicon chip comparable to the size of a pencil eraser while vastly increasing its computational speeds. This single chip with the components and processing speeds of a computer was called a micro–processor and was initially intended for use in calculators, not computers.

During this generation the silicon chip technology was harnessed by the chip manufacturer Intel. Intel in partnership with IBM created the first microcomputer, or personal computer. A few years later Apple in partnership with Motorola introduced the Macintosh to compete against the IBM personal computer. Only recently has Apple recognized the need for standardization and has embraced the Pentium technologies currently supported by Intel.

During this periods new and more powerful programming languages developed. This included Pascal, C and compilers which converted the program to a lower–level language that the machine could process. The UNIX operating system was also developed during this time to manage system resources.

The Fifth Computer Generation Computer (Mid 1980s – Early 1990s)

Artificial intelligence and Parallel Processing

The goal of this generation is to develop devices that are capable of responding sensibly to a user's natural language and also capable of learning and self–organization. It is characterized by the introduction of computers with hundreds of processors that could be assigned to work on different sections of a single program. This is called parallel processing, and is being used to develop communication between a computer in natural spoken language and its user, through access to a vast knowledge database

to make intelligent inferences and draw logical conclusions in the way that humans do.

Several programming languages known as artificial intelligence (AI) languages have been developed simply because they are used almost exclusively for AI applications. The two most commonly used languages are LISP and Prolog.

The linking of computers together, called computer networks, and the increasing use of workstations (explained in table 2.1) were also developed during this generation.

The Sixth Generation (Mid 1990s to Present)

Computers and Video Games

This era refers to the generation of computer and video games which became popular around 1998. The Nintendo Game Cube, Sony PlayStation 2, and Microsoft's Xbox are noted to have dominated game playing in all age groups.

2.3 Types of Computer Systems :

In the past computers were classified as microcomputers, minicomputers, or main–frame computers, based on their size. Today these distinctions are rapidly disappearing as the capabilities of even the smallest units rival that of their earlier big brothers. Today's microcomputers are faster, more powerful and more versatile than the minicomputers and the main–frame computers were a few years ago. Table 2.X describes the terms used to classify todays of computers and computing devices.

Type of Computer System	Brief Description
Desktop Computer	A PC that is expected to be placed on the top of a computer or other desk. Desktops usually are powerful and have reasonably large secondary storage. Desktops require a number of input and out devices to make them useful.
Laptop	Compared to the desktop, laptops are portable computers that have their monitor, keyboard, and other memory and storage devices all included in a package that is up 17 inches in size and is powered by a special battery. Laptops are also called notebooks.
Mainframe	Mainly associated with large companies, that process millions of transactions calculations from multiple sources at one time, mainframes previously filled large rooms, but today consist of a number of linked components that allow the different processors to communicate with one another and share their total computing power.

Minicomputer	Minicomputers are powerful and can support many users at once. Their size is between microcomputers (PCs) and mainframes.
Palmtop	More commonly called Personal Digital Assistants (PDAs). They are compact computers that often use special secondary flash memory instead of a typical hard drive for storage. Palmtops usually have optional keyboards but mainly use touch screens for input. They are typically, the size of a paperback novel or even smaller and are very lightweight and use battery power.
Personal Computer	Personal Computers (PC) was designed to be used by individuals for general use. The PC is not usually associated with the Apple Mac although it is a PC. Often the term desktop and PC are used interchangeably.
Server	A computer that has been optimized to provide services to other computers over a network. Servers usually have powerful processors, lots of memory and large hard drives. They often provide custom services such as an e–mail server, a backup server, a database server, etc.
Super Computer	Supercomputers have the world's fastest processors and are able to perform millions of computations a minute. Supercomputers are normally comprised of multiple high–performance computers working in parallel as a single system. The best known supercomputers are built by Cray Super Computers.
Wearable Computers	This is the latest trend in computing where common computer applications such as electronic mail, are integrated into watches, cell phones, visors and even clothing.
Workstation	A workstation is a desktop computer with a more powerful processor, and more memory for performing a special function, such as 3D Graphics

2.4   Computer Hardware and Peripherals :

We have briefly looked at the different types of computer systems in Topic 1. We will discuss the different hardware components that make up different computer systems. The hardware and peripherals can be categorized as either Input, output, process or storage devices.

Input Devices

You use input devices to provide information to a computer, such as typing a letter or giving instructions to a computer to perform a task. Some examples of input devices are described in the following list.

Mouse : A device that you use to interact with items displayed on the computer screen. A standard mouse has a left and a right button.

Trackball : This is an alternative to the traditional mouse and is favored by graphic designers. It gives a much finer control over the movement of items on the screen.

Other screen pointing devices are pointing stick, touch pad, joystick, light pen, digitizing table.

Keyboard : A set of keys that resembles a typewriter keyboard. You use the keyboard to type text, such as letters or numbers into the computer.

Scanner : A device that is similar to a photocopy machine. You can use this device to transfer an exact copy of a photograph or document into a computer. A scanner reads the page and translates it into a digital format, which a computer can read. For example, you can scan photographs of your family using a scanner.

Barcode Readers : When used in a business barcodes provide a lot of information. Made up of columns of thick and thin lines, at the bottom of which a string of numbers is printed.

Multimedia devices : This is the combination of sound and images with text and graphics. To capture sound and image data, special input devices are required.

Microphone : Voice input, for instance, can be recorded via a microphone. A device that you can use to talk to people in different parts of the world. You can record sound into the computer by using a microphone. You can also use a microphone to record your speech and let the computer convert it into text.

Webcam : A device that is similar to a video camera. It allows you to capture and send the live pictures to the other user. For example, a webcam allows your friends and family to see you when communicating with them.

Digital cameras : record photographs in the form of digital data that can be stored on a computer. These are often used to record photographs on identity cards.

Output Device

Output devices in the computer system are the equipment whereby the result of a computer operation can be viewed, heard or printed. You use output devices to get feedback from a computer after it performs a task. Some examples of output devices are described in the following list.

Monitor : A device that is similar to a television. It is used to display information, such as text and graphics, on the computer.

Printer : A device that you use to transfer text and images from a computer to a paper or to another medium, such as a transparency film. You can use a printer to create a paper copy of whatever you see on your monitor.

Plotter : A plotter is an output device similar to a printer, but normally allows you to print larger images. It is used for printing house plans and maps.

Multimedia Output Device : The most common multimedia output is sound, including music. The audio output device on a computer is a speaker. Headphones can also be used to receive audio output.

Printers : There are various types of printers available and these vary considerably in the quality of their production.

Impact Printers : Dot matrix printers are an example of impact printers. They form characters from patterns of dots. They are inexpensive, but the output can be difficult to read.

Non–impact Printers :

Inkjet printers work by shooting a jet of ink in the shape of the character required, they provide god, low–cost color printing.

Laser printers – a laser beam is directed at an electro–statically charged surface, creating a template of the page to be printed. This template is then used to transfer the ink to the page. Toner sticks to the light images and is transferred to paper.

PROCESS AND STORAGE DEVICES

The system unit is the name given to the main computer box that houses the various elements as illustrated in the picture below.

How do we get the different computer parts to work together so that your computer can work ? Let's start of our discussion with the process devices.
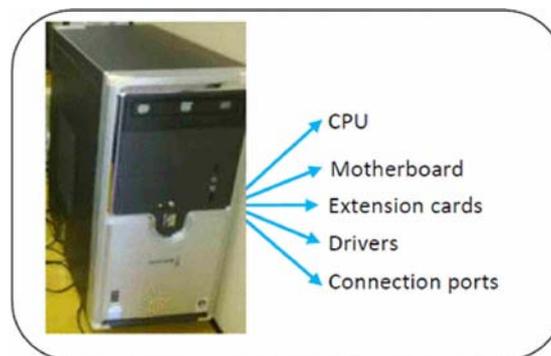
How do we get the different computer parts to work together so that your computer can work ? Let's start of our discussion with the process devices.

Motherboard

Inside the systems unit is a circuit board with tiny electronic circuits and other components which is called a mother board. It is sometimes called a system board. The motherboard connects input (keyboard, mouse and scanner), output (monitor, speakers, and printer), processing (CPU, RAM and ROM) and storage (hard drive, CD–ROM/DVD–ROM and flash drives) components together and tells the CPU how to run (Lubbe and Benson, 2010:18). Other components on the motherboard include the video card, the sound card, and the circuits that allow the computer to communicate with devices like the printer.

Expansion Cards

Yes, you can play music and video files on your computer. But how is it possible ? Inside the computer system box, you also find an expansion card which is another circuit board that can be attached to the motherboard to add features such as video display and audio capability to your computer. Expansion cards are also called expansion boards that enable your computer

to use the multimedia devices. An expansion card either improves the performance of your computer or enhances its features. Examples of expansion cards that can be added include:

- **Video Card :** It is connected to the computer monitor and is used to display information on the monitor.

- **Network Interface Card (NIC) :** The NIC allows the computer to be connected to other computers so that information can be exchanged between them.

- **Sound Card :** It converts audio signals from a microphone, audio tape, or some other source to digital signals, which can be stored as a computer audio file. Sound cards also convert computer audio files to electrical signals, which you can play through a speaker or a headphone. The microphone and the speakers or the headphones connect to the sound card.

STORAGE DEVICES

All computers need to store and retrieve data for processing. The CPU is constantly using memory from the time that it is switched on until the time you shut it down.

There are two types of storage devices as illustrated in the flow chart below.
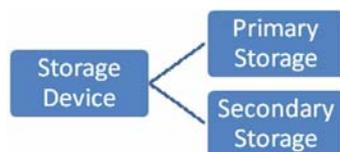
Primary Storage is also called main memory or immediate access store (IMAS). This is necessary since the processing unit can only act on data and instructions that are held in primary storage. Primary storage consists of two types of memory chips :

- Random Access Memory (RAM)

- Read Only Memory (ROM)

Random Access Memory (RAM) is the main working memory. RAM is only filled after a computer has been turned on and is given something to do. It holds data and instructions temporarily while processing takes place. RAM is volatile – this means that if the power is turned off or the computer reboots (start up again) all the information held in RAM will be lost. RAM is measured in MB (megabytes) and most entry level computers will have 1024 MB RAM but you also find some computers having up to 3 GB RAM. RAM chips are expensive and the price of a computer is determined by the amount of RAM space in the chip.

Read Only Memory (ROM) holds data and instructions necessary for starting up the computer when it is switched on. These instructions are hard–wired at the time of manufacture. ROM is permanent and cannot be deleted but can only be accessed or read, hence the name Read Only

Memory. Data stored in ROM is non–volatile – meaning that memory will not be lost when power is turned off.

So, we can compare the features of the two memory types as below:

RAM	ROM
Needs power	Does not need power
Data can be changed	Data can't be changed
Data will be lost if power is turned off	Data will not be lost if power is turned off
Volatile	Non–volatile
Stores data currently being processed	Fixed instructions are stored

Units of Storage

The memory of all digital computers is two–state (bi–stable) devices. Computers operate using a binary number system – and therefore use binary digits (bits). Bits have only two values by 0 and 1. A bit is the smallest unit of storage in a computer.

The amount of data and instructions that can be stored in the memory of a computer or secondary storage is measured in bytes. A byte is made up of a combination of eight (8) bits and has the storage power to represent one character (a character is a letter or symbol or punctuation mark or blank space).

Units of Storage	
1 byte	8 bits
1 kilobyte (K)	1024 bytes
1 megabyte (MB)	1000 kilobytes (approx. 1 million bytes)
1 gigabyte (GB)	1000 megabytes (approx. 1 billion bytes)
1 terabyte (TB)	1000 gigabytes (approx. 1 trillion bytes)

Secondary Storage Devices

PCs use a simple method of designating disk drives to store data. These drives are assigned letters of the alphabet.

A Drive	Floppy drive. Still found in older computers
C Drive	Internal hard drive (hard disk drive) situated inside the system case.
D Drive	Usually the CD–ROM/DVD–ROM drive although can also be used for another virtual or physical hardware if a second one is deployed.
E Drive or Higher	Usually use for any other disks, such as CD–writer, USB flash drive, external hard drive, etc.

Data and information stored on a permanent basis for later use. Secondary storage is cheaper to purchase and access. Hard disks, Zip drives, Optical disks (CD's and DVD's) are all examples of secondary storage.

Internal Hard Disks are rigid inflexible disks made of highly polished metal. Data is stored magnetically. They can contain a single disk or two or disks stacked on a single spindle. They come in a variety of sizes but all have a very high storage capacity compared to floppy disks. An average computer has a hard disk of about 80 – 250 GB. It provides direct access to information.

External hard Disks/Drive – same features as the internal hard disks, but are external to the system unit and therefore can be carried around. USB port is used to connect the external hard drive to the

Optical Disks are disks that are read by laser beams of lights. The three main types are CD–R, CD–RW and DVD.

• **CD–R or CD–ROM (Compact Disk – Read Only Memory)** are so called because you can only red the information on the CD–ROM. They are particularly useful for storing multimedia (texts, graphics, sound and videos), application software packages (encyclopedias, training programs etc.).

• **CD–R or Compact Disk Recordable** allows you to write information onto the disk only once using a CD recordable burner.

• **CD–RW or Compact Disk Rewriteable,** allows you to write and erase information from the disk many times. They are used to store large volumes of information such as texts, graphics, sound and video.

• **DVD** disks or Digital Versatile Disks are specifically created to store movies. A typical DVD disk can hold between 4.7GB and 17GB of information.

USB flash drive – consists of a flash memory data storage device integrated with a USB (Universal Serial Bus) interface. USB flash drives are typically removable and rewritable. They come in a variety of sizes to include 128 MB, 256 MB, 512 MB, 1 G, 2 G, 8 G etc.

Memory Card – Use mainly with digital cameras, cellular phones and music players (MP3, MP4 and iPods). They offer high–re–record ability and fast and power– free storage. Data can be access by linking the card to a computer using a USB cable or a memory card reader.

2.5 Computers and Computing :

GENERAL PURPOSE COMPUTER SYSTEMS

When you look at a desktop computer, it comprises a monitor, keyboard, mouse, and a vertical or horizontal box called a system unit. It is acceptable to refer to all of these components as a computer. Technically the systems unit houses the actual 'computer' or programmable machine (hardware, firmware and software), which executes (carries out) or responds to a sequence of program instructions. A computer system then is a collective term for a computer (housed within the system unit), as well as these other components that are attached to it to allow the user to input data and view output using different devices. Some of these components include a monitor, keyboard, mouse, printer, disk drives, scanners, microphones, and speakers, which are also referred to as peripherals. The peripherals work together to help the user accomplish a given task effectively. Therefore, as an example, when you perform a calculation, the keyboard – a peripheral device – is used to input the data. It is the system unit that accepts and processes the data, and generates the results. Other peripheral devices such as the hard drive store the data and results, which can be viewed on the monitor.
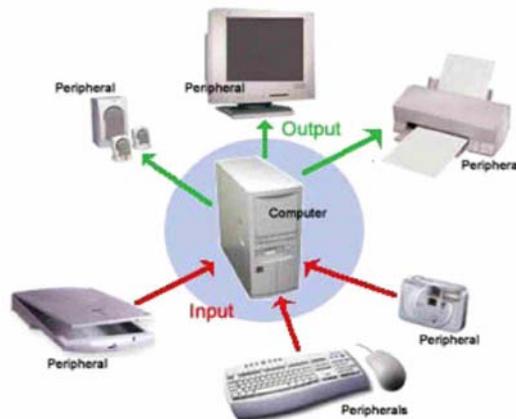
The peripheral devices mentioned above are collectively called hardware devices, since they can be physically attached to the computer. However, computer systems also include software, or programs that are integral in the functioning of some of these peripheral devices and are necessary to make the computer operate. Every computer system, for example, requires an operating system. An operating system is a program that establishes communications with the various peripherals and acts as a bridge to other application specific software programs. An operating system is like the command center of the ship. It makes all of the decisions about how the computer will function and work with others.

EMBEDDED COMPUTER SYSTEMS

The typical personal computer or laptop described in the last discussion is categorized as a general–purpose computer system. This section will explore a special type of computer system called an embedded system. Embedded systems are designed to perform a very small number of very specific functions. For example, a GPS computer in a car only provides driving instructions. It cannot perform any other computing function. A typical embedded system also uses certain types of hardware, and limited resources, such as small keyboards, screen and reduced memory. These systems are also actually built into the device they are controlling.

Compared to a typical computer, embedded systems are often smaller in size, tend to be cheaper, and as a result many are mass–produced. Embedded systems range from small portable devices to large complex systems. The major difference is that they are single purpose devices with only one form of input or output. Some may also have simple user interfaces or displays which include buttons, or touch screens, while others have none at all.

Table – Examples of systems and devices which comprise embedded systems

| Portable devices	Large complex systems
• Digital watches	• Traffic lights
• MP3 players	• Systems controlling nuclear power
• Microwave ovens	• plants
• Washing machines	• Controllers used in remote
• Television sets	• machine operation
• DVD players	• Navigation Systems
• Air conditioners	• Military Weapons Systems
• Sprinklers	
• Security monitoring system	
• Handheld computers	
• Thermostats	

Mobile (cellular) phones and handheld computers may be categorized as embedded systems, but since these devices can be enhanced with the addition of other applications and peripherals, they are better suited to the category of general–purpose computer systems and not really embedded systems.

COMPUTER SYSTEM – HOW IT WORKS

The major components of a computer system include input and output devices as well the important processor or central processing unit (CPU). The CPU comprises a set of electronic circuits kept within the system unit. The CPU is the brain of a computer system and is responsible

for processing the data that is input from a peripheral device and output to another peripheral device. Figure 2.2 illustrates the major components of a system unit that is attached to an input and output device.

The Central Processing Unit (CPU), also known as the processor or microprocessor has components that control the operating system and other software installed on the computer. The CPU also sends commands and data to the peripherals attached to the computer, such as the monitor or printer. Therefore, the speed (how fast the electrons move around the chip) at which the CPU executes its tasks (or commands) determines how quickly you can view or hear the output from the command; such as printing a page or allowing you to view a letter on the monitor. This speed is called 'clock speed', and is measured in megahertz (MHz). A computer system that responds to commands quicker means that its clock speed is working faster to execute these commands.
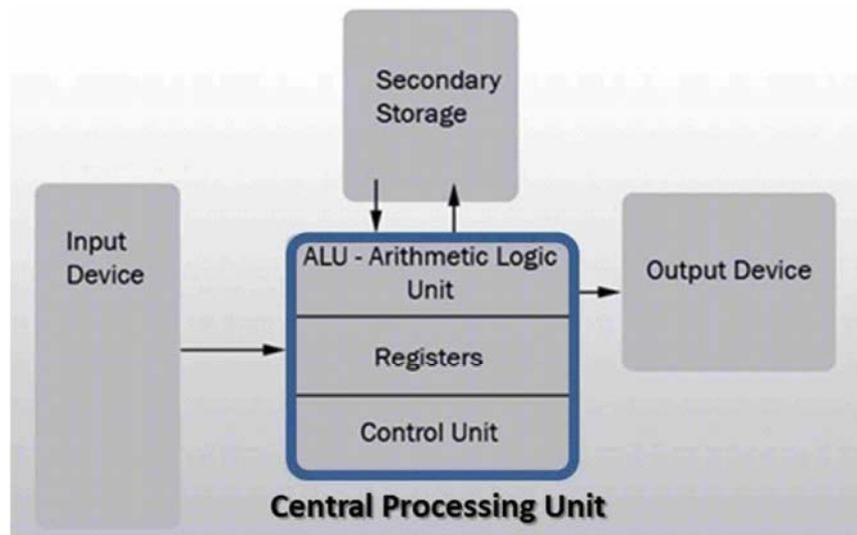
Figure 2.2 : Central Processing Unit

Table 2 compares some common CPUs and their clock speeds. Different CPUs use different silicon chips to execute the commands and process data. Different types of chips have different clock speeds based on the technology that was used to create them. Some examples are provided below.

Table 2.1 : Typical CPU Speeds Based on Chip Type

Name of CPU	Average CPU Speed
Intel Celeron	500 MHz – 800 MHz
Intel Pentium II	233 MHz – 450 MHz
Intel Pentium III	450 MHz – 1 GHz
Intel Pentium 4	1.4 GHz – 2 GHz
Intel Core i7	3.6 Ghz
AMD Athlon XP	1.4 GHz – 1.8 GHz
Macintosh G4	733 MHz

Now let's look deeper into the operation of the CPU. All computer systems have a CPU which comprises (1) a control unit and (2) arithmetic and logic unit (ALU).

The Control Unit (CU)

The control unit is similar to an efficient manager. It is responsible for directing other parts of the computer system in order to carry out the instructions for the task required. The control unit (CU) must interact with the arithmetic and logic unit (ALU) and memory to complete its tasks. As instructions are fetched from memory, the CU interprets the instruction. The CU then sends commands to other components to gather data that may be needed to complete the instruction, even if it involves a transfer of data from other components and devices. The CU than determines where to send the result. This may include activating the printer, showing the result on the monitor or playing a sound on the speakers.

Arithmetic and Logic Unit (ALU)

The Arithmetic and Logic Unit (ALU) is the part of the CPU which performs all arithmetic and logic operations this involves arithmetic calculations including addition, subtraction and multiplication. As calculations are required, the Control Unit sends them to be performed in the ALU which sends the result back to the Control Unit. It also performs logic operations such as comparisons of numbers or letters to test for, such as equal–to (=), less–than (<), greater–than (>) and other combinations, such as less–than or equal–to (<=).

Memory

Primary memory is necessary to store instructions and data for processing, but they are not part of the CPU. Memory are separate chips stored on a mother board which connects all the hardware together. Program instructions or data are kept in primary memory for only as long as the program currently using them. In human terms this would be considered "short term memory". The original instructions and data are lost once the computer is turned off; therefore, primary memory is deemed volatile. In later units we discuss those non–volatile devices which allow data and instructions to be permanently stored in a computer system for use later on. Primary memory is also as – memory, main memory, primary storage, main storage, internal storage, computer memory and RAM (Random Access Memory).

2.6   Data Processing :

Processing data is the most important activity in the computer, and so the task of the processor is to interpret and execute program instructions, in order to transform data into information. The processor is also responsible for interacting with the input, output and storage devices.

PROCESSING DATA AND COMPUTER MEMORY

Keeping instructions and data in primary memory when a program is not in use is not feasible for three reasons :

- The processed data may be too much to be held in primary memory.

- Generally primary memory only stores data and instructions while the computer is turned on, but once the computer is turned off, the data and instructions are lost.

- If more than one program or application is opened at the same time, then, a single program should not exclusively use all the memory; some memory should be available for the other programs to use.

The amount of memory available to hold the data and instruction is measured in megabytes or MB. A personal computer with a minimal amount of memory of say less than 512 MB may not be able to perform efficiently and may be rather slow in executing the applications. Memory is also loosely known as RAM which is an acronym for Random Access Memory. It should be noted there that the word random implies that data can be retrieved quickly, and in the same length of time, regardless of where the data is located (that is, the address of the data).

Read Only Memory (ROM)

Read–only memory or ROM is an integrated circuit, programmed with specific data when it is manufactured. It is used in computer systems and other electronic devices. RAM and ROM are different since data stored in ROM cannot be modified easily. In other words, ROM is ideally suitable for storing a set of data for the life of the device, and is therefore nonvolatile.

Modern types of ROM include such as Programmable ROM (PROM), Erasable Programmable ROM (EPROM), Electrically Erasable Programmable ROM (EEPROM) and flash memory can be erased and re–programmed many times, although they are still called ROM because the reprogramming process is usually rarely done. Many ROM chips are often identified by the prominent circular 'window' which allows ultraviolet (UV) light to enter and erase its contents.

Flash memory (or simply flash) is a modern type of EEPROM which can be erased and rewritten faster than EEPROM. Flash memory is mainly used in memory cards, USB flash drives, memory stick, flash stick and jump drive), which are used for general storage and transfer of data between computers and other digital products.

Function of the Machine Cycle Consider a user who needs to add two numbers, 10 and 15. These numbers may be input at the keyboard and the results shown on a screen. The processing of this simple addition is carried out in the CPU.

Let us examine how a single instruction is executed or carried out in the central processing unit. Of course, computers today generally execute one instruction at a time, although as quickly as a fraction of a second.

In order to carry out an instruction, the program instructions and data must be moved into memory from either an input device or a secondary storage device. Once in memory, the control unit and ALU in the CPU work together to perform the following four steps (fetch, decode, execute, and store) for each instruction. These steps are collectively known as the machine cycle or the processing cycle. This machine cycle has two phases, the instruction cycle (instruction time, or I–Time) and the execution cycle (execution time or E–Time). Let us examine these cycles in more detail.
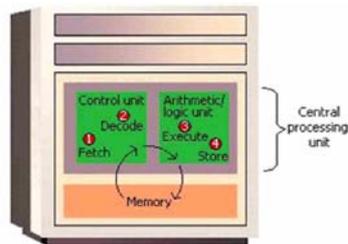
Phase A : Instruction Cycle

1. **Fetch Instruction :** The control unit fetches (gets) the program instruction from memory.

2. **Decode Instruction :** The control unit decodes the instruction (decides what it means) and then moves the necessary data from memory to the ALU.

Phase B : Execution Cycle

3. **Execute Instruction :** The ALU performs the requested action, by executing the arithmetic or logical instructions on the data.

4. **Store (write) Result :** The ALU writes or stores the result of this operation in memory or in a temporary register.

Once these two phases are complete, the control unit instructs memory to send the result to an output device or a secondary storage device. The figure below illustrates how these cycles interact to produce a result.

Check Your Progress :

State whether the following statements are true or false

1. RAM is memory where fixed instructions is being stored

2. Data is another word for information

3. A byte of memory can store an entire word

4. DVD's are used mainly for storing movies

5. Data on CD–R disks can be erased and rewritten

6. Back up files are usually created on hard disks

7. The smallest unit of data is a bit

8. ROM is volatile memory

9. Trackballs, pointing sticks and touch pads do the same function as a mouse

10. Input devices take raw data and turn it into information

11. The most suitable input device for creating a short report would be a :

    (a) Mouse   (b) Scanner   (c) Keyboard   (d) Joystick

12. The most suitable input device for selecting (highlighting) text on a screen would be a :

    (a) Joystick   (b) Mouse   (c) Keyboard   (d) Touch Screen

13. In order to create a digital image from a paper photograph you would first need to input it using a :

    (a) Scanner   (b) Joystick

    (c) Digital Camera   (d) Touch Screen

14. Magnetic Ink Character Recognition is often used on :

    (a) Receipts   (b) Photographs (c) Cheques   (d) Barcodes

15. Multiple choice answers on a test paper can be input using :

    (a) Barcode Reader

    (b) Optical Mark Reader

    (c) Magnetic Ink Character Recognition

    (d) Magnetic Strip Reader

2.8   Let Us Sum Up :

- Computer hardware consists of input, output, process and storage devices.

- You use input devices such as keyboard, mouse, scanner and multimedia devices to provide information to a computer.

- Output devices are used to get feedback from a computer after it performs a task. Examples include monitor, printer and multimedia devices.

- CPU takes raw data and turns it into information. The CPU is made up of Control Unit, Arithmetic Logic Unit (ALU) and the main memory.

- Storage devices are divided in primary and secondary storage devices.

- Primary/main memory is subdivided into ROM and RAM.

- Random Access Memory (RAM) is the main memory and allows you to temporarily store commands and data.

- Read Only Memory (ROM) retains its contents even after the computer is turned off.

- A bit is the smallest unit of storage in a computer.

- The amount of data and instructions that can be stored in the memory of a computer or secondary storage is measured in bytes.

- A byte is made up of a combination of eight bits and has the storage power to represent one written character.

- Hard disks, CD–R, CD–RW and DVD are secondary storage devices.

- The internal workings of a computer are very similar to the internal workings of the brain.

- The CPU represents the brain. Both are used to store and process information. Both carry out complex algorithms to store and combine crucial information. Both control the external operation of the body or in the case of the computer the peripherals and other attached devices.

- A computer is a device that accepts data, uses a program to process the data, and generate results.

- A computer system is a collective term that includes a computer and all peripheral devices attached to it, such as a monitor, keyboard and mouse.

- An embedded system is a special–purpose computer system designed to perform a dedicated function

- The main components of a computer system include the Central Processing Unit (CPU), primary memory, input and output devices, and secondary storage.

- The Central Processing Unit (CPU) comprises the Arithmetic and Logic Unit (ALU) and the Control Unit (CU).

- The ALU is the part of the CPU which performs all arithmetic and logic operations this involves arithmetic calculations including addition, subtraction and multiplication, as well as comparison of numbers and text.

- The control unit is responsible for directing other parts of the computer system in order to carry out program instructions

- Both primary memory and secondary storage are also necessary to store instructions and data for processing, but they are not part of the CPU

- Each new computer generation improves on its previous generation, by reduction in size (or miniaturization) of computer circuitry

- First Computer Generation is characterized by the huge vacuum tubes whose main purpose was to strengthen weak signals for transmission, and used switches to start and stop the instant flow of electricity

- Second Computer Generation replaced vacuum tubes by a much smaller transistor.

- Third Computer Generation produced and compacted millions of transistors on to an integrated circuit.

- Fourth Computer Generation is instrumental in the invention of the microcomputer, also known as a personal computer

- Fifth Computer Generation is developing communication between a computer in natural spoken language and its user

- Sixth Generation refers to the generation of computer and video games
- Primary storage is used to temporarily hold data and instructions
- Primary memory is known by other terms which are used interchangeably – memory, main memory, primary storage, main storage, internal storage, and RAM (Random Access Memory).
- In order to carry out an instruction, the program instructions and data must be moved into memory from either an input device or a secondary storage device
- The control unit and ALU in the CPU work together to perform the following four steps (fetch, decode, execute, and store) for each instruction

2.9 Answers for Check Your Progress :

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

2.10 Glossary :

Integrated Circuit : Compacting of millions of transistors in a small space is called an integrated circuit

Microprocessor : It is single chip with the components and processing speeds of a Computer.

Input device : It is used to provide information to a computer, such as typing a letter or giving instructions to a computer to perform a task.

Output device : Output devices in the computer system are the equipment whereby the result of a computer operation can be viewed, heard or printed.

Primary storage : Primary Storage is also called main memory or immediate access store (IMAS).

Bit : Binary Digit – Bits have only two values by 0 and 1. A bit is the smallest unit of storage in a computer.

Byte : A byte is made up of a combination of eight (8) bits and has the storage power to represent one character

2.11 Assignment :

- What is the main purpose of a CPU ?
- Distinguish between RAM and ROM.
- Define input and output devices and give examples of each.
- Name one device that can function as both and input as well as an output device.
- What does 'bits' stands for ?

- Explain what is meant by the phrase "primary memory is deemed volatile"

- Describe briefly the four basic operations that comprise a machine cycle or instruction cycle.

- Explain the difference between instruction time (i–time) and execution time (e–time).

- Explain why the control unit is regarded as an efficient manager.

- Explain in simple terms, what is understood by a memory address

2.12 Activity :

Explain, with reasons, which computer system(s) would be most appropriate in the following examples :

1. Business executive who travels often

2. Student who needs to prepare a History project report

3. A multi–million–dollar company with six branches in the country and three in other countries

4. Banking system with many tellers who access the same customer database

2.13 Case Study :

Try and think of other examples of embedded systems that you typically use in your day–to–day activities but have never thought of them as embedded computer systems.

2.14 Further REading :

1. Introduction to Computers, Roger Powley, CD PhD, Wilhelmina Louw, Glenda Gaye, commonwealth of learning

2. Linux for IT Managers Course Guide, commonwealth of learning

3. Business Information Systems, Derrick Thompson, Commonwealth of Learning

Unit 3

INTRODUCTION TO SOFTWARE

: UNIT STRUCTURE :

3.0 Learning Objectives

3.1 Introduction

3.2 Operating System

3.3 Types of Operating Systems

3.4 Functions of an Operating System

3.5 User Interface

3.6 Utility Programs

3.7 Language Translators

3.8 Productivity Applications

3.9 Let us sum up

3.10 Answers for Check Your Progress

3.11 Glossary

3.12 Assignment

3.13 Activity

3.14 Case study

3.15 Further Readings

3.0 Learning Objectives :

At the end of this unit, you should be able to :

• Explain the purpose of system software.

• Distinguish among the three major categories of system software.

• Explain the interaction between the user and the computer and the role of system software to support this interaction.

• Describe the purpose of system software.

• Explain the purpose of the different operating systems.

• Describe the various user interfaces.

• Explain the purpose of utility programs.

• Describe characteristics of language translators.

• Explain the purpose of the different operating systems.

3.1 Introduction :

This unit discusses the two categories of software that are used to actually have the computer complete specific tasks and that communicate with the hardware and other peripherals. The two categories of software are: systems software and applications software.

40

System software comprises a collection of programs with instructions that work together with the hardware components of a computer (including peripheral devices), to accomplish its tasks efficiently and effectively. System software acts as a mediator between the hardware resources and the application programs. In addition, system software monitors the activities of the computer (like memory and file storage) so that it functions efficiently.

Three major categories of system software are:

- Operating systems (OS),

- Utility programs, and

- Language translators.

Application software allows the computer user to create documents, produce graphics, capture and manipulate photographs, create databases and treat the computer as a tool for a variety of tasks.

The difference between the two can be summarized as follows: application software is what users require to complete their tasks while system software is the software that interfaces between the hardware to perform what is requested by the application software.

There are three different types of software that are part of all computer systems and that ensure that the hardware and application programs can effectively communicate with each other. This software is classified as operating systems, utility programs and language translators.

3.2   Operating System :

A computer cannot work without an operating system! The operating system comprises a set of coded programs that work with the peripheral devices and computer hardware to control and organize the general operating functions of the computer. Some of these functions include:

- Starting the computer (also called 'booting'),

- Managing and monitoring other programs, memory management, communications management and the management of peripheral devices,

- Enabling interaction between the user and the computer system through the use of external input devices, and monitoring and security of access to data and applications.

Starting the Computer

Starting the computer, also called booting, is the process of loading the operating system into the computer's memory so it can execute the different operations and manage the hardware devices. When the power button on the computer is turned on to load the operating system, this process is called a cold boot. If the computer system is already on and the system needs to be re–started for a number of reasons (like the hardware stops operating or the user gets an error message), then the process of

reloading the operating system is called a warm boot (because the computer was already on) A warm boot in a Windows based PC is normally done by holding down the CTL–ALT–DEL keys at once.

Managing Other Programs

The computer system needs to manage the programs that the computer user needs to complete business or personal tasks such as a word processing, Internet research, spreadsheet production and others. The operating system must therefore be able to manage one or more software application programs at the same time. This is known as multi–tasking and the computer is considered a multi–tasking operating environment. For example, multitasking operating systems run more than one application program at a time.

Suppose a user has a word processing program, Internet browser and a spreadsheet are open at the same time and the computer user currently typing a report, using the word processing program. The word processing program is called the active program, since it is the current program in use while the other programs – the Internet browser and spreadsheet – are called inactive programs since they are running in the background and are not currently in use.

Since computers use primary memory to increase processing efficiency, the operating system allocates memory spaces for each running program so that the individual programs do not interfere with each other. In order to accomplish this, the operating system uses 'virtual memory' or secondary storage, as an extension of random–access memory (RAM). This is illustrated in the figure 3.1. Sometimes, if there are too many applications opened, then the operating system is unable to allocated adequate memory to each application. When this happens, none of the applications may appear to work and the computer system may need a warm boot.
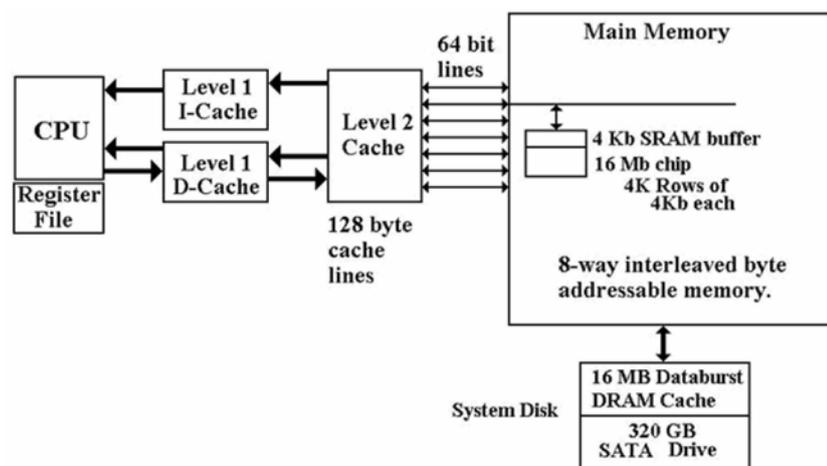
Figure 3.1 : Memory CPU Interaction

3.3   Type of Operating System :

Now that the purpose of an operating system has been explained, let us examine some operating systems that were developed for specific purposes.

The Macintosh (or Mac) and the IBM personal computer operate with hardware and software configurations. This is known as the platform. The platform of a computer system is the underlying hardware and software that it allows it to function. For example, the Apple computer was developed with a Mac platform using Motorola chips and unique operating software called "Mac OS" The original IBM computer uses Intel chips and originally employed an operating system called "DOS" or Disk Operating System. Today's PCs now use a Windows based operating system that incorporates many of the original concepts in DOS. Operating systems differ in functionality, flexibility and ease of use. Today there are a number of different operating systems in use. They can be classified as either personal operating systems, network (client/servers) operating systems and handheld operating systems. A representative list of different operating systems is described below.

Operating System (OS)	Type	Main Purpose or Major Development
UNIX	Network	These are network operating systems that are powerful. Runs on many types of PCs, mainframes and workstations; is the primary operating system for Internet servers; first multitasking system, widely used by large corporations
Linux	Network	Uses a command line interface; more stable than Windows, but applications using Linux are rare.
Macintosh (MAC) OS X	Personal	First operating system to be developed that used a graphical user interface. Also considered the easiest system for beginners
Microsoft Windows 95, 98 and XP	Both personal & network	Capable of Internet browsing, and multimedia support. None of these earlier versions of Windows are supported by Microsoft
Microsoft Windows NT/2000	Network	Also network operating systems that were designed specifically for corporate and other large businesses, and were also known as client/server systems (one computer 'serves' provides applications for many users 'clients'). Offered enhanced security, and remote access to computer systems among other features
Microsoft Windows Mobile 7	Handheld and Cell Phone	Supports handheld devices and smartphones. Supports integration with other Microsoft software.
Microsoft Windows 7	All Types	The current Microsoft operating system with a number of variants which can be used in all types of computer environments.

3.4 Functions of an Operating System :

Birbal and Taylor, (2004 : 39–40) summaries the functions of an operating system as follows :

1. **Managing Computer Resources :** The operating system allows application software Programmes such as word processing, spreadsheet and database packages to communicate with the computer's hardware. For example, if you work on a document in Excel and you want to print the document, you just press the print button on the toolbar. Excel will direct the operating system to select a printer to print the document. The operating system then notifies the computer to begin sending data and instructions to the appropriate program to get the document printed. The operating system therefore acts as an interface between the application Programmes and the hardware.

2. **Managing Files and Memory :** The operating system manages all files on a computer. It keeps tracks of the locations where Programmes and data are stored within the computer's memory. For example, when you open a file that has been saved to the hard drive, you are first instructing the computer to find the file, and then to open it. The operating system also allows you to easily find files stored in secondary storages devices. Other file management functions include copying, erasing, renaming and backing–up files.

3. **Maintaining Security :** In networks and larger computers each user is given a user name or ID and password to gain access to the computer system. The operating system keeps a register of all these names so that only persons with valid usernames and passwords can access the system. This prevents access by hackers and unauthorized persons. The operating system also keeps a log which records users logged in, the length of time each user stayed on the system, and heat they did. Administrators can check the log to look for security breaches and abuse of resources.

4. **Managing Tasks :** A computer can perform many tasks simultaneously. One way of doing this is multi–tasking – ability of the computer to run more than one Programme at the same time. For example, a user can listen to music on his/her computer whilst at the same time typing a document or typing an e–mail while another e–mail is being sent. In the case of networks, the multiuser operating system allows more than one user to access the same data at the same time.

5. **Providing a User Interface :** Many operating systems functions are never apparent on the computer's display screen. What you do see is what is called the user interface. The interface helps the user to interact with the computer.

3.5 User Interface :

In order to interact with the computer, a user uses a part of the operating system called a user interface. The functions of the user interface

are to start application programs, manage secondary storage, such as hard disks, as well as manipulate files and folders, and finally shut down the computer safely.

The three principal types of interfaces include:

*   Graphical User Interface (GUI),

*   menu–driven interface, and

*   command–line interface.

The Graphical User Interface (GUI) uses graphics or icons which represent various tasks. For example, the icon to print is a small picture of a printer which when clicked with a mouse, will invoke the printing dialog box. Once the printer dialogue box is opened you can pick other commands that will be used to send your document to the printer. A GUI is a user–friendly interface that eliminates the need to remember complex computer commands or programming languages.

The menu–driven interface is used to show all of the options available to the user in the form of pull–down or pop–up menus. An illustration of a pull–down menu is shown in figure 3.2. Many menu interfaces now include the GUI icons with text menu options.


*Figure 3.2 : Graphical User
Interface Example*
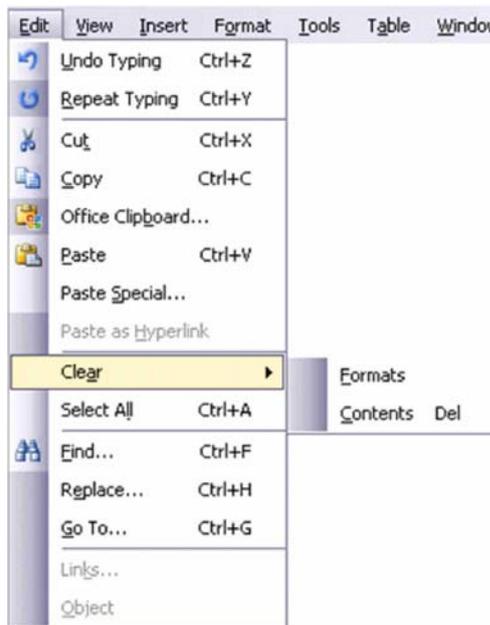
*Figure 3.2 : Menu Driven
Interface Example*

The command–line interface requires the user to type keywords or commands at a prompt, in order to enter data or execute commands. You can experience this type of command when you open the "Run" interface to input DOS based commands to execute an operating system task. This interface is the most difficult one for the average computer users to learn. They are often used in programming applications or in support of systems software.
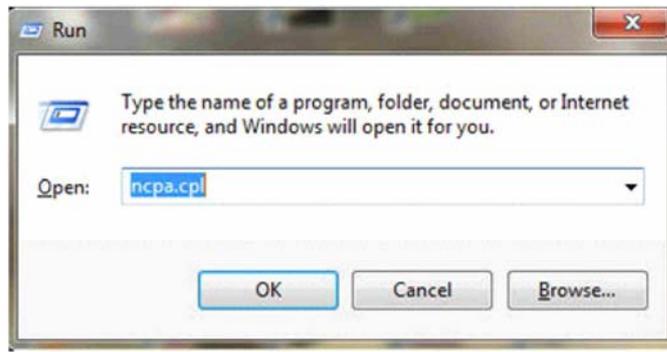
Figure 3.3 : Command Line Interface Example

3.6 Utility Programs :

Utility programs are tools that help the operating system manage the computer system's secondary or non–priority jobs. These jobs are repetitive in nature. Some examples of utility programs include antivirus software, backup software, disk defragmentation, disk scanning; file compression software, file management programs, and searching software. Often are automatically loaded into member when the system is booted and they operate in the background at the same time as the application program. Often you do not know they are working until they send you a message like "Virus detected, click here to eliminate". Only then does the user need to engage some form of interface to take the appropriate action.

Table 3.1 : Examples of Utility Programs

Utility Program	Description
Antivirus software	Protects the computer from computer viruses. Examples are Norton and Zone Alarm.
Backup software	Used to copy data from the hard disk to another storage medium.
Disk Defragmentation	Re–organizes data on a storage device to improve performance.
Disk Scanning	Involves disk–scanning utilities to detect and fix errors on storage devices, or disk cleanup utilities that remove unused or unnecessary files that are no longer needed.
File Compression	Reduces the size of a file, folder or directory. Popular utility is WinZip.
File Management	Stores files in a hierarchical structure, to enable various tasks such as creating, deleting, copying and moving files, folders, and directories
Search programs	Used to find files, folders or directories on storage devices.

3.7   Language Translators :

Language translators convert the data in a program (source code) into machine language code (object code) so that the computer can then process. The main purpose of translating source code to object code is to create a program in machine language so that the computer can produce the desired results. An example of different types of language translators are compilers and interpreters. The compiler is a computer program or in some cases a set of programs that translates another program's source code into object code all at once, while the interpreter is a set of programs that translate the application program's source code, one line at a time while the program is running.

3.8   Productivity Applications :

Personal productivity applications serve the needs of various users and have several subcategories. Generally, personal productivity software includes word processing, spreadsheet, presentation, and database programs. Another area, Internet applications, includes Web browsers and electronic mail programs. Multi–media or graphics applications use desktop publishing, as well as editing of photos and graphics, while home and educational applications include personal finance programs, tax preparation programs, reference software and game playing software.

These personal productivity programs are usually stand–alone programs which do not depend on other application software to function. However, there are some applications whose interfaces are the same, and also share data and resources with each other. These applications together are called software suites, and some examples are Microsoft Office ? which is the most popular, Corel WordPerfect Office, and Lotus SmartSuite.

Table 3.2 : Some useful Application Software

Types	Description
Financial Software	Provides automated assistance for tax preparation and submission. An example is Turbo Tax.
Accounting Software	Provides assistance for personal accounting and cheque writing. Examples are Quicken and QuickBooks
Word Processing Software	Provides assistance in formatting, printing documents. Some examples are Microsoft Word, and Corel WordPerfect
Spreadsheet Software	Provides built–in functions to perform calculations and graphics. Some examples are Microsoft Excel and Lotus
Database Software	Stores, manipulates and retrieves data. Some examples are Microsoft Access, dBase and FoxPro

Workgroup Applications

These applications are used by two or more users who work as a team to achieve a common task. The programs therefore should support the sharing of information and sections of the work or a project, scheduling group meetings, group electronic mail services, group decision making and conferencing. Some examples of this software are project management software, groupware like Microsoft SharePoint and collaborative software like WIKIs (an example of a WIKI is Wikipedia).

Enterprise Applications

These applications are used by personnel to support the company in its interaction with customers and employees. Some of the activities include entry of orders, billing, payroll, human resource management, and general reporting activities. Enterprise applications are specialized or tailor made to the specific activities of the company. Examples of enterprise software include PeopleSoft a complete package of company operations and Banner an enterprise system used by universities and colleges to support records management, financial management, course management, student management, etc.

Application Software Development

Some applications, are developed 'in–house' specifically for use in the company. Other applications are developed via a contract by technology companies that specialize in producing custom application software for their customers. One example of custom software development would the book ordering process for Amazon.com. Finally, there are off the shelf application software packages which, as the name implies, can be purchased and used without the ability to customize the software.

Check Your Progress :

1. _____ is the process of loading the operating system into the computer's memory so it can execute the different operations and manage the hardware devices

2. _____ is a person who tries to gain access to a computer system without authorization. Hacking is illegal in most countries.

3. There are _____ principal types of interfaces.

4. The _____ interface requires the user to type keywords or commands at a prompt, in order to enter data or execute commands.

5. _____ programs are tools that help the operating system manage the computer system's secondary or non–priority jobs.

3.9 Let Us Sum Up :

While the CPU is the brain of the computer, it needs instructions to work effectively. It uses electronic instructions or binary signals in bits and bytes to communicate with other parts of the system. Software, specifically operating software, provides specific instructions to the peripherals and the various systems attached to the computer including network operations.

Application software provides the creative portion of the brain. It allows you to use the computer to create and communicate. We will now explore application software.

System software plays an important role in the proper functioning of a computer system. This unit explained the three main programs that comprise system software, namely operating systems, utility programs and language translators. Of course, different types of system software are necessary for the different types of operating systems available. The user interface was also discussed as a mediator between the user and the computer system, to ensure that the computer system performs certain complex or other mundane tasks for the user.

This unit also introduced personal productivity software or applications software which are stand–alone programs that do not depend on other applications to function. Some popular application software programs discussed were for word processing, spreadsheet analysis, presentations, and statistical analysis. Some other applications such as workgroup and enterprise applications were also introduced, since they are also widely used in the day–today tasks in many businesses.

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3.10 Answers for Check Your Progress :

1. 'booting'   **2.** Hacker   **3.** Three

4. command–line   **5.** Utility

3.11 Glossary :

System Software : System software comprises a collection of programs with instructions that work together with the hardware components of a computer (including peripheral devices),

Operating System : The operating system comprises a set of coded programs that work with the peripheral devices and computer hardware to control and organize the general operating functions of the computer.

Application Software : Application software allows the computer user to create documents, produce graphics, capture and manipulate photographs, create databases and treat the computer as a tool for a variety of tasks.

User interface : In order to interact with the computer, a user uses a part of the operating system called a user interface.

Hacker : A hacker is a person who tries to gain access to a computer system without authorization. Hacking is illegal in most countries.

3.12 Assignment :

- Explain the purpose of system software.

- Distinguish among the three major categories of system software.

- Explain the interaction between the user and the computer and the role of system software to support this interaction.

- Describe the purpose of system software.

- Explain the purpose of the different operating systems.

- Describe the various user interfaces.

- Explain the purpose of utility programs.

- Describe characteristics of language translators.

- Explain the purpose of the different operating systems.

3.13 Activity :

- Identify a number of tasks that are carried out by all operating systems.

- Describe at least one task that a multi–tasking operating system would be able to execute.

- Describe at least one task that a multi–user operating system would be able to execute.

3.14 Case Study :

You share a computer with four other family members. Over the last three months, you notice an increase in files, and folders from the various projects and assignments. There are also quite a few files which have been downloaded from the Internet. Think about which utility programs would be appropriate, not only to organize the many files and folders, but to generally use on this computer.

3.15 Further Reading :

1. Introduction to Computers, Roger Powley, CD PhD, Wilhelmina Louw, Glenda Gaye, commonwealth of learning

2. Linux for IT Managers Course Guide, commonwealth of learning

3. Business Information Systems, Derrick Thompson, Commonwealth of Learning

Unit 4

FILE AND DATA MANAGEMENT

: UNIT STRUCTURE :

4.0 Learning Objectives :

At the end of this unit, you should be able to :

• Illustrate the movement of files, folders to organize information in a meaningful way.

• Explain different disk and file management operations.

• Describe a computer the operation of a computer file management system.

• Show diagrammatically basic file and data management structures.

• Carry out basic file and data management operations.

4.1 Introduction :

This unit explains how a computer file and data management system operates and is accompanied by some practical activities which are useful in helping understand how files can be organized on secondary storage devices into multiple folders and sub–folders.

4.2 File Management :

In Microsoft Windows operating system, Windows Explorer is a tool for organizing files on disk and uses several important components to manage drives such as disks (floppy disks, CDs, DVDs, and memory sticks), folders and files. When Explorer is started, you will see the

directory window, which displays the contents of a specified folder on a selected drive.

Files, folders and disks must interact to organize information in a meaningful way. Files are a collection of information, data, or program files. For example, an application software program such as a spreadsheet or word processor is a program file, while the document created using the spreadsheet or word processor is called a data file. Folders are used to organize where the files are located, so that a particular folder may contain all spreadsheet files, while another folder can contain all word processing files.

A disk is a secondary storage device such as a floppy disk, CD, DVD, or memory stick, where folders and files can be stored. Consider a disk to be like a filing cabinet with the folders similar to physical folders or drawers in the filing cabinet. These folders can therefore contain files or rather paper files! So, you can have many folders in a file, and the folders can contain many files! Also, just as your filing cabinet can become full of files, your disk (storage device) can also become full.

4.3 Root Folders and Subfolders :

Two terms need to be explained before beginning the practical Topic. A root folder is the main or general folder found on all disks and is identified with the disk drive letter followed by a backslash (\ ). A root folder is often known as a drive or storage device. Table 4.2 illustrates some other designated disk drive letters. So, the root directory of the floppy drive is designated A:\

Table 4.2 : Designated Drive Letters

Disk Drive Name	Designated Drive Letter
Floppy Drive	A:\
Another Floppy drive	B:\
Hard Disk Drive	C:\
Another Hard Disk Drive	Can be given another letter such as D:\ or more depending on the number of installed hard–drives on the computer.
Memory Stick (also called Flash drive)	If there are two hard drives on the computer, then it is designated E:\
Another Memory Stick	F:\ – Assuming you have a second one.
A Network Drive	H:\ or higher – Note network drives do not physically reside on your desktop or laptop computer. To connect to a Network Drive your computer must be installed on a local or wide area network.

Once you create folders within the root folder, then these folders are called subfolders. So, if the root folder contains another folder called WORD, then the folder is identified by its name preceded by the name of the root. Therefore, we have in our example, A:\WORD which indicates that the subfolder WORD is in the root folder of the A: drive. Folders can have more folders within them. So, if ASSIGN1, is created within the WORD Subfolder, then A:\WORD\ASSIGN1 indicates that the ASSIGN1 subfolder is within the WORD subfolder contained in the root folder of the floppy disk. Another way to describe the hierarchical nature of the above example is below :

❖ Root Folder (e.g., C:\)

≻ Sub Folder (e.g., C:\WORD)

▪ Sub–Sub Folder (c:\WORD\ASSIGN1)

4.4 Using the Directory Window :

Launch Windows Explorer by right–clicking the Start button and selecting Explore. Then maximize the resulting window.

Double–click on the icon located in the left panel. (you may not see the numbers before the C: A list of folders will be displayed in the right panel. Double–click the WINNT or WINDOWS folder depending on the system you are using. (You may get a message telling you that these files are hidden for security reasons. Simply click the on the Show Files option.) You can also double–click on any folder for this activity; the Explorer title will be updated to reflect the name of the folder that you have opened.

Double–click the Desktop folder in the left panel, or in the file list (in the right panel), and notice the files change to reflect those in the desktop folder.

You should now select and click the View pull–down menu, and notice how the Explorer panels change with each option. Try the four options in the Arrange Icon option and Details option to see the result.
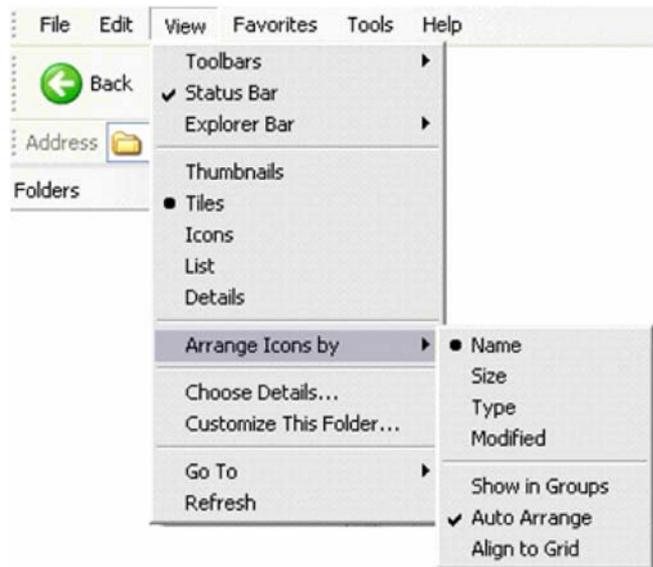
4.5 Creating and Deleting Folders :

You can also create and delete folders in Explorer. To create a new folder, you first need to know WHERE your folder will be located, such as the desired drive, and then the directory from the tree (left panel). Select the disk and folder that you want to create this new subfolder within, and select File New Folder from the menu bar.

You need to be careful when deleting or removing folders, since you may remove a folder with important files still within it. Deleting folders also removes files and any subfolders in that folder. Click to select the folder, and then select File Delete from the menu bar.

- Launch Explorer and put your floppy disk in the floppy drive. Click on the Floppy Drive icon.

- Select File New Folder. Alternatively, you can right click in the right pane and select the New Folder Option
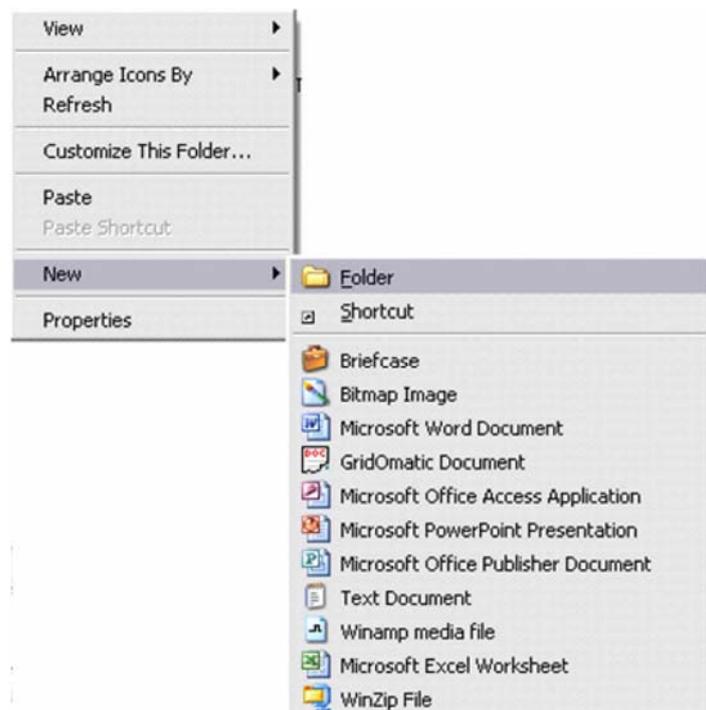
- Type DISTANCE and press [ENTER]. The new folder has been added under the A:\ root directory. Double–click the folder DISTANCE and select File New Folder (or once again right click and select New Folder). Type ACTIVITY. Your directory tree for the floppy disk is shown :

- If you have other folders, then they will also be shown.

- Click on the DISTANCE folder. To delete this folder (and all its contents), select File Delete from the menu, or press DELETE. Click OK when the Confirm Delete dialog box appears.

4.6 Disk and File Management Operations :

Windows Explorer allows the management of files such a wide range of file activities including copying, moving, deleting and renaming.

Copying Operation – In order to copy one or more files from one folder to another, these file(s) should be first selected from the directory list. Multiple files can be selected from the folder by clicking on the first file (remember, do NOT double click as this will open the document and not select it), then hold down the CONTROL key while clicking on each individual file. If the files are located together, then first hold down the SHIFT key and then click on the first and then the last file. All files between the first and last will be selected. A file can be de–selected by clicking on the file a second time. After selecting the file(s) use the Edit Copy command, or hold down the CTRL key and tap the letter C on the keyboard. Click in the destination folder on the desired drive, and select Edit Paste. Your files should be copied to the desired folder.

Moving Operation – To move one or more files, first select the required files, as in the copying operation above. With the files selected or highlighted, click and hold on the selected files. Then drag the mouse pointer onto the destination folder name in the tree and release the mouse button. You should check to see that the files were actually moved to the desired location. Alternatively, files can be moved by first selecting the files and using Edit Cut, to remove the files from the first location. Then click in the destination folder on the desired drive, and select Edit Paste to move the files to this folder.

Renaming Operation – Renaming files is accomplished by selecting the desired file and then choosing File Rename from the menu. Simply type in the new filename and press Enter.

First create the following tree structure on your floppy disk, or memory stick (removable disk)

Use Start, Programs, Accessories, and Paint to create the four bitmap files and save those files with a Monochrome Bitmap file format. Use WordPad or Notepad to create and save the four text files shown. You do not need to type anything in the file. Save these files in the root folder of your disk. Also make sure your files are arranged by type in Explorer.
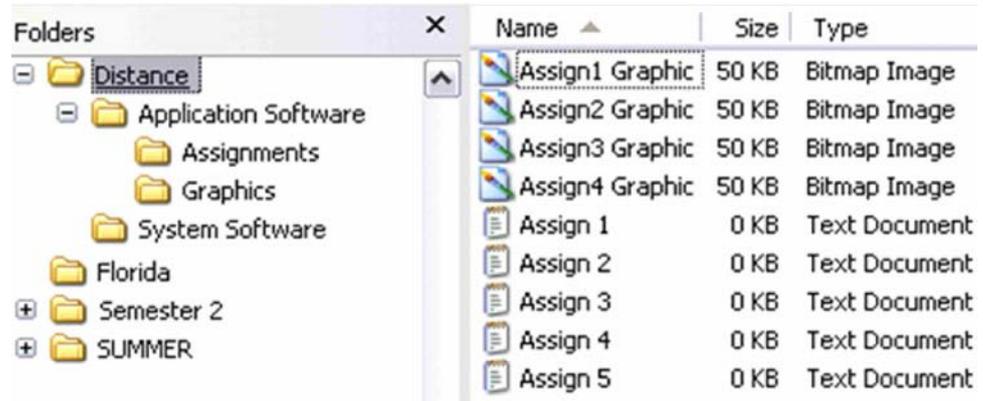
Copy all bitmap files from the root (Distance) to the Graphics folder. To do this: Click on the first file Assign1 Graphic, hold the SHIFT key down and click or select the Assign4 Graphic to select all of the graphic files.

Select Edit Copy from the menu, or hold down the CTRL key and tap the C key. Click on the Graphics folder in the directory structure (left panel). Select Edit Paste, or CTRL V to copy the files. A dialog box will show you the files as they are copied.

Move the text files to the folder Assignments.

Click on the first file Assign1, hold the SHIFT key down and click or select the Assign5 text file to select all of the text files.

Select Edit Cut from the menu, or hold down the CTRL key and tap the C key. Click on the Assignments folder in the directory structure (left panel). Select Edit Paste, or CTRL V to copy the files. A dialog box will show you the files as they are copied.

Delete the remaining files from the root. Select all files in the root and tap the DELETE (DEL) key. Select YES when the Confirm Multiple File Delete dialog box appears.

Rename files. Click on the System Software folder in the Tree. Select File Rename from the menu, and type in the new file name : Operating Systems. Press ENTER.

Click on the Application Software folder and press DELETE. What happens ? Since you do not actually want to delete this folder, what should you do ?

Check Your Progress :

1. In Microsoft Windows operating system, _____ is a tool for organizing files on disk

2. A _____ folder is the main or general folder found on all disks and is identified with the disk drive letter followed by a backslash (\ ).

3.   Once you create folders within the root folder, then these folders are called _____ .

4.   To select multiple files one by one we need to press _____ Key and click

5.   To select multiple files in sequence we need to select first file and press _____ key and then click on last file

4.7   Let Us Sum Up :

In this unit we explored how to create a file and data management system that will ensure you are able to effectively store and retrieve information from your computer system. An effective business will treat its data like gold. You must know how to protect, how to store it and how to back it up.

The following concepts were explored in this unit :

1.   Windows Explorer is a tool for organizing files on disk.

2.   Files are a collection of information, data, or program files.

3.   Folders are used to organize where the files are located.

4.   A disk is a secondary storage device such as a floppy disk, CD, DVD, or memory

5.   stick, where folders and files can be stored.

6.   The root folder is the main or general folder found on all disks.

7.   Once you create folders within the root folder, then these folders are called subfolders.

8.   To create a new folder, you first need to know WHERE your folder will be located.

9.   You need to be careful when deleting or removing folders, since you may remove a folder with important files still within it.

This unit explained the difference among terms such as disks, files, folders and sub folders and root folder. It also noted the various disk drive letter designations when performing data and file management tasks.

4.8   Answers for Check Your Progress :

1. Windows Explorer   **2.** Root   **3.** Subfolders

4. Ctrl   **5.** Shift

4.9   Glossary :

Windows Explorer : In Microsoft Windows operating system, Windows Explorer is a tool for organizing files on disk and uses several important components to manage drives such as disks (floppy disks, CDs, DVDs, and memory sticks), folders and files.

Root folder : A root folder is the main or general folder found on all disks and is identified with the disk drive letter followed by a backslash (\ ).

Sub folder : If you create folders within the root folder, then these folders are called subfolders.

4.10 Assignment :

- Write short note on windows explorer

4.11 Activity :

- Make a list of useful short–cut key for Windows File and Directory operations

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4.12 Case study :

- Study Linux operating system file management

4.13 Further Reading :

1. Introduction to Computers, Roger Powley, CD PhD, Wilhelmina Louw, Glenda Gaye, commonwealth of learning

2. Linux for IT Managers Course Guide, commonwealth of learning

3. Business Information Systems, Derrick Thompson, Commonwealth of Learning

BLOCK SUMMARY

In this block we have learned about Impact and History of Computers, Computer Hardware, Software and File and Data Management in windows operating system.

BLOCK ASSIGNMENT

Short Answer Questions :

* Define the following terms

    o Information technology.

    o General computer system

    o Embedded system.

    o Memory addressing.

    o Megabyte

* What is Operating System ?

* What is primary memory ?

* What is utility program ?

* What are Language translators ?

* What do you mean by secondary memory ?

* Describe the purpose of system software.

Long Answer Questions :

* Explain characteristics associated with computer technology.

* Discuss the contributions of computer technology to everyday living.

* Explain terms associated with computer technology.

* Explain features of computer technology.

* Explain evolution of computer systems.

* Describe the basic components of a computer system.

* Explain with example how a computer processes data.

* Describe the various user interfaces.

* Explain the difference between application software and system software.

* Write detailed note on personal productivity applications.

❖ **Enrolment No. :**

1. How many hours did you need for studying the units ?

Unit No.	1	2	3	4
No. of Hrs.				

2. Please give your reactions to the following items based on your reading of the block :

Items	Excellent	Very Good	Good	Poor	Give specific example if any
Presentation Quality	☐	☐	☐	☐	_____
Language and Style	☐	☐	☐	☐	_____
Illustration used (Diagram, tables etc)	☐	☐	☐	☐	_____
Conceptual Clarity	☐	☐	☐	☐	_____
Check your progress Quest	☐	☐	☐	☐	_____
Feed back to CYP Question	☐	☐	☐	☐	_____

3. Any other Comments

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Computer Application

BLOCK-2 OPERATING SYSTEM

UNIT 1

INTRODUCTION TO OPERATING SYSTEM

UNIT 2

WINDOWS OPERATING SYSTEM

UNIT 3

LINUX OPERATING SYSTEM

BLOCK 2 : Operating System

Block Introduction

This block covers introduction to Operating System with definition, evolution of operating system and different types of operating systems. It includes the services and structure of operating systems as a whole. It focusses on terminologies used, functionalities of an operating systems have and types of operating systems. The very foundations of operating system can be viewed from different perspectives.

Learner will get introduction to the Windows operating system (Windows OS) for personal computers which dominates the personal computer world. Block also covers introduction of Linux Operating System.

Block Objectives

The objective of this block is to define an Operating System and principles and objectives of the operating system with the corresponding aims they have. To describe the evolution stages of operating systems and general categories of OS, different software structures of operating systems, services provided by the operating systems, objetives of Operating System, evolution of Windows OS, features of Windows OS and discuss new features of windows 10

Block Structure

Unit–1 : Introduction to Operating System

Unit–2 : Windows Operating System

Unit–3 : Linux Operating System

Unit 1

INTRODUCTION TO OPERATING SYSTEM

: UNIT STRUCTURE :

1.0 Learning Objectives :

After studying this unit learner should be able to :

• Define an Operating System State the principles and objectives of the operating system with the corresponding aims they have

• Describe the evolution stages of operating systems

• List general categories of OS

1.1 Introduction :

An operating system (OS) is a program that manages the computer hardware. It also provides a basis for application programs and acts as an intermediary between the computer user and the computer hardware. In this unit we provide a general overview of the major components of an operating system.

This unit introduces definition, evolution, structure and services of operating system. The operating system is a system software. This unit addresses the following questions:

• What are operating systems functionalities ?

• What are the activities performed by the modern operating systems ?

• What kind of software structure does it have ?

1.2 Definition of Operating System :

Let us try to define what is operating system. Our focus is about the operating system software. What is it ?

What is Operating System ?

Operating systems are system software that run on top of computer hardware. This definition needs to be observed from different perspectives of computer system, namely from application software and user hardware interaction.

Operating system can be defined as, system program that monitors works of application programs. It is responsible for the loading and execution of application programs. It has to make sure the availability of the required hardware and software requirements before executing the application program.

Operating system can also be defined as system software which acts as a bridge between the hardware and its users. The operating system, according to this definition, has a responsibility to hide the complexities of the underlying hardware for the end user. The end user is not supposed to know the details of hardware components like CPU, memory, disk drives, etc.

As we have discussed the definitions of operating system so far, we can conclude that the operating system is found between user, application software, and physical component of the computer system. It facilitates and monitors running of application programs and functions as a middle man between hardware and users.

Check Your Progress – 1

1. OS is a program that manages the computer software. (True/False)

2. An Operating system is an example of system software. (True/False)

3. OS functions as a middle man between hardware and users. (True/False)

4. OS facilitates and monitors running of application programs. (True/False)

1.3 Evolution of Operating Systems :

Computers gone through different generations. The generations are classified based on varieties of criterion. One of the major criteria to classify computer generations is the type of operating system used. Evolution of operating systems has a close tie with the generation of computers. What were the basic changes made on operating systems over these generations ?

Studying evolution of Operating Systems is used to understand key requirements of an Operating System. Moreover, it helps to understand significance of the major features of modern Operating Systems.

Operating systems and computer architecture are historically tied. The combination of computer architecture with operating system is known as computer platform. Architectural changes affect structure and performance of Operating Systems. While studying the evolution of operating systems, consideration on the architecture is required.

Evolution of operating systems over the past decades has shown number of progresses from several perspectives. Starting from the point where machine does not have operating systems to a distributed processing capability. The foundation for the modern operating system was built over different parameters.

The following shows the major evolution of Operating Systems :

Wiring–up Plug–boards

Low level programming language called machine language was used to write computer instructions through wiring up plug–boards Plug–boards control the basic functions of the computer. No Operating Systems software were introduced. No programming languages to develop applications. No operators were required. Complex programming and machine underutilization.

Serial Processing

The technique is to running a single Job. Following are the working of serial processing :

• Developer creates his/her program and punches it on cards

• He/she submits the card deck to an operator in the input room

• he/she reserves machine time on a sign–up sheet

• Operator set–up the job as scheduled

• Operator caries over the returned output to the output room

• The developer will collect the output later

No Operating Systems software were introduced. No programming languages to develop applications.

Features

• Users get access in series

• Program writing was improved Disadvantages

• Wasted time due to scheduling and setup

• Wasted time while operators walk around the machine room

• Large machine/processor idle time

Batch Processing

The users of batch operating system do not interact with the computer directly. Each user prepares his job on an off–line device like punch cards and submits it to the computer operator. To speed up processing, jobs with similar needs are batched together and run as a group. Thus, the programmers left their programs with the operator. The operator then sorts programs into batches with similar requirements. The technique is to running a batch of Job.

Advantages

• Once the data process is started, the computer can be left running without supervision.

- Batch processing allows an organization to increase efficiency because a large amount of transactionscan be combined into a batch rather than processing them each individually.

Disadvantages

- It is very difficult to maintain the priority between the batches.

- There is no direct interaction of user with computer. Lack of interaction between the user and job.

- CPU is often idle, because the speeds of the mechanical I/O devices is slower than CPU.

- Difficult to provide the desired priority.

- With batch processing there is a time delay before the work is processed and returned.

Spooling Batch Processing

Technique

- Adds up Spooling technique to simple batch processing

- Spooling – Simultaneous Peripheral Operation Online

- It is the ability to read jobs/print job outputs while the processor executes jobs

- Read jobs – from cards to disk

- Print job outputs – from disk to printer

- Used in input and output operations

With spooling, every time a currently executing task is completed, a new task is shipped from storage to the now–empty panel and be executed by the OS. Spooling is the first attempt of multiprogramming

Advantages

- Avoids CPU idle time between batches of jobs

- Improve turn–around time: Output of a job was available as soon as the job completed, rather than only after all jobs in the current cycle were finished.

Disadvantages

- Large turn–around time

- Large CPU idle time on heavily I/O bound jobs

Multi–programming

In a multiprogramming system there are one or more programs loaded in main memory which are ready to execute. Only one program at a time is able to get the CPU for executing its instructions (i.e., there is at most one process running on the system) while all the others are waiting their turn.

The main idea of multiprogramming is to maximize the use of CPU time. Indeed, suppose the currently running process is performing an I/O task (which, by definition, does not need the CPU to be accomplished).

Then, the OS may interrupt that process and give the control to one of the other in–main–memory program that are ready to execute (i.e. process context switching). In this way, no CPU time is wasted by the system waiting for the I/O task to be completed, and a running process keeps executing until either it voluntarilyreleases the CPU or when it blocks for an I/O operation. Therefore, the ultimate goal of multi programming is to keep the CPU busy as long as there are processes ready to execute.

Note that in order for such a system to function properly, the OS must be able to load multiple programs into separate areas of the main memory and provide the required protection to avoid the chance of one process being modified by another one. Other problems that need to be addressed when having multiple programs in memory is fragmentation as programs enter or leave the main memory. Another issue that needs to be handled as well is that large programs may not fit at once in memory which can be solved by using pagination and virtual memory.

Advantages

• Increase CPU utilization and reduce CPU idle time.

• It decreases total read time needed to execute a job as the jobs are in main memory. Disadvantages of Multi Programming Operating System

Disadvantages

• Long response time: the elapsed time to return back a result for a given job was often several hours

• Poor interactivity between programmer and his program

Time Sharing

Multiple jobs are executed by the CPU by switching between them, but the switches occur so frequently. Thus, the user can receives an immediate response. For example, in a transaction processing, processor execute each user program in a short burst or quantum of computation. That is if n users are present, each user can get time quantum. When the user submits the command, the response time is in few seconds at most.

Operating system uses CPU scheduling and multiprogramming to provide each user with a small portion of atime. Computer systems that were designed primarily as batch systems have been modified to time–sharing systems.

Advantages

• More than one user can execute their task simultaneously.

• Avoids duplication of software

• CPU Idle time is reduced and better utilization of resources.

• Provide advantage of quick response.

Disadvantages

- Question of securing the security and integrity of user's data and programs.

- Since multiple processes are managed simultaneously, so it requires an adequate management of main memory

- Problem of reliability.

Real–time processing

Real time system is defined as a data processing system in which the time interval required to process and respond to inputs is so small that it controls the environment. Real time processing is always on line whereas on line system need not be real time. The time taken by the system to respond to an input and display of required updated information is termed as response time. So, in this method response time is very less as compared to the online processing.

Real–time systems are used when there are rigid time requirements on the operation of a processor or the flow of data and real–time systems can be used as a control device in a dedicated application. Real–timeoperating system has well–defined, fixed time constraints otherwise system will fail. For example, Scientific experiments, medical imaging systems, industrial control systems, weapon systems, robots, and home–applicance controllers, Air traffic control system etc. There are two types of real–time operating systems.

Hard real–time systems : Hard real–time systems guarantee that critical tasks complete on time. In hard real–time systems secondary storage is limited or missing with data stored in ROM. In these systems virtual memory is almost never found.

Soft real–time systems : Soft real time systems are less restrictive. Critical real–time task gets priority over other tasks and retains the priority until it completes. Soft real–time systems have limited utility than hard real–time systems. For example, Multimedia, virtual reality, Advanced Scientific Projects like undersea exploration and planetary rovers etc.

Advantages

- Better task scheduling as compared to manual process and time deadlines achievement is guaranteed in most of the cases.

- Accelerate the process by automanaging the system resources as in the case of Autopilot airplanes and railway e–ticket booking system.

Disadvantages

- If time dead lines are missed it may result in severe disastrous situation.

- Complex and need additional kernel, Memory and other resources are required.

- More vulnerable to security breaches like virus and unauthorized access.

Networked Processing

Comprise of several computers that are interconnected to one another. Each of these networked devices has their own local users and executes their own local OS not basically different from single computer OSs. Users also know about the presence of the several computers. Additional features needed by network operating systems are Network interface controller, NIC, A low–level software to drive it and software for remote login & remote file access.

Distributed Processing

A distributed system is a collection of physically separate, possibly heteroge-neous computer systems that are networked to provide the users with access to the various resources that the system maintains. Access to a shared resource increases computation speed, functionality, data availability, and reliability. Some operating systems generalize network access as a form of file access, with the details of networking contained in the network interface's device driver. Others make users specifically invoke network functions. Generally, systems contain a mix of the two modes–for example FTP and NFS. The protocols that create a distributed system can greatly affect that system's utility and popularity.

Runs on a multi–computer system : set of computers, each having its own memory, storage devices and other I/O modules. This is useful for distributing the task between these different computers. Existence of multiple computers is transparent to the user: It appears as a uniprocessor system. It differs in critical ways from uniprocessor OSs. Examples of distributed operating systems include LOCUS, MICROS, IRIX, Solaris, Mac/OS, and OSF/1.

Advantages

- With resource sharing facility user at one site may be able to use the resources available at another.

- Speedup the exchange of data with one another via electronic mail.

- If one site fails in a distributed system, the remaining sites can potentially continue operating.

- Better service to the customers.

- Reduction of the load on the host computer.

- Reduction of delays in data processing

Disadvantages

- Security problem due to sharing

- Some messages can be lost in the network system

- Bandwidth is another problem if there is large data then all network wires to be replaced which tends to become expensive

- Overloading is another problem in distributed operating systems

- If there is a database connected on local system and many users accessing that database through remote or distributed way then performance become slow

- The databases in network operating is difficult to administrate then single user system

Check Your Progress – 2

1. Monitoring utilities were put to memory when required in simple batch processing systems (True/False)

2. In which type of system, the output of a program is sent to the disk and is printed only when the job completes ?

   (a) Multi–programmed batch systems

   (b) Batch systems with spooling

   (c) Time sharing systems

   (d) Multi–printing systems

3. A system that supports multiple processes per user is called a

   (a) Multi–user system   (b) Multi–programming system

   (c) Multi–tasking system   (d) None of the above

4. _____ operating system allows a computer to work independently as well as provides a means for sharing resources (e.g. files, printers, etc.) to other computers connected to it.

   (a) Real–time operating system (b) Symmetric operating system

   (c) Local area network   (d) Network operating system

1.4   General Categories of Operating System :

In above sections, we have introduced the general structure of a typical computer system. We have also seen that how the peripheral devices are attached to the processor and I/O between external and internal storage. There are different categories of the operating system according to the use and utilities provided by architecture.

Desktop system : The program controls the machine itself and provide services to the user of the machine only is called desktop or laptop operating system. This operating system takes the control of the hardware and run the environment to provide services like – memory management, process management, device access and data handling. Many systems of this category provide security and data protection. Examples are windows 10, Ubuntu 18.04 LTS, Mac OS 10.14 (Mojave) etc.

Multiprocessor system : System with two or more than two processors is known as multiprocessor system. This system shares common bus, clock, memory and devices. According to Flynn's classification, MISD (Multiple Instruction stream and Single Data stream) and MIMD (Multiple Instruction stream and Multiple Data stream) computers are of this category. Distributed system and clustered system are also part of multiprocessor system. When

data stream and instruction stream are increased it effect the following parameters :

1. **Throughput :** Get more work done in less time. When more data and instruction stream are there, they can do the work simultaneously so the performance is increased. The speed–up ratio is increased for N processor work together but theoretically we are not getting increase according to number of processors. There are many reasons for that.

2. **Economy scale :** MISD and MIMD architecture can use cluster of the computers and processors, that sharing external devices. This can be a cost effective solution in many cases.

3. **Reliability :** Failure of one processor will not affect other processing going on in the system, albeit load of the failed processor can be divided among other processors. This is user transparent mechanism so user don't have to bother about failure and system will be more reliable.

Distributed system : Distributed system is collection of physically separate, heterogeneous, and system that are networked to provide services. Sharable devices increase the speed of computation, data availability and reliability.

Clustered system : Cluster is usually used to provide high–availability services, when one of the nodes in the cluster is failed than other node takes charge of that node and start execution from where it is failed. There are mainly two types of clustered system– asymmetrical and symmetrical. In asymmetrical one node is standby mode so it can take the control of the failed node while symmetrical cluster all nodes are running simultaneously and monitor each other.

Real time system : Real time system are special system that works on special requirements. The unique feature of this system is to complete the task in given deadline and instant service to the requisition generated in the environment. If task is not finished or handled in the given timeframe than it can cause the disaster. Major issue in the real time system is to develop a routine for proper scheduling of processes.

Handheld system : This category of the system includes PDA (Personal Digital Assistant) like tablets, cellular telephones etc. main issue of this system to manage data and application in limited amount of resources. Size of the device is small, processor rate is also slow, and amount of the memory is small to manage data.

1.5   Let Us Sum Up :

An operating system is software that manages the computer hardware as well as providing an environment for application programs to run. Perhaps the most visible aspect of an operating system is the interface to the computer system it provides to the human user.

There are several different strategies for designing a computer system. Uniprocessor systems have only a single processor while multiprocessor systems contain two or more processors that share physical memory and peripheral devices. The most common multiprocessor design is symmetric multiprocessing (or SMP), where all processors are considered peers and run independently of one another. Clustered systems are a specialized form of multiprocessor systems and consist of multiple computer systems connected by a local area network.

To best utilize the CPU, modem operating systems employ multiprogram-ming, which allows several jobs to be in memory at the same time, thus ensuring the CPU always has a job to execute. Timesharing systems are an extension of multiprogramming whereby CPU scheduling algorithms rapidly switch between jobs, thus providing the illusion each job is running concurrently.

The operating system must ensure correct operation of the computer system. To prevent user programs from interfering with the proper operation of the system, the hardware has two modes: user mode and kernel mode. Various instructions (such as I/0 instructions and halt instructions) are privileged and can be executed only in kernel mode. The memory in which the operating system resides must also be protected from modification by the user. A timer prevents infinite loops. These facilities (dual mode, privileged instructions, memory protection, and timer interrupt) are basic building blocks used by operating systems to achieve correct operation.

In this unit we have lean about Definition of Operating System, Evolution of Operating Systems, operating systems functionalities, activities performed by the modern operating systems.

1.6 Answers for Check Your Progress :

Check Your Progress – 1

    1. False   **2.** True   **3.** True   **4.** True

Check Your Progress – 2

    1. False   **2.** b   **3.** d   **4.** d

1.7 Glossary :

Operating System : Operating systems are system software that run on top of computer hardware. This definition needs to be observed from different perspectives of computer system, namely from application software and user hardware interaction

Real Time Processing : Real time system is defined as a data processing system in which the time interval required to process and respond to inputs is so small that it controls the environment.

Spooling : Simultaneous Peripheral Operation Online

Time sharing : Multiple jobs are executed by the CPU by switching between them, but the switches occur so frequently.

Multi Programming : In a multiprogramming system there are one or more programs loaded in main memory which are ready to execute. Only one program at a time is able to get the CPU for executing its instructions (i.e., there is at most one process running on the system) while all the others are waiting their turn.

Distributed System : Distributed system is collection of physically separate, heterogeneous, and system that are networked to provide services. Sharable devices increase the speed of computation, data availability and reliability.

Multiprocessor System : System with two or more than two processors is known as multiprocessor system.

1.8 Assignments :

• What is an operating system ?

• Write detailed note on evolution of operating system

• Write note on Simple Batch Processing

• Explain network operating system

• What is real time operating system ?

1.9 Activity :

• Write Disadvantages of multiprogramming and timesharing

• Write difference between Network OS and Distributed OS

1.10 Case study :

• Explain general categories of Operating System

1.11 Further Reading :

• Andrew S. Tanenbaum (2008). Modern Operating System. 3rd Edition. Prentice–Hall.

• A Silberschatz, Peter B Galvin, G Gagne (2009). Operating System Concepts. 8th Edition. Wiley.

| Unit 2 | WINDOWS OPERATING SYSTEM |

: UNIT STRUCTURE :

2.0 Learning Objectives

2.1 Introduction

2.2 History of Windows OS

2.3 Microsoft OS for Servers and Mobile Devices

2.4 New Features of Windows 10

2.5 Let Us Sum Up

2.6 Answers for Check Your Progress

2.7 Glossary

2.8 Assignments

2.9 Activities

2.10 Case Study

2.11 Further Readings

2.0 Learning Objectives :

Upon completion of this unit, you should be able to :

• Describe Evolution of Windows OS

• List features of Windows OS

• Understand new features of windows 10

2.1 Introduction :

The Windows operating system (Windows OS) are more formally called Microsoft Windows and is actually a family of operating systems for personal computers. Windows dominates the personal computer world, running, by some estimates, more than 90 percent of all personal computers – the remainder running Linux and Mac operating systems.

Windows provides a graphical user interface (GUI), virtual memory management, multitasking, and support for many peripheral devices. In addition to Windows operating systems for personal computers, Microsoft also offers operating systems for servers and mobile devices. In this unit we will learn about evolution of today's Windows Operating System and features of Windows Operating System.

2.2 History of Windows OS :

The following details the history of MS–DOS and Windows operating systems designed for personal computers (PCs). Microsoft Windows is a family of operating systems. We look at the history of Microsoft's Windows operating systems (Windows OS) from 1985 to present day.

MS–DOS – Microsoft Disk Operating System (1981)

Originally developed by Microsoft for IBM, MS–DOS was the standard operating system for IBM–compatible personal computers. The initial versions of DOS were very simple and resembled another operating system called CP/M. Subsequent versions have become increasingly sophisticated as they incorporated features of minicomputer operating systems.

Windows 1.0 – 2.0 (1985–1992)

Introduced in 1985, Microsoft Windows 1.0 was named due to the computing boxes, or "windows" that represented a fundamental aspect of the operating system. Instead of typing MS–DOS commands, windows 1.0 allowed users to point and click to access the windows. In 1987 Microsoft released Windows 2.0, which was designed for the designed for the Intel 286 processor. This version added desktop icons, keyboard shortcuts and improved graphics support.

Windows 3.0 – 3.1 (1990–1994)

Windows 3.0 was released in May, 1900 offering better icons, performance and advanced graphics with 16 colors designed for Intel 386 processors. This version is the first release that provides the standard "look and feel" of Microsoft Windows for many years to come. Windows 3.0 included Program Manager, File Manager and Print Manager and games (Hearts, Minesweeper and Solitaire). Microsoft released Windows 3.1 in 1992.

Windows 95 (August 1995)

Windows 95 was released in 1995 and was a major upgrade to the Windows operating system. This OS was a significant advancement over its precursor, Windows 3.1. In addition to sporting a new user interface, Windows 95 also includes a number of important internal improvements. Perhaps most important, it supports 32–bit applications, which means that applications written specifically for this operating system should run much faster.

Although Windows 95 can run older Windows and DOS applications, it has essentially removed DOS as the underlying platform. This has meant removal of many of the old DOS limitations, such as 640K of main memory and 8–character filenames. Other important features in this operating system are the ability to automatically detect and configure installed hardware (plug and play).

Windows 98 (June 1998)

\Windows 98 offers support for a number of new technologies, including FAT32, AGP, MMX, USB, DVD, and ACPI. Its most visible feature, though, is the Active Desktop, which integrates the Web browser (Internet Explorer) with the operating system. From the user's point of view, there is no difference between accessing a document residing locally on the user's hard disk or on a Web server halfway around the world.

Windows ME – Millennium Edition (September 2000)

The Windows Millennium Edition, called "Windows Me" was an update to the Windows 98 core and included some features of the Windows 2000 operating system. This version also removed the "boot in DOS" option.

Windows NT 31. – 4.0 (1993–1996)

A version of the Windows operating system. Windows NT (New Technology) is a 32–bit operating system that supports preemptive multitasking. There are actually two versions of Windows NT: Windows NT Server, designed to act as a server in networks, and Windows NT Workstation for stand–alone or client workstations.

Windows 2000 (February 2000)

Often abbreviated as "W2K," Windows 2000 is an operating system for business desktop and laptop systems to run software applications, connect to Internet and intranet sites, and access files, printers, and network resources. Microsoft released four versions of Windows 2000: Professional (for business desktop and laptop systems), Server (both a Web server and an office server), Advanced Server (for line–of–business applications) and Datacenter Server (for high–traffic computer networks).

Windows XP (October 2001)

Windows XP was released in 2001. Along with a redesigned look and feel to the user interface, the new operating system is built on the Windows 2000 kernel, giving the user a more stable and reliable environment than previous versions of Windows. Windows XP comes in two versions, Home and Professional. Microsoft focused on mobility for both editions, including plug and play features for connecting to wireless networks. The operating system also utilizes the 802.11x wireless security standard. Windows XP is one of Microsoft's best–selling products.

Windows Vista (November 2006)

Windows Vista offered an advancement in reliability, security, ease of deployment, performance and manageability over Windows XP. New in this version was capabilities to detect hardware problems before they occur, security features to protect against the latest generation of threats, faster start–up time and low power consumption of the new sleep state. In many cases, Windows Vista is noticeably more responsive than Windows XP on identical hardware. Windows Vista simplifies and centralizes desktop configuration management, reducing the cost of keeping systems updated.

Windows 7 (October, 2009)

Windows 7 was released by Microsoft on October 22, 2009 as the latest in the 25–year–old line of Windows operating systems and as the successor to Windows Vista (which itself had followed Windows XP). Windows 7 was released in conjunction with Windows Server 2008 R2, Windows 7's server counterpart. Enhancements and new features in Windows 7 include multi–touch support, Internet Explorer 8, improved performance

and start–up time, Aero Snap, Aero Shake, support for virtual hard disks, a new and improved Windows Media Center, and improved security.

Windows 8

Windows 8 was released on August. 1, 2012 and is a completely redesigned operating system that's been developed from the ground up with touchscreen use in mind as well as near–instant–on capabilities that enable a Windows 8 PC to load and start up in a matter of seconds rather than in minutes.

Windows 8 will replace the more traditional Microsoft Windows OS look and feel with a new "Metro" design system interface that first debuted in the Windows Phone 7 mobile operating system. The Metro user interface primarily consists of a "Start screen" made up of "Live Tiles," which are links to applications and features that are dynamic and update in real time. Windows 8 supports both x86 PCs and ARM processors.

Windows 10

Windows 10 is Microsoft's Windows successor to Windows 8. Windows 10 debuted on July 29, 2015, following a "technical preview" beta release of the new operating system that arrived in Fall 2014 and a "consumer preview" beta in early 2015. Microsoft claims Windows 10 features fast start up and resume, built–in security and the return of the Start Menu in an expanded form. This version of Windows will also feature Microsoft Edge, Microsoft's new browser. Any qualified device (such as tablets, PCs, smartphones and Xbox consoles) can upgrade to Windows 10, including those with pirated copies of Windows.

2.3   Microsoft Operating Systems for Servers and Mobile Devices :

Aside from operating systems designed for use on personal computers (PCs) and laptops, Microsoft has also developed operating systems for services, handheld devices, and mobile phones.

Windows Server (March 2003)

Windows Server is a series of Microsoft server operating systems. Windows servers are more powerful versions of their desktop operating system counterparts and are designed to more efficiently handle corporate networking, Internet/intranet hosting, databases, enterprise–scale messaging and similar functions. The Windows Server name made its debut with the release of Windows Server 2003 and continues with the current release, Windows Server 2008 R2, which shares its codebase with Windows 7. Windows Server 2008 R2 debuted in October 2009.

Windows Home Server (January 2007)

Announced in January 2007, Windows Home Server (WHS) is a "consumer server" designed to use with multiple computers connected in the home. Home Server allows you to share files such as digital photos and media files, and also allows you to automatically backup your home networked computers. Through Windows Media Connect, Windows Home

Server lets you share any media located on your WHS with compatible devices.

Windows CE (November 2006)

A version of the Windows operating system designed for small devices such as personal digital assistants (PDAs) (or Handheld PCs in the Microsoft vernacular). The Windows CE graphical user interface (GUI) is very similar to Windows 95 so devices running Windows CE should be easy to operate for anyone familiar with Windows 95.

Windows Mobile (April 2000)

A mobile operating system for smartphones and mobile devices from Microsoft based on the Windows CE kernel and designed to look and operate similar to desktop versions of Microsoft Windows. Windows Mobile has largely been supplanted by Windows Phone 7, although Microsoft did release, in 2011, Windows Embedded Handheld 6.5, a mobile OS compatible with Windows Mobile 6.5 that's designed for enterprise mobile and handheld computing devices.

Windows Phone (November 2010)

Windows OS – Windows Phone

A mobile operating system for smartphones and mobile devices that serves as the successor to Microsoft's initial mobile OS platform system, Windows Mobile. Unlike Windows Mobile, Windows Phone 7 (also referred to as WinPhone7) is targeted more to the consumer market than the enterprise market, and it replaces the more traditional Microsoft Windows OS look and feel with a new "Metro" design system user interface.

Windows Phone 7 features a multi–tab Internet Explorer Mobile Web browser that uses a rendering engine based on Internet Explorer 9 as well Microsoft Office Mobile, a version of Microsoft Office that's tailored for mobile devices. Its successors include Windows Phone 8 and Windows 10 Mobile.

2.4   New Features of Windows 10 :

Windows 10 is the most recent version of the Microsoft Windows operating system. While older versions of Windows mainly ran on desktop and laptop computers, Windows 10 is also designed to run equally well on tablets.

Start menu

Whereas Windows 8 uses the Start screen to launch applications, Windows 10 has reintroduced a more traditional Start menu. It's also been expanded to make it easier to find important apps.

Microsoft Edge

This new browser is designed to give Windows users a better experience on the Web. It's faster, more secure, and includes a lot of new features. Microsoft Edge is meant to replace Internet Explorer as your

default web browser, but you'll still be able to use IE (or another browser) if you prefer.

Cortana

Similar to Siri and Google Now, you can talk to this virtual assistant with your computer's microphone. Cortana can answer questions like What's the weather like today ?, perform simple tasks like remind you to take out the trash, and much more.

Multiple desktops and Task view

Instead of keeping everything open on the same desktop, you can move some of your windows to a virtual desktop to get them out of the way. And the new Task view feature makes it easy to manage all of your open windows.

Action Center

The new Action Center is pretty different from previous versions of Windows. For example, it's been expanded to let you access frequently used settings, such as Wi–Fi connectivity and tablet mode. It's also where you'll see important notifications, so if your computer receives an update you'll get a notification about it here.

Tablet mode

Unlike Windows 8, Windows 10 makes a clear distinction between desktops and tablets. If you're using a keyboard and mouse with Windows 10, you'll be in desktop mode by default. If your computer also has a touchscreen, you can go into tablet mode at any time. Tablet users can also switch back to desktop mode if they prefer.

Check Your Progress :

1. Windows–7 launch in the year _____

    (a) 2007   (b) 2008   (c) 2009   (d) 2010

2. Which of the following is a new feature in windows 10

    (a) Microsoft Edge   (b) Cortana

    (c) Tablet Mode   (d) All of these

3. Windows XP comes in two versions, Home and Professional.

4. Windows NT (New Technology) is a 64–bit operating system that supports preemptive multitasking. (True/False)

5. Windows CE is designed to look and operate similar to desktop versions of Microsoft Windows. (True/False)

6. Windows 10 has reintroduced a more traditional Start menu. It's also been expanded to make it easier to find important apps.. (True/False)

7. Windows 10 makes a clear distinction between desktops and tablets.. (True/False)

8. Windows 8 is a completely redesigned operating system that's been developed from the ground up with touchscreen and enable a

Windows 8 PC to load and start up in a matter of seconds rather than in minutes. (True/False)

2.5 Let Us Sum Up :

In this unit we have learn about windows operating system and evolution of Windows Operating System, Microsoft Operating Systems for Servers and Mobile Devices and understand new features of windows 10.

2.6 Answers for Check Your Progress :

1. a	2. b	3. True	4. False
5. True	6. True	7. True	8. True

2.7 Glossary :

Windows : It is actually a family of operating systems for personal computers

Microsoft Edge : This new browser is designed to give Windows users a better experience on the Web. It's faster, more secure, and includes a lot of new features. Microsoft Edge is meant to replace Internet Explorer as your default web browser, but you'll still be able to use IE (or another browser) if you prefer.

Cortana : Similar to Siri and Google Now, you can talk to this virtual assistant with your computer's microphone. Cortana can answer questions like What's the weather like today ? perform simple tasks like remind you to take out the trash, and much more.

Action Center : The new Action Center is pretty different from previous versions of Windows. For example, it's been expanded to let you access frequently used settings, such as Wi-Fi connectivity and tablet mode. It's also where you'll see important notifications, so if your computer receives an update you'll get a notification about it here.

Tablet mode : Unlike Windows 8, Windows 10 makes a clear distinction between desktops and tablets. If you're using a keyboard and mouse with Windows 10, you'll be in desktop mode by default. If your computer also has a touchscreen, you can go into tablet mode at any time. Tablet users can also switch back to desktop mode if they prefer.

Windows CE : A version of the Windows operating system designed for small devices such as personal digital assistants (PDAs) (or Handheld PCs in the Microsoft vernacular).

2.8 Assignment :

• Write detailed note on history of Windows OS

• Explain new features of Windows 10 Operatiing System

2.9 Activities :

• Explore new features of windows 10 operating system

2.10 Case Study :

• Study Microsoft Operating Systems for Servers and Mobile Devices

2.11 Further Reading :

• https://www.webopedia.com/DidYouKnow/Hardware_Software/ history_of_microsoft_windows_operating_system.html

• https://www.microsoft.com/en–in/windows/features–activetab= feature–pivot%3aprimaryr2

| Unit 3 | LINUX OPERATING SYSTEM |

: UNIT STRUCTURE :

3.0   Learning Objectives :

Upon completion of this unit, you should be able to :

• Describe Evolution of Windows OS

• List features of Windows OS

• Understand new features of windows 10

3.1   Introduction :

Free and Open–Source Software (FOSS) can be available commercially or as non–commercial software. The "free" in open–source software refers to the Free Software Foundation's (www.fsf.org) definition of 'What is Free Software'. The freedoms at the core of free software are defined as :

1.   The freedom to run the software for any purpose;

2.   The freedom to study how the software works and adapt it to your needs;

3.   The freedom to redistribute copies so you can help others; and

4.   The freedom to improve the software and release your improvements to the public, so that everyone benefits.

The Free Software Foundation's philosophy behind software development provided great motivation for the Free Software community. In the early 1990s, along with the increasing use of the Internet and the success of the World Wide Web, many new Open–Source projects emerged. The most prominent example is Linux. Linux is a Unix–like operating

system targeted to run on a personal computer. It was developed by the Finnish computer science student Linus Torvalds who used the GNU (named for Gnu'sNot Unix) software tools. In 1991, he released the code of an experimental version under the GPL (General Public License) to a newsgroup and asked for comments and improvements.

Linux is a powerful, free and Open–Source operating system. Linux has a modular structure, so individuals or groups of developers can focus on one part of the program. Linux was used increasingly in combination with the GNU tools. Because the operating system is central to IT infrastructure, it eventually became relevant for business use.

3.2 What Is Linux ?

From smartphones to cars, supercomputers and home appliances, home desktops to enterprise servers, the Linux operating system is everywhere.

Linux has been around since the mid–1990s and has since reached a user–base that spans the globe. Linux is actually everywhere : It's in your phones, your thermostats, in your cars, refrigerators, Roku devices, and televisions. It also runs most of the Internet, all of the world's top 500 supercomputers, and the world's stock exchanges.

But besides being the platform of choice to run desktops, servers, and embedded systems across the globe, Linux is one of the most reliable, secure and worry–free operating systems available.

Just like Windows, iOS, and Mac OS, Linux is an operating system. In fact, one of the most popular platforms on the planet, Android, is powered by the Linux operating system. An operating system is software that manages all of the hardware resources associated with your desktop or laptop. To put it simply, the operating system manages the communication between your software and your hardware. Without the operating system (OS), the software wouldn– t function.

The Linux operating system comprises several different pieces :

Bootloader	The software that manages the boot process of your computer. For most users, this will simply be a splash screen that pops up and eventually goes away to boot into the operating system.
Kernel	This is the one piece of the whole that is actually called ? Linux ? The kernel is the core of the system and manages the CPU, memory, and peripheral devices. The kernel is the lowest level of the OS.
Init system	This is a sub–system that bootstraps the user space and is charged with controlling daemons.
Daemons	These are background services (printing, sound, scheduling, etc.) that either start up during boot or after you log into the desktop.

Graphical server	This is the sub–system that displays the graphics on your monitor. It is commonly referred to as the X server or just X.
Desktop environment	This is the piece that the users actually interact with. There are many desktop environments to choose from (GNOME, Cinnamon, Mate, Pantheon, Enlightenment, KDE, Xfce, etc.). Each desktop environment includes built–in applications (such as file managers, configuration tools, web browsers, and games).
Applications	Desktop environments do not offer the full array of apps. Just like Windows and macOS, Linux offers thousands upon thousands of high–quality software titles that can be easily found and installed. Most modern Linux distributions include App Store–like tools that centralize and simplify application installation. For example, Ubuntu Linux has the Ubuntu Software Center which allows you to quickly search among the thousands of apps and install them from one centralized location.

3.3   Linux Distribution and Installation :

Because of the Open–Source nature of the Linux Kernel, which allows anyone to modify or enhance the base kernel (Operating System) with other software, Linux is available in a wide variety of distributions. *A linux distribution is a collection of software packages, utilities, and tools and is based on the version of a Linux kernel.* Some distributions can be created with a specific purpose in mind e.g to set–up a firewall or for educational purposes etc. but there are also general–purpose distributions, meaning that they come with a variety of software packages, tools and applications that can be installed by the end user resulting in flexibility.

Each distribution comes with its own characteristics and special tools, created by the distribution company to increase the value of their version of Linux. Most of these distributions are obtained for free but many companies also sell commercial distributions.

Often mention will be made for distinct changes with other key Linux distributions. It is also important to note that this manual does not seek to promote any particular distribution but will seek to expound on implementations that cut across any Linux distribution. This implies that the concepts described in this manual cut across majority of the Linux distributions out there. For a comprehensive listing of Linux distributions see http://www.distrowatch.com/

Popular Linux distributions include

• Linux mint

• Manjaro

• Debian

- Ubuntu
- Antergos
- Solus
- Fedora
- Elementary os
- Opensuse

There are many Linux distributions out there, most of them with very elaborate installation instructions. The following are some of the key linux distributions and where you can find their download and installation instructions.

Distribution Name	Download and Installation Instructions Site
SuSE Linux Enterprise Server	https://www.suse.com/download/
Ubuntu	https://ubuntu.com/download/desktop
Fedora	https://getfedora.org/en/workstation/download/
CentOS	https://www.centos.org/download/

Linux offers one of the easiest installations of all operating systems. In fact, most versions of Linux offer what is called a Live distribution ? which means you run the operating system from either a CD/DVD or USB flash drive without making any changes to your hard drive. You get the full functionality without having to commit to the installation. Once you've tried it out, and decided you wanted to use it, you simply double–click the "Install" icon and walk through the simple installation wizard.

Typically, the installation wizards walk you through the process with the following steps (We'll illustrate the installation of Ubuntu Linux):

Preparation : Make sure your machine meets the requirements for installation. This also may ask you if you want to install third–party software (such as plugins for MP3 playback, video codecs, and more).

Wireless setup (if necessary) : If you are using a laptop (or machine with wireless), you'll need to connect to the network, in order to download third–party software and updates.

Hard drive allocation : This step allows you to select how you want the operating system to be installed. Are you going to install Linux alongside another operating system (called "dual booting"), use the entire hard drive, upgrade an existing Linux installation, or install over an existing version of Linux.

Location : Select your location from the map.

Keyboard layout : Select the keyboard for your system.

User setup : Set up your username and password.

That's it. Once the system has completed the installation, reboot and you're ready to go. For a more in–depth guide to installing Linux, take a look at "How to Install and Try Linux the Absolutely Easiest and Safest Way" or download the Linux Foundation's PDF guide for Linux installation.

3.4   The Linux Command line Structure :

A Unix shell is a command–line interpreter and script host that provides a traditional user interface for the Unix operating system and for Unixlike systems. Users direct the operation of the computer by entering command input as text for a command line interpreter to execute or by creating text scripts of one or more such commands.

A basic way to interact with a computer system is to use the command line. The shell interprets the instructions typed in at the keyboard. That is the shell is the interface between a human user and the Linux Operating System. The shell prompt (ending with $ or # for user root) indicates that it is ready for user input.

You can access the Linux Shell by Pressing Ctrl+Alt+F1 or F2 or F3 or F4 or F5 or F6. These commands open up a shell terminal where you can be able to enter any Linux command. You may also access the terminal on the windows interface. This terminal runs a shell which is a programming environment which can be used to perform automated tasks. Shell programs are called scripts. The most common shells are summarized in the table below:

Most Common shells

The Bourne shell	/bin/sh
The Bourne again shell	/bin/bash
The Korn shell	/bin/ksh
The C shell	/bin/csh
Tom's C shell	/bin/tcsh

Since the bash shell is one of the most widely used shells we shall concentrate on the use of this shell. This Module shall focus on the use of various Linux commands to perform basic file management commands in the Linux System. In this Module you will be :

Introduced to the Linux Command Structure (Variables and command options), the Interactive Shell, metacharacters and quotes plus perform the following :

• Carry out Basic File Management Operations including creating, Deleting, Editing, Renaming, Copying etc file contents and folders

• Moving around the file system;

• Find files and directories; and.

• Work with hard and soft links.

Shell commands are often of the form

command [options] {arguments}.

To print text to the screen the bash shell will use the echo

$echo "this is a short line"

The shell interprets the first "word" of any string given on the command line as a command. If the string is a full or relative path to an executable then the executable is started. If the first word has no "/" characters, then the shell will scan directories defined in the PATH variable and attempt to run the first command matching the string.

For example if the PATH variable only contains the directories /bin and /usr/bin then a command stored in /etc will not be found therefore, the full path needs to be specifies.

An alternative to typing the full path to an executable is to use a relative path. For example, if the user is in the directory where a particular program is stored then one can type:

$ ./<Program Name>

3.5 Linux File Management :

Moving around the File System

A directory or a file can be accessed by giving its full pathname, starting at the root (/) or its relative path, starting from the current directory.

Absolute path : independent of the user's current directory starts with /

Relative path : depends on where the user is doesn't start with /

As in any structured file system there are a number of utilities that can help you navigate through the system. The next two commands are built–in commands.

pwd : Gives your actual position as an absolute path.

cd : The 'change directory' command

Finding Files and Directories

We will describe the find, which, whereis and locate utilities.

Find

Syntax: find <DIRECTORY> <CRITERIA> [-exec <COMMAND> {} \;]

The DIRECTORY argument tells find where to start searching and CRITERIA can be the name of a file or directory we are looking for.

Examples :   find /usr/X11R6/bin–name ¨x*¨.

find /–user 502

Matching lines are listed to standard out. This output can be acted upon. For example, delete the file, or change the permission. The find tool has the build–in option –exec which allows you to do that. For example, remove all files belonging to user 502 :

locate

Syntax : locate <STRING>

Example : locate X11R

When using locate all files and directories that match the expression are listed.

which

Syntax : which string

This tool will return the full path to the file called string by scanning the directories defined in the user's PATH variable only. As a result which is only used to find commands.

Whereis

Syntax : whereis string

This tool will return the full path to source or binaries as well as documentation files matching string by scanning the PATH variable as well as a number of well known locations

ls

Syntax : ls <option>

Most common options for ls

-I show inode

-h print human readable sizes

-n list UIDs and GIDs

-p append descriptor (/=@) to list

-R recursively display content of directories

-S sort by file size

-t sort by modification time (similar to–c)

Handling Directories

Making a directory with mkdir :

When making a directory you can set the permission mode with the –m option. Another useful option is–p which creates all subdirectories automatically as needed.

Example : mkdir –p docs/programs/versions

Removing directories :

To remove a directory, use either rmdir or rm–r. If you are root you may have to specify–f to force the deletion of all files.

Notice :   rm –rf /dir1/* removes all files and subdirectories leaving dir1 empty

rm –rf /dir1/ removes all files and subdirectories including dir1

Using cp and mv

cp

Syntax : cp [options] file1 file2

cp [options] files directory

It is important to notice that cp file1 file2 makes a new copy of file1 and leaves file1 unchanged.

You can also copy several files to a directory, using a list or wildcards. The following table lists the most used options.

Most common options for cp

-d do not follow symbolic link (when used with ?R)

-f Force

-I interactive, prompt before overwrite

-p preserve file attributes

-R recursively copy directories

Note : cp −r /dir/* /dir2/ will copy all files and subdirectories omitting mydir

cp −r /mydir/ /dir2/ will copy all files and subdirectories including mydir

mv

Syntax : mv [options] oldname newname

mv [options] source destination

mv [options] source directory

The mv command can both move and rename files and directories. If oldname is a file and newname is a directory then the file oldname is moved to that directory.

If the source and destination are on the same filesystem, then the file isn't copied but the inode information is updated to specify the new location. Most common options are–f forces overwrite and–i query interactively.

Touch

Another way of creating or modifying a file is to use touch.

Syntax : touch {options} file(s)

If file doesn't exist it is created. You can also change the access time of a file using the–a option,–m changes the modification time and–r is used to apply the time attributes of another file.

Example :

touch file1.txt file2.txt   creates new files

touch myfile–r /etc/lilo.conf   myfile gets the time attributes of lilo.conf

To create a file called –errors use the – option:

touch -- -errors

dd

This command copies a file with a changeable I/O block size. It can also be used to perform conversions (similar to tr).

Main options are if= (input file) of= (output file) conv= (conversion)

The conversion switch can be : lcase ucase ascii

Example :

dd if=/mnt/cdrom/images/boot.img of=/dev

Check Your Progress :

1. Which option of ls command used to view file inode number

   (a) –l   (b) –o   (c) –a   (d) –i

2. Find / –name '*' will

   (a) List all files and directories recursively starting from /

   (b) List a file named * in /

   (c) List all files in / directory

   (d) List all files and directories in / directory

3. Core of Linux operating system is _____.

   (a) Shell   (b) Kernel   (c) Terminal   (d) Command

4. Which command is used to remove files ?

   (a) rm   (b) dm   (c) erase   (d) delete

5. _____ command is used to remove the directory.

   (a) rdir   (b) rd

   (c) rmdir   (d) None of the above

6. FSF stand for –

   (a) Free Software File   (b) Free Software Foundation

   (c) First Serve First   (d) None of the above

3.6   Let Us Sum Up :

In this unit you learned about the historical evolution of Free and Open–Source Software. You also learned that Free and Open–Source Software can be available as commercial software and learned about the various Linux File types. You have also looked at the Linux File System Standard and learned how to install the Linux, how to work with the command shell and noted the structure of any Linux command, how to navigate your way on the command line. The commands you have learned in this module are critical for your effective operations within the Linux system. You notice that you were able to change the operations of a linux command by using appropriate switches/options. This is common across all the Linux commands as this is a design principle common in all linux applications.

3.7 Answers for Check Your Progress :

1. d   **2.** a   **3.** b   **4.** a

5. c   **6.** b

3.8 Glossary :

Linux : Linux is an operating system. In fact, one of the most popular platforms on the planet, Android, is powered by the Linux operating system.

Kernel : This is the one piece of the whole that is actually called ? Linux ? The kernel is the core of the system and manages the CPU, memory, and peripheral devices. The kernel is the lowest level of the OS.

Daemons : These are background services (printing, sound, scheduling, etc.) that either start up during boot or after you log into the desktop.

3.9 Assignment :

• 'What is Free Software' ?

• What is Linux ?

• What do you mean by distribution ?

• Write short note on Linux Distribution

• What is Shell ?

• Explain any five file and directory commands in linux

3.10 Activity :

• Attempt to access and download two different distributions above and attempt to install them on your computer. Note the differences between the distrubtion's installation processes.

3.11 Case Study :

• Having Installed Microsoft Windows Operating Systems before. Compare and contrast the installation process between your selected Linux Distribution and your Windows Installation Process.

3.12 Further Reading :

• https://www.linux.com/

• https://www.howtoforge.com/

• http://www.tldp.org/

• http://www.linux–tutorial.info/

• https://lwn.net/

BLOCK SUMMARY

- An operating system is software that manages the computer hardware as well as providing an environment for application programs to run.

- To best utilize the CPU, modem operating systems employ multiprograming, which allows several jobs to be in memory at the same time, thus ensuring the CPU always has a job to execute.

- Timesharing systems are an extension of multiprogramming whereby CPU scheduling algorithms rapidly switch between jobs, thus providing the illusion each job is running concurrently.

- The operating system must ensure correct operation of the computer system. To prevent user programs from interfering with the proper operation of the system, the hardware has two modes: user mode and kernel mode. Various instructions (such as I/0 instructions and halt instructions) are privileged and can be executed only in kernel mode. The memory in which the operating system resides must also be protected from modification by the user. A timer prevents infinite loops. These facilities (dual mode, privileged instructions, memory protection, and timer interrupt) are basic building blocks used by operating systems to achieve correct operation.

- We have leaned about Definition of Operating System, Evolution of Operating Systems, operating systems functionalities, activities performed by the modern operating systems.

- We have learned about windows operating system and evolution of Windows Operating System, Microsoft Operating Systems for Servers and Mobile Devices and understand new features of windows 10.

BLOCK ASSIGNMENT

Short Answer Questions :

• What is operating system ?

• What is kernel mode ?

• What is Multi–programming ?

• What is time sharing OS ?

• What is network operating system ?

• What is windows operating system ?

• What is Exokernels architecture ?

Long Answer Questions :

• Write detailed note on General Categories of Operating System

• Explain in details about Services of Operating System

• Describe objectives of operating system

• Write detailed note on windows operating system with its features

❖ **Enrolment No. :** [   ]

1. How many hours did you need for studying the units ?

Unit No.	1	2	3
No. of Hrs.			

2. Please give your reactions to the following items based on your reading of the block :

Items	Excellent	Very Good	Good	Poor	Give specific example if any
Presentation Quality	☐	☐	☐	☐	_____
Language and Style	☐	☐	☐	☐	_____
Illustration used (Diagram, tables etc)	☐	☐	☐	☐	_____
Conceptual Clarity	☐	☐	☐	☐	_____
Check your progress Quest	☐	☐	☐	☐	_____
Feed back to CYP Question	☐	☐	☐	☐	_____

3. Any other Comments

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BBAR-203/ DBAR-203

**Dr. Babasaheb
Ambedkar
OpenUniversity**

Computer Application

BLOCK-3 WORD PROCESSING AND SPREADSHEET

UNIT 1

MICROSOFT WORD BASIC FEATURES

UNIT 2

MICROSOFT WORD ADVANCED FEARURES

UNIT 3

MICROSOFT EXCEL SPREADSHEET BASICS

UNIT 4

MICROSOFT EXCEL ADVANCED FEATURES

BLOCK 3 : Word Processing and Spreadsheet

Block Introduction

This block covers introduction and advanced features of word processing and spreadsheet software Microsoft Word and Microsoft Excel

Block Objectives

The objective of this block is to introduce learner about basic and advanced features of word processing software Microsoft Word and spreadsheet software Microsoft Excel.

Block Structure

Unit–1 : Microsoft Word Basic Features

Unit–2 : Microsoft Word Advanced Fearures

Unit–3 : Microsoft Excel Spreadsheet Basics

Unit–4 : Microsoft Excel Advanced Features

Unit 1

MICROSOFT WORD
BASIC FEATURES

: UNIT STRUCTURE :

1.0 Learning Objectives :

After studying this unit learner should be able to :

• Create a file in Microsott Word and format it.

• Understand the functions of different Microsoft Microsoft Word Interface.

• Perform Spelling and grammar checking

• Selecting text, Cut, copy and paste

• Find and replace text

• Create bulleted and numbered lists

- Insert symbols, graphics and Hyperlink
- Utilize WordArt and SmartArt

1.1 Introduction to Word Processing :

Word processing describes creating or editing a document using a word processor, such as Microsoft Word, Google Docs, or OpenOffice Writer. For example, a student could create a book report in a Word Processor application. Then, the student could print it, save it to a disk, display it on the screen, or send it over e–mail. Also, a person looking for a job could create a resume using a word processor, then e–mail or print and mail it to job recruiters.

Some benefits of the document created using Word Processing instead of handwritten or typewritten documentsare as under:

o **Simplicity :** The word processor provides a user with simple Graphical User Interface to create a document. It is very easy to create attractive and informative documents by giving just a few clicks and commands. In addition, many word processors provide templates of different type of documents. WE can easily replace the sample details given in the templates with the appropriate information.

o **Editing :** Editing the text and other details is as simple as adding the details. It is possible to add details in–between the existing details. Also, details can be removed from the document and It is also easy to update the details by using various keys available on the keyboard.

o **Replication :** Sometimes we need to create a new document by changing a small portion of an existing document. Word processor can be very useful in such situations. A word processor is equipped with features using which we can produce multiple copies of the same document.

o **Storage of document :** Word Processor stores document in digital form. Normally the information is stored on magnetic disk medium like hard disk or optical medium like CD/DVD. These mediums guarantee long storage duration of the information. It is possible to store many GBs of data in an extremely small–sized data card. Thousands or millions of pages of documents can be stored on few DVDs; this also resolves the storage problem.

o **Rearranging Sections :** Once the documents have been prepared, a word processor provides the facility to rearrange sections within it. Word Processor provides features of 'Cut' and 'Copy', using which a section can be removed (cut) from its original place and put (paste) into another place very easily. Sometimes it is required to put a section as it is or with minimal changes in a new place, and in such cases the 'Copy' and 'Paste' feature of the word processor can be used. Using this feature, a user may replicate a sentence, a paragraph or a section many times, and thus can be spared out from the task of repeated typing.

o   **Formating :** After adding details in the word document, it is possible to set Font type, Style, Color, Alignment, Border, Background or other such formation quickly and easily. Such formation increases the attractiveness and legibility of the document considerably.

o   **Spelling and Grammar Check :** Word processor provides a feature to find and correct the spellings and grammar of the text keyed into the documents. With the help of this feature, a document can be made error–free very easily.

1.2   The Microsoft Word Interface :

When Microsoft Word is started, the components as shown in the figure are presented on the screen. Let us get the introduction of different components used to create a document.

o   The **Quick Access toolbar** contains one–click buttons for saving, undoing, redoing, and print previewing a document. You can easily modify this toolbar to add your most frequently used commands. Just click the down–arrow on the right edge to customize this toolbar!
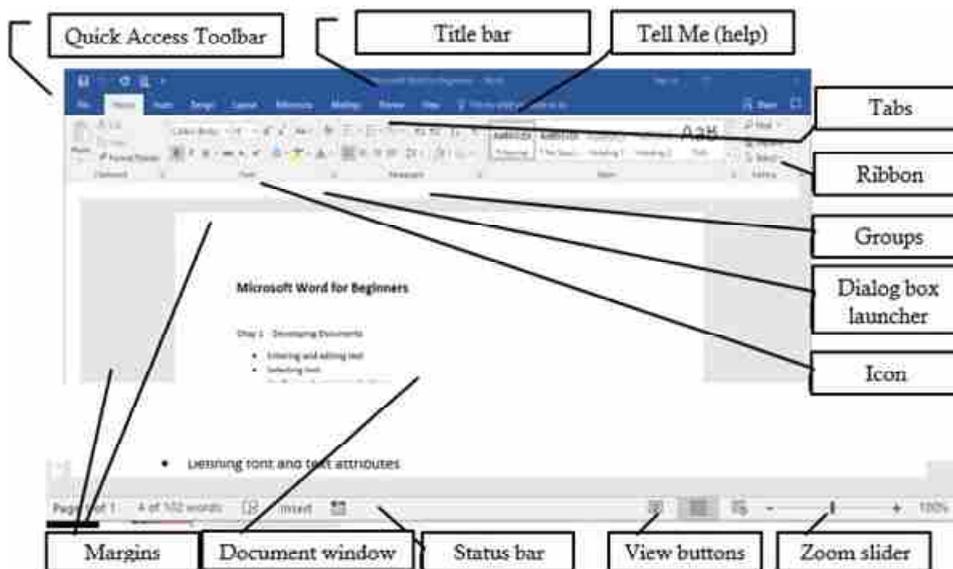
o   The **title bar** displays the name of current document, and the program. A new document will default with a temporary file name, such as Document1 until you save the file with a different name. The Minimize, Maximize and Exit buttons appear on the right edge of the title bar.

o   The **Tell Me tool** is a new way to get assistance with specific tasks in Word. When the user starts typing, Word suggests commands that are related to your keyword(s). The tool is context sensitive, and integrated into your current document versus opening a separate window. Therefore, if you type insert picture into the field, and click the resulting command, Word will open the Insert Picture dialog window without explaining the navigation instructions.

o The **Ribbon** interface is a set of toolbars at the top of the window in Office programs designed to help you quickly find the commands that you need to complete a task. The ribbon displays a combination of icons and tabs. Commands are grouped under multiple tabs. Some commands are so extensive that they need additional windows to display their entire functionality. The dialog box launcher icon will open these windows. Contextual tabs will appear only when the user needs them, such as when a picture is selected, or a table is inserted.

Check Your Progress – 1

1. _____ contains one–click buttons for saving, undoing, redoing, and print previewing a document

2. The _____ displays the name of current document, and the program.

3. The _____ interface is designed to help you quickly find the commands that you need to complete a task.

4. The _____ is a new way to get assistance with specific tasks in Word.

5   _____ will appear only when the user needs them, such as when a picture is selected, or a table is inserted

1.3 Entering and Editing Text :

Microsoft Word is a word processor software application used to create, modify, and share documents. When Word is started, the user has the option of modifying a pre–developed template or creating a blank document. Users begin by entering data at the existing insertion point identified by the I–beam pointer (cursor). As the user types text into the document, Word will word–wrap the data when encountering the right margin, and continue the text on the following line. The user only needs to press [Enter] when it is desired to start a new paragraph or insert a blank line.

Line spacing is the space between each line in a paragraph. By default, the line spacing within a paragraph in Word is 1.15 lines, and the end of a paragraph is followed by a blank line. While the default spacing may be appropriate for some documents, other situations might require different settings. For example, this paragraph is using 1.5 line spacing, which can be adjusted by clicking the option encircled below in the Paragraph group from the Home tab. Other popular line spacing options include double and triple–spacing.

Line Spacing

Line spacing is a popular option to adjust for various documents. However, **paragraph spacing** is less well–known. Adjusting the spacing

before and after paragraphs creates necessary white space to the document more readable. Go to **Page Layout** and under **Spacing**, click the up or down arrows to adjust the distance before or after the paragraph. Spacing is measured in points. You can also type a number directly. This document is currently using 8pt of paragraph spacing After each paragraph.
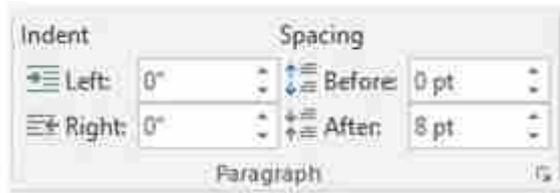
Paragraph spacing

While entering text, users encounter many automatic features as they type, which include :

Feature	How to Use
AutoComplete	A ScreenTip appears you type. Pressing [Enter] inserts the suggested text. Continue typing to reject the suggestion.
AutoCorrect	Commonly misspelled words and capitalization mistakes are fixed based from Word's dictionary.
Word Count	Continually recalculates the total count in the Status bar.
Spelling and Grammar	Right-click red- or green-underlined text to reveal a shortcut menu of correction options. Click an option to accept and fix the text.

1.4 Spelling and Grammar :

In addition to the automatic **spelling and grammar** functionality, a user can manually check their document, and utilize extra functionality. To manually check the document for spelling and grammatical errors, the user can use the commands found under the Review tab. The keyboard shortcut to invoke this command is the **[F7]** key. In addition to the Spelling & Grammar check, the user can also utilize the **Thesaurus** and **Word Count** features to improve readability and accuracy. The thesaurus offers a collection of synonyms that can replace words that are used too often. It is a great tool for solving crossword puzzles! The Word Count is also automatically updated on the status bar.
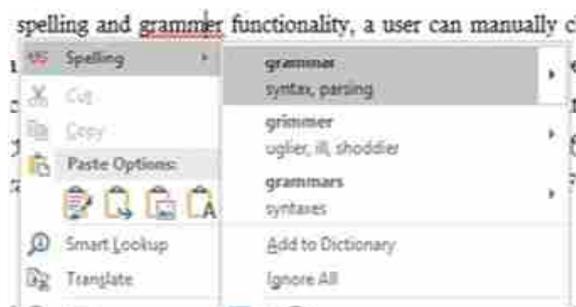
Spelling & Grammar

Status bar

1.5   Selecting Text :

Feature	How to Use
[Ctrl] + A	Select all text in the document or all files in File Explorer.
Click & Drag	A very common, yet easily error-prone way, by holding down the left mouse key and dragging to select multiple characters, words, or rows of text.
[Shift] + Arrow	Position the cursor, and then click the [Shift] key and use the arrows to select one character at a time.
[Shift] + [Home] or [End]	Position the cursor, and then click the [Shift] key and the [Home] key to select everything from the cursor to the left margin. Conversely, the [End] instead of the [Home] key will select everything from the cursor to the right margin.
Double-click	Selects the current word.
Triple-click	Selects the entire paragraph.
Margin + click	Selects an entire line of text.
Margin + click & drag	Selects multiple lines of text.
Margin + double-click	Selects an entire paragraph.
Margin + triple-click	Selects the entire document.
Selection + [Ctrl]+Selection	Selects two non-contiguous blocks of text. Select the first range of text, then hold down the [Ctrl] key, and select another range of text.

Selecting Text

Aside from entering text, selecting text is probably the most common task for most Word users. Almost every task begins by selecting something. Perhaps that's why there are so many ways to select text ? The following list is not comprehensive.

1.6   Cut, Copy & Paste :

Editing a document often requires moving and duplicating text from one location to another. The process of moving text is commonly referred to as cut and paste. When data (text, files, graphics, etc.) is cut, it is removed from the document and placed into

Paste Options

temporary memory in the Clipboard. The Cut process can be performed via the scissor's icon on the ribbon, using the right–click shortcut menu or using the keyboard equivalent [Ctrl] + X. To paste the recently cut data, position the cursor in the desired location, and then choose **Paste** from the ribbon, shortcut menu, Paste Options screen tip, or the [Ctrl] + V keyboard shortcut.

The **Copy** process can be performed to create duplicate data via the Copy icon on the ribbon, using the right–click shortcut menu or using the keyboard equivalent [Ctrl] + C. The paste process is the same regardless if the prior process is the Cut or Copy option. The paste process offers the paste options menu to allow the user to Keep the Source formatting, Merge the formatting from the source into current document, Keep the Text Only, or paste a picture of the selected data, instead of text. Data can be copied or moved within a document, between multiple documents or between multiple programs. This is a great example of how Microsoft Office is a suite of software applications that use common features to integrate data from one software application to another.

1.7 Saving Files :

Once a document has been created, it should be saved as a file for future retrieval. The process of saving a Word document requires two essential elements: giving the document a filename, and defining the location where the file will be stored. The save process can be initiated by clicking the Save icon on the Quick Access toolbar, choosing **Save** or **Save As** from the File menu or using the keyboard equivalents, [Ctrl + S] for Save or [F12] for Save As. The filename should be a unique, yet identifiable description of the file's contents. The filename extension (.docx) is automatically added to filenames in Word. Once saved, the title bar will update with the new file name. The location of the file should also be given careful consideration. The user will likely choose between saving the file to the hard drive of the computer they are using, or using cloud–storage to make the file more easily accessible from multiple devices. The Save command < will overwrite the existing file, while the Save As command will allow the user to change the filename or file location.

1.8 Finding and Replacing Text :

A document can be automatically searched for a specific character, word or phrase. Choosing the **Find** command on the Home tab will open the Navigation pane where search text can be entered. Matches will be displayed in the pane and highlighted in the document.

Similarly, the **Find and Replace** feature allows users to make mass edits to a document. For example, a user might want to substitute the words teacher with trainer throughout a long document. Using the Replace command found in the Editing group of the Home tab, a user can choose to find and review or replace each occurrence individually or replace all occurrences in one step.

The Advanced Find features are similar to the Find and Replace Search Options. To make the search more specific, Word allows users to define criteria, such as Match case or Find whole words only. These options will narrow the scope of returned results. For example, with the Match case check box selected, the text Mark will not be found if the word mark is entered as the search criteria. Conversely, the use of Wildcard characters will increase the search results. An asterisk character will allow any characters to be substituted. Therefore, check* will find checks, checked or checking.

1.9 Creating Bulleted and Numbered Lists :

Formatting a list with bullets or numbers can help to organize the logic of a document. In a **bulleted list**, each item is a separate paragraph formatted with a hanging indent, a bullet (•), and a tab. The bullet character can be formatted to represent other symbols, such as check marks, squares or other symbols from the bullet library or custom–defined new bullets. Formatting a list with bullets adds emphasis, but not priority. Each bulleted item is considered of equal importance, such as a grocery list. Conversely, a numbered list shows a priority or sequence. A typical recipe helps illustrate this difference :

Candy Cookies in a Jar

Need:
* 1 jar Candy Cookie mix   * large microwavable bowl or sauce pan
* 1 1/2 sticks unsalted butter   * wooden spoon
* 1 egg   * 2 cookie sheets
* 1 teaspoon vanilla   * parchment paper

1. Preheat oven to 350 degrees F. Line two cookie sheets with parchment paper and set aside.
2. Melt butter in microwave or stove top. Let cool.
3. Add egg and vanilla to butter and whisk to combine.
4. Pour contents of jar into butter mixture and stir with a wooden spoon until combined.
5. Drop by rounded tablespoonfuls onto prepared cookie sheets, 2 inches apart.
6. Bake for 10 to 12 minutes, or until top are cracked.
7. Remove from oven and move parchment to wire rack to let cookies cool completely.

Enjoy!

Bullets and Numbered Lists

The ingredients and supplies are listed using bullets, because there is no distinction in their priority. However, the instructions utilize a numbered list, because the sequence is crucial to the process.

Bullets & Numbering Ribbon

To create a bulleted or numbered list, first select the paragraphs of text, and the select the appropriate option from the Home tab on the ribbon. Click the Increase Indent or Decrease Indent commands from the Home tab to format the list appropriately. To remove the bullets or numbering, place your cursor in the list and re–click the Bullets or Numbering command.

1.10 Inserting Symbols :

Unique characters that don't exist on your computer keyboard can be inserted into your document by selecting the Ω **Symbol** option from the Insert ribbon. Special characters such as the degree (º) or trademark (™) symbols can easily be inserted from the Symbol dialog window. Other popular symbols include graphics, shapes, and foreign language characters, such as the (é) used in the word résumé, which is a different word than résumé.
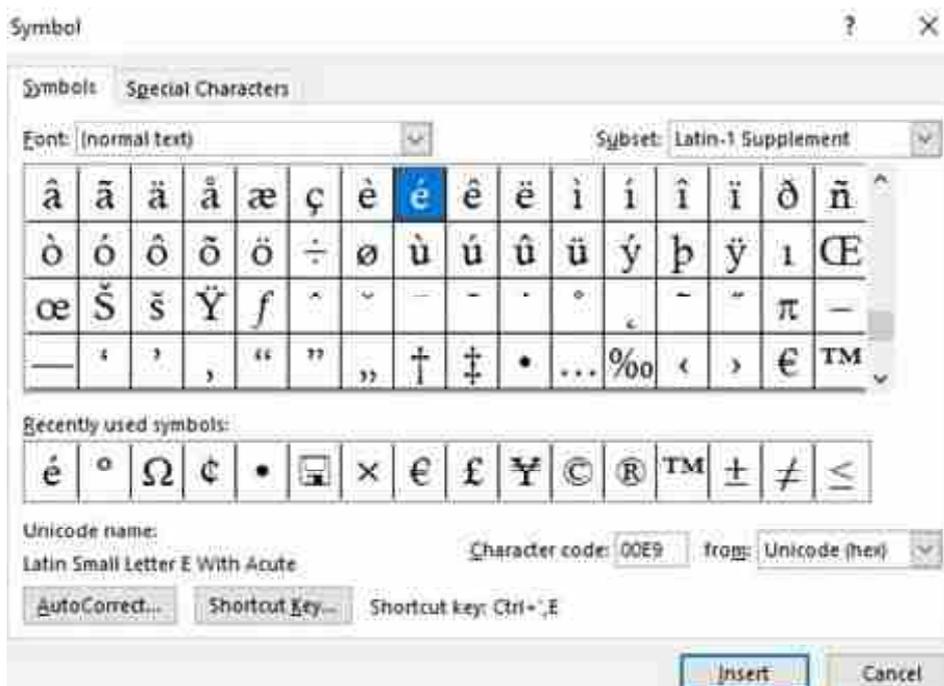
Symbol dialog

In the Symbol dialog window, different sets of symbols will appear when different Fonts or Subsets are selected from their respective list arrows. The Webdings or Wingdings fonts offer a variety of graphics that can be inserted into paragraphs or as bullet shapes.

1.11 Inserting and Modifying Graphics :

It is said that a picture is worth a thousand words. This could be because graphic images make a document more interesting. You can insert photos from your computer or the web, edit them, compress them, resize

and re–position them. Word offers a variety of graphics (from the Illustrations group of the Insert ribbon) that can be inserted into documents to add pizzazz to an otherwise dry document.

Illustrations group

A word–processing application differs from a text editor in part due to its ability to perform basic graphic design functionality. As shown in this textbook, the author has inserted graphic screenshots via the Pictures button on the Insert tab. **Pictures** and **Online Pictures** only differ by where the source files reside. The Pictures option will allow you to insert local pictures that reside on your local device. Conversely, Online Pictures allows
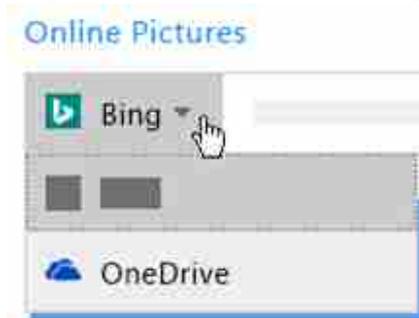
Online Pictures

the user to insert images from the Internet using Microsoft's Bing search engine or OneDrive, provided you have a OneDrive account set up. When inserting graphics obtained from the Internet, keep in mind that using someone else's work without their permission is not only wrong but also may be illegal. US Copyright laws control how a copyrighted work can be used. Consider either using public domain images, which are free to use, or images distributed under a Creative Common license, which generally are free, as long as you provide attribution to the owner.
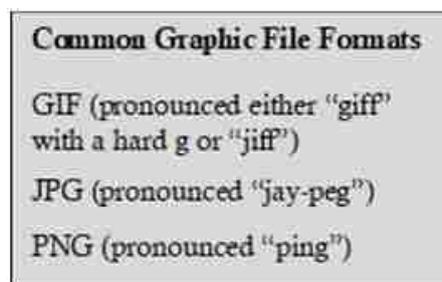
Most of the images inserted via the Pictures and Online Pictures features are likely to be photos. Nonetheless, other common graphics include clip art, scanned artwork, and shapes. Clip art differs from photos when the images consist of simple illustrations. This results in flexible file formats and small file sizes, which explained the appeal to early desktop

publishers. However, increased computing resources have marginalized the

Clip art example

benefits of clip art, and the rich quality of photos have diminished their demand. The once popular clip art option is hidden behind the Online Pictures feature. The keyword that is entered into the search box will, by default, retrieve photos, clip art, and other images. However, the filter

option, which appears once the original results appear, can further restrict the results to only clip art images, or other image types, specific sizes. layouts or colors.

A complete array of built–in **shapes** can be inserted to complement existing graphics. Popular shapes include lines, rectangles and flow chart symbols. Once a shape is selected, the user needs to draw it on a blank area of the document. Once inserted, the shape, like any other graphic object, can be resized and re–positioned. To move the image, hover the mouse over the image until the pointer is the four arrows, then click
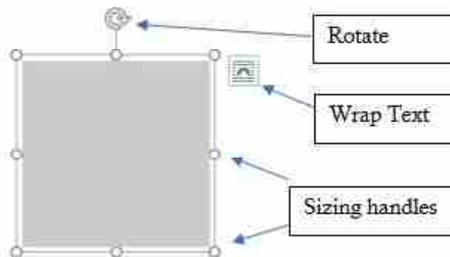
Graphic Editor

and drag to your desired position. To resize a graphic, select the image and drag a corner **sizing handle** to resize it proportionately. The top/bottom or side handles allow the user to resize the graphic disproportionately. The rotate icon allows the user to rotate the object up to ± 360º.

Tip

A real useful picture to create is an image of your signature. Use a scanner or take a digital photo of your autograph and save your signature as an image file on your computer. Then insert the file below your typed name in professional correspondence.

Once the graphic is selected, a new contextual tab called the Picture Tools tab will appear on the ribbon. This tab will allow the user to make a plethora of corrections and adjustments to the graphic. Picture styles, effects, layouts, and the image size are common edits to the defaulting graphic. To **resize an image** disproportionately, click the launcher icon in

the bottom right corner of the Size group to open the Layout dialog window. Now unmark the Lock Aspect Ratio checkbox.
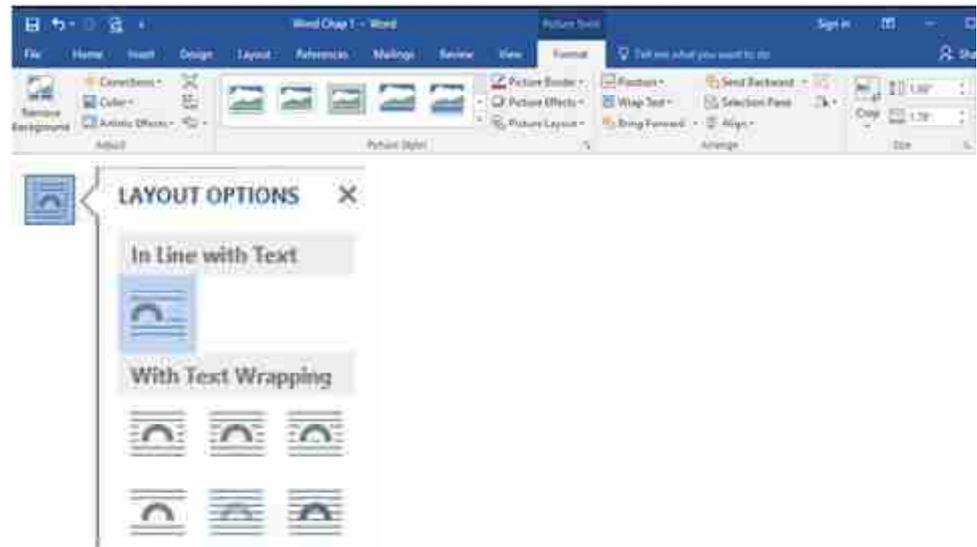
Text Wrap

Perhaps the most common feature used in document layout considerations is the **Wrap Text** feature. By default, when pictures are inserted into a document, their layout is set to In Line with Text. This leaves a lot of unnecessary white space to the right of the image. To wrap text around a picture, select the picture, and then select a wrapping option (as shown in the image to the right of this paragraph). Popular options include Tight or Square.

1.12 Utilizing WordArt and SmartArt :

Another desktop publishing tool that adds pizzazz to a drab document

WordArt styles

is the use of WordArt or SmartArt. **WordArt** is a drawing object with special effects that change the appearance of text by formatting special shapes, patterns and orientations. WordArt can be used to add color, outlines and 3–D effects to regular text. Common usage is titles for papers, posters or other marketing materials. Click the WordArt button in the Text group of the Insert tab. After selecting an initial WordArt style, a placeholder box will appear and await your input of text.

WordArt placeholder textbox

Once inserted, a contextual tab offers numerous to change the effects of the WordArt object. Additional formatting options available include change the text fill, outline or text effects of the WordArt object. The Text Effects offer some exciting ways to rotate and transform the text. The best way to learn about these features is to experiment with them!

SmartArt are diagrams that illustrate concepts and show relationships between elements. Think of SmartArt as pre–made drawing canvases that you can insert into your document and then customize as you see fit. There are a variety of styles to choose from, which you can use to illustrate many different types of ideas. Simply pick an arrangement, such as a list, process, cycle, etc. Insert the SmartArt via the Illustrations group on the Insert tab, which opens the SmartArt dialog window.

After choosing a layout, a SmartArt placeholder will appear. In a SmartArt graphic, elements are represented by shapes. Each shape can have text applied, be resized and re–positioned. You can even add, delete, promote and demote shapes via the text pane or the contextual tab.
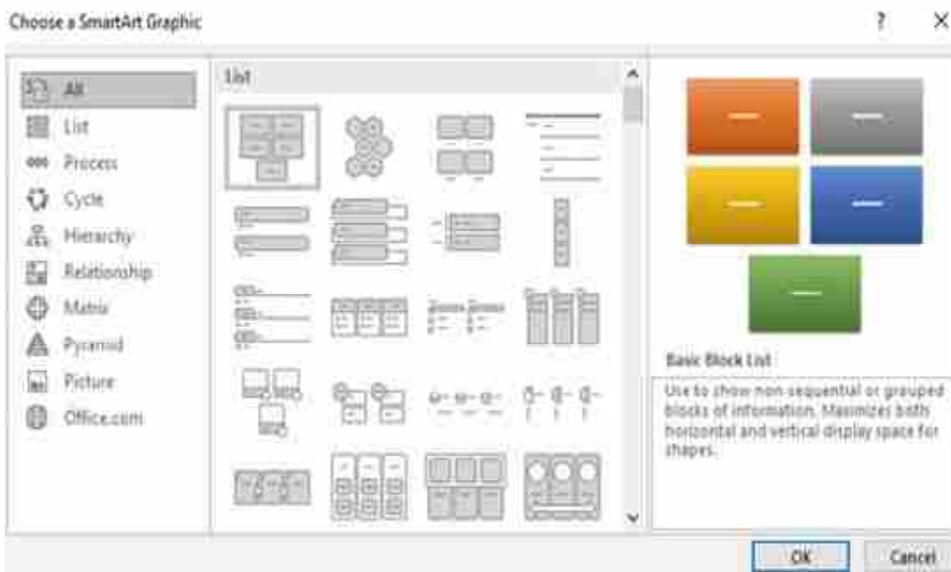
SmartArt dialog

A SmartArt graphic can be formatted and edited using options on the contextual SmartArt Tools Design and Format tabs. The Design tab allows the user to pick from numerous layouts, styles and colors. The Format tab provides choices for shape styles and WordArt options. SmartArt can be utilized throughout the Microsoft Office suite of applications. Again, the best way to learn about these options is to experiment!

SmartArt pyramid

1.13 Inserting and Modifying Hyperlinks :

A hyperlink, often referred to simply as a link, is text or a graphic that, once clicked, "jumps" to a different location in the file or to a different software program. Software programs include e–mail applications, web pages or an external file, often created in Microsoft Office programs like Excel or PowerPoint. There are a few ways to insert a link into your document. Depending on how you want the link to appear, you can use Word's automatic link formatting or convert the text or graphic into a link. The fastest way to create a link in a document is to press ENTER or the SPACEBAR after you type the address of an existing webpage, such as www.baou.edu.in Word automatically converts the address into a link. The same result occurs if the user were to enter an e–mail address, such as student@baou.edu.in Hyperlinks have two parts: the address (URL) of the web page and the display text. In the two previous examples, the URL matches the display text, however it is possible to create a link to any word, combination of words, or an object, such as a picture or shape.
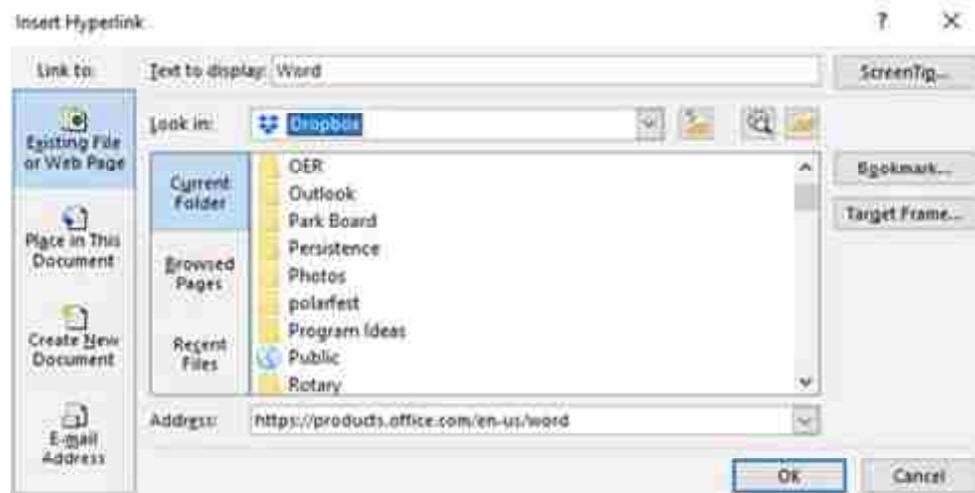
Insert Hyperlink

To create a link on a specific word or object to a web page, start by selecting the word(s) or object, and then click the Link button in the Links group of the Insert tab to open the Insert Hyperlink window. In the illustration below, a link is being defined to go to Microsoft's website for

the Word program. The text "Word" appears as the Text to display so that once the link is created, this text will appear with the hyperlink attributes, which are typically blue and underlined. The Address field contains the URL to the specific web page destination that will open in the current device's default browser application. The Insert Hyperlink window fields will change significantly if the Link to: open on the left side is changed from Existing File or Web Page to another option. To follow a hyperlink in Word, hold the Ctrl key and click the linked text or object.

1.14 Borders and Shading :

Borders add interest and emphasis to your document. Borders make attractive frames for text, pictures, tables, or entire pages. You can customize borders to complement your document by experimenting with Word's built–in styles. To add a border to text, select the text. On the Home tab, click the small down arrow next to the **Borders** button, and choose an option OR choose the Borders and Shading option to open the Borders and Shading dialog window.
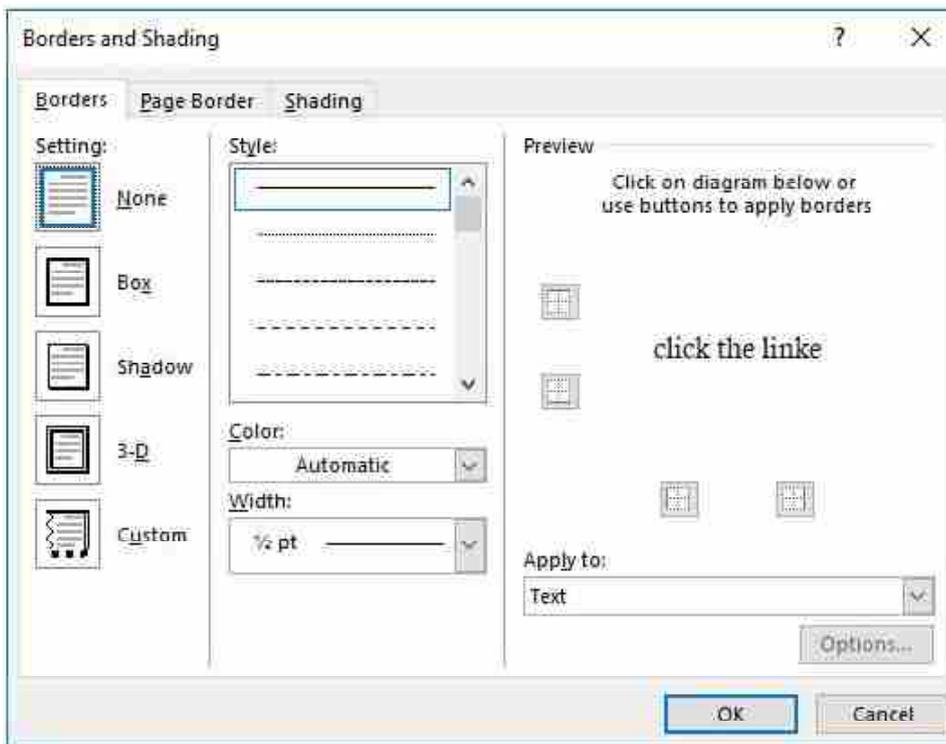
Make sure the Apply to box is set to Text, which adds a border around lines of text, or Paragraph, which creates a border that outlines the paragraph. Also make sure that a choice, like Box, is selected under the Setting option.

Shading is the color or artistic design you use as background for a paragraph. By shading words or paragraphs in Word, you can create visual interest in a document. The **Highlight** command offers a more limited color selection, which you can use when you review or edit a document to highlight specific text. The shading fill, style, and color can be defined from the Shading tab of the Borders and Shading window. To apply shading to

a part of a document, select the data, then click the arrow next to Shading, and under Theme Colors, click the color you want to shade your selection.
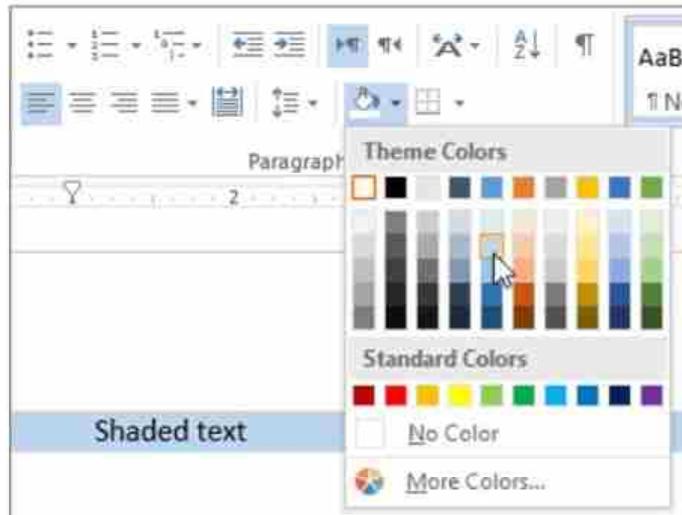
Shading palette

Borders can also be added to pictures. Just select the picture, then choose a pre–formatted border from the Picture Styles gallery off of the Picture Tools Format tab.
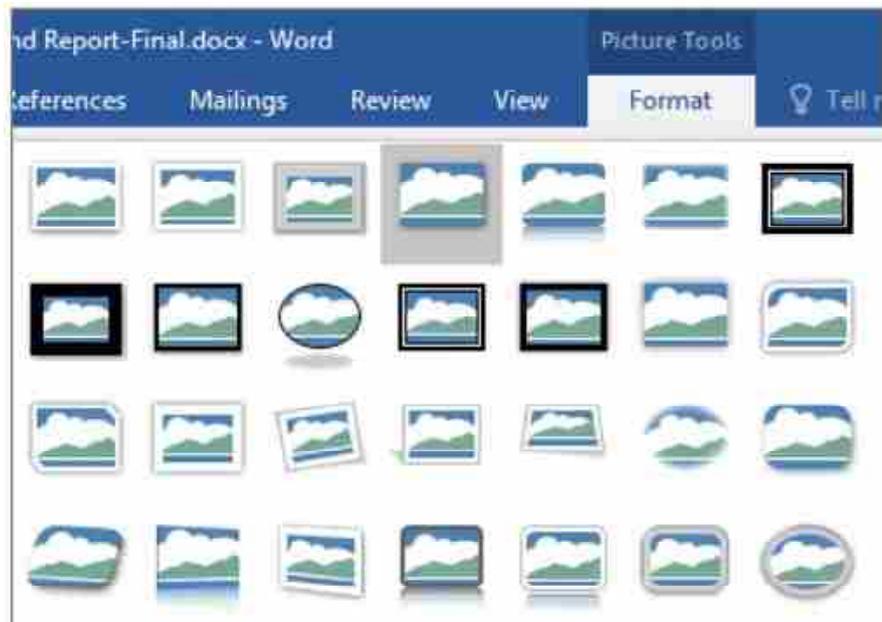
To remove the paragraph borders and/or shading, choose the None option in the Borders and Shading window. In the Shading tab choose the No Color item in the Fill section, and choose the Clear style in the Patterns section.

Check Your Progress – 2

1.   _____ is short cut key for copy.

2.   _____ is short cut key for paste.

3.   _____ is short cut key for Cut.

4.   _____ is short cut key for selecting all text.

5.   _____ is short cut key for Spelling and Grammar Checking

1.5 Let Us Sum Up :

In this unit we have learn about how to Create a file in Microsott Word and format it. We understand the functions of different Microsoft Microsoft Word Interface, Perform Spelling and grammar checking, Selecti text, Cut, copy and paste, Find and replace text, Create bulleted and numbered lists, Insert symbols, graphics and Hyperlink and how to utilize WordArt and SmartArt

1.16 Answers for Check Your Progress :

Check Your Progress – 1

1. Quick Access toolbar   **2.** Title bar   **3.** Ribbon

4. Tell Me tool   **5.** Contextual tabs

Check Your Progress – 2

1. Ctrl+C   **2.** Ctril+V   **3.** Ctrl+X   **4.** Ctrl+A   **5.** F7

1.17 Glossary :

Word processing : Word processing describes creating or editing a document using a word processor, such as Microsoft Word, Google Docs, or OpenOffice Writer.

Ribbon : The Ribbon interface is a set of toolbars at the top of the window in Office programs designed to help you quickly find the commands that you need to complete a task.

Symbol : Unique characters that don't exist on your computer keyboard can be inserted into your document by selecting the ? Symbol option from the Insert ribbon.

WordArt : WordArt is a drawing object with special effects that change the appearance of text by formatting special shapes, patterns and orientations.

SmartArt : SmartArt are diagrams that illustrate concepts and show relationships between elements.

Hyperlink : A hyperlink, often referred to simply as a link, is text or a graphic that, once clicked, "jumps" to a different location in the file or to a different software program.

Shading : Shading is the color or artistic design you use as background for a paragraph.

1.18 Assignments :

• What is a word processing ?

• Explain basic components of Microsoft Word Interface

• Write note on features of word processing

1.19 Activity :

• Discuss Advantages of Word Processing

1.20 Case Study :

- Find and Study some Free and Open Source Word Processing Software

1.21 Further Reading :

- https://open.umn.edu/opentextbooks/textbooks/business–computers–365–lacher
- Information Systems for Business and Beyond, David T. Bourgeois

Unit 2

MICROSOFT WORD ADVANCED FEATURES

: UNIT STRUCTURE :

2.0   Learning Objectives :

After studying this unit learner should be able to :

•   Define font and text attributes

•   Set paragraph alignment and hyphenation

•   Utilize the Format Painter

•   Indent paragraphs

•   Set tabs and tab stops

•   Create and format tables

•   Insert headers and footers

•   Set page orientation and margins

•   Create and insert citations and bibliographies

•   Print and save files in alternative file formats

2.1   Introduction to Defining to Font and Text Attributes :

The way text appears on the screen or a page is referred to its format. Formatting text can enhance the appearance of a document, create visual

impact, and help illustrate a document's structure. Font, size, and style define a character's format. A **font** is a complete set of characters with the same typeface or design. Dozens of fonts are available in the Font drop down list. Users can easily format text with fonts, colors, styles, and other formats by selecting the text and clicking various commands in the Font

or Paragraph group on the Home tab. The Mini toolbar, appears faintly above text when you first select it, and includes the most commonly used formatting commands. The table below describes the functions of each button on the mini toolbar.

Button	How to Use
Calibri (Body)	Change the font of the selected text. The default font is Calibri.
11	Change the font size of selected text. Size is measured in points.
A	Increase the size of selected text.
A	Decrease the size of selected text.
	Format Painter. Copies the formatting of selected text to apply to other text.
A	Apply a style to selected text.
B	Apply bold to selected text.
I	Apply italics to selected text.
U	Underline selected text.
	Apply colored highlighting to selected text.
A	Change the color of selected text.
	Format the selected paragraphs as a bulleted list.
	Format the selected paragraphs as a numbered list.
Other Formatting Options from the Font Group not found on the Mini Toolbar	
abc	Applies a strikethrough line to the selected text. Tells the reader to omit the text.
x₂	Converts the selected text into subscript font, which lowers the position and reduces the size of the text.
x'	Converts the selected text into superscript font, which raises the position and reduces the size of the text.
A	Text Effects and Topography tool changes the look of text by changing its fill, its outline, or adding effects, such as shadows, reflections, or glows.
	Clears the formatting of the selected text.

Many of these commands have keyboard equivalents to improve productivity!

Formatting Buttons

Here are a couple of best practices when utilizing fonts. First, avoid using too many fonts in the same document. More than two or three fonts in the same document becomes distracting. Secondly, legibility and readability should be primary considerations. This should factor in the reader's characteristics, and the purpose of the document. For example, while the default size for a font is 11pt, a larger size font (i.e. 14pt) might be more appropriate for an older aged reader. A pt (or **point**) is the equal to 1/72 of an inch. Headings and titles deserve larger font sizes. However, it is also good practice to limit the quantity of font sizes used in a single document. Lastly, consider using common fonts for professional and business documents. Calibri, Arial, Verdana and Times New Roman are ranked highly by Monster.com as preferable fonts for résumés, whereas Comic Sans is not

recommended. Note that Calibri is only available on Windows operating systems, whereas Arial, Verdana and Times New Roman are some of the cross–platform available fonts.

2.2   Setting Paragraph Alignment and Hyphenation :

Paragraph alignment determines how the edges of each paragraph aligns with the left and right margins. Alignment settings apply to all text within a paragraph. Remember that a paragraph is created each time the user presses the Enter key. To display the hidden characters, including paragraph marks, press the ¶ symbol in the Paragraph group of the Home tab. Press the button again to hide the formatting marks.
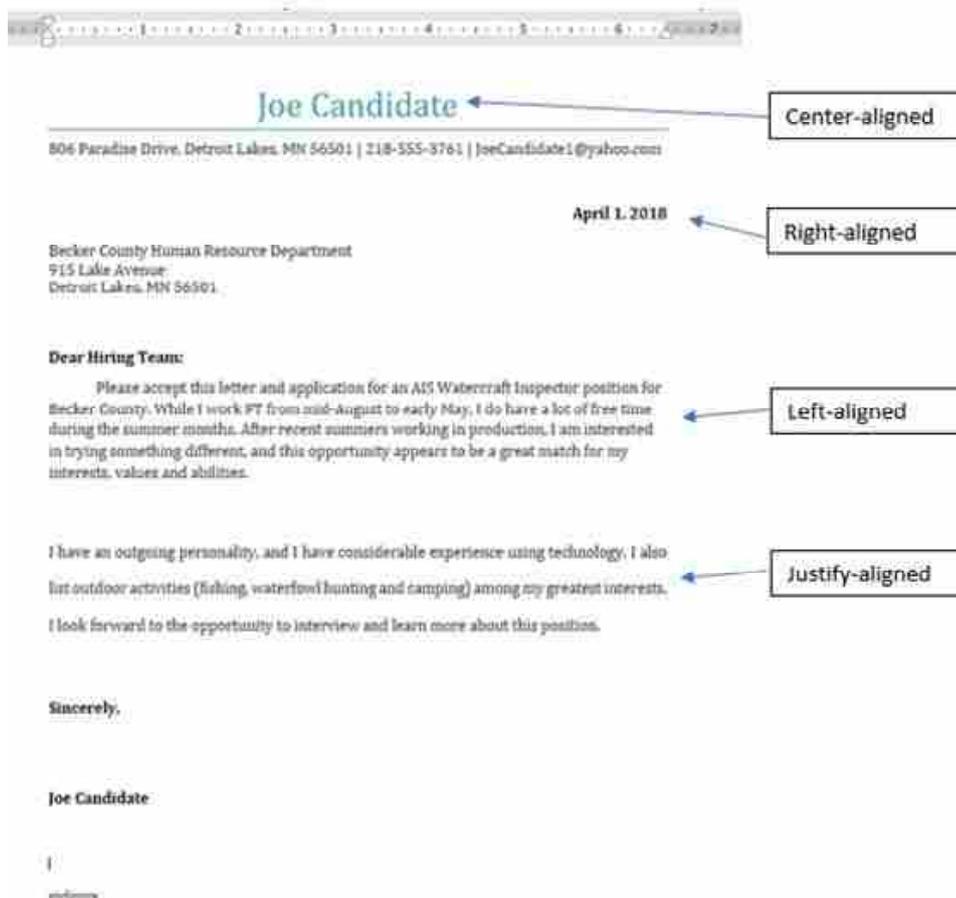
Paragraph Alignments

- Left–aligned text is the default paragraph format. The left edge of the paragraph is flush, and the right edge is jagged. This option is typical for letters and reports.

- Centered text is equally distant from the left and right margins. Common uses are titles and headings.

- Right–aligned text is flush with the right edge, and the left edge is jagged. Typical uses are dates or headers and footers.

- Justified–aligned text spreads the text evenly between the left and right margins, leaving both edges flush, unless the final line has limited characters. This option is common for newspaper columns and textbooks.

Hyphenation can improve the overall readability of certain documents. Hyphenation is the process of adding hyphens to words at the beginning of lines so the hyphenated part will fit at the end of the previous line. The hyphens are inserted between syllables in a word. Word can automatically hyphenate your document for you, or you can use the hyphenation tool to manually hyphenate your document. Users can customize their hyphenation settings via the Hyphenation Options dialog window. Use caution when manually inserting hyphens, because the hyphen will always remain even if editing moves the word to the middle of a line, and results in the word no longer needing hyphenating.

2.3   Utilizing the Format Painter :

The **Format Painter** tool allows the user to copy a format from selected text and apply the format to other selections. For example, if you have inserted text in Word, and have it formatted using a specific font type, color, and font size, you could copy that formatting to another section of text by using the Format Painter tool. Select the text or place your cursor in the paragraph that contains your source formatting, then click the Format Painter tool from the Home tab's Clipboard group. The cursor will change to include a paintbrush , which indicates that the user can now select the destination text that should receive the source formatting. If multiple areas of text need the same formatting, the user should double–click the Format Painter tool to be able to apply the formatting to multiple selections, until the user presses the Esc key. The Format Painter tool works similarly in Excel and PowerPoint too.

2.4   Indenting Paragraphs :

Indenting a paragraph results in moving the editable insertion point from the left or right margins. Users can indent the left or right edge of a paragraph, just the first line, or all lines except the first line. Paragraphs are indented relative to the page's margins, and indenting a paragraph doesn't affect the paragraph's alignment. The default indents are 0 inches, meaning that lines of text extend from the left margin to the right margin. Indenting paragraphs can be performed by pressing the Decrease Indent or Increase Indent buttons on the Paragraph tab of the Home tab. Alternatively, to make precise changes to the Left and/or Right Indents or Paragraph Before/After Spacing, utilize the Paragraph group of the Layout tab. Indents are measured in inches and Spacing is measured in point, much like font sizes.
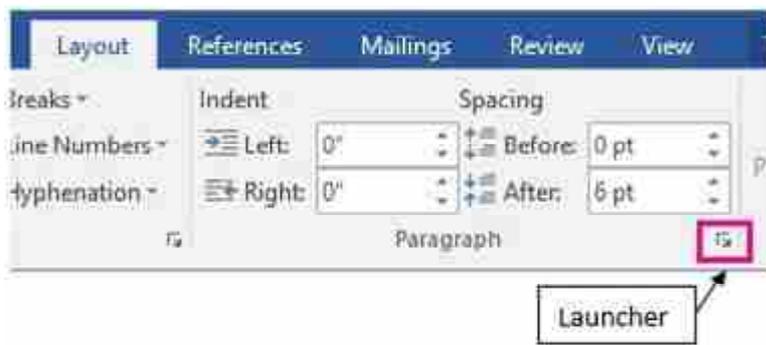
A semi–block letter style requires the first line of each paragraph to be indented from the left margin, which is known as a **first–line indent**. Precise indent definitions can be specified in the Paragraph dialog window which can be opened by clicking the **Launcher** button in the Paragraph group. Alternatively, indents can also be set by dragging the markers on the ruler :
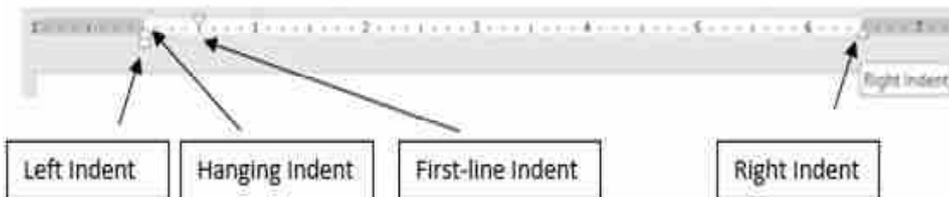
Indent Ruler Markers

A first–line indent requires the user to drag the marker on the ruler to the position where the first line of the paragraph should begin. Typically, this is the .5" mark, which can also be accomplished by pressing the Tab key to indent the first line to the default .5" tab stop. A **hanging indent** occurs when the subsequent lines of a paragraph are indented more than the first. Hanging indents are often used when manually creating citations in a bibliography. To create a hanging indent, drag the marker on the ruler to the right. When citing long quotations in a research paper, users typically use both a left and right indent to offset the quotation, as shown below.
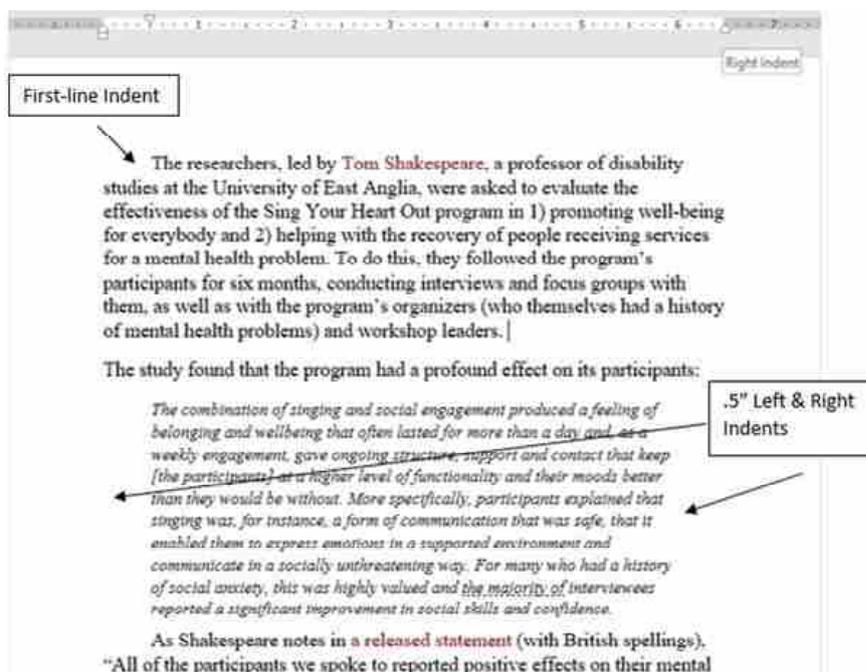
2.5   Setting Tabs and Tab Stops :

Tabs allow users to align text vertically at a specific location in a document. A **tab stop** is a point on the horizontal ruler that indicates the location at which to align text. A tab stop is a location where the insertion point will stop when the user presses the [Tab] key. Tab stops can be used to help align text to create columns of data. Custom defined tab stops are displayed on the ruler above the document. A set of default tab stops are located every half inch, but they do not appear on the ruler. When a new tab stop is defined, Word automatically removes the default tab stops to the left. Using tabs, users can align text to the left, right, or center of a tab stop, or text can be aligned at a decimal point. Word stores paragraph formatting, such as tab stops, in the paragraph marks at the end of a paragraph. Therefore, when the user pressing the ENTER key, tab stops are copied to the next paragraph. The same tab stops can then be used in sequential paragraphs to create columns of text. Tabs can be set by clicking on the horizontal ruler, or by using the Tabs dialog window. The following icons represent different tab stops on the horizontal ruler :
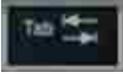
Tab stop icon		How to Use
L	Left tab	Text is aligned to the right of this tab stop.
⊥	Center Tab	Centers the text equidistant over the tab stop.
⅃	Right Tab	Text is right aligned and extends to the left.
⊥	Decimal Tab	Numbers are aligned to the left of the decimal.

Each type of tab stop is used in the example shown below. Note the markers on the ruler :

Name	Country	Color	Year	Type	Price
Tahbilk	Australia	Red	2013	Cabernet Sauvignon	$18.99
Ritual	Chile	Red	2015	Pinot Noir	$18.99
Simonnet Febvre	France	White	2015	Chablis	$22.99
Borgo Scopeto	Italy	Red	2014	Chianti	$15.99
Los Dos	Spain	Pink	2017	Rosé	$7.99
Tokara	South Africa	White	2016	Sauvignon Blanc	$19.99
Saint M	Germany	White	2016	Riesling	$14.99
Ramspeck	USA	Red	2013	Merlot	$16.99

Inserted Tab Stops

The default tab stop is Left, but tab stops can easily be switched by multi–clicking the tab selector L on the horizontal ruler. Existing tab stops on the ruler can be dragged to a new position if needed. To remove a tab stop, drag the tab stop off the ruler and release the mouse. The text will realign itself to the existing tab stops. Once the tab stops are in set, newly inserted text will align to the stops when the tab key is pressed. Alternatively, some users prefer to enter text with tabs, but without tab stops, and then apply the tab stops to the existing text.

The Tabs dialog window is useful for adding new, and editing existing tab stops. The window can be opened by double–clicking an existing tab stop or by clicking the Tabs… button in the Paragraph Dialog window, which is opened from the Paragraph Launcher button. The Tabs window is useful for precise position definitions, and it is the only option for adding Leaders to tab stops. A tab **leader** is a character that is repeated to fill the space spanned by a tab. The dotted leader is very commonly used on menus to make it easier to associate the menu description with its correlating price. The Tabs window is also a convenient way to clear one or all tab stops in a document.
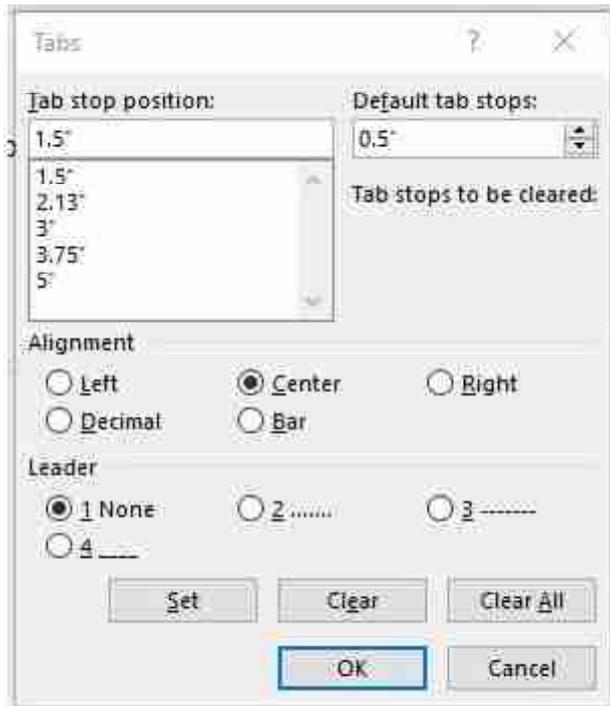
Tabs Dialog

2.6   Creating and Formatting Table :

A table is a great way to organize information within a document. A **table** is a grid of cells arranged in rows and columns. Tables can be used to organize any type of content, whether you're working with text, graphics or numerical data. Unlike tabs, table cells can have headers (in bold), as well as borders or boundaries, which make the information easier to read. A table typically includes headings that identify each column or row that contains data. The following is a 5×3 table, which means it has five columns and three rows.
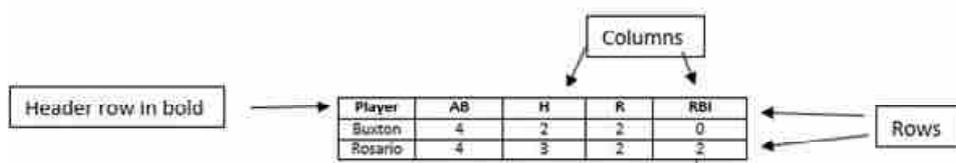
Sample Table

To create an empty table, click Table from the Insert tab, and move the cursor over the grid to select the number of cells for the table. Click the grid to create the table and then type text into the individual cells. Word automatically adjusts the column widths to be equal so that the table fills the space between the left and right margins. To manually adjust the width or height of a cell, drag the border. Press the Tab key to move from cell to cell. If the insertion point is in the last cell, pressing the Tab key will automatically add a new row.
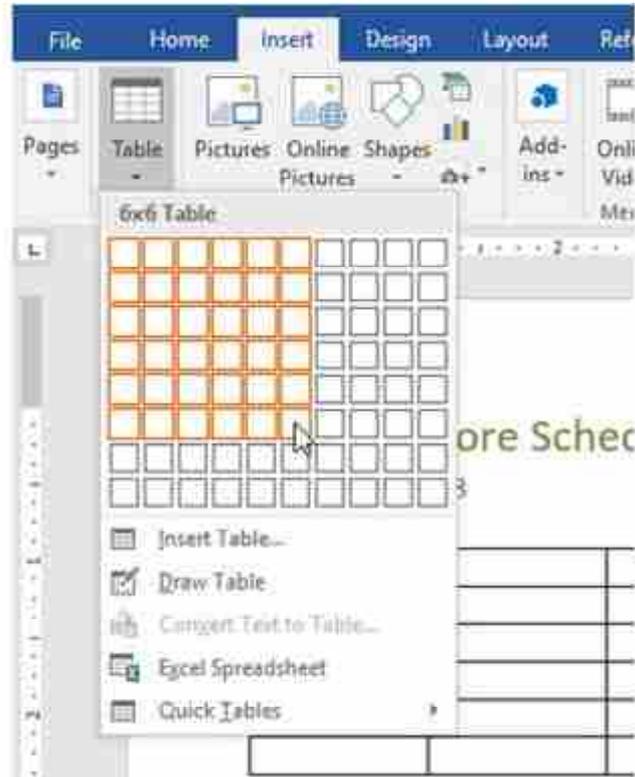
If the number of rows and columns you create turns out to be different than what is needed, you can easily add or delete rows and columns via the Table Tools Contextual tab. The Layout side of this contextual tab will also allow the user to change cell size, merge & split cells, sort table data, change text alignment, and modify table properties.

The Table Tools Design tab offers additional functionality to modify Word tables. Design elements include defining Table Style Options, like Header and/or Total Rows, selecting from a gallery of Table Styles, as well as adding shading and borders. You can easily insert and delete table rows and columns via this tab as well.
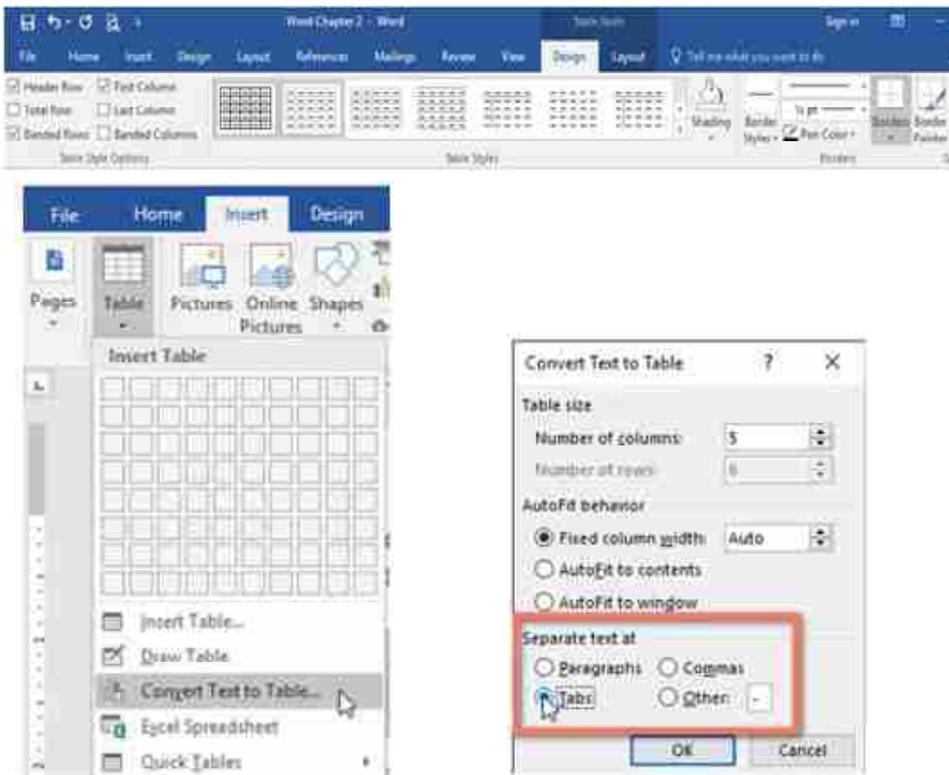
It is possible to create a table from text that already exists. However, the data must be consistently separated, field–by–field, using a delimiter. A **delimiter** can be tabs, paragraphs, commas or some other user–defined character which is used to separate each field. With the cursor residing inside the existing source data, select the Convert Text to Table… option from the Table tab of the Insert ribbon.

Clicking an option from a menu that ends with the ellipsis notation (…) indicates that a dialog window will appear. The Convert Text to Table dialog window allows the user to define the table size, AutoFit behavior, and the delimiter.

The contents of the rows in a table can be sorted based on a column. Users can sort in alphabetic (text), numerical (numbers), or chronological
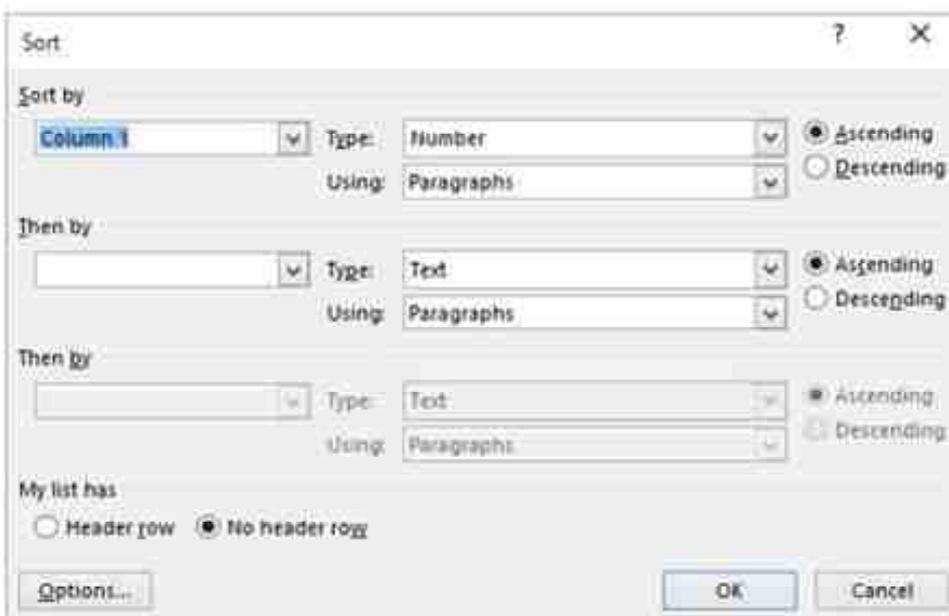
(dates) order using either Ascending (A → Z) or Descending (Z → A) manner. Clicking the Sort button on the Table Tools Layout tab will open the Sort dialog window.

The Sort by options will be the column headers, or Column 1, Column 2, etc. if there is No header row. The first sort selection is known as the primary sort, followed by the secondary, and tertiary sort options. The Type drop–down list will offer the choices of Text, Number or Date, depending on the existing table data. Make sure to choose either Ascending or Descending for each sort level.

2.7 Inserting Headers and Footers :

A header is the area at the top of a page, and a footer is the area at the bottom of a page. Headers and footers consist of one or more lines of text, page numbers, graphics, and other fields, such as the file name, document title, current date and/or time, or author's name. To create a header or footer, click either the Header or Footer drop down list from the Insert ribbon.

Header Gallery

A gallery of built–in designs is displayed. Clicking a built–in design makes the header or footer the active area of the document, while the body of the document fades to the background. A header or footer has three sections: left, center, and right. The user can either type text into existing placeholders, or insert fields from the Header & Footer Tools Design contextual tab, which only appears when the cursor is placed in either the header or footer.

To return to the body of the document, double–click in the document body, or click the Close Header and Footer button on the Header & Footer Tools Design tab. Double–click in the header or footer area to make it active and allow for editing.

The header or footer is printed on each page of the document. To specify a different header and footers for the first page, select the Different First Page checkbox on the Options group of the Header & Footer Tools
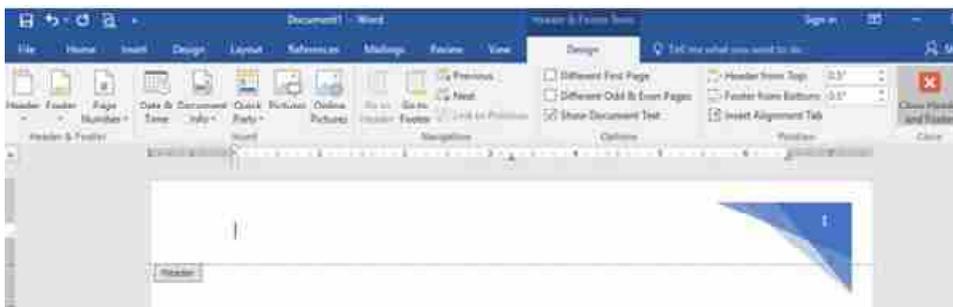
Header Footer Tools Tab

Design tab. Any existing header or footer will automatically be removed. A different first page is common in long documents to prevent the cover page from including the headers and footers contained in the rest of the document. A cover page usually does not include any header or footer data.

One of the most common purposes of headers and footers is to include page numbers. Page numbers are helpful in documents that have more than one page. To add a page number at the current location in an existing header or footer, click Page Number > Current Position, and then choose a style from the gallery of choices. Scroll through the list of style
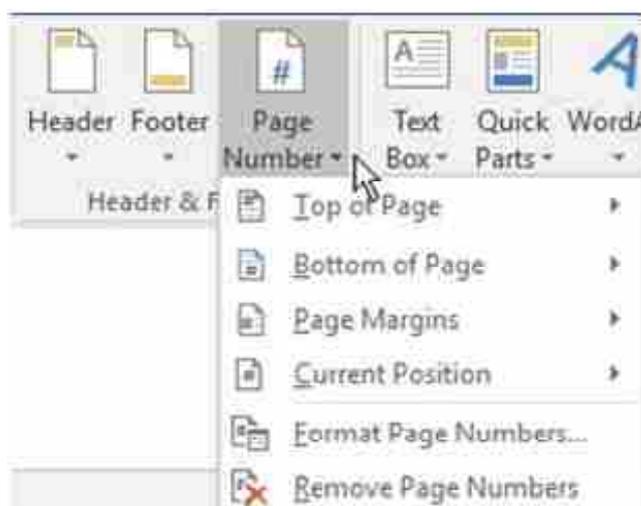
options in the gallery to find one you like. You can select a plain number style, or a Page X of Y style to get a more defined starting and ending number (Page 1 of 7) format. Experiment to find the style that best meets your needs.

An inserted page number can be further formatted as needed. Number formatting and different starting page numbers can be defined in the Page Number Format dialog window, which is opened when the user selects Format Page Numbers…. from the Page Number drop down list. Number formats include Arabic, alphabet, and roman numeral formats.
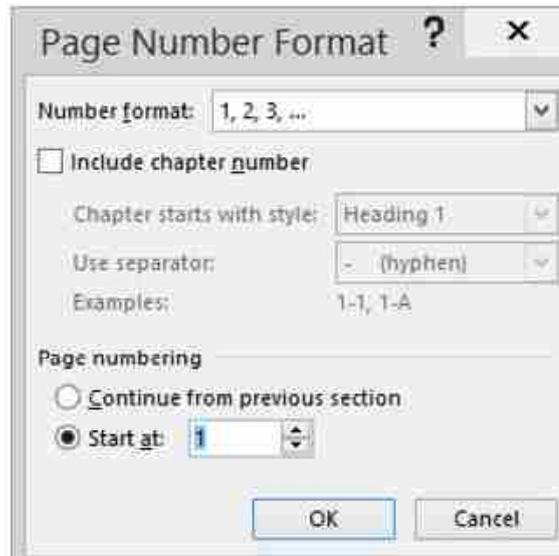
The Page numbering options allow a user to restarting the page numbers at a user–defined number. This can be useful to recognize unnumbered pages that precede the main part of the document.

In the Position group, you can control the amount of space allotted to the header and footer. By default, each is 1/2–inch tall. Users can change these values in the Header from Top and Footer from Bottom list boxes. Manipulating these selections will affect the printable area of the document's margins.

It is a "best practice" to add page numbers before adding other header and footer fields, because any existing text will be replaced by adding page numbers using the Insert > Page Number process. Alternatively, users can add page numbering to existing header and footer text through the Quick Parts feature, which is not explained in this text. Other than page numbers, headers and footers often contain the document's author, date and/or title. Each of these fields help identify the document, particularly when the document is printed and compared with other similar documents.

2.8 Setting Page Orientation and Margins :

The page setup of a document includes settings such as margins, orientation, and other pagination settings. These settings can be applied to the entire document, or specific sections, which can be created by inserting section breaks (not explained in this text). The Page Setup group found under the Layout tab contains these selections.

Page orientation refers to how a rectangular page is arranged for viewing.

The orientation of a Word document can be either portrait or landscape. Portrait orientation is taller than it is wide (vertically), and landscape orientation is wider than it is tall (horizontally). The default orientation is portrait.
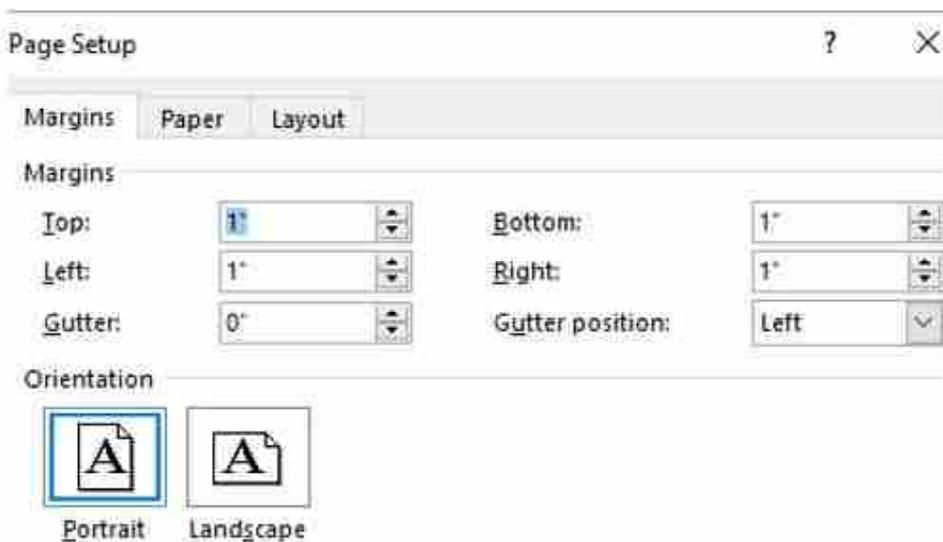
Choosing a page orientation needs to consider the paper size selected for the document. The standard paper size in North America is called Letter, which has the dimensions of 8.5" x 11". Legal documents are 14" instead of 11", which means when printed in portrait orientation, legal documents are three inches longer (and a pain to fit in a standard folder!). The standard paper size in Europe is known as A4. Its dimensions are 210mm x 297mm, which is closer to the Legal size, than the Letter size. Many posters and tables are often printed on Tabloid sized paper, which is 11" x 17". However, since a lot of home printers cannot accommodate this size of paper, many users choose to change their orientation to landscape, which changes the printable width to 11", and the printable height to 8.5". If adjusting the orientation doesn't solve the layout challenges of the document, consider adjusting the margins!

Margins are the white space surrounding the text on a page. Margins can be specified for the top, bottom, left and right edges of a document. The default margins are 1" each, but margins can easily be adjusted from the pre–set choices in the Margins drop–down list, or by manually

adjustments in the Page Setup window, which can be opened by clicking the launcher button in the Page Setup group in the Layout tab. Narrow margins leave more room for more data, while wider margins decrease the amount of printable space. Similarly, larger top and bottom margins decrease the available space. If adjusting orientation and margins aren't enough to resolve page formatting, consider using page breaks.

Pagination is how a document is divided into pages. Word automatically determines how much text will fit on a page based on the amount of text and the document formatting. As new data is added to a page, Word creates automatic page breaks, also known as soft page breaks. To force data to a new page, a user can insert a manual (hard) page break. Inserting a page break moves the text after the insertion point to the next page. To insert a page break, press Ctrl + Enter or click Page Break from the Insert tab. To remove manual page breaks, utilize the Show/Hide button to display formatting marks, such as the Page Break mark :
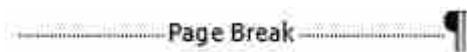
To remove a hard page break, place the insertion point to the left of the page break and press the Delete key. Word will re–paginate itself, and move data to the previous page.

2.9 Printing and Saving Files in Alternative File Formats :

Before printing a document, it is a good idea to preview the document and specify which pages should print. The preview might help the user discover some layout issues that can be addressed before wasting ink/toner and paper. The Print Preview window can be accessed in Backstage view by clicking File > Print. It is also a popular idea to add the Print Preview command to the Quick Access toolbar if it doesn't already exist.
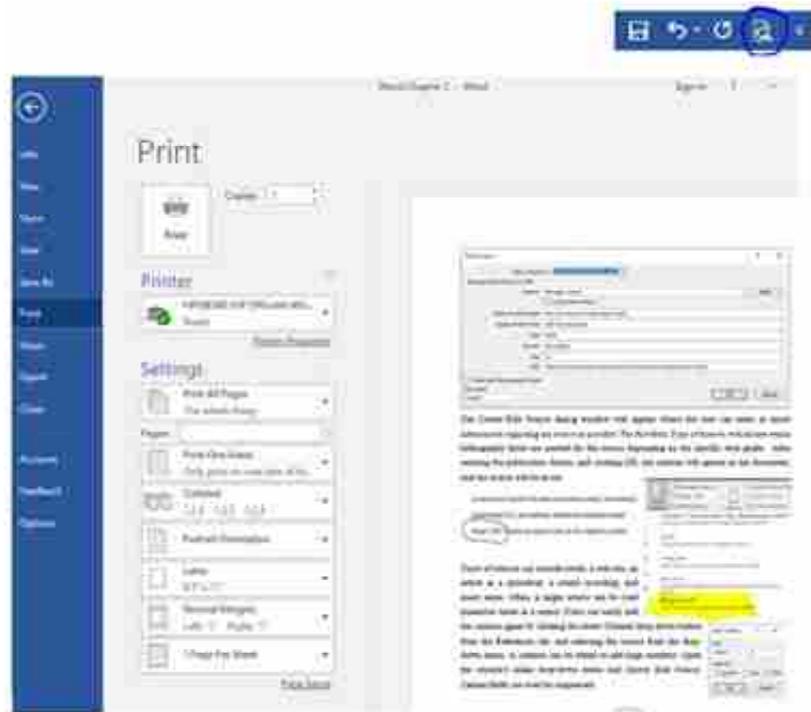
Print Preview

Numerous options can be defined in Backstage view, such as which printer, how many copies, which pages, etc. Once these decisions are made, pressing the big Print button in the top left of the window, will send the data to the selected printer. The back button will exit Print Preview.

If printing a hard copy is not desired, saving the file is the obvious alternative. The way that the user saves a document and the format that they save it in depends on how they plan to use the document. While choosing Save from the File menu will resave the file in its existing format, choosing the Save As command (F12) provides numerous alternatives.

The first option available by using the Save As dialog window, is the ability to choose an alternative storage destination versus the existing location. Alternate storage destinations include a different file folder on the user's hard drive, a portable file storage location, such a USB drive device, or a cloud–based storage location. OneDrive is Microsoft's cloud–based storage option, but other cloud–based solutions, such as Dropbox, exist as well. Cloud computing requires Internet–connectivity to access the current versions of the files. An alternative file format is another option to consider from the Save As window. Choosing the drop–down list to the left of the Save button displays a list of alternative file formats.
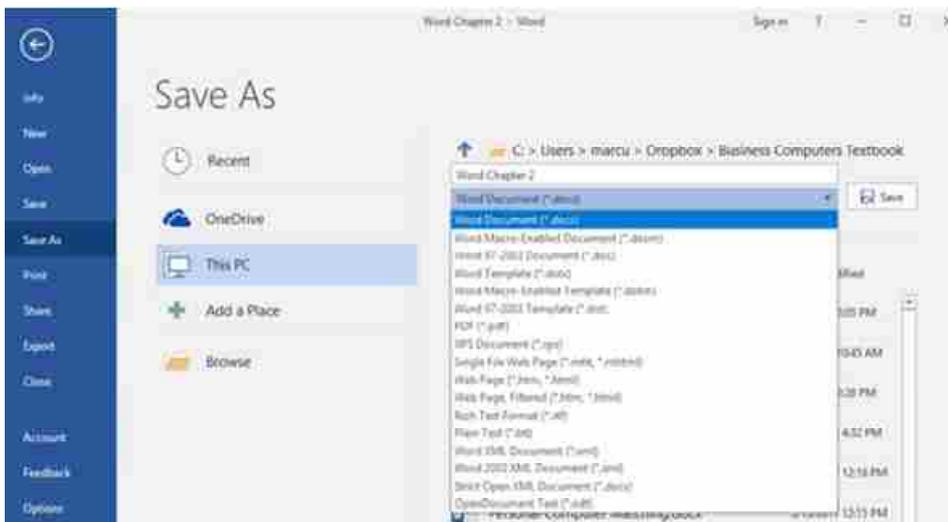
One of the most common alternative file formats is a PDF (Portable Document Format) file. PDFs are popular formats to share with non–Microsoft Office users, commercial printers, and users for whom the document is not to be edited. The PDF format looks the same on most computers, has a smaller file size, and preserves most formatting characteristics of the source document. The only software that is required to read or print a PDF file is Adobe Reader, which is available as a free download from Adobe's web site. While prevention of editing was a key feature of PDF files, the current version of Word can actually edit PDF files, however, the edits are traceable.

The other common file format is saving a file to be viewed on a web site or simply in a web browser. Saving a file as a Single File Web Page is the optimal approach to allow users to open the document using a web

browser. The file extension of a single file web page is .MHT. Other occasionally used file formats include: .XPS, .ODT, and RTF.

Check Your Progress :

1. A _____ once clicked, "jumps" to a different location in the file or to a different software program.

2. A _____ is a complete set of characters with the same typeface or design.

3. A pt (or point) is the equal to _____ of an inch.

4. _____ tool allows the user to copy a format from selected text and apply the format to other selections.

5. _____ occurs when the subsequent lines of a paragraph are indented more than the first.

6. _____ allow users to align text vertically at a specific location in a document.

7. _____ is a grid of cells arranged in rows and columns.

8. _____ can be tabs, paragraphs, commas or some other user–defined character which is used to separate each field.

9. _____ refers to how a rectangular page is arranged for viewing.

10. _____ are the white space surrounding the text on a page.

11. Inserting a _____ moves the text after the insertion point to the next page.

12. The _____ format looks the same on most computers, has a smaller file size, and preserves most formatting characteristics of the source document.

2.10 Let Us Sum Up :

In this we have leaned about how to define font and text attributes and set paragraph alignment and hyphenation, how to utilize the Format Painter and Indent paragraphs. We have also learned about setting tabs and tab stops, create and format tables, insert headers and footers and set page orientation and margins and how to print and save files in alternative file formats.

2.11 Answers for Check Your Progress :

1. Hyperlink	**2.** Font	**3.** 1/72
4. Format Painter	**5.** Hanging indent	**6.** Tabs
7. Table	**8.** Delimiter	**9.** Page orientation
10. Margins	**11.** page break	**12.** PDF

2.12 Glossary :

Format : The way text appears on the screen or a page is referred to its format.

Header : A header is the area at the top of a page.

Footer : A footer is the area at the bottom of a page.

Format painter : The Format Painter tool allows the user to copy a format from selected text and apply the format to other selections.

Tab : Tabs allow users to align text vertically at a specific location in a document.

Hyphenation : Hyphenation is the process of adding hyphens to words at the beginning of lines so the hyphenated part will fit at the end of the previous line.

Table : A table is a grid of cells arranged in rows and columns.

Indenting : Indenting a paragraph results in moving the editable insertion point from the left or right margins.

2.13 Assignment :

•   Write short note on Table in Microsoft Word

•   Explain options available for page setup

2.14 Activity :

1.   Create a 2 x 9 table

2.   Add and format data to table as shown below

Name	Number of Moons
Mercury	0
Venus	0
Earth	1
Mars	2
Jupiter	63
Saturn	59
Uranus	27
Neptune	13

3.   Add a new column to the table to the left of the Name column. The header should be Proximity to the Sun. The data should be 1, 2, 3 …. 8.

4.   Sort the table in descending order by Number of Moons.

5.   Apply the table style to the table.

6.   Add the file name field to the left side of the footer, and the Accent Bar 2 page number to the center section of the footer.

7.   Change the paper size to Legal.

8.   Insert a page break before the paragraph beginning with The Dwarf Planets.

9.   Change the margins to the Office 2003 defaults.

10.   Save the file with a new name.

11.   Save another version of the file in PDF format.

2.14 Case Study :

• Study the review tab of Microsoft Word

2.15 Further Reading :

• https://open.umn.edu/opentextbooks/textbooks/business–computers–365–lacher

• Information Systems for Business and Beyond, David T. Bourgeois

MICROSOFT EXCEL BASIC FEATURES

Unit 3

3.0 Learning Objectives :

After studying this unit learner should be able to :

• Understand What is a Spreadsheet ?

• Enter, Select and Insert Data

• Manipulate Sheets

• Format Worksheets

• Create Formulas to Perform Calculations

• Copy and Paste Formulas

• Add Basic Functions to Formulas

• Insert Headers and Footers

• Adjust the Page Layout and Print

3.1   What is a Spreadsheet ?
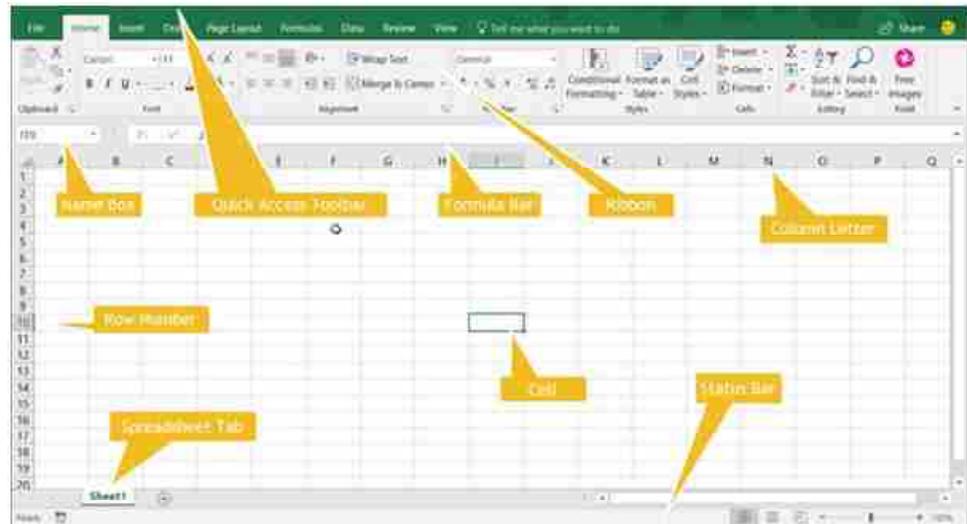
A spreadsheet is a collection of data that is organized into rows and columns. Microsoft® Excel is a spreadsheet application used to store and analyze quantitative data. An Excel file is called a workbook, and it is saved with an .xlsx extension. A workbook file consists of one or more worksheets which consists of many columns and rows. Columns are the vertical part of a worksheet grid identified by letters. Rows are the horizontal part of a worksheet grid identified by numbers. The intersection of a row and column is called a cell. Each cell can store a single item of data. The data can contain text, numbers, formulas, and/or functions. Clicking a cell with the mouse pointer will make the selected cell the active cell. The active cell's contents are displayed in the formula bar.

Typical uses for Excel include :

•   Accounting reports (Balance Sheets, Income Statements, etc)

•   Budgets

•   Calendars

•   Checklists and task lists

•   Contact/Address lists

•   Expense tracking

•   Inventory control

•   Invoices

•   Mortgage and other financial calculations

•   Operational statistics

•   Sales price lists, forecasts and analysis

3.2   Entering Data :

Excel is great tool for generating useful information from data. However, the data has to be entered before it can be analyzed and manipulated. There are numerous types of data, and numerous ways to streamline data entry. As data is typed, it appears in the active cell and in

the formula bar. Pressing the Enter key will complete data entry and make the next cell in the column the active cell. If moving to the next cell after completing data entry is not the desired outcome, try clicking the Enter check mark in the formula bar. The data will be entered, but the active cell remains the current cell.

Type of Data	Purpose
Label	Any text. Cannot be used in calculations. Left-aligned.
Value	Numbers that can be used in calculations. Right-aligned.
Date/Time	Can be used in calculations. Right-aligned.
Formula	An expression that starts with an equal sign and produces a result that may contain numbers, text, operators and/or functions.

Pressing the Esc key before completing data entry will cancel data entry and restore the original cell contents.

Cancel   Enter   Insert Function

× ✓ fx   =SUM(B4:E4)*4
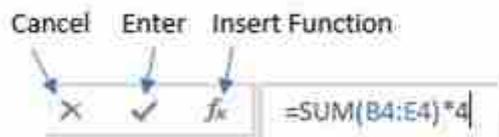
Keyboard Shortcut	Result
Ctrl + C	Copy the cell contents to the clipboard.
Ctrl + X	Cut the cell contents and copy to clipboard.
Ctrl + V	Paste the contents from the clipboard.
Ctrl + N	Open a new workbook.
Ctrl + S	Save the current workbook (with same name).
F12	Opens the Save As window (save to a new location or with a new name).
Ctrl + P	Print the file.
Ctrl + F2	Open Print Preview window.
Ctrl + Z	Undo last action.
Ctrl + A	Select the entire worksheet.

Streamlining data entry in Excel can be accomplished using several different features including keyboard shortcuts and Automatic Completion. **Keyboard** shortcuts allow rapid navigation in a worksheet without having to use the mouse. There are hundreds of keyboard shortcuts available in Excel and many are also available in other Microsoft Office applications. A few keyboard equivalents are illustrated at right, but for more examples, use the shortcut F1 to open the Help pane, and type keyboard shortcuts in the Excel Help field.

Jordan Howard	RB	Eagles
Keenan Allen	WR	Chargers
Joe Mixon	RB	Bengals

When entering data into a sheet that contains a lot of duplicates, Excel uses the Automatic Completion feature to speed up data entry. After typing a couple of characters, Excel guesses how to fill the rest of the cell based on data previously entered in the cells above. To accept the suggestion (in highlighted text), press Enter, or alternatively, continue typing to replace the automatic entry.

3.3   Selecting Data :

After entering data, a common practice is to begin formatting the data. However, before a user can format the data, they must first select the data. Selecting data has multiple techniques based on user intent. Clicking on a single cell makes that cell the active cell. The cell reference appears in the Name box to the left of the formula bar. To select an entire column of data, just click the column letter heading. To select an entire row, click the row number heading. If a user wants to select several cells adjacent to each other, this would be considered selecting contiguous cells. Clicking the middle of the cell and dragging horizontally or vertically will select a **contiguous** range of cells. Another way to select a contiguous range of sequential cells is to click the first cell, hold down the Shift key, and click the last cell in the range. For example, clicking cell A3, and then holding down the Shift key and selecting F7 would select all of the cells from A3 through F7. The range reference would be written as A3:F7.

	A	B	C	D	E	F	G
1	Little Lizzie's Girl Scout Cookie Sales						
2							
3	Date	Thin Mints	Chocolate /Peanut Butter	Carmel D'Lites	Peanut Butter Sandwich	Sales $$	
4	1-Feb	13	10	8	3	$136	
5	2-Feb	11	18	13	7	$196	
6	3-Feb	12	19	8	4	$172	
7	4-Feb	13	18	4	4	$156	
8	5-Feb	15	11	7	3	$144	
9	6-Feb	8	9	2	5	$96	
10	7-Feb	2	3	0	2	$28	

Selecting a non–contiguous range of cells requires the use of the Ctrl key. To select non–contiguous cells, click the first cell, hold down the Ctrl key, and click each additional cell. This practice is sometimes referred to as "cherry–picking" cells. In the example below, the selected range of cells are A4,A6,A7,F4,F6,F7. This practice can be used for selecting non–adjacent rows or columns as well.

	A	B	C	D	E	F
1	Little Lizzie's Girl Scout Cookie Sales					
2						
3	Date	Thin Mints	Chocolate /Peanut Butter	Carmel D'Lites	Peanut Butter Sandwich	Sales $$
4	1-Feb	13	10	8	3	$136
5	2-Feb	11	18	13	7	$196
6	3-Feb	12	19	8	4	$172
7	4-Feb	13	18	4	4	$156
8	5-Feb	15	11	7	3	$144
9	6-Feb	8	9	2	5	$96

To select the entire worksheet, click the triangle box located to the left of column A and above row 1, or by pressing the keyboard shortcut: Ctrl+A.

3.4   Inserting Data :

It is usually easy to add data to an existing worksheet, because Excel has seemingly unlimited columns and rows of cells. (There are limits, but this is not Jeopardy!) Nonetheless, sometimes it is necessary to insert a

column or row into the middle of an existing range of cells. To insert a new column, select the column heading to the right of where you want the new column to appear, and click the top–half of the Insert button from the Home tab. Alternatively, just right–click the column heading to the right of the destination, and choose Insert from the **Context Menu**. Deleting columns is very similar. Whichever column(s) that are selected will be deleted if using the Delete button instead of the Insert button. Inserting and deleting rows is also very similar. Selecting the row below the intended new row and either choosing Insert from the ribbon or from the Context Menu will create a new row above the selection. For example, right–clicking row 10, and choosing Insert from the Context Menu will create a new, blank row 10, and all existing data will move down one row.
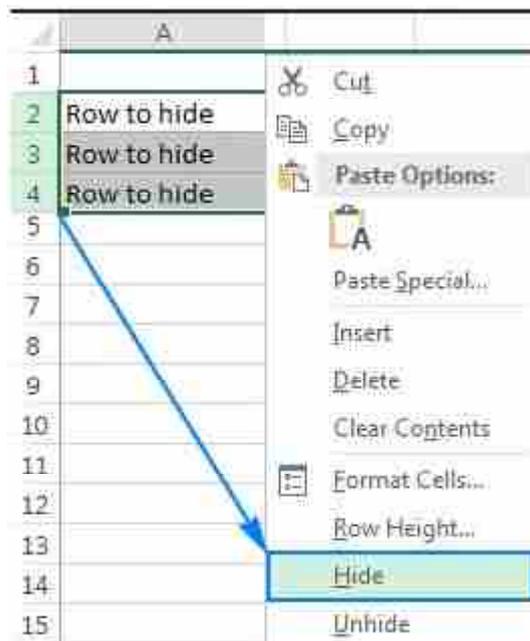
Using the right–click method is a little faster than clicking the worksheet and then clicking the ribbon, as the shortcut menu avoids the need to move the mouse to the ribbon. The Context Menu, also known as Shortcut Menu, provides added functionality by offering actions that can be taken with the selected item. In addition to inserting and deleting, formatting column widths and row heights, as well as hiding and unhiding columns and rows are options from the Context Menu. Adjusting the column width is a common action since excessively wide columns prohibit efficient worksheet printing. Therefore, it is often preferable to widen a
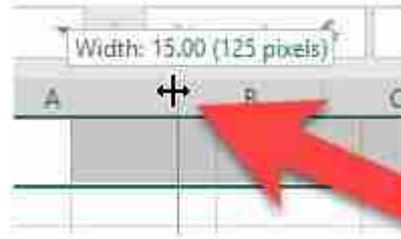
column width by double–clicking the boundary bar that separates the column heading letters. This is known as auto–fitting the column width since the column will resize its width to be just wide enough to display the longest data contained in that column. Clicking and dragging the double–arrow pointer to the left or right allows users to manually adjust the column width.

3.5   Manipulating Sheets :
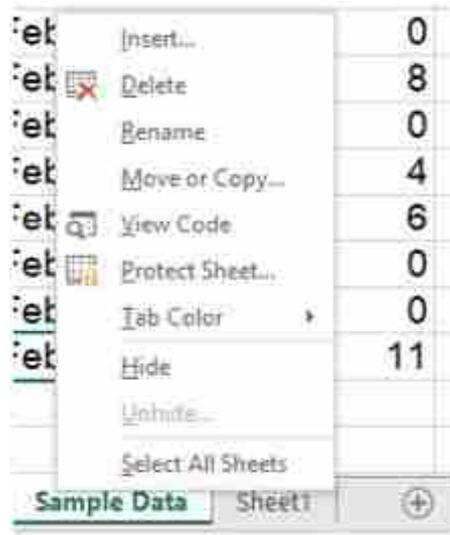
An Excel workbook consists of one or more worksheets. Much like a binder can have multiple sections of sheets divided by colorful tabs, an Excel workbook can multiple sheets that can be re–arranged, colored and renamed to fit individual organization plans. Inserting and deleting worksheets is similar to the inserting of columns and rows. In addition to using the Insert or Delete buttons from the ribbon, right–clicking an existing sheet tab will produce a Context Menu with a plethora of options.

Just as inserting a new column will add the column to the left of the selected column, the newly inserted worksheet will appear to the left of the selected sheet tab. Options exist to insert a blank worksheet or a new sheet based off of an existing template. Clicking and dragging sheet tabs are easy method to rearrange the order of sheets. However, the Move or Copy… command offers the opportunity to move or place a duplicate sheet within an existing, open workbook. Adding tab colors and the Rename option can help organize sheets to user–specific criteria. Sheets can also be hidden and unhidden. If it is necessary to prevent others from unhiding sheets, the workbook can be protected with a password to be able to modify the sheets. The tab scrolling buttons to the left of the sheet tabs are enabled when too many sheets exist to be displayed above the status bar. To quickly add a

new, blank sheet to the workbook, click the plus button ⊕ to the right of the sheet tabs.

3.6   Formatting Worksheets :

Formatting data generally makes it easier to comprehend, and more attractive. The goal of formatting a business spreadsheet should be to make it look professional, accurate, and understandable. Options to format worksheet data depends a lot on the type of data. Formatting text in Excel is very similar to formatting text in Word. Using the Font and Alignment group icons on the Home tab of the ribbon, users can manually format all of the data in a cell or in a range of cells. Changing default formats includes things like changing the font color, style, size, text alignment in a cell, or apply formatting effects – all in an effort to make the data appear more visible.
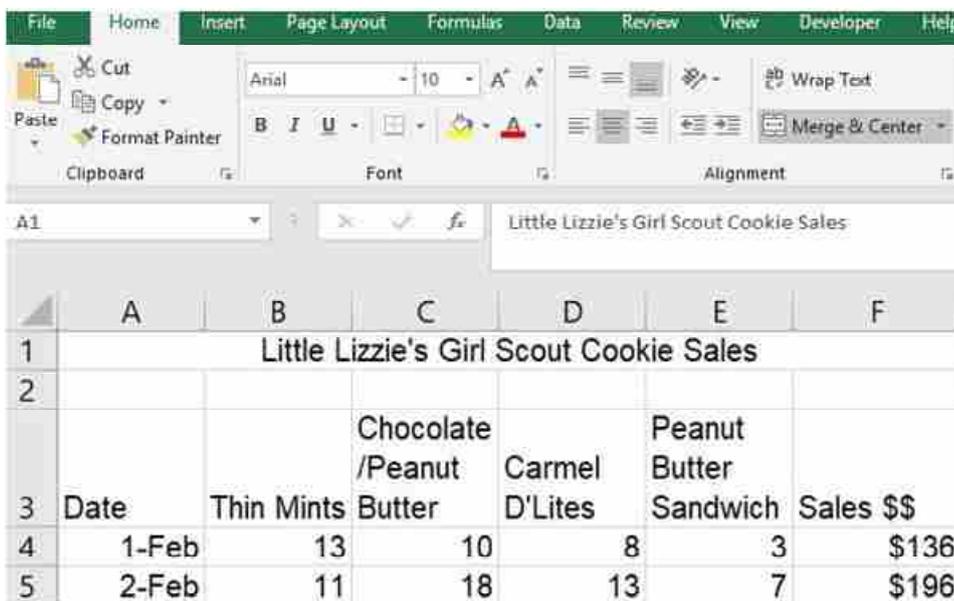
Excel's tabular layout (organized into labeled columns and numbered rows) sometimes limits the amount of data that can be efficiently displayed. Using the Alignment group options can help format data to make it appear as much like a word–processed report as possible. In the screenshot above, two Excel–unique formatting features help make the data more readable. In row 1, the text has been merged and centered across cells A1:F1. This required the cell range A1:F1 be selected before clicking the **Merge & Center** button from the Alignment group. This is very popular for worksheet titles. If the wrong cell range was selected and the Merge & Center is not effective, the user must re–select the Merge & Center button to unmerge the data, so the correct range can be selected before again clicking the Merge & Center button.

Another popular Excel text–formatting feature illustrated above is the **Wrap Text** tool, which will prevent text from being truncated by wrapping the text into multiple rows within the same cell. If a cell has a

lot of text, the data will overlap into the next cell to the right of the active cell. However, if the adjacent cell already has data, the text will be truncated (cut–off) without applying this feature. Cells C3:E3 in the above screenshot each have the Wrap Text feature applied.

While Excel has some pretty useful text–formatting functionality, the majority of data entered into Excel is usually numerical data. Therefore, utilizing Excel's number formats effectively is crucial to make the worksheet as professional as possible. Professional formatting relies a lot on consistent formatting. Therefore, using the Format Painter tool (introduced in the Word chapters) and workbook themes are very helpful to maintain that consistency. Changing the existing **theme** will dynamically update the appearance of all worksheets in a workbook by modifying the fonts, styles, colors and/or effects.

Applying the correct cell format to numerical data is more than just style – it is substance too, because applying the wrong format can impact how other, related cell results are interpreted. The following graphic describes some of the more popular number formats. In addition to the examples provided, there are also other formats, including date & time values, which can be accessed by clicking the Number Format drop–down list.

	Number Formats			
Format Name	**Example**	**Ribbon Icon**	**Description**	
General	7500		Default format; displays the numbers the way they were typed.	
Number	7500.00		Displays the number with two decimal places.	
Currency	$7,500.00		Displays the number with a currency symbol and two decimals.	
Accounting	$ 7,500.00	$ -	Similar to Currency format except the currency symbol left aligns.	
Percentage	750000.00%	%	Displays the number as a percentage and two decimals.	
Comma	7,500.00	,	Displays the number with two decimal places.	

Changing the number of decimals displayed can be manipulated by the Increase Decimal and Decrease Decimal buttons in the Number group. The displayed value could change to a rounded value, however, the actual value stored in the cell has not changed unless a ROUND function has been applied. Formatting only affects how the value is displayed. Applying formats can result in number signs (#####) being displayed in a cell. This is not an error, but an indication that the cell width is not wide enough to display the formatted number.

Excel data can also be formatted as a table. A table is a collection of related data, organized into a tabular layout of rows and columns, that can be manipulated via sorting, filtering and formulas. To create a table, select the data and click Insert > Table from the ribbon to open the Create Table dialog window.

	A	B	C	D	E	F
1	Little Lizzie's Girl Scout Cookie Sales					
2						
3	Date	Thin Mints	Chocolate/ Peanut Butter	Carmel D'Lites	Peanut Butter Sandwich	Sales $$
4	1-Feb	13	10	8	3	$136
5	2-Feb	11	18	13	7	$196
6	3-Feb	12	19	8	4	$172
7	4-Feb	13	18	4	4	$156
8	5-Feb	15	11	7	3	$144
9	6-Feb	8	9	2	5	$96
10	7-Feb	2	3	0	2	$28

Table style Blue, Table Style Medium 16 with banded rows, a header row, and filter buttons.

Applying a table style will format the table with a predefined set of special table properties that includes options to define a header row or total row, and to band the row and/or columns to make the data easier to read. The filter buttons can also be removed. If the table functionality is no longer desired, click the Convert to Range option in the Tools group of the Design tab to convert the table to a normal range.

There are many additional formatting tools available within Excel, but it is important to consider that sometimes, less is more! Too much formatting can be overkill and reduce the readability of a worksheet. Try to limit the use of multiple colors, fonts, and background colors/graphics. Format with a design purpose, not to entertain, and don't forget to use the Spell Check tool (F7) to proof your workbook before printing or sharing!

3.7 Creating Formulas to Perform Calculations :

Perhaps the biggest benefit of using Excel is its ability to create formulas that, when written correctly, can dynamically update when predecessor data is updated. Formulas are mathematical calculations using data in the existing workbook to calculate new values. All formulas in Excel must begin with an equal sign (=), and can contain cell references, ranges of cell references, arithmetic operators, and constants as part of the formula's syntax. Calculations in Excel follow normal math rules as it pertains to the order of operations rule. There are mnemonics available in

various dialects to help decipher the order. The following graphics illustrate the order of operations rules and different formula syntax examples :

Order of Operations Rules		
American	British	Canadian
(P) Parenthesis	(B) Brackets	(B) Brackets
(E) Exponentiation	(O) Orders	(E) Exponentiation
(M) Multiplication	(D) Division	(D) Division
(D) Division	(M) Multiplication	(M) Multiplication
(A) Addition	(A) Addition	(A) Addition
(S) Subtraction	(S) Subtraction	(S) Subtraction

Formula Example	Description
=A4 + B4	Uses cell references and the plus sign mathematical operator.
= (A4 + B4) * 4	Uses cell references, parenthesis, a plus sign and multiplication symbol, as well as a constant value.
=SUM(A4:A11)	Uses a function and a cell range.

Formulas typically reference values stored in other cells. For example, in the Accounting equation: Assets = Liabilities + Owner's Equity, one could calculate the Owner's Equity using a formula. Assume that the value for Total Assets resides in cell D30, and the value for Total Liabilities resides in D60. The formula for Owner's Equity in D65 using cell references would be =D30–D60. Using cell references is advantageous because if any of the cells that generate either the Total Assets or Total Liabilities is changed, the formulas in D30, D60 and D65 will also get updated. Another advantage is when a cell containing a formula is copied to another location, the formula will dynamically update to the new location's reference information. This is called **Relative Cell Referencing**. If the formulas in column D are copied to column E, the new formula for Owner's Equity in column E will be =E30–E60. Additionally, if rows are added or deleted in the range that the Total formulas reference, the formula will automatically update to the new formula range.

Entering the syntax for a formula can be accomplished through typing the formula components, using a **pointing** technique or a combination of both. The pointing method can help avoid typing errors. In the Owner's Equity example, the user would start by typing the equal sign, and then instead of typing D30, just click on D30. Continue by pressing the minus sign, and then click on cell D60, and the click the Enter check mark on the formula bar. Using the point method is even more practical when defining large cell ranges in formulas. Just make sure not to reference the active cell in the formula. This will likely create a circular reference error, which is a formula in a cell that directly or indirectly refers to its own cell.

3.8   Copying and Pasting Formulas :

Data in Excel can be cut, copied and pasted using similar shortcut menu options, keyboard equivalents, and ribbon icon commands as seen in Microsoft Word. Following operating system file management principles, moving data is synonymous with using the "Cut" and "Paste" commands, while duplicating data is the same as using the "Copy" and "Paste" commands. Other terminology that should be recognized is "source", which is the cell or range to be moved or duplicated, and "destination", which is the upper–left cell in a worksheet where the data is to be pasted.

Copying and pasting formulas contain cell references is a very powerful feature, and to expedite this process, Excel has a nifty feature called AutoFill. The AutoFill procedure utilizes the fill handle, which is the

solid, green square in the lower–right corner of the active cell or cell range. Clicking and dragging the fill handle to adjacent cells (horizontally or vertically) will copy and paste the contents and update the destination cells with relative cell references or sequential data aligned with built–in Custom Lists. This should save significant time, and likely improve accuracy, and AutoFill has many uses. Not only can AutoFill copy formulas, but it also be used to complete lists that have a recognizable pattern. It is helpful to select the source cells that demonstrate a pattern, then hover the mouse pointer over fill handle. The mouse pointer will change from the default

pointer icon to a thin, black plus sign. The patterns can be numbers, dates, months, days of the week, etc. If AutoFill incorrectly guesses the series pattern, the AutoFill Options icon is available to change the paste actions. In the screenshots below, the fill handle in cell D5 will by copied to cells D6:D13. The results shown in the second screenshot will update the formula from D5 with relative cell references to rows 6:13. What is happening in cells D7:D8 ?

3.9 Adding Basic Functions to Formulas :

Excel contains over 400 built–in functions that can be included in a formula to perform common calculations. A **function** performs a calculation on data called arguments to compute a result. **Arguments** are variables or

values the function requires and are contained within parenthesis, and usually consist of cell references, but can also contain constants, text, cell ranges, and even other functions! The syntax of a formula using a function is: function name (argument1, argument2, etc.) Functions can be typed with the help of a ScreenTip, or added from the Insert Function window, which can be opened by clicking the symbol found at the left of the formula bar, or at the left side of the Function Library found in the Formulas tab of the ribbon.

The most popular functions are also the easiest to comprehend, which might be correlated! Some of these most popular functions are easily accessible from the AutoSum button in the Editing group on the Home tab of the ribbon. Look for the Greek sigma symbol. This feature is invaluable when it comes to entering functions, especially for common calculations

computed via the SUM, COUNT, AVERAGE, MAX or MIN functions. There are multiple ways to utilize AutoSum, but the following procedure is probably the simplest. In the screenshot below, assume the desire is to total the number of boxes of Thin Mints cookies were sold the first 15 days of February. Make B19 the active cell (the destination cell), then click the AutoSum button. The defaulting SUM option will be inserted into the formula bar with a defaulting cell range (the source cells) inside parenthesis. The cell range that defaults appears on screen with a scrolling marquee surrounding the cell range. This range is usually correct, but not always. If Excel chooses the wrong range, simply type in the cell range, or use the mouse to re–select the correct range (pointing method), and then click the Enter check mark.

	A	B	C	D	E	F
1			Little Lizzie's Girl Scout Cookie Sales			
2						
3	Date	Thin Mints	Chocolate/Peanut Butter	Carmel D'Lites	Peanut Butter Sandwich	Sales $$
4	1-Feb	13	10	8	3	$136
5	2-Feb	11	18	13	7	$196
6	3-Feb	12	19	8	4	$172
7	4-Feb	13	18	4	4	$156
8	5-Feb	15	11	7	3	$144
9	6-Feb	8	9	2	5	$96
10	7-Feb	2	3	0	2	$28
11	8-Feb	0	0	0	0	$0
12	9-Feb	5	8	3	6	$88
13	10-Feb	1	0	0	1	$8
14	11-Feb	2	4	7	3	$64
15	12-Feb	9	6	1	2	$72
16	13-Feb	0	0	0	0	$0
17	14-Feb	0	0	0	0	$0
18	15-Feb	6	11	2	2	$84
19						
20						
21						
22						
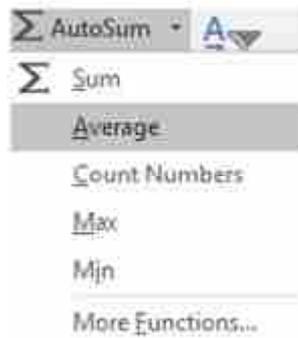
The formula that defaults should be =SUM(B4:B18). Once this formula is submitted, the result, 97 will display. The intent of the **SUM** function is pretty self–explanatory. The **AVERAGE** function takes the SUM function one step further by dividing the sum of the values by the number of cells in the range. The **MIN** and **MAX** functions are used to find the smallest and largest values in a range of cells. These can be useful to identify outlier data that might skew the results. Each of these functions

ignore cells that contain text or are empty. Alternatively, the **COUNT** function totals the number of cells that contain values. If a cell contains the value 0 (zero), it will be counted. However, if the cell is blank or contains the text zero, the cell will not be counted. This function is useful for determining the number of people who mark a checkbox in an Employee roster. For example, how many employees identify as a Veteran ? Those who don't, wouldn't have a value, and therefore, would not be counted. If the desire if to count all cells that contain any data – use the **COUNTA** function.

3.10 Inserting Headers and Footers :

In Excel, **headers** and **footers** are lines of data that print at the top (header) and bottom (footer) of each page in a worksheet to help identify printouts. Headers and footers can contain descriptive text, graphics, and/ or fields, such as titles, dates, or page numbers. Header and footer information does not display in Normal view, so to edit a header or footer, click Insert > Header & Footer to open the sheet in Page Layout view, and activate the Header & Footer Tools contextual tab on the ribbon. There are left, center and right sections for both the header and footer areas.

Users have the option to use one or more of the many built–in headers and footers, or they can click any of the buttons in the Header & Footer Elements group on the Header & Footer Tools Design toolbar to create custom fields.

Command buttons in the Header & Footer Elements group include :

- **Page Number :** Click this button to insert the &[Page] code that puts in the current page number.

- **Number of Pages :** Click this button to insert the &[Pages] code that puts in the total number of pages.

- **Current Date :** Click this button to insert the &[Date] code that puts in the current date.

- **Current Time :** Click this button to insert the &[Time] code that puts in the current time.

- **File Path :** Click this button to insert the &[Path]&[File] codes that put in the directory path along with the name of the workbook file.

- **File Name :** Click this button to insert the &[File] code that puts in the name of the workbook file.

- **Sheet Name :** Click this button to insert the &[Tab] code that puts in the name of the worksheet as shown on the sheet tab.

- **Picture :** Click this button to insert the &[Picture] code that inserts the image that you select from the Insert Picture dialog box that

enables you to select a local image (using the From File option) or download one from an online source using a Bing Image Search.

- **Format Picture :** Click this button to apply the formatting that you choose from the Format Picture dialog box to the &[Picture] code that you enter with the Insert Picture button without adding any code of its own.

The following screenshot illustrates fields in each section of the header. The Page Number and Number of Pages fields are in the left section. Manually entered text is in the center section, and finally, the Current Time and Current Date fields are being inserted into the right section.

To create a custom header or custom footer, click the Launcher icon in the Page Setup group of the Page Layout ribbon to open the Page Setup window. Next, click the Header/Footer tab, and then choose to open either the Custom Header… or Custom Footer… buttons.

Four checkboxes appear at the bottom of the "Header/Footer" tab, and in the Options group of the Design tab of the ribbon. To remove headers and footers from the first printed page, select the **Different First Page** check box. To specify that the headers and footers on odd–numbered pages should differ from those on even–numbered pages, select the **Different Odd & Even Pages** check box. These options are similar to those in Microsoft Word. The other two options are unique to Excel. To specify whether the headers and footers should use the same font size and scaling as the worksheet, select the **Scale with Document** check box. To make sure the header or footer margin is aligned with the left and right margins of the worksheet, select the **Align with Page Margins** check box.
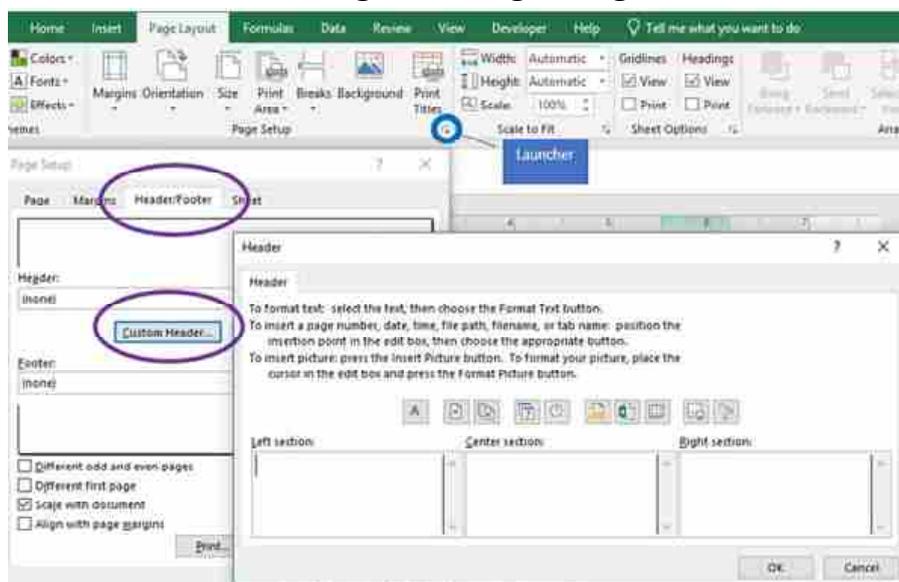
3.11 Adjusting the Page Layout and Preparing to Print :

The size of Excel workbooks tend to grow the more each worksheet is manipulated, typically by adding more columns and rows, and sometimes, more sheets. This added complexity makes physical output of Excel data somewhat challenging. Too many columns will result in the sheet not being able to be printed on one sheet of paper, and too many rows make make it difficult to interpret data on pages beyond the first page. Fortunately, the Page Layout tab can help fit the data on fewer sheets of paper and make each page easier to understand.
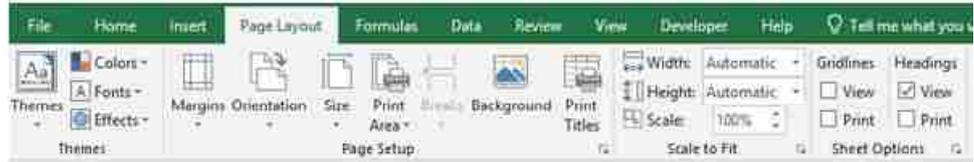
While themes can help modify the appearance of a spreadsheet's colors and fonts, the other groups in the Page Layout tab can impact the arrangement of data, and streamline the readability of the output. Starting with the Page Setup group, Excel allows tremendous flexibility with the margins of each worksheet. For example, Narrow **margins** allow more data to fit on one page by reducing the amount of white space on the edges of the sheet. A quick and easy way to allow more columns to print on one sheet, is to change the **orientation** from the default Portrait, to Landscape, which allows more columns and fewer rows to print on one sheet. The effects of these Setup decisions can be more easily illustrated by switching from the default Normal workbook view to the Page Layout. The View tab also allows users to to enable/disable the Ruler, Formula Bar, and on–screen gridlines and headings.
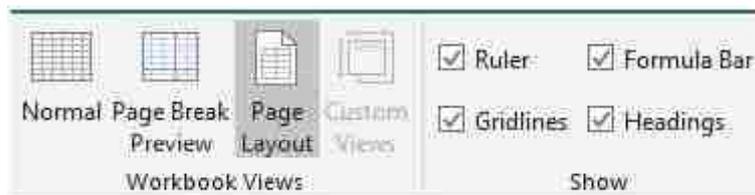
If changing the margins and/or orientation is not resolving the issue of getting extra columns to print on the same page, an alternative could be changing the paper size. The default printer determines the paper sizes available from the Size drop–down list. To check the range of paper sizes that a printer can print on, consult the printer manual, or view the paper sizes that are currently set for the printer in the **Print Setup** dialog box. Some users have the option of printing to Legal (8.5" x 14") or even 11" x 17" (tabloid) printers, especially if commonly printing large worksheets.

A final, more drastic option to keep data from overlapping into multiple sheets, is to utilize the scaling feature. Using the Scale to Fit group from the Layout tab, a printed worksheet can be scaled by to modify the font size of printed output by either shrinking or enlarging the output. The options exist to scale the output to fit to 1 page wide (width) by 1 page tall (height). It might make sense to only modify the width, or by choosing

a Scale percentage, which adjusts the overall sheet height and width proportionately. Keep in mind the needs of your audience. Too small of font might make the spreadsheet unreadable, and for certain audiences, the output might need to be scaled to a larger font than the editing view.

The Sheet Options group of the Layout tab provides two significant print features for basic Excel printing. These include the options to have gridlines and/or headings appear in printed output. By default, the options appear in the Viewing screen, but do not appear when printed. Without Headings, the output would be very difficult to explain to others, and gridlines, much like banded rows, make it easier for the eye to line up the intersections of rows and columns.

More advanced options exist for enhancing page layout and printing options by clicking the launcher button in each group. Additionally, several print settings can be adjusted in the Print Preview window. The sheet in the screenshot below is modified to print in landscape orientation with Narrow Margins and it is scaled to Fit on One Page. It also has headings included in the print output.

Check Your Progress :

State whether the following statements are true or false

1. Excel contains over 400 built–in functions that can be included in a formula to perform common calculations.

2. An Excel worksheet consists of one or more workbook.

3. In Excel, headers and footers are lines of data that print at the top and bottom of each page in a worksheet to help identify printouts.

4. A function performs a calculation on data called arguments to compute a result.

5. Formulas typically reference values stored in other cells

Unit 4

MICROSOFT EXCEL ADVANCED FEATURES

: UNIT STRUCTURE :

4.0 Learning Objectives :

After learn this unit, student will be able to :

• Define Absolute versus Static References

• Understanding Complex Formulas

• Write and use Date & Time Functions

• Write and use Logical Functions

• Write and use advanced Math Functions

• Sorting and Filtering data

• Do Conditional Formatting

• Create Pie Charts, Bar & Column Charts and Line Charts

4.1 Absolute versus Static References :

One of the first things that new Excel users need to realize is that Excel is so much more powerful than a calculator. Some users insist in setting up a worksheet as if it is merely a calculator. These people fail to

realize the power of cell references. Instead they use static references to constant values. A static reference is a reference to a value that does not change. In the example to the right, instead of using static references (= 9000–3952.96) for the formula in D5, the user should employ cell references. (= B5–C5). The main benefit of use cell references is that the user can manipulate the input values in columns B and C, and the formulas in column D will remain accurate. If the user changes either input values in columns B or C with static references, the formulas in column D will need to be manually updated.

D5			× ✓ f_x	=B5-C5

▲	A	B	C	D
1		Peach Sales Profits		
2		Rotary Club		
3				
4	Year	Income	Expenditures	Balance
5	2012	9,000.00	3,952.96	5,047.04
6	2013	6,895.00	6,649.45	245.55
7	2014	8,536.00	10,807.94	–2,271.94

Cell referencing is an extremely useful feature when formulas need to be copied across ranges in a worksheet. When creating formulas that contain references to cells or cell ranges, the default cell reference is considered to be a relative cell reference. When formulas with these type of cell references are copied to other cells the formulas will automatically change relative to the cells that they are copied to. However, there may be instances where it is necessary for Excel to keep the exact cell referenced in a formula when copying to other cells. A cell reference that does not change when copied is called an absolute cell reference (sometimes called a fixed cell reference). The indicator that a cell reference is absolute is the presence of a dollar sign symbol in front of both the column letter and row number, such as $A$3. To create an absolute cell reference, either type the dollar sign manually, or press the F4 after entering the cell reference. Repeatedly pressing the F4 key cycles the reference through the four different combinations of relative, absolute, and mixed cell references.

Mixed cell references are a combination of relative and absolute: either the column is relative and the row fixed (absolute), for example D$2, or the column is fixed and the row relative: $D2. Mixed cell references are rarely used, but they play a significant role when it is necessary to keep a single row or column unchanged while copying the formula. Mixed cell references are commonly used when creating a table of values, like a multiplication table or a mortgage rate table.

Whenever possible, utilize relative and/or absolute references instead of static cell references.

In the worksheet at the right, the formula in C6 is using relative cell references to both the Sales amount (B6), and the Commission Rate (B3). Unfortunately, if this formula is copied (perhaps by using the fill handle) to rows 7:16, the resulting formulas will be wrong. Some cells will display zeros or a #VALUE! error, while others will display inflated amounts because the Rate percentage is being replaced by higher sales values. Therefore, the reference to B3 in the formula should be an absolute cell reference, i.e. =B6*$B$3. It may be tempting to construct the formula using a static reference to the constant value of .075 (i.e. =B6*.075). However, if the rate needs to be changed to 7.25%, the formulas with the static references would each need to be changed manually. Conversely, if the formulas in column C are using absolute cell references to $B$3, a single edit to B3 is all that is needed to update all of the cells in column C. Knowing the differences between the various type of cell reference will make the worksheet more scalable and flexible for future expansion.

4.2 Understanding Complex Formulas :

Formulas can be simple mathematical formulas or complicated formulas involving multiple mathematical operations, multiple cell ranges and nested functions. While it is a good idea to remember the order of operations rules, complex formulas can use parentheses to identify the arguments of functions and to override the order of operations. In mathematical operation formulas, operations within parentheses are performed before those outside of it. For example, in =A3+B3*C3, B3 is multiplied by C3 before A3 is added to the result, but in =(A3+B3)*C3, A3 and B3 are added together first, then the result is multiplied by C3.

Parentheses in operations may be nested inside each other. The operation in the innermost set of parentheses will be performed first. Whether nesting parentheses in mathematical operations or in nested functions, always be sure to have as many closed parentheses in the formula as there are open parentheses, or Excel will return an error message. In the illustrated worksheet below, cell D30 contains a complex formula that calculates the differences between rooms available and rooms rented to determine the total number of unrented rooms in the Balcony and Penthouse categories. The formula in D30 is: =(SUM(C5:C8)–SUM(D5:D8))+(SUM (C25:C28)–SUM(D25:D28)). Notice the number of open and closed parenthesis!

4.3 Date & Time Functions :

Excel can produce the current date and/or time, based on the computer's regional settings. Excel can also add and subtract dates and times.

Popular Excel Date and Time Functions	
Function & Syntax	Usage
=TODAY()	Returns the current computer system date. No arguments are necessary inside the parenthesis.
=NOW()	Returns the current computer system date and time. No arguments are necessary inside the parenthesis.
=DATE(year,month,day)	Returns a date, from a user-supplied year, month and day. Popular for birthdates, invoice dates or other static dates.
=DAYS(end_date,start_date)	Calculates the number of days between two dates. The arguments can be cell references or static values entered within quotation marks.

For example, it may be necessary to keep track of how many hours an employee worked each week, and calculate their pay and overtime. There are numerous Date and Time functions in Excel to help calculate the addition or difference between dates or times. Excel stores all date and time values as sequential serial numbers. For example, January 1, 1900 is represented by the serial number 1, and January 1, 2020 is represented by serial number 43831 because it is 43,831 days after January 1, 1900. To view the serial number of an existing date, format the date using the General Number format. The conversion of dates and times to serial numbers simplifies the process of using dates and times in calculations. The key to displaying the results of these calculations it using the appropriate Number format, which may require diving into the world of creating custom number formats to display only days, hour and/or minutes. For example, if only the number of years is desired to be displayed when calculating the difference between two dates, the Custom Number format should be yy.

The TODAY and NOW functions are very similar since both return the current system date. However, the NOW function also returns the current system time. Many users format the results of the NOW function to only display the current system time. One characteristic of these functions versus the DATE function is that TODAY and NOW are volatile functions, so if the workbook is opened tomorrow, these functions will update automatically, whereas the DATE function will not change. These functions are for use within the grid of the worksheet, typically to calculate durations. There are separate Date and Time fields for use in worksheet headers and footers.

4.4 Logical Functions :

Many employers and educators are placing increasing emphasis on the value of critical thinking.

Condition	Operator	Formula Example	Description
Equal to	=	=A1=B1	The formula returns TRUE if a value in cell A1 is equal to the values in cell B1: FALSE otherwise.
Not equal to	<>	=A1<>B1	The formula returns TRUE if a value in cell A1 is not equal to the value in cell B1: FALSE otherwise.
Greater than	>	=A1>B1	The formula returns TRUE if a value in cell A1 is greater than a value in cell B1: otherwise it returns FALSE.
Less than	<	=A1<B1	The formula returns TRUE if a value in cell A1 is less than in cell B1: FALSE otherwise.

Greater than or equal to	>=	=A1>=B1	The formula returns TRUE if a value in cell A1 is greater than or equal to the values in cell B1: FALSE otherwise.
Less than or equal to	<=	=A1<=B1	The formula returns TRUE if a value in cell A1 is less than or equal to the values in cell B1: FALSE otherwise.

Critical thinking skills are often associated with problem solving skills, empathy, and thinking and acting in purposeful ways by making fact–based decisions. Excel is a practical tool for collecting and analyzing data critically. Excel's logical functions are especially useful for enabling critical thinking. However, before exploring the utilization of Excel's logical functions, it is necessary to review the logical operators that are used to compare data between cells. The operators are often referred to as comparison operators. The six main logical operators are explained in the following graphic:

These comparison operators can be used in Excel functions to compare all types of data, including dates, numbers, Boolean values (True or False, Yes or No), or text. All arguments must evaluate to the Boolean values of either True or False, or contain another, nested logical function.

The IF function is one of the most popular and useful functions in Excel. It can be used to make a decision based on a comparison. If the comparison is true, one value is displayed in the cell; if the comparison is false, a second value is displayed. The syntax of the IF function is: IF(logical_test, [value_if_true], [value_if_false]).

• logical_test – a value or logical expression that can be either TRUE or FALSE. Required.In this argument, you can specify a text value, date, number, or any comparison operator.

• value_if_true – the value to return when the logical test evaluates to TRUE, i.e. if the condition is met. Optional.

• value_if_false – the value to be returned if the logical test evaluates to FALSE. Optional.

Simple IF functions test to see if a cell contains a certain text string, and returns different values depending on if the logical test returns a True or False logic. A sample formula is illustrated in the screenshot at right. That's some logical critical thinking!

=IF(E36="Vikings", "Good", "Bad")

	E	F	G
	Bears	Bad	
	Lions	Bad	
	Packers	Bad	
	Vikings	Good	
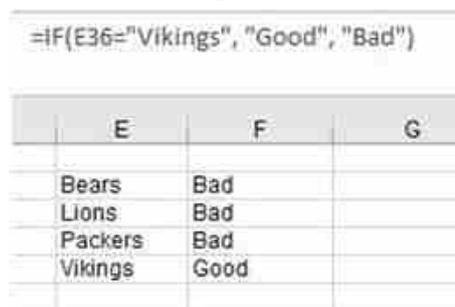
Instead of returning text strings, the IF formula can test the specified condition, perform a corresponding math operation and return a value based

on the result. This is done by using arithmetic operators or other Excel functions in the value_if_true and /or value_if_false arguments. For example, =IF(C4>=D4, E4*.25, E4*10%). This formula is determining if the value in column C is greater than or equal to the value in column D. If the result of the comparison is true, then the value to be displayed should be the value in column E multiplied by .25 (25%). If the result of the comparison is false, then the value to be displayed should be the value in column E multiplied by 10% (.10).

Other popular Excel Logical functions include the AND, as well as the OR functions. These functions allow users to create multiple logical tests within a single IF function. These functions return either TRUE or FALSE results when their arguments are evaluated. The AND function only returns TRUE if every condition is met. However, the OR function returns TRUE if any condition is met. The syntax of both functions are the same: =AND(logical1, logical2, etc.) Examples of each function are illustrated in the screenshots below. The first illustration uses the AND function to determine if any of the people are eligible for the Inner Circle. They need to have a Customer Satisfaction Score of at least 4.0, and be a Vikings fan. The second example uses the OR function. The more lenient comparison operator yields more eligible people for the Inner Circle.

AND function example

OR function example

4.5 More Math Functions :

The most popular Excel function in the Math category is undoubtedly the SUM function. The Excel Math Functions perform many of the common mathematical calculations, including basic arithmetic, conditional sums & products, quotients, and rounding calculations. There are many more examples, but some of the more popular Math functions are identified in the table below. There are many variations of some of these functions to be found in the Insert Function window.

Popular Excel Math Functions	
Function & Syntax	**Usage**
PRODUCT =PRODUCT(number1, number2,....)	Multiplies all of the numbers given as arguments.
QUOTIENT =QUOTIENT(numerator,denominator)	Returns the integer portion of a division.
RAND =RAND()*100	Returns an evenly distributed random real number greater than or equal to 0 and less than 100.
ROUND =ROUND(number,num_digits)	Rounds a number to a specified number of digits.
SUMIF =SUMIF(range,criteria,sum_range)	Adds the cells specified by a given condition or criteria.

The first two functions from the table above are considered basic mathematical operations. Instead of multiplying two cells using the * operator, Excel users can opt to use the PRODUCT function. i.e. =PRODUCT(B2,B3) versus =B2*B3. The PRODUCT function is most useful when multiplying a series of cells. Ensure that the cells referenced contain numbers or dates. If the data referenced includes text, the PRODUCT function will return the #VALUE! error result. The QUOTIENT function is similar to the PRODUCT function, except instead of multiplying cells, it divides cell(s) by other cell(s) and returns a result in Integer format. An integer is a whole number, therefore it will not display the remainder typically generated in division calculations. The graphic at right illustrates the differences between using the divide operator and the QUOTIENT function. The numerator is the dividend and is the value before the forward slash (/). The denominator is the divisor, and is the value after the forward slash (/). In this example, A1 (or 13) is the dividend, and B1 (or 5) is the divisor.

	A	B
1	13	5
2		
3	**Formula**	**Result**
4	=A1/B1	2.6
5	=QUOTIENT(13,5)	2
6	=QUOTIENT(A1,B1)	2
7		

An alternative to using the QUOTIENT function is to utilize the ROUND function or any of its related functions (ROUNDDOWN, ROUNDUP,MROUND). In the graphic above, a user could rewrite the

formula in A4 as =ROUND(A1/B1,0) by using the ROUND function to get the similar results as the QUOTIENT functions. The difference is that the QUOTIENT result does not store any remainder amounts.

	A	B	C
1	13	6	
2			
3	**Formula**	**Result**	**Result * 5**
4	=A1/B1	2.166667	10.83333333
5	=QUOTIENT(13,6)	2	10
6	=QUOTIENT(A1,B1)	2	10
7	=ROUND(A1/B1,0)	2	10
8	=ROUND(A1/B1,1)	2.2	11
9	=ROUND(A1/B1,2)	2.17	10.85
10			

As shown in the graphic at the right, using the ROUND function can yield significantly different results than using the QUOTIENT function, however, the user can control the level of detail desired in the calculation. Some users simply opt for the first scenario without using either functions. Instead, they utilize Excel's formatting functionality to remove the displaying of decimals. Using the Decrease Decimal button from the ribbon on cell B4 can change the display to various results. However, the un–truncated/ un–rounded result is still stored in the cell.

4.6   Sorting and Filtering :

Worksheets can have large amounts of data, and it can be overwhelming if it is not sorted correctly. Arranging data in a specified order is called sorting. Rows can be sorted in either ascending (low to high) or descending (high to low) order. Ascending order can also be considered alphabetic order if the data is text or chronological order if the data is dates or times.

Before data can be sorted, Excel needs to know the exact range of cells that is to be sorted. Excel will select areas of related data as long as there are no blank rows or columns in the data range. Blank rows and columns define the outer limits of the data range. To ensure that the correct data is selected, highlight the range before starting the sort.

As Excel determines the defined range of data to be sorted, Excel also determines if field names exist. Users should format the first row of the data range with unique formatting Often, just making the labels bold will help Excel identify the field names. Identifying the field names will prevent Excel from including these fields in the records to be sorted. The field names become the sort keys needed for multiple column sorts. In the image below, the possible sort keys are: Cruise Date, Accommodation Category, Rooms Available, Rooms Rented, Rate, Revenue and Shortfall.
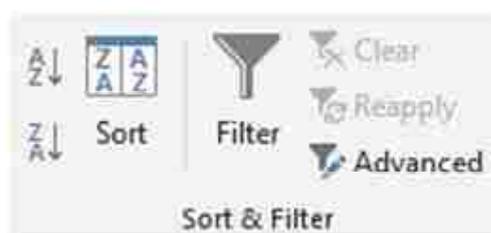
The data range above is already sorted in ascending order by the Accommodation Category key field. A single column sort is quite easy. Simply click any cell in the column that represents the key sort. In the above example, any cell from B4 to B28 would be acceptable. Then, click the the A–Z option in the Sort & Filter group of the Data tab. The entire row is sorted because each row is a record that should stay grouped together. Be careful NOT to select a single column of data or the records may not be kept together. Excel will warn the user with a warning message. If the user chooses to Continue with the current selection, only the data in the column with change their order, while the data in the other columns remain unchanged. This will most likely destroy the integrity of the data.

	Cruise Date	Accommodation Category	Rooms Available	Rooms Rented	Rate	Revenue	Shortfall
5	July 5, 2019	Balconies	60	35	$ 5,000	$ 175,000	$ 125,000
6	July 12, 2019	Balconies	60	45	$ 5,600	$ 252,000	$ 84,000
7	July 19, 2019	Balconies	60	45	$ 6,000	$ 270,000	$ 90,000
8	July 26, 2019	Balconies	60	58	$ 6,000	$ 348,000	$ 12,000
9	July 5, 2019	Inside	50	30	$ 2,500	$ 75,000	$ 50,000
10	July 12, 2019	Inside	50	50	$ 2,500	$ 125,000	$ -
11	July 19, 2019	Inside	50	32	$ 3,000	$ 96,000	$ 54,000
12	July 26, 2019	Inside	50	48	$ 3,000	$ 144,000	$ 6,000
13	July 5, 2019	Outside Level 1	80	60	$ 4,500	$ 270,000	$ 90,000
14	July 12, 2019	Outside Level 1	80	72	$ 5,025	$ 361,800	$ 40,200
15	July 19, 2019	Outside Level 1	80	70	$ 5,375	$ 376,250	$ 53,750
16	July 26, 2019	Outside Level 1	80	80	$ 5,225	$ 418,000	$ -
17	July 5, 2019	Outside Level 2	90	75	$ 4,300	$ 322,500	$ 64,500
18	July 12, 2019	Outside Level 2	90	66	$ 4,800	$ 316,800	$ 115,200
19	July 19, 2019	Outside Level 2	90	82	$ 5,000	$ 410,000	$ 40,000
20	July 26, 2019	Outside Level 2	90	89	$ 5,000	$ 445,000	$ 5,000
21	July 5, 2019	Outside Level 3	100	80	$ 4,000	$ 320,000	$ 80,000
22	July 12, 2019	Outside Level 3	100	89	$ 4,450	$ 396,050	$ 48,950
23	July 19, 2019	Outside Level 3	100	78	$ 4,850	$ 378,300	$ 106,700
24	July 26, 2019	Outside Level 3	100	92	$ 4,750	$ 437,000	$ 38,000
25	July 5, 2019	Penthouse	3	1	$ 6,000	$ 6,000	$ 12,000
26	July 12, 2019	Penthouse	3	2	$ 7,000	$ 14,000	$ 7,000
27	July 19, 2019	Penthouse	3	2	$ 8,000	$ 16,000	$ 8,000
28	July 26, 2019	Penthouse	3	3	$ 7,500	$ 22,500	$ -

Advanced sorting involves multiple key fields from multiple columns. A multi–level sort can be set up by clicking the Sort button from Sort & Filter group from the Data tab (or the Sort & Filter button from the Editing group of the Home tab and choose Custom Sort) to open the Sort dialog window. The first sort criteria, also known as the primary sort, was previously defined to sort by Accommodation Category in ascending order. To add a second level, also known as a secondary sort, click the Add Level button. After entering additional sort criteria, additional levels can be added. As shown in the graphic to the right, secondary criteria has been added to sort in descending order by Revenue. The data in column B will not appear to change, but the records will reorder. Compare the results below with the table above.
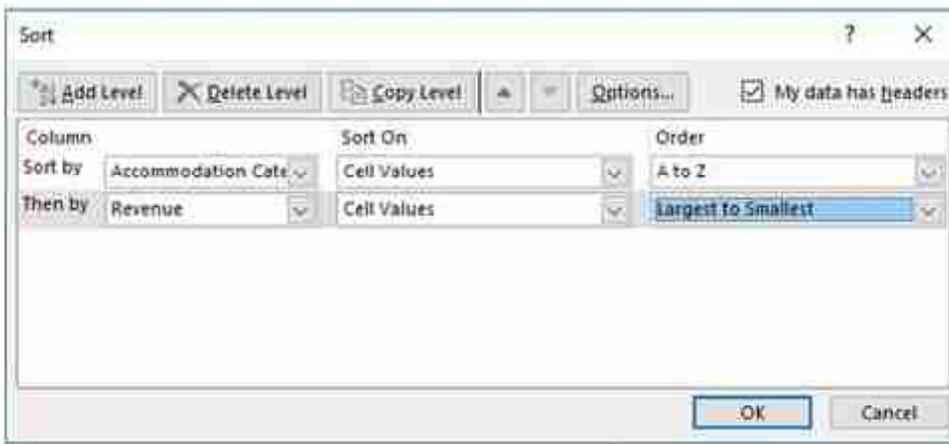
Sort							
Add Level	Delete Level	Copy Level	▲ ▼	Options...		☑ My data has headers	? ✕

Column	Sort On	Order
Sort by	Accommodation Cate ∨	Cell Values ∨	A to Z ∨
Then by	Revenue ∨	Cell Values ∨	Largest to Smallest ∨

OK   Cancel

	Cruise Date	Accommodation Category	Rooms Available	Rooms Rented	Rate	Revenue	Shortfall
4							
5	July 26, 2019	Balconies	60	58	$ 6,000	$ 348,000	$ 12,000
6	July 19, 2019	Balconies	60	45	$ 6,000	$ 270,000	$ 90,000
7	July 12, 2019	Balconies	60	45	$ 5,600	$ 252,000	$ 84,000
8	July 5, 2019	Balconies	60	35	$ 5,000	$ 175,000	$ 125,000
9	July 26, 2019	Inside	50	48	$ 3,000	$ 144,000	$ 6,000
10	July 12, 2019	Inside	50	50	$ 2,500	$ 125,000	$ -
11	July 19, 2019	Inside	50	32	$ 3,000	$ 96,000	$ 54,000
12	July 5, 2019	Inside	50	30	$ 2,500	$ 75,000	$ 50,000
13	July 26, 2019	Outside Level 1	80	80	$ 5,225	$ 418,000	$ -
14	July 19, 2019	Outside Level 1	80	70	$ 5,375	$ 376,250	$ 53,750
15	July 12, 2019	Outside Level 1	80	72	$ 5,025	$ 361,800	$ 40,200
16	July 5, 2019	Outside Level 1	80	60	$ 4,500	$ 270,000	$ 90,000
17	July 26, 2019	Outside Level 2	90	89	$ 5,000	$ 445,000	$ 5,000
18	July 19, 2019	Outside Level 2	90	82	$ 5,000	$ 410,000	$ 40,000
19	July 5, 2019	Outside Level 2	90	75	$ 4,300	$ 322,500	$ 64,500
20	July 12, 2019	Outside Level 2	90	66	$ 4,800	$ 316,800	$ 115,200
21	July 26, 2019	Outside Level 3	100	92	$ 4,750	$ 437,000	$ 38,000
22	July 12, 2019	Outside Level 3	100	89	$ 4,450	$ 396,050	$ 48,950
23	July 19, 2019	Outside Level 3	100	78	$ 4,850	$ 378,300	$ 106,700
24	July 5, 2019	Outside Level 3	100	80	$ 4,000	$ 320,000	$ 80,000
25	July 26, 2019	Penthouse	3	3	$ 7,500	$ 22,500	$ -
26	July 19, 2019	Penthouse	3	2	$ 8,000	$ 16,000	$ 8,000
27	July 12, 2019	Penthouse	3	2	$ 7,000	$ 14,000	$ 7,000
28	July 5, 2019	Penthouse	3	1	$ 6,000	$ 6,000	$ 12,000
29							

An Excel filter, also known as an AutoFilter, is used to display only the data that meet specific criteria. Data that does not meet the criteria is hidden from view. Excel's basic filter functionality allows users to filter rows by value, by format and by criteria. Filters can reduce a large, complex worksheet of data into meaningful information. With filtering, you can control not only what you want to see, but what you want to exclude. Users can filter based on choices they make from a list, or they can create specific filters to focus on exactly the data that they want to see. Clicking the filter button from the Data tab will add drop–down arrows to the column headers in a range of data.
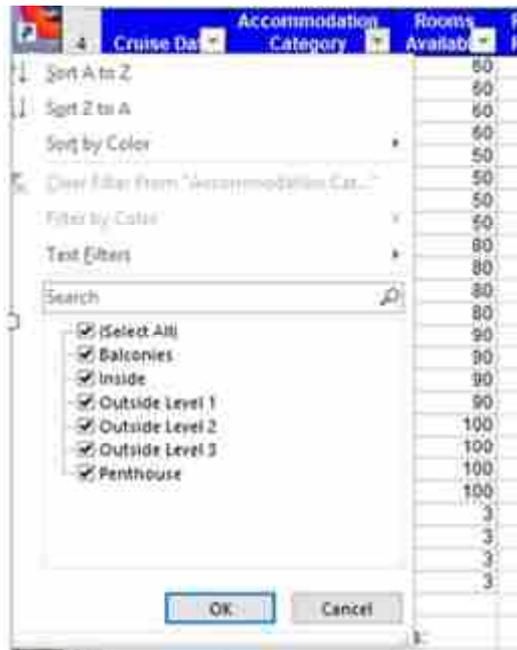
Clicking a drop–down arrow provides sorting and filtering options, like filter by color or text filters. A simple AutoFilter will be signified by the clearing of check boxes of the data that should be hidden. After applying a filter, a user can copy, edit, chart or print only visible rows without rearranging the entire list. Like sorting, filters can be applied to multiple columns to further reduce the results that are displayed.

Cruise Da	Accommodation Category	Rooms Availab	Rooms Rente	Rate	Revenue	Shortfall
July 26, 2019	Penthouse	3	3	$ 7,500	$ 22,500	$ -
July 19, 2019	Penthouse	3	2	$ 8,000	$ 16,000	$ 8,000
July 12, 2019	Penthouse	3	2	$ 7,000	$ 14,000	$ 7,000
July 5, 2019	Penthouse	3	1	$ 6,000	$ 6,000	$ 12,000

A column that has been filtered will have its drop– down arrow icon switch from an upside–down triangle to a filter icon, as shown highlighted in yellow below. Only the cruises from the Penthouse accommodation category will be displayed after clearing all check boxes except the Penthouse category.

To remove a single filter, click the filter icon in the row header and choose Clear Filter from…. To clear all filters quickly, choose the Clear button from the Data tab on the ribbon or to remove filtering functionality, re–click the Filter icon from the Sort & Filter group. For more advanced users there are many more ways to utilize filters in Excel, such as Custom Filters and Advanced Filters. Nonetheless, a lot can be accomplished with the basic AutoFilter feature.

4.7 Conditional Formatting :

Using spreadsheet functionality to enhance critical thinking is a primary reason that Excel is so popular among business professionals. Decision–making is made easier when users can quickly spot trends, identify variances, and be alerted when certain criteria is met. Excel's conditional formatting feature is a really powerful tool when it comes to

applying different formats to data that meets certain conditions. Conditional formatting is one of the most simple yet powerful features in Excel by applying user–specific formats to a cell/cells when user–specific conditions (rules) are met. Not only does it make a spreadsheet look awesome, but it also helps make sense of the data.
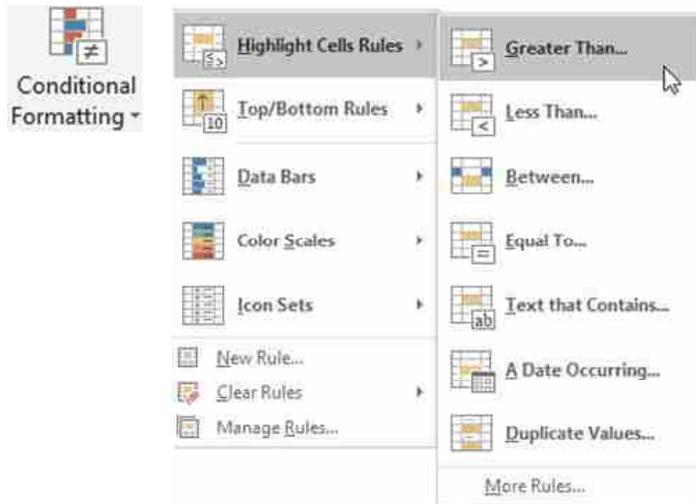
Clicking the Conditional Formatting button on the Home tab of the ribbon offers several options to define the condition criteria (rules), and several formatting options to display the data in meaningful ways. To choose formats that are applied to a cell(s) when a condition is met, select a range of cells, then click the Conditional Formatting button to display a menu of rules. Clicking a rule will expand an additional menu. For example to identify which cruise accommodation categories provide the most significant revenue shortfall, utilizing a highlighting rule that formats cells that are greater than $100,000 would be a very practical conditional formatting rule that could provide some strategic information. Selecting the range of G5:G28 and applying the Greater Than rule, will create eye–catching formatting. The data in the first field can either be a cell reference or a static value, as shown below.
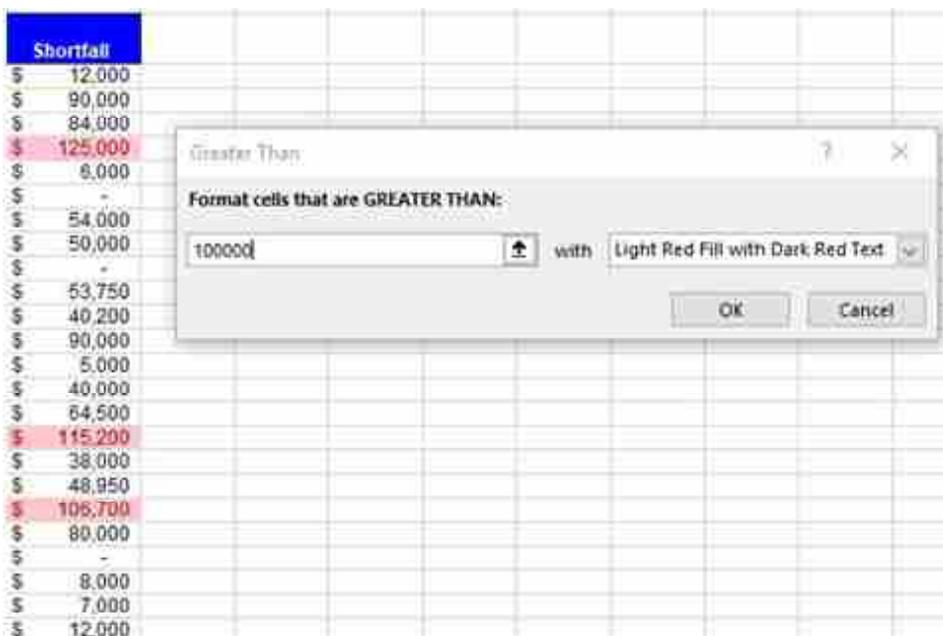
Numerous rule types exist beyond the preset comparison operator menu choices. Rules can identify cells that contain certain text or before/ after a certain date, or even highlight duplicate data. Top/Bottom Rules can reveal the top or bottom 10 records in a certain column. The quantity can be modified from the top/bottom 10 to a user–specific number.

Custom rules can be defined by choosing More Rules… from the Highlight Cells Rules menu, which opens the New Formatting Rule window. Choosing alternative Rule Types will modify the functionality available in this window.
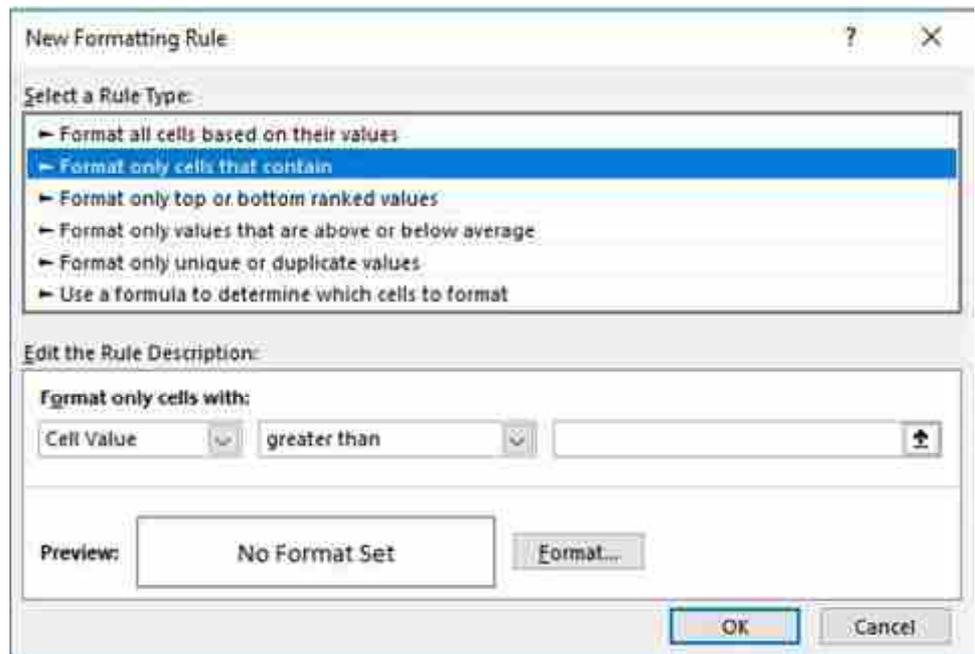
After defining the rule criterion, custom formats can be selected by clicking the Format button.

The Format Cells window opens to allow custom Number, Font, Border or Fill formatting. To enforce more complex rules, multiple conditional formatting rules can be applied to the same data. However too many colors can sometimes be distracting, and should be used sparingly. Therefore, Excel offers more formatting choices than just color fills. Data bars, color scales and icon sets can also be used to emphasize data that meets certain conditions.

The icon sets work great when color is not effective, such as when printing to black & white laser printers. Icons are even more noticeable than colors because of their unique look and sparing use. Icon sets will help visually represent the data with directional arrows, shapes, indicators, ratings, and other objects. For icons in sets of three, Excel will assign icons by dividing values into thirds – the first icon is assigned to the top one third of values, the second icon is assigned to the second third of values, and the third icon is assigned to the lowest one third of values. The values are adjusted for four and five–icon sets. Conditional formatting's flexibility is extensive, but perhaps even more impressive is that, like formulas, conditional formatting rules are volatile. As the data changes, the conditional formatting dynamically adjusts to evaluate the new data against the existing conditional rules.

4.8 Pie Charts :

With Excel, users can organize data so that it has context and meaning. The output of Excel manipulation can take the shape of either a table or chart. When deciding to use a chart or a table to communicate the data–driven message, it is wise to always ask how the information will be used, and who is the audience ? People interact very differently with these two types of visuals. Tables, which display data in a columnar layout, are meant to be read. Therefore tables are ideal when the data requires more specific analysis. Tables offer preciseness, letting users dive deeper to crunch the numbers and examine exact values, instead of focusing on approximations or visualizations.

A chart is a visual representation of a range of related worksheet data. A chart can illustrate a large amount of numerical data quickly and in an easy–to–understand fashion. Charts are particularly useful for simplifying complex sets of data to expose the shape of the data – numerical patterns, trends, and other significant activity. What charts lack in terms of precision they overcome with broader insight and quicker comprehension.

Learning how to work with charts means not only knowing how to create them but also realizing that different types of chart and layouts can reveal and emphasize different knowledge. Like a picture, a chart can be worth a thousand words. It all depends on how well the chart is designed and developed. A well constructed chart will provide context and clarity for data analysis and story telling. The first step to creating useful charts it to organize and precisely select the data that should be charted. This includes the cells that contain both the data and the label headings.

Each chart type conveys information in different ways. Pie charts, for example, are best for charting data that is a percentage of a whole. For example, what percentage of your monthly income is spent on transportation ? Charts contain different objects for each chart type. Objects in a pie chart include :
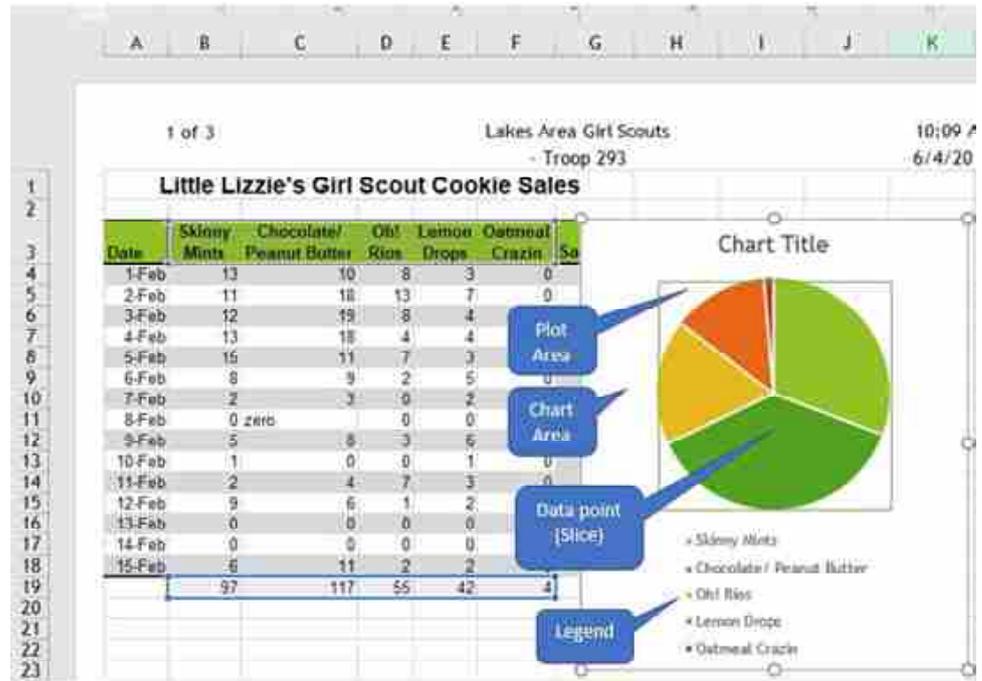
- Chart title – describes what is charted. The label heading of the data series is used by default, but this can be edited.

- Legend – an index of information that corresponds to the category labels.

- Data labels – identify each value in the data series.

- Plot area – the part of the chart that displays data graphically.

- Chart area – the entire chart and all of its elements.
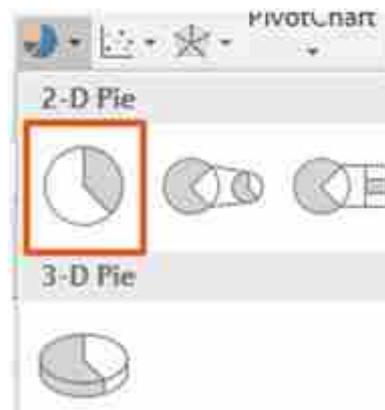
A pie chart can only include a single series of data, whether it is a single column or a single row of data. A data series is the sequence of values that Excel uses to plot in a chart. Each value from the data series is represented by a slice (or wedge) of the pie. The size of each slice varies with its percentage of the total of the entire data series. To create a pie chart, first carefully select the appropriate data range before selecting the chart

type from the Insert tab. In the above chart, the selected data range is $B$3:$F$3, $B$19:$F$19, since the only data series being charted is the total sales (quantity) of each cookie flavor. Every date (row) represents an additional data series, but since pie charts only plot a single data series, these series' should not be selected. Pie charts should be avoided when there are many categories, or when categories do not total 100%. Typically, 2–D charts are easier to read than 3–D charts.

When a chart is created as an object on a worksheet, sizing handles will appear on the outer borders. The chart, or any object within the chart, can be moved and/or resized similarly to a picture or other objects in Microsoft Office. When a pie chart is first created, Excel will use the default colors and design. Users can customize the chart look easily by utilizing chart styles. In the Design contextual tab of the Ribbon, a number of different styles will be displayed in a row. Mouse over them to see a preview :

An additional option for quickly changing the look of a chart is to utilize the Quick Layout menu to select one of several preset to add elements like percentage labels, value labels, and differently located legends to the chart.
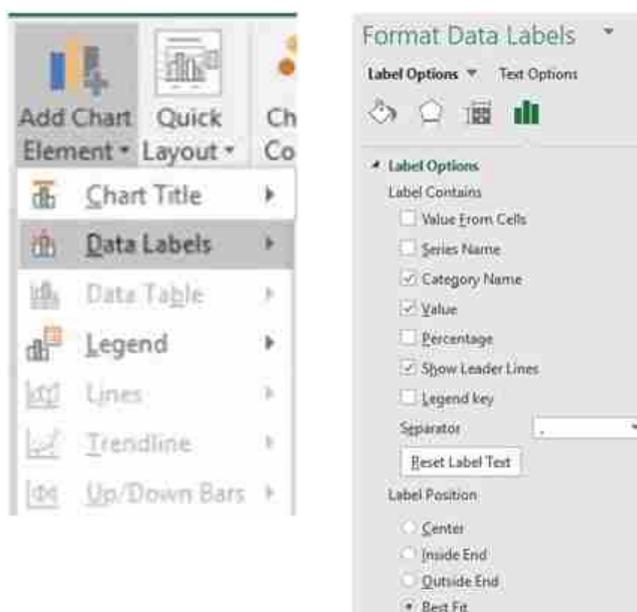
Users can also add and remove individual elements, such as chart titles, data labels, data tables, and more by using the Add Chart Element menu. Some elements are not available for certain chart types. One of the most useful chart elements that get added manually to a chart are data labels. Data labels are linked to values on the worksheet, and they update automatically when changes are made to these values. Data labels make a chart easier to understand because they show details about a data series or its individual data points. Users can add data labels to all data points or a specific data slice by ensuring that only the specific slice is selected. In addition to the Add Chart Element menu and quick layout options, users can add data labels by right–clicking the chart and choosing Add Data Labels from the shortcut menu. Once added, the data labels can be further modified by right–clicking the chart and choosing Format Data Labels to open the Format Data Labels task pane. One or more types of labels can be added and positioned. Adding Category Name labels make the legend redundant. Be careful not to add so many labels that the chart becomes too crowded to read!
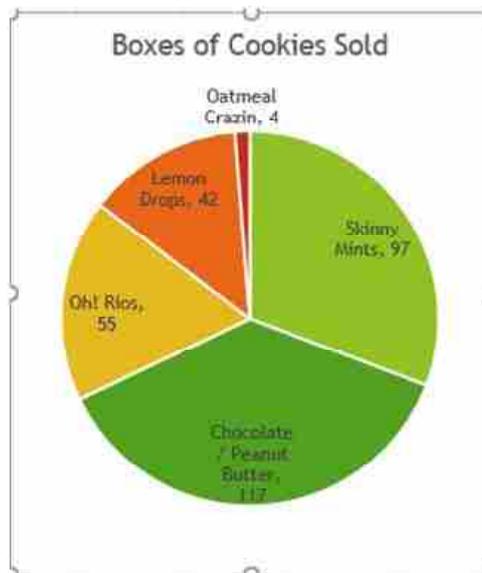
After adding labels, it may become necessary to resize or move the chart. After adding a title, data labels, and removing the legend, the chart looks different, but is still the same size, even though certain elements have resized.

Which pie chart looks better ? Generally, removing the legend through use of data labels is considered a preferable design strategy. Alas, there are even more ways to customize a pie chart that is beyond the scope of this text! Additional functionality includes creating 3–D pie charts, exploding slices, rotating, sorting, adding different fill designs, and much more!

4.9 Bar & Column Charts :

Bar charts are practical for comparing the differences between values with horizontal bars. The lengths of the bars are proportional to the size of the data category they represent. A vertical bar chart is referred to as a

column chart, and they are basically the same – just 90° apart. Unlike a pie chart, a bar chart can include several series of data. Bar charts are simple, easy and flexible, and thanks to the horizontal layout, bar charts can accommodate longer category names. Bar (and column) charts contain the following objects :

- Chart title – describes what is charted.

- Chart area – the entire chart and all of its elements.

- Plot area – the region within the horizontal and vertical axes.

- Axes titles (horizontal, vertical)– describe the data.

- Legend – an index of information that corresponds to the series names.

- Data labels – identify each value in a data series.

- Value axis (y–axis) – contains values. Horizontal axis on bar charts and vertical axis on column charts.

- Category axis (x–axis) – contains the category labels. Horizontal axis on column charts and vertical axis on bar charts.

- Gridlines – mark the intervals on an axis.

While the data and chart above only displays one data series, most bar and column charts tend to display multiple data series to compare and contrast one set of data against another. The chart below adds a second data series in column C, and changes the chart type to a column chart. The two different data series are illustrated with different color data points. Also, note how the axes change directions! The value axis maximum, major and minor units were also modified to different numerical values.
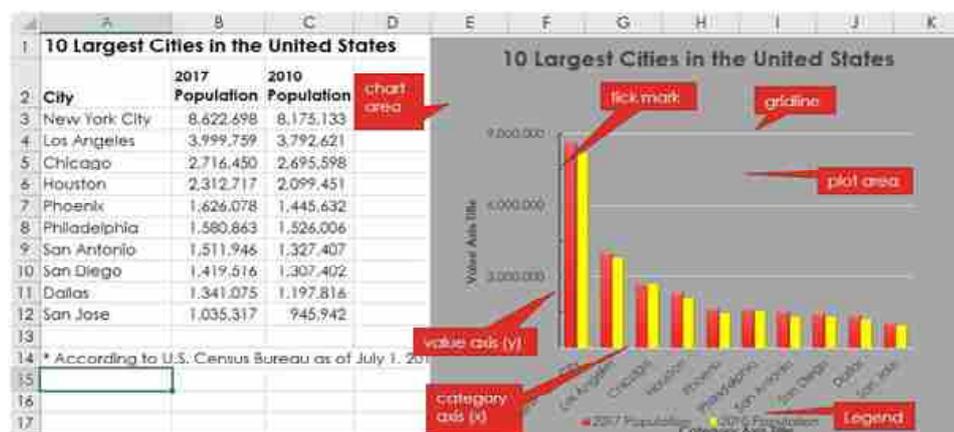
Charts can easily get crowded with details. Therefore, keeping the chart on the same worksheet as the data is not always feasible. Users can move a chart to any location on a worksheet or to a new or existing worksheet. By default, a chart is created as an object within a sheet. The chart can be resized, but sometimes the chart needs to be as large as possible. To move the chart to a new worksheet, click the Move Chart button on the Chart Tools Design tab. Next, click the New sheet radio button, and then in the New sheet box, type a name for the new worksheet. After clicking OK, the new sheet will be to the left of the existing sheet. A new, standalone chart will occupy the entire page to maximize the visibility of the data. The Move Chart window also provides the option of moving the chart as an embedded object into an existing sheet.

4.10 Line Charts :

A line chart displays a series of data points connected by a straight line. Line charts are a good way to show change or trends over time. Line charts are simple to create and easy to read. In contrast to column or bar charts, line charts can handle more categories and more data points without becoming too cluttered. Each line displays as a different color. Line charts help people examine why data is changing and make decisions about how to proceed. The Line Chart is especially effective in displaying data trends. Stock market investors utilize line charts to track historical stock performances, and help determine if a trend can be forecasted in the future.

In a Line Chart, the vertical axis (Y–axis) always displays numeric values and the horizontal axis (X–axis) displays time or other categories. Time intervals can be measured in years, months, days, or hours.

To create a line chart, start by selecting the data range, then choosing the Line Chart button Microsoft Excel in the Charts group from the Insert tab.

In the 2–D line chart illustrated above, two sets of data series are plotted for fifteen days. The Skinny Mints cookies are identified by the red line, and the orange line plots the Chocolate/Peanut Butter cookies. Each date is a data point. Additional data series can be added by expanding the data source range. Line charts provide an easy way to track historical data. In many cases, the way the data is trending makes it easy to predict the results of data in future periods.

Excel offers numerous other charts that might better help illustrate the story behind the data, however all charts must address the challenge of sharing or outputting the graphic(s) to their target audience(s). Here are a few printing issues to consider:

- Printing only the chart. If the active cell is not selecting the chart, both the chart and worksheet data will print. However, if the chart is currently selected, only the chart will print by default (as a chart sheet). If the intent is to print both the chart and the data, make sure to move and/or resize the chart to ensure everything fits appropriately within the sheet margins. This will embed the chart within the sheet. Utilizing the Print Preview window to verify what will print by default will allow the user to make numerous changes, such as the orientation, margins and scaling. A different installed printer can also be selected. The graphic below illustrates from the Print Preview window, an embedded line chart in landscape orientation with headings enabled for print. The sheet has also been scaled to fit to one page.
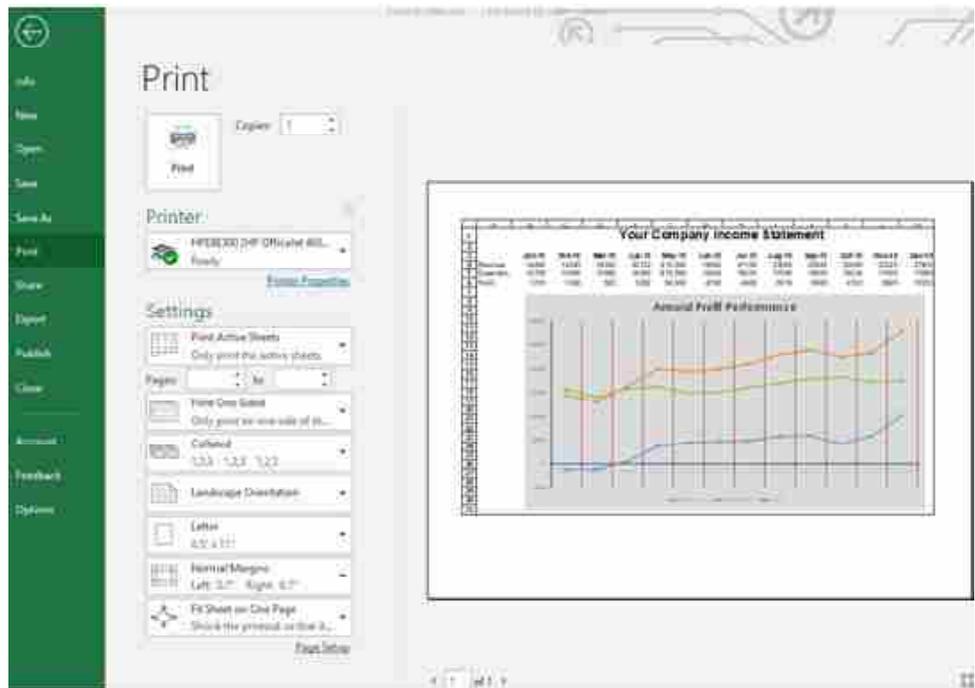
- Chart colors that are not compatible with black and white printers. A lot of office printers are black and white laser printers due to their low–cost to operate at high volumes. A color laser printer may be a worthy investment for common chart printing. If a black and white printer is all that is available, it may be necessary to change the colors to patterns or contrasting shades of grey.

- Not enough or too much information. Reads of the chart must be able to comprehend the message the chart is attempting to convey. This might require adding context, such as titles, data labels, and text–box callouts. Conversely, a chart can have too much information that the chart is cluttered and unreadable. In this case, summarizing the data my be prudent, or even re–selecting a different source data range. A chart can also be unreadable due to poor design considerations like wrong fonts and font sizes, as well as distracting colors and object sizes.

- Excel charts are volatile and will change as often as the source data is changed. If a static copy of a chart is needed, consider saving the chart as a picture. This can be accomplished through using the copy and paste special commands. Using Paste Special will allow a chart to pasted in either PNG, JPEG, GIF or other formats. Alternatively, Excel files can be saved as PDF files for inserting in other electronic documents/files.

Check Your Progress :

State whether the following statements are true or false

1. Cell referencing is an extremely useful feature when formulas need to be copied across ranges in a worksheet.

2. Mixed cell references are a combination of relative and absolute

3. Relative reference are sometimes called a fixed cell reference

4. Parentheses in operations can't be nested inside each other.

5. Excel charts are volatile and will change as often as the source data is changed.

4.11 Let Us Sum Up :

Int this unit we have learn many advanced features of Microsoft Excel such as Absolute versus Static References, Understanding Complex Formulas, Date & Time Functions, Logical Functions, advanced Math Functions, Sorting and Filtering Data, Conditional Formatting of data, creating Pie, Bar, Column and Line Charts.

4.12 Answers for Check Your Progress :

1. True **2.** True **3.** False **4.** False **5.** True

4.13 Glossary :

Static Reference : A static reference is a reference to a value that does not change.

Absolute cell reference : A cell reference that does not change when copied is called an absolute cell reference (sometimes called a fixed cell reference).

Mixed cell references : Mixed cell references are a combination of relative and absolute: either the column is relative and the row fixed (absolute)

Sorting : Arranging data in a specified order is called sorting.

Filter : An Excel filter, also known as an AutoFilter, is used to display only the data that meet specific criteria.

4.14 Assignment :

• Write short note on date and time functions

• Explain logical function

• Explain different types of charts.

4.15 Activity :

• Create chart for student marksheet in Microsoft Excel

4.16 Case Study :

• Write formula to calculate result and grade obtained by the student in seven subjects.

4.17 Further Reading :

• https://open.umn.edu/opentextbooks/textbooks/business–computers–365–lacher

• Information Systems for Business and Beyond, David T. Bourgeois

BLOCK SUMMARY

In this block we have learn about word processing and spreadsheet fundaments and we have also discuss advanced features of word processing and spreadsheet.

BLOCK ASSIGNMENT

Short Questions :

- What is cell reference ?

- What is absolute cell reference ?

- What is Mixed Cell Reference ?

- What is logical function ?

- What is chart ?

- Lits components of chart.

- What is use of pie chart ?

- What is sorting ?

- What is filtering ?

Long Questions :

- Write detailed note on chart

- Explain in details about cell referencing

- Explain different types of functions available in Microsoft Excel

- Write detailed note conditional formatting

- Explain sorting and filtering with suitable example

❖ **Enrolment No. :** [   ]

1. How many hours did you need for studying the units ?

Unit No.	1	2	3	4
No. of Hrs.				

2. Please give your reactions to the following items based on your reading of the block :

Items	Excellent	Very Good	Good	Poor	Give specific example if any
Presentation Quality	☐	☐	☐	☐	_____
Language and Style	☐	☐	☐	☐	_____
Illustration used (Diagram, tables etc)	☐	☐	☐	☐	_____
Conceptual Clarity	☐	☐	☐	☐	_____
Check your progress Quest	☐	☐	☐	☐	_____
Feed back to CYP Question	☐	☐	☐	☐	_____

3. Any other Comments

   ....
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   ....

Dr. Babasaheb Ambedkar OpenUniversity

Computer Application

BLOCK-4 PRESENTATION AND DATABASE

UNIT 1

MICROSOFT POWERPOINT BASICS

UNIT 2

INTRODUCTION TO GOOGLE SLIDES

UNIT 3

INTRODUCTION TO MICROSOFT ACCESS DATABASE

BLOCK 4 : Presentation and Database

Block Introduction

This block introduces presentation software Microsoft Powerpoint and Google Slides for creating effective presentation using text, image, ClipArt and video. This block introduce Microsoft Access Database and discuss basic features of Microsoft Access.

Block Objectives

The objective of this block is to create and save a new presentation, Add, delete, and move slides, Insert text boxes, Change theme on a presentation, Add images and clip art, Add videos and Arrange objects in Microsoft Powerpoint and Google Slides. It also gives essential overview of Microsoft Access database tool.

Block Structure

Unit–1 : Microsoft Powerpoint Basics

Unit–2 : Introduction to Google Slides

Unit–3 : Introduction to Microsoft Access Database

| Unit 1 | MICROSOFT POWERPOINT BASICS |

1.0 Learning Objectives :

After studying this unit learner should be able to :

• Create and save a new presentation

• Add, delete, and move slides

• Insert text boxes

• Change theme on a presentation

• Add images and clip art

• Add videos

• Arrange objects

1.1 Introduction to Using Microsoft PowerPoint :

PowerPoint is one of several applications in Microsoft's Office product line, including enterprise staples Outlook (email and calendar), Excel (spreadsheet) and Word (word processing).

PowerPoint has a 95 percent market saturation. PowerPoint is available in over one hundred languages. PowerPoint has been installed one billion times. 30 million presentations are created every day in PowerPoint.

With a market share of approximately 95 percent, PowerPoint is considered the industry standard for both business and education. PowerPoint supports over 100 languages and can be used on both Android and Mac devices. There are over 1 billion installations of PowerPoint worldwide, with 30 million presentations created daily. Similar to Kleenex for tissue, the PowerPoint brand name has become a generic reference for all presentation software and the generally poor use of this technology has given rise to the phrase "death by PowerPoint," a scenario you will learn to avoid in subsequent sections. In this section, we will focus on the basics of creating a presentation, including how to create and save a presentation, how to change layouts and templates, how to add text, images and video and how to manage slides and objects within a slide.

1.2 Create New Presentations and Save Presentation :

At the Microsoft Office 365 home page, you will see a selection of apps as well as any recently–viewed documents. To open PowerPoint, click on the PowerPoint icon. The PowerPoint icon style varies depending on your operating system (PC or Mac) and the version of your software, but it's always a red–orange P, sometimes accompanied by a chart graphic, as you can see circled in Figure 1.
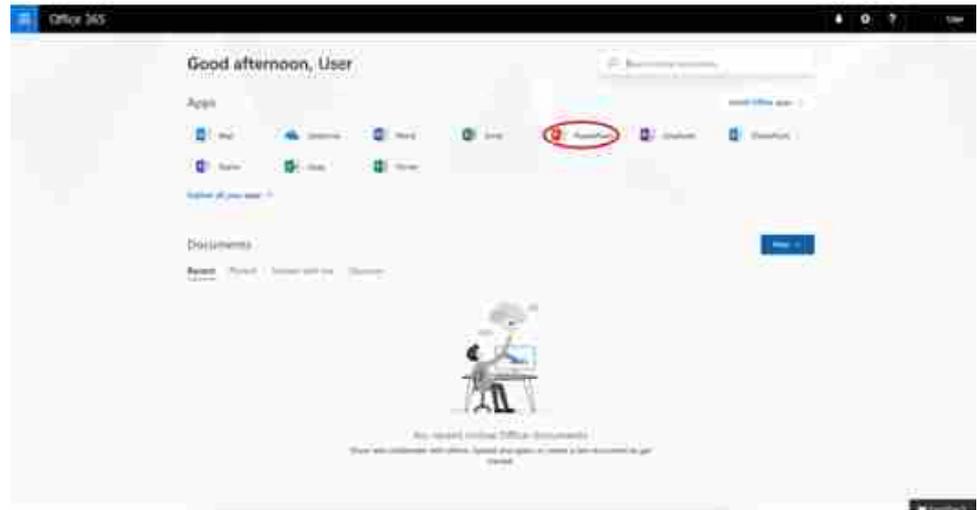
Figure 1 : Accessing PowerPoint in Office 365

When you open PowerPoint, the application will take you to a presentation gallery (see Figure 2), where you can choose to either open a new blank presentation or start a presentation using a template. To start with the proverbial blank page–no pre–set graphics, backgrounds or text– click (or double–click, depending on your version) New blank presentation. You'll be presented with a new blank presentation title slide containing two text boxes for a title and subtitle. These are placeholders that can be used, deleted, or simply ignored.
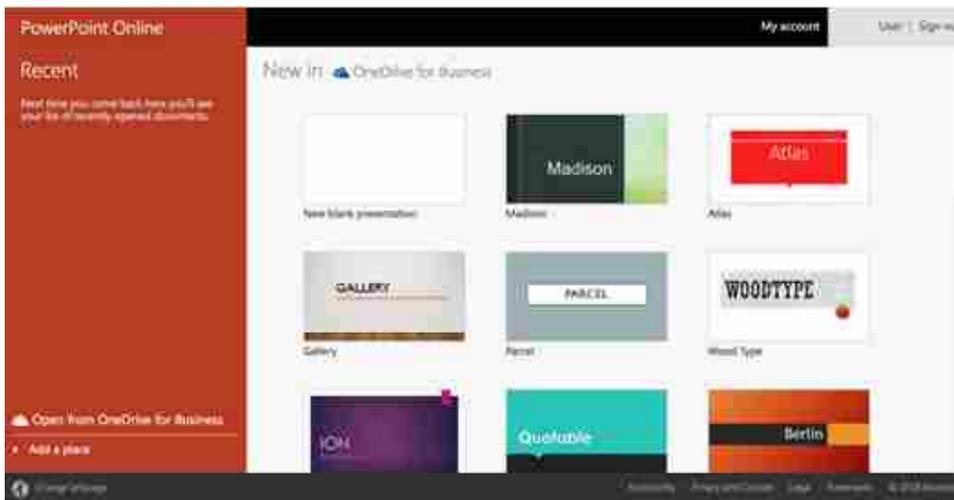
Figure 2 : Template Gallery

If you want to use the default layout, click where it says Click to add title and type in your text. Note that when you click in the text box, the prompt text disappears and is replaced with a flashing cursor. To finish your entry, simply click outside the box. Pressing the enter or return key after typing your text will act as a return and advance the cursor to the next line. If you pressed return and don't want a two–line title, simply press the Undo arrow under the File tab at the top left of your screen (or if you're using Windows, press Ctrl + Z on your keyboard; if you're using a Mac, press Cmnd + Z). To continue adding or editing text, click the text or within another text box and continue.
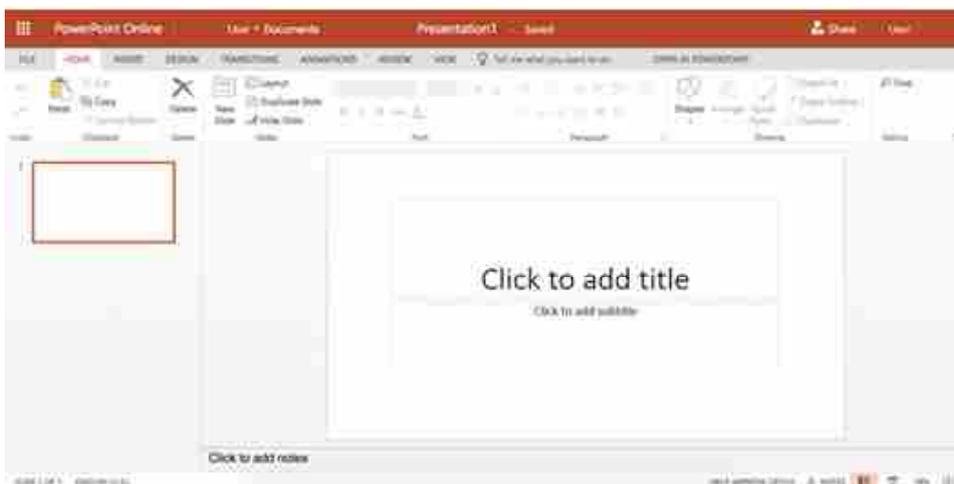
Figure 3 : Your New Presentation

Placeholder boxes and prompts don't show up in Slide Show or presentation mode, so you don't necessarily need to delete those you don't use. If, however, you find them distracting, click on the border of the placeholder and press either the delete or backspace keys on your keyboard.

As mentioned above, the web–based version of PowerPoint will save your file automatically, assigning a default title of Presentation. If you have multiple presentations in progress, it will save subsequent files as Presentation1, Presentation2, etc. To (re)name your presentation, click the default title, type your desired title and press enter.
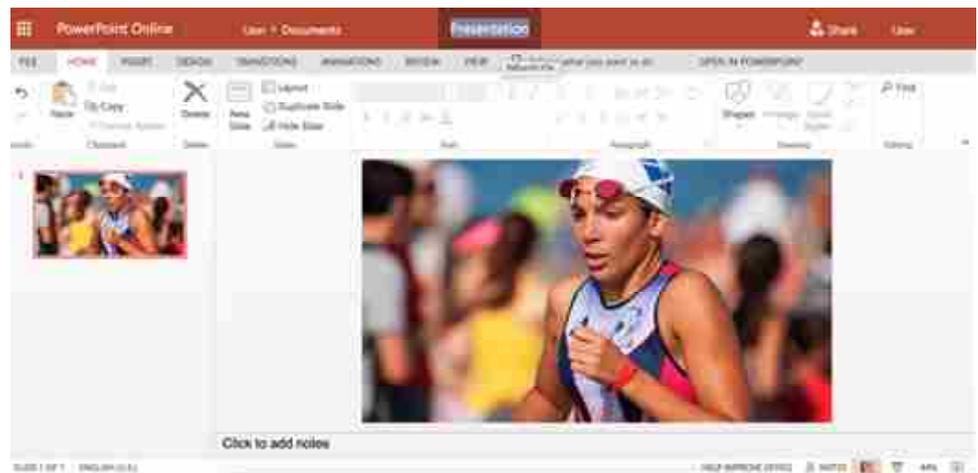
Figure 4

Saving Documents When Working Offline

If you're not working with PowerPoint Online, you will need to save your presentation manually: click on the File tab.
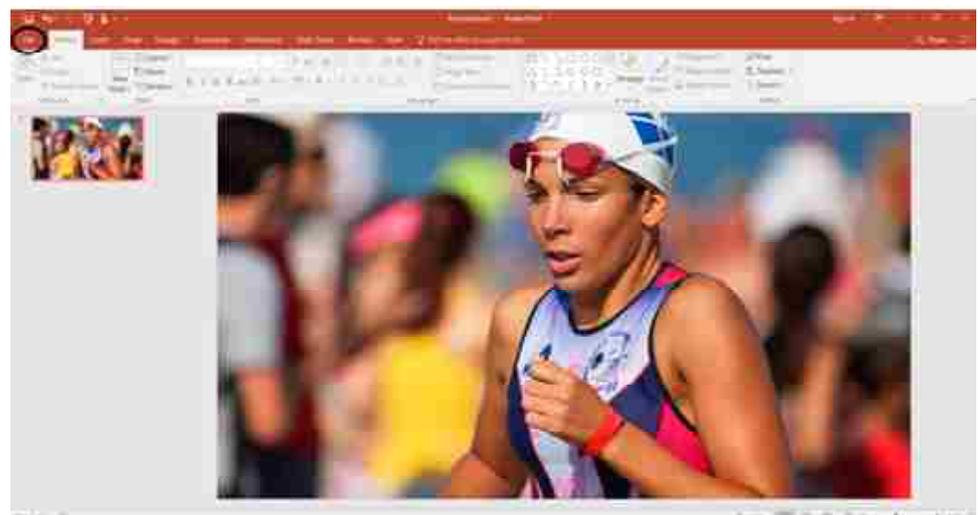
Figure 5

You'll then click Save or Save As in the menu along the left side of the screen. Note: you can also use the common keyboard shortcuts Ctrl + S (Windows) or Cmnd + S (Mac).

Figure 6

To save your presentation on your desktop, choose This PC, select my Desktop and tile your presentation–for example, "To–the–Bank Retail Trends." At this point, you will also choose the format you want to save

your presentation in Save as type. If you will be sharing your presentation with other students or colleagues who are using an older version of PowerPoint, select PowerPoint 97–2003 as the type from the drop–down list. Otherwise, go with the default option.

1.3 Editing and Enhancing a PowerPoint Presentation :

Now that you've created a presentation, let's start adding to it! If you closed your presentation after saving, you can reopen it by starting PowerPoint and selecting your presentation (i.e., To–the–Bank Retail Trends) listed under Recents.

1.4 Adding Slides :

You can add a slide from either the Home tab, Insert tab or Thumbnail pane.

From the Home Tab

Figure 7 : Home Tab

1. Click on New Slide (or Duplicate Slide, to copy the current slide layout)

2. If you clicked New Slide, select a layout that best fits your content

3. Press enter
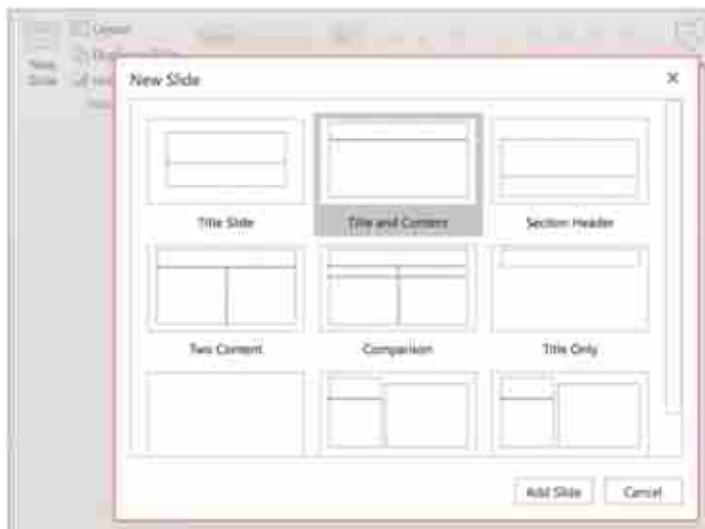
From the Insert Tab
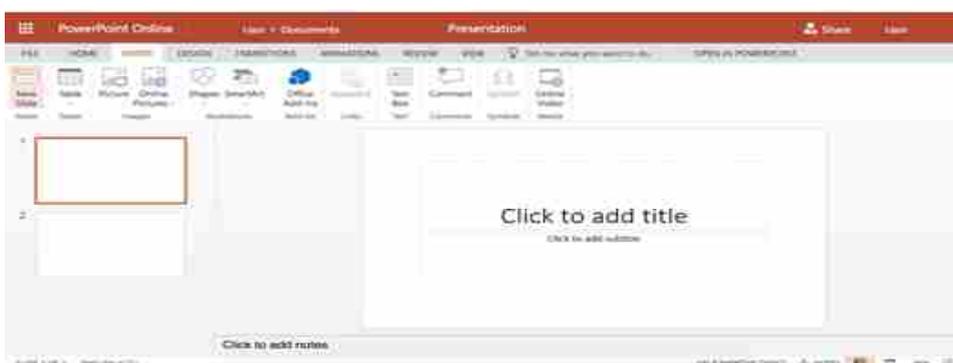
1. Click on New Slide

2. Select a layout

3. Press enter

    From the Thumbnail Pane
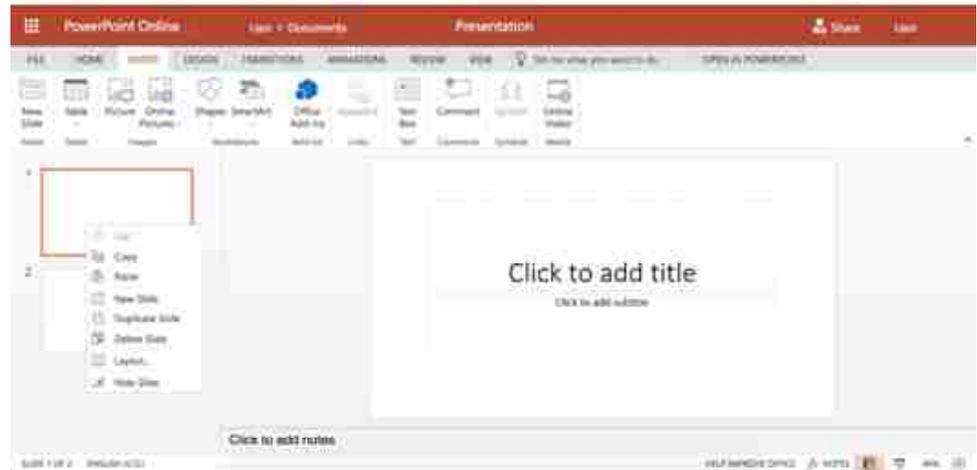
You can also add slides from the thumbnail pane, the lefthand column of your screen when you're in the default or Slide view.

1. Select (highlight) the slide you want the new slide to follow

2. Right–click on the slide

3. Select New Slide for the default content slide layout or Duplicate Slide to copy the slide layout and content

    OR, to use a shortcut to duplicate the slide layout (not content)

1. Select (highlight) the slide you want the new slide to follow

2. Press Ctrl + M (PC) or Cmnd + M (Mac)

Note that your layout choice isn't final, so don't overthink the decision. If you're just trying to get your thoughts down on slides, select Duplicate Slide and fine–tune later.

1.5   Deleting a Slide :

As with most operations, there are multiple ways to delete a slide :

*   Highlight the slide in the thumbnail pane and press delete

*   Highlight the slide in the thumbnail pane and press the delete icon (Home tab)

*   Highlight the slide in the thumbnail pane, right click and select Delete Slide

---

1.6   Organizing Slides :

To move a slide, simply drag and drop in the thumbnail frame.

1.7   Inserting Text Boxes :

There are multiple ways to insert text into your slides. One of the ways to enter text, as discussed earlier, is to click inside a placeholder box and enter your text. However, you may want to add text to a blank slide or in

a place where there is no placeholder. To do so, select the Insert tab on the ribbon, and choose Text Box.

A text box will be inserted in your slide with a Click to insert text message similar to the placeholder Title and Subtitle boxes discussed earlier. The text box will expand to fit your text. If you decide you want to reposition the text box, you can click and move the text box/text around the slide. If you want to modify the width of the text box, click on a corner and drag it out as desired. The circular icon at the top of the text box activates the drawing and formatting options and allows you to rotate the text box.

1.8 Changing the Theme on a Presentation :

Themes are one of the formatting options within PowerPoint. A theme is a slide design that contains pre–set colors, fonts, formatting and/ or images. To view formatting options, click on the design tab and scroll through the available themes.

Clicking on a theme's thumbnail applies the formatting to your slides, so you can evaluate potential fit. A second group of options in the ribbon provides color variations on that design. A third option, exclusive to the online version of PowerPoint, is Design Ideas, providing additional variations; this feature is still being built out. To revert to your original format, click Undo.

One caveat: given the limited number of templates and the number of people using PowerPoint, using a standard template doesn't do anything to distinguish you or your message. Instead of selecting a standard template, use thoughtful images and complementary fonts to add design impact.

Check Your Progress – 1

1. To save a new Microsoft PowerPoint presentation online:

    (a) Select File > Save and tile your presentation

    (b) Select Ctrl+S (PC) or Command+S (Mac)

    (c) Click to edit presentation and rename

    (d) None of these

2. Your meeting organizer sends you an email asking you to edit your presentation down to 15 minutes to accommodate a "drop in" visit from your President. To delete one or more slides:

    (a) Click on Slide Thumbnail and select Ctrl+D

    (b) From Review Tab, Click on Slide Thumbnail and select Delete

    (c) From Home Tab, Click on Slide Thumbnail and select Delete

    (d) Any of the above

3. You have vowed to create a custom presentation using none of the default slide layouts. To add text in an area where there is no preformatted text box:

    (a) Double Click and Type Text

    (b) From the Insert Tab, Select TextBox

    (c) From the Design Tab, slect insert text

4. You want to experiment with different color, layout, and font options, but the number of possible combinations is overwhelming. You decide to scroll through the theme options to see how they work with your material. To do that:

    (a) Select Format > Theme and select a theme

    (b) Select File > Open and select a theme

    (c) From the designer tab, select a t heme and click to apply

1.9   Adding Images and Clip Art :

Adding art, images and photographs is a way to both personalize your slides and reinforce your message.

Adding visual elements to your slides is done from the Insert tab. Images can also be inserted directly from a new slide using the Add Pictures, Online Pictures or Online Video icons embedded in new slide layouts.
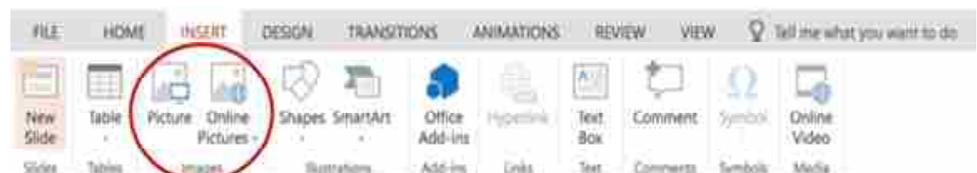
To add pictures from your computer

1.   Select the Insert tab

2.   Click on Picture

3.   Select your desired image

4.   Press Open to insert

The Add Pictures From the Internet option allows for two possibilities: searching via Bing and uploading images from OneDrive (Microsoft's cloud storage product). Of course, you can also do an image search using Google Images or your preferred search engine, download images to your desktop and upload them to your presentation using the steps above. Don't be put off by the initial Bing images served up. Bing's filters allow you to search by size (small, medium, large, extra large), type (all, photograph, clip art, line drawing and transparent), color (all, color, B&W and by 12 basic colors) and license (all or Creative Commons only).

To add pictures from the Internet

1.   Select the Insert tab

2.   Click on Online Pictures

3.   Type in your search term(s)

4.   Refine your image search using Bing's size, type, color and license filters

5.   Select an image

6.   Press Insert to insert into slide

7.   Use the corner image "handles" (small boxes) to size
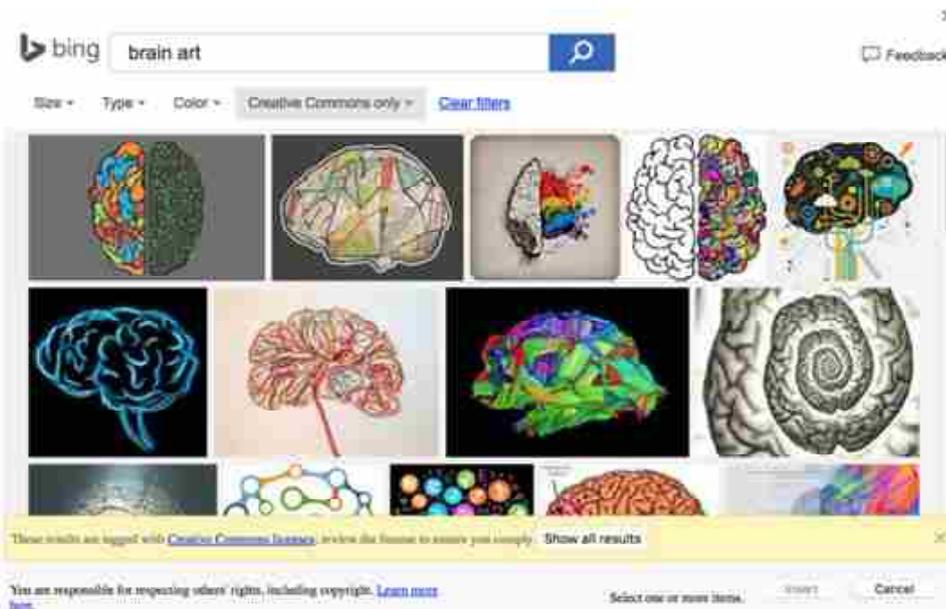
1.10 Adding Videos :

Adding video allows you to incorporate both motion and sound into your presentation and this can translate into audience energy! As with other visual elements, video is an Insert tab command.

The add video command launches a YouTube video search. To see video details, hover over the video. To view the video once embedded, click on the View tab, select Current Slide and press Play.

To add video

1. Select the Insert tab

2. Click on Online Video

3. Enter your search terms

4. Select your desired video

5. Press Open to insert
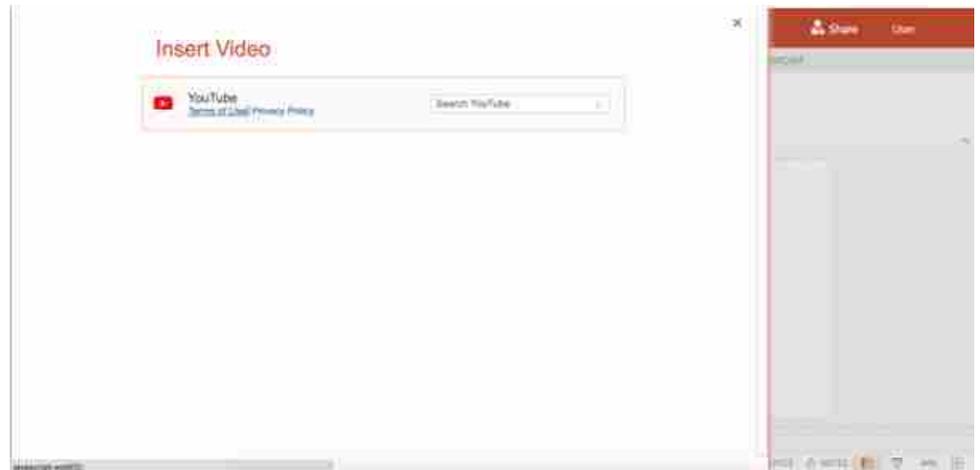
1.11 Arrange Objects :

There may be times when default line spacing doesn't work or you're trying to build a slide that involves multiple blocks of text and/or imagery. That's where PowerPoint's Arrange function comes into play. Arrange allows you to order (layer) objects, bringing individual elements forward or sending them backwards. It also allows you to flip objects. Refer to Figure 4 for a screen shot.
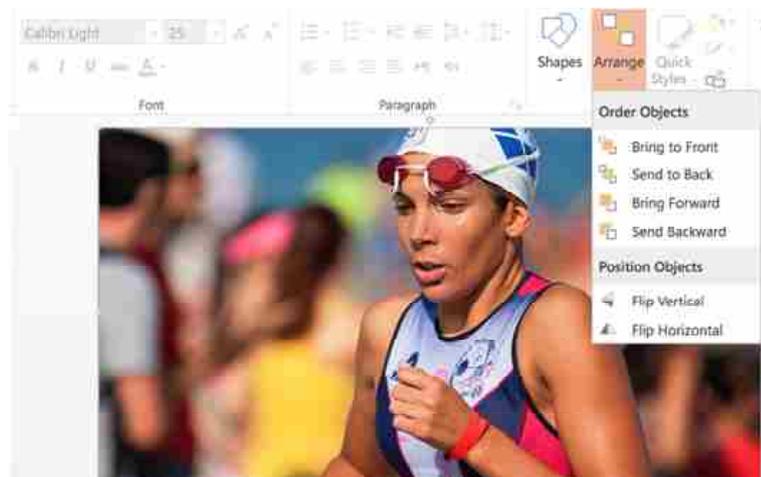
Check Your Progress – 2

1. You want to incorporate a powerful image to balance the text and data in your presentation. You recently took a photo that would be perfect. To insert your photo:

    (a) Select Insert > Picture > Click to select and Click open to insert

    (b) Search for the image on your computer and drag it into your slide

    (c) Select View > Photos > Click to select and click insert

2. You're creating a class presentation on note–taking strategies and want to include the YouTube video that taught you how–and why– to use Cornell notes. To add it to your presentation:

    (a) Select Insert > Online Video > Search YouTube > Select a Vide > Insert

    (b) From YouTube, Select Share, Copy and Paste the URL into your slide

    (c) From YouTube, Select Share and select the Microsoft PowerPoint icon

    (d) None of these

3. You're building a layered slide, with a full–size image and a text box. You created the text first and it's now obscured by the image. To bring your text forward, you would use the following commands:

    (a) From Design Tab, select Format background > Set background

    (b) From the Transition tab, select Arrange > Send backward

    (c) From Home tab, select Arrange > Send back

1.12 Let Us Sum Up :

In this unit we have discussed about Microsoft PowerPoint and it's features. We have lean how to create New Presentations and Save Presentation, Editing and Enhancing a PowerPoint Presentation, Add Delete and Organize Slides, Insert Text Boxes, Change the Theme on a Presentation, Add Images, Clip Art Video and Arrange Objects.

1.13 Answers for Check Your Progress :

Check Your Progress – 1

    1. b   **2.** b   **3.** c   **4.** c

Check Your Progress – 2

    1. b   **2.** c   **3.** a

1.14 Glossary :

Presentation Software : Presentation software is defined as computer programs designed to allow the user to present information in an engaging way such as with text, pictures, sound and video. PowerPoint is an example of a presentation software.

Slide : The slides contain the information you want to communicate with your audience.

Slide layout : Slide layouts contain formatting, positioning, and placeholder boxes for all of the content that appears on a slide.

Theme : A theme is a slide design that contains pre-set colors, fonts, formatting and/or images.

Template : A PowerPoint template is a pattern or blueprint of a slide or group of slides that you save as a . potx file. Templates can contain layouts, colors, fonts, effects, background styles, and even content.

1.15 Assignments :

• What is a PowerPoint ?

• Explain features of Microsoft PowerPoint

1.16 Activity :

• Discuss different types of presentation software available in

1.17 Case Study :

• Compare Microsoft PowerPoint with Google Slide

1.18 Further Reading :

• https://courses.lumenlearning.com/wm–businesscommunicationmgrs/ chapter/introduction–to–using–microsoft–powerpoint/ ?

<table>
<tr><td>Unit
2</td><td colspan="2">INTRODUCTION TO
GOOGLE SLIDES</td></tr>
</table>

: UNIT STRUCTURE :

2.0   Learning Objectives :

After studying this unit learner should be able to :

* Create a presentation using Google Slides

* Create and save a new presentation

* Organizing Slides

* Text Boxes

* Themes

* Images

* ClipArt

* Video

2.1   Introduction :

Google Slides is a free program that's part of Google's suite of web–based applications, including Google Docs (word processing), Sheets (spreadsheets), Slides (presentations) and Forms (collecting & organizing information). What's particularly powerful about Google Slides is that you can create, edit, collaborate and present seamlessly across operating systems and without potential file compatibility or corruption issues,

managing flash drives or figuring out connector cables. Using a web–based program also eliminates the risk of transferring a virus.

It is also fairly easy to move a presentation from PowerPoint to Google Slides and back again, though you may lose some formatting in the process. If you do move a presentation, page through to make sure the slides still look the way you want them to. However, all the content should convert just fine. If you are used to PowerPoint and find yourself needing to use Google Slides (or vice versa), fear not! The commands and procedures are pretty similar between the two of them, and if you get stuck, there are lots of good online resources to answer your questions.
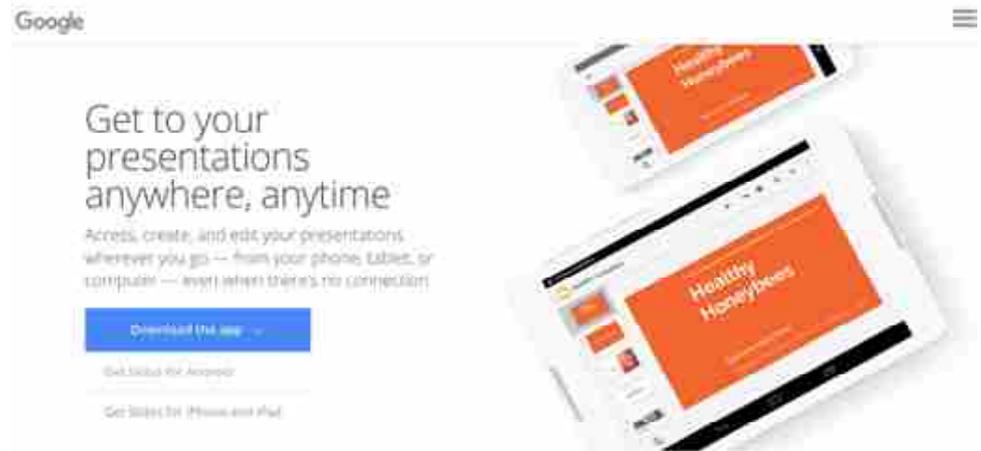
Figure 1

For an overview of Google Slides capabilities, scroll down through the front pages on the Google Slides website.

To highlight a few key features and benefits :

• Universal access, from your phone, tablet or computer

• Support for both Android and iPhone/iPad (Google Slides apps)

• Share your presentation with options for to restrict/enable viewing, commenting and editing

• Auto–save

Embedded in Google Slides are a variety of presentation themes and templates, hundreds of fonts and support for text, images and video. You can search Google Slides template gallery for perspective or a jump start to creating your presentation. Let's jump right in!

Googles Slides is free to use, but to do so requires a Google account. If you don't already have a Google account (i.e., a gmail address, Google Drive or Google Calendar), you will need to create one in order to use Google Slides. To establish a Google account, search for "Google account" or go directly to the Google Account sign up page.
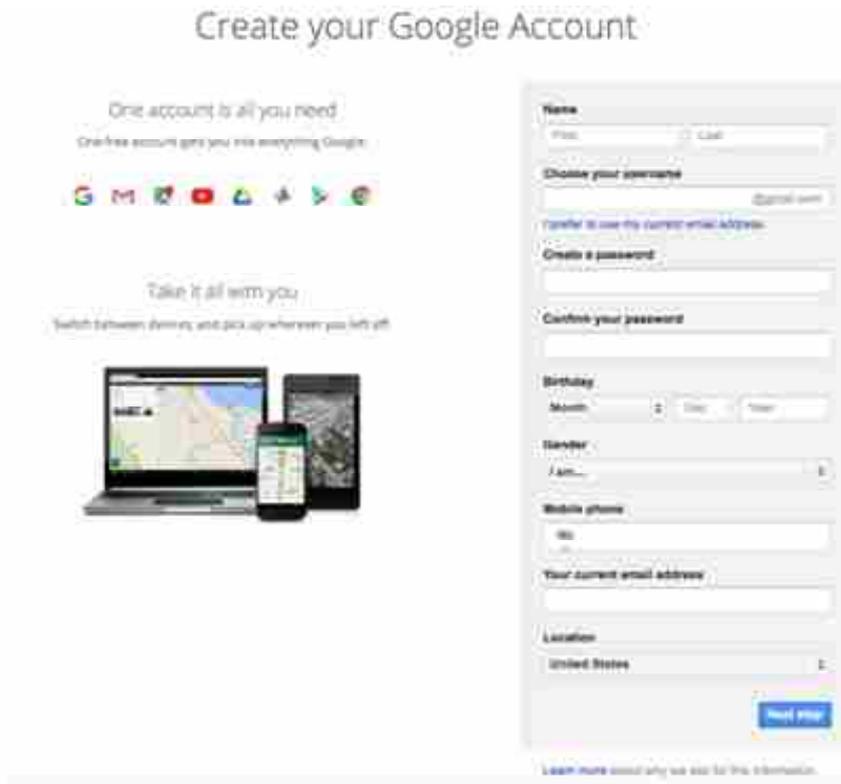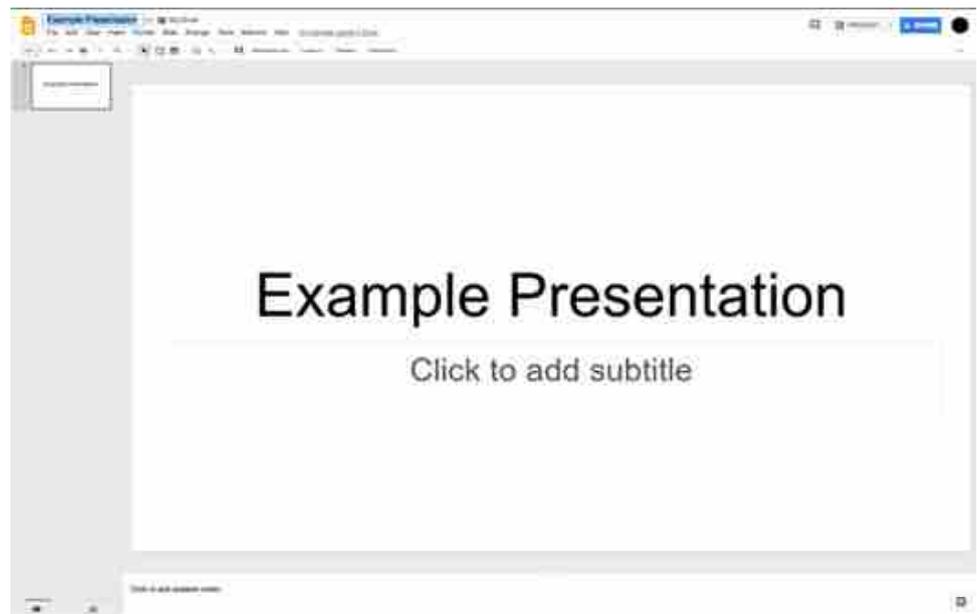
Figure 1

2.2   New Presentations :

To start a new presentation, search for "Google slides" or go to https://www.google.com/slides/about/. See Figure 2 for a visual of the application's opening view. You can start a new blank presentation or choose from a number of existing, editable presentations or templates. If you recently viewed a shared presentation or created a presentation, you would see it listed under Recent Presentations. To start a new presentation, click on the plus (+) sign in the Blank Presentation box.

Figure 2

Within Google Slides, as in all Google applications, your work is saved automatically. Until you name your presentation, it will save as Untitled presentation.

To title your presentation, click in the [Untitled Presentation] box and type your desired title. By default, Google slides will insert the text from the title box as the title; you can accept that or delete and enter an alternate title (see Figure 3).

Figure 3

2.3   Organizing Slides :

There are multiple options for adding slides:

• Select "+" (New slide) from the second menu line. To select a specific slide layout, use the dropdown menu to the right of the slide to add a slide that best matches the content for that slide

• Use the New slide shortcut: Ctrl+M

• From the Insert dropdown, select New slide (Ctrl+M) Select Insert > new slide

• Select Slide > Duplicate slide, which will copy the slide that's currently highlighted in the thumbnail section in the left column of the screen

• Right click in a slide in the thumbnail sidebar and select New slide or Duplicate slide

To delete a slide, right click on the thumbnail image and press delete OR delete from the Slide dropdown: Slide > Delete slide. If you delete a slide in error, don't panic! Click on the Undo arrow or use the Ctrl+Z shortcut.

To move a slide, click on the slide in the sidebar–this will highlight the thumbnail–and drag it to where you want it to appear. A second sorting option is to shift from the default ("Filmstrip") view to Grid view–View > Grid view–and use a select, drag and drop method. You can toggle between the default and Grid view by selecting the icons at the bottom of the thumbnail window.

Figure 4

2.4 Textboxes :

As with most actions in Google slides, there are multiple ways to add a text box:

• Select the Text box icon from the main menu (see Figure 1).

• Select Insert > Text Box.

Using either method, your cursor will become a crosshair; position your cursor where you want the text box to start and click to anchor. Drag the cursor the approximate width and length of your anticipated text entry and release the cursor. If you want to change the location of the text box, click within the text box to highlight it and use the arrow keys on your keyboard to reposition. To change the box dimensions, click within the text box (if it's not already highlighted) and hover over one of the anchor points (tiny boxes). A directional arrow will appear; click to stretch or reduce the size; release when complete.
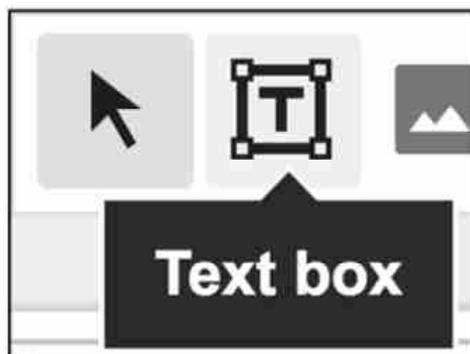
Figure 1

To delete a text box, select to highlight and press delete. If you change your mind, click on the Undo (Ctrl+Z) arrow.

2.5 Themes :

Themes are one of the formatting options within Google Slides. To view theme options, click on Slide > Change theme. A column will appear on the right of the screen, showing various color, layout and font options. To see how a particular combination would work with your content, click on your chosen theme. You can continue test–driving themes; clicking on a new theme will replace the prior choice. There's no risk of losing your original formatting; Undo (or Ctrl+Z) will return you to your original theme. You can also import a theme from outside Google Slides. Click on the Import theme button at the bottom of the themes column. Sites such as Slides Carnival allow you to copy slide formats directly into Google Slides.

2.6 Images and ClipArt :

Using art and images adds impact and provides welcome relief to the challenge of processing information–intensive slides. To insert an image, select Insert > image or the image icon, to the right of the Text box icon. As shown in Figure 1, there are multiple options for accessing images; you can also access these options using the drop–down menu to the right of the Image icon. You can upload images from your computer, use the camera on your device to take a photo, link to an image using a URL, or Search Google Images. Selecting Search the Web will link you to Google Images, where you can use a keyword or keywords to search for images, including quote images based on your keyword(s).

When your results appear, you'll see a small magnifying lens in the bottom right corner of the images. Clicking on the magnifying lens allows you to preview the image prior to selection/inserting. To exit preview (if you don't want to choose this image), press the left (return) arrow to return to the search options.

(b)

(a)
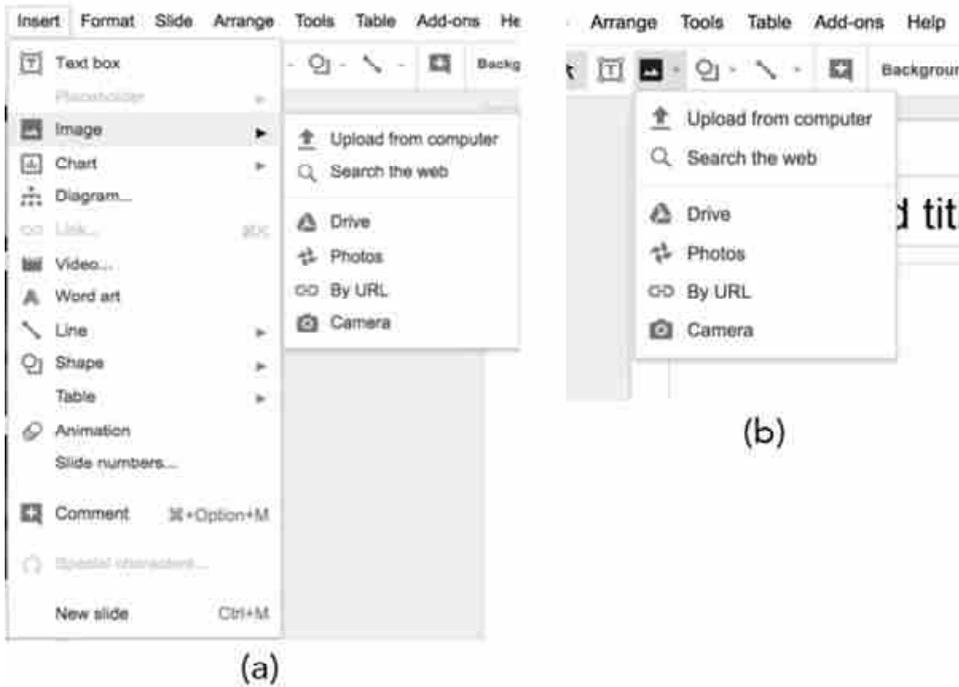
To select an image, click on it and click on the INSERT button at the bottom of the window. The image will be inserted into your current (highlighted in the thumbnail) slide. If you change your mind, press the escape key (ESC), Undo, or Ctrl+Z to reverse the Insert operation.

To incorporate clip art, select Insert > Image to open the Google Image browser. In the Search area "Search for Google Images," enter your keyword or desired image and clip art as your search terms. For example, "brain clip art" or "brain + clip art." For more professional images, include "stock" – stock image or stock photo – in your search. For example, "brain stock image."

Images shown are generally in the public domain or labeled for commercial use with modification, but as the disclaimer on the Google Image window notes, you are responsible for ensuring that your intended use is in accordance with the image creator's license.

2.7   Videos :

Adding video to your Google slides adds yet another level of visual interest and engagement. To incorporate video:

1.   Select Insert > Video from the main menu. A window will appear where you can search for a YouTube video, or you can select URL at the top of the window, and paste a URL for a specific YouTube video.

2.   Click on a video to select it and press the Select button to embed it in your current slide. Your video is now embedded in your slide.
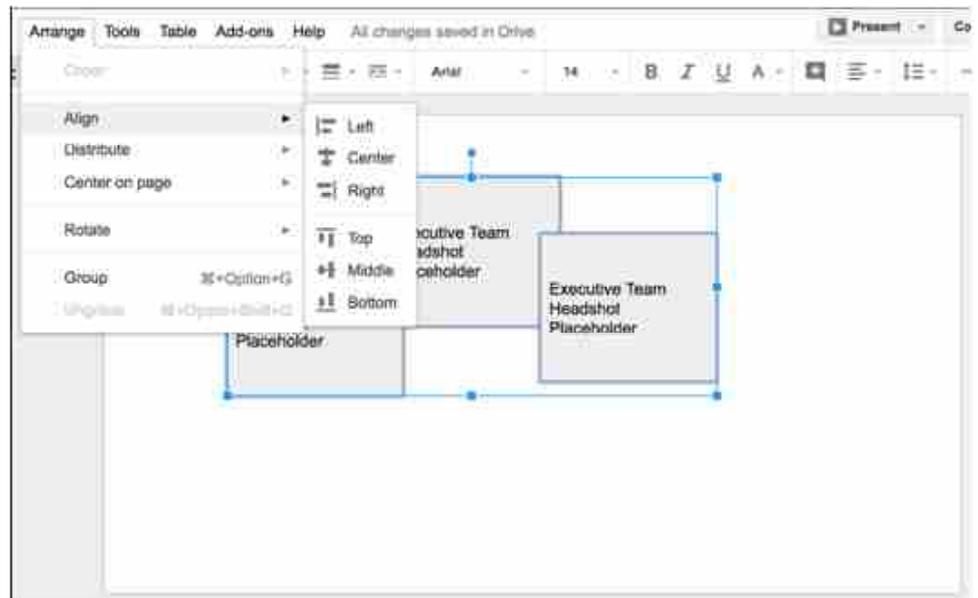
2.8 Arranging Objects :

When you're creating a slide with multiple elements–for example, layering text, imagery, lines, shapes or other objects–you may find a need to arrange the elements or objects.

To manage objects on a slide :

1. Click Arrange from the main menu.

2. Choose from the following options :

   • **Order :** Put the object behind or in front of text, other objects, or images.

   • **Align horizontally or Align vertically :** When you select multiple objects, you can align the edges of the objects.

   • **Center on page :** Center objects vertically or horizontally on a slide.

   • **Rotate :** Change the orientation of an object, by flipping or rotating it.

   • **Distribute :** When you select three or more objects, you can evenly distribute the space between them.

   • **Group :** Lock multiple objects together to make them easier to move around and format.

The Google Slides grid line feature, enabled by default, also provides a visual to help with alignment. When you click and drag an object, you will see colored lines appear that will help you align the object with other objects on the page. This setting (View > Snap to > Guides) is selected by default.
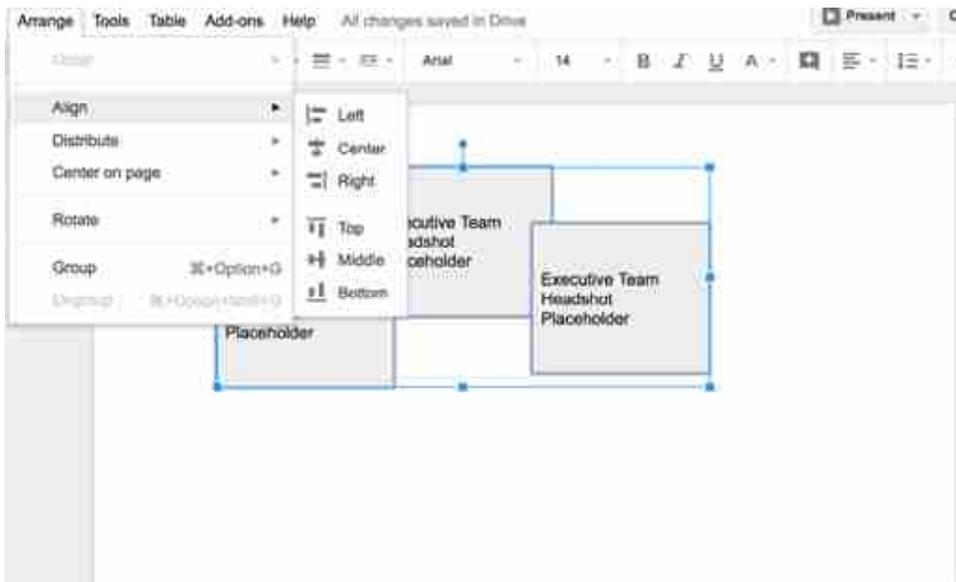
Check Your Progress :

1. To save a new Google Slides presentation:

   (a) Select Ctrl+S

   (b) Click to edit Untitled presentation and rename

   (c) Select File > Save and title your presentation

2. Your meeting organizer sends you an email asking you to edit your presentation down to 15 minutes to accommodate a "drop in" visit from your President. You think it would be easier to delete and move slides in grid view. To shift from the default to grid view :

   (a) Select View and then Grid View

   (b) Select Ctrl+G

   (c) Select Format and then Grid View

3. You are ready to venture outside the box (slide layout templates). To add a text in an area where there is no preformatted text box :

   (a) Double click and type your text

   (b) Select Insert and then Textbox

   (c) Select Format and then Text

4. You want to experiment with different color, layout, and font options, but the number of possible combinations is overwhelming. You decide to scroll through the theme options to see how they work with your material. To do that :

   (a) Select Format > Theme and select a theme

   (b) Select File > Open and select a theme

   (c) Select Theme and click on a thumbnail to apply

5.   You want to add emotion to your presentation and decide to look for a compelling image. To do that :

(a) Select View > Google Images > Enter search term > Select insert

(b) Open a browser window, search for and download an image & drag it into your slide

(c) Select Insert > Image > Search the web > Enter search term > Select insert

6.   You're doing a lunch & learn for your team, and you want to add something that will be engaging as well as informative. You saw a YouTube clip recently that would be a perfect addition. To add it to your presentation:

(a) Select Insert > Vieo > Search YouTube > Select Insert

(b) From YouTube, select Share and select the Google Slide icon

(c) From YouTube, select Share, Copy and Paste the URL into your slide

7.   One of the slides in your presentation is an introduction of three new team members, with a row of three headshots and three text boxes with brief profiles below. You built it on the fly, and the rows of boxes are not even. To format the two rows horizontally, you would use which of the following functions:

(a) Edit > Align   (b) Format > Align

(c) Arrange > Centre on Page

2.9   Let Us Sum Up :

In this unit we have learn about Google Slides, a free program that's part of Google's suite of web–based applications, including Google Docs (word processing), we got overview of Google Slides capabilities and learn to create effective presentation in google slide. We have learn how to create and save a new presentation, Add, delete, and move slides, use Text Boxe, Themes, Images and ClipArt, Videos and arranging Objects.

2.10   Answers for Check Your Progress :

1. c	**2.** b	**3.** c	**4.** c
5. b	**6.** b	**7.** c	

2.11   Glossary :

Google Slide : Google Slides is an online presentation app that lets you create and format presentations and work with other people.

Slide : The slides contain the information you want to communicate with your audience.

Slide layout : Slide layouts contain formatting, positioning, and placeholder boxes for all of the content that appears on a slide.

Theme : A theme is a slide design that contains pre-set colors, fonts, formatting and/or images.

Template : A PowerPoint template is a pattern or blueprint of a slide or group of slides that you save as a . potx file. Templates can contain layouts, colors, fonts, effects, background styles, and even content.

2.12 Assignment :

•   What is google slide ?

•   Write features of Google Slide

2.13 Activity :

•   Create attractive presentation for business meeting

2.14 Case study :

•   Learn Google sheets and Google docs

2.15 Further Reading :

•   https://courses.lumenlearning.com/wm–businesscommunicationmgrs/ chapter/introduction–to–using–google–slides/

Unit 3

MICROSOFT ACCESS BASIC FEATURES

: UNIT STRUCTURE :

3.0   Learning Objectives :

After studying this unit learner should be able to :

*   Identify the terminology and functions common to most database management systems.

*   Identify the qualities of valuable information.

*   Identify the elements of good database design.

*   Create and use tables.

*   Create and use queries.

*   Create simple reports and forms.

*   Use the Access online Help feature.

*   Discuss ethical issues connected to the use of databases.

3.1   Introduction :

In this unit we will consider Microsoft Access as a proprietary relational database structure. Proprietary as it is written using a combination

of Visual Basic (VB) and Structured Query Language (SQL) from Microsoft. The Microsoft Access application is available as one of the productivity tools in the suite of Microsoft Office products. In Unit 3 and 4 of Block–3, we saw where Excel allowed us to store and manipulate various data sets and generated reports. Excel however has certain limitations due to the "flat file" nature of its data structure. Access on the other hand, supports a relational data structures

3.2 Database Overview :

A database is a collection of information centrally organized so that various programs can have access to the same information set. Some people refer to the database as an electronic filing system. A special program called a Database Management System (DBMS) is used to access and manipulate information from the database. The terms database is often used as shorthand for DBMS.

A database may be on paper, or held in computer files such as spreadsheets or more formally in a software system known as a computerized database management system (for example: DB2, db4o, IMS, MS Access, MS SQL Server, mySQL, Oracle, Sybase, Total, Versant).

A database is a critical tool for any business. It has the capability of storing huge sums data. The data can be organised separately in various tables and linking them together. Eg you can have a list or database of customers. Each customer is called a record and the information relating to a particular customer (name, sex, address) is known as attributes. Databases can be searched or queried to produce meaningful reports for your business. Databases can be organized as either a "flat file" (e.g. a grocery list) such as Microsoft Excel or as a relational database with two dimensional tables linking together.

3.3 Relational Database :

Relational Databases were introduced by E. F. Codd in 1969. We begin with a very small example: a database with one relation, the list of employees shown below.
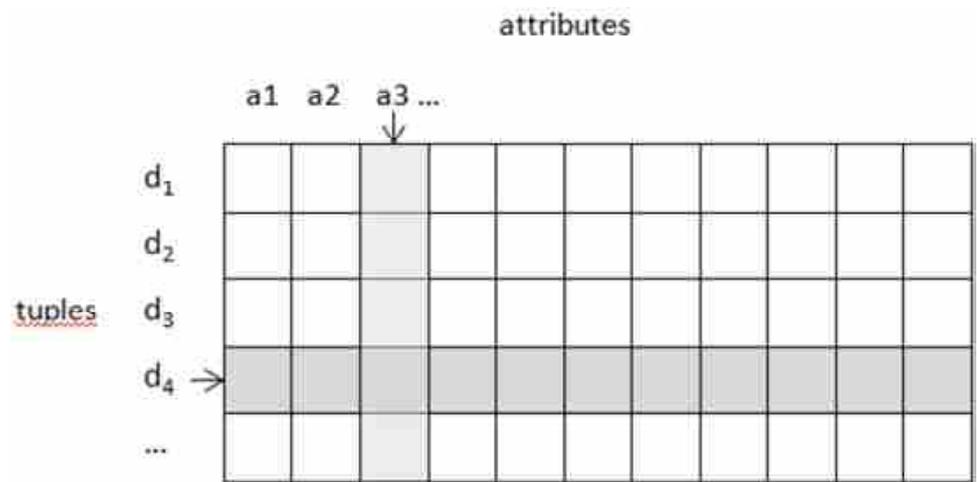
Employees			
Employee ID	**First Name**	**Last Name**	**Gender**
123	Joe	Smith	Male
333	Jim	Jones	Male
456	April	Smith	Female
842	Jenny	Jones	Female
777	Tom	Lee	Male

Figure 1.1 : List of Employee

You should notice this looks just like a two dimensional table of rows and columns. The name of the table is Employees, each column of the table has its own title, and each row has the same structure. Each row has a value for employee number, first name, last name, and gender. As tables of data

appear in so many places (newspaper articles, text books, web pages, etc.) it is very likely you have seen and used this representation for data previously.

Let us assume the Employees table in figure 1.1 has one row for each employee who works for some hypothetical company. Data kept for each employee comprises their employee identification number, their first and last names, and their gender. Information structured in tables is very concise; at a glance we can obtain useful information Commercial relational database systems are systems where data is organized into relations. Figure 1.2 shows the general structure of a relation. We say a relation comprises a set of tuples where each tuple has the same number of attribute values, where each attribute value is taken from some corresponding domain, and where a domain represents a set of valid values for an attribute.

Figure 1.3 : General structure of a relation

The Employees table in figure 1.1 can be considered a relation of 5 tuples where each tuple has 4 values drawn from each of the employee identifier, first name, last name, and gender domains.

Relations are typically implemented in commercial databases as tabular structures comprising rows and a fixed number of columns. Everybody is familiar with tables as they are commonplace in textbooks, papers, magazines, etc. This simplicity of representation is one reason why relational databases have been very successful as repositories for important data.

3.4   Microsoft Access :

Access is a relational database that allows you to create and maintain databases for small to medium size corporations and other organizations. Unlike a "flat file" database, a relational database allows you divide your data into logical pieces and place each piece in a table. This logical separation of data makes it more powerful for further manipulation such as queries and reporting.

Microsoft suggests that the following scenarios as some instances when you should consider using Access :

1. When you need to be able to collect contact information accurately from large groups.

2. When you want a database that is easy for colleagues to explore your information without training.

3. When you need to run the same report daily, weekly, or monthly.

4. When you want to know who your most valuable customers are so you can target your marketing.

The list above is by no means exhaustive but in a nutshell you can see how valuable a business tool access is. Very few if any business activities can be executed efficiently and accurately without the use of some form of database. In addition, Access provides various database templates for different types and size of businesses. To provide a clearer picture of the use of the access database Microsoft lists on its website (Fig 6.1) a number of templates and what they are best suited for.

Templates	Best used for:
Assets template >	Tracking the condition or status of assets or inventory.
Contacts template >	Keeping track of your customers' key information, buying habits, and more.
Issues and tasks template >	Tracking the progress of team activities.
Non-profit template >	Managing events, donors, members, and donations.
Projects template >	Keeping track of projects, tasks, and people assigned to them.
Services template >	Managing quotes, create invoices, and run your business.
Goods template >	Tracking inventory, create invoices, and run your business.
Price Compare template >	Establishing your price and keeping track of your competition.

3.5 Access for Your Business :

Access is a mature and well supported relational database. You will recall from Lesson 1.2 our discussion on flat file and relational data structures. Access is a relational structure that can support huge volumes of data for a variety of different industries. Access offers the standard database tools in the forms of queries, reports macros etc. As an entrepreneur or business operator you are interested in how this tool can be utilized to support your business, and assist in improving efficiencies, increase market share and realise profits.

Microsoft has tailored portions of the product specifically toward business operators such as you. In so doing, you can concentrate your effort on adopting and applying the software directly to your business needs.

The product is available in Office 2010 called and is referred to as "Access for your Business". It is a web based data base (cloud service) and has three main featured components or templates

1. Turn your quotes into invoices

2. Mange your inventory and cut expenses

3. Target your customer marketing.

Turn your quotes into invoices with the services database template

Running a services business then you can appreciate how important quotes and invoices are. The difficulty is that they are difficult to manage and keep track of. This web based database template in access allows you to do just that.

• Add data to your services database

• Track active quotes and invoices

• Manage all your quotes

• Manage all your invoices

• View and print reports

• Manage services, products employees and customers

Manage inventory and ship effectively

This ready–to–use–module allows you to use the goods web database template to manage your inventory, track orders and ship efficiently if you are running a business that sells goods. The following are some of the functionalities that are already set up and available directly from the template.

• Start the database

• Add existing products or goods to the database

• View orders and purchase status

• Manage products inventory and supplies

• Manage customer orders

• Restore your inventory

• View and print reports

Target your customer marketing

This database template is an excellent way to manage your customer database by having the ability to manage essential contact information. Foe each contact you can now manage emails, address, phone numbers, add pictures and share documents. This detailed information on all your customers can be used to automate your email advertising campaign. This was discussed in Unit 3. The more you know about your customers the better you are able to serve them, thus enhancing the speed and efficiency of your organisation. We have spoken about using the template as a customer database but the same templates can be applied to an employee database, a suppliers data or any other list of stakeholders.

3.6 Creating a Database :

The Microsoft website gives detail information on how to create and manipulate the access database. The following section is taken from the website to give you a sense of the major database activities. These include :

1. To create a database by using a template

2. To create a database without using a template

3. To create a table in Design View

4. To copy data from another source into an access table

5. To Import, append, or link to data from another source

Create a Database by Using a Template

Access comes with a variety of templates that you can use as–is or as a starting point. A template is a ready–to–use database that contains all the tables, queries, forms, and reports needed to perform a specific task. For example, there are templates that you can use to track issues, manage contacts, or keep a record of expenses. Some templates contain a few sample records to help demonstrate their use. If one of these templates fits your needs, using it is usually the fastest way to get a database started. However, if you have data in another program that you want to import into Access, you might decide it is better to create a database without using a template. Templates have a data structure already defined, and it might require a lot of work to adapt your existing data to the template's structure.

Create a database without using a template

If you are not interested in using a template, you can create a database by building your own tables, forms, reports, and other database objects. In most cases, this involves one or both of the following:

1. Entering, pasting, or importing data into the table that is created when you create a new database, and then repeating the process with new tables that you create by using the Table command on the Create tab.

2. Importing data from other sources and creating new tables in the process.

Access creates the database with an empty table named Table1, and then opens Table1 in Datasheet view. The cursor is placed in the first empty cell in the Click to Add column.

Begin typing to add data, or you can paste data from another source.

Entering data in Datasheet view is designed to be very similar to working in an Excel worksheet. The table structure is created while you enter data. When you add a new column to the datasheet, a new field is defined in the table. Access automatically sets each field's data type, based on the data that you enter.

3.7 Create a Table, Starting in Design View :

In Design view, you first create the table structure. You then switch to Datasheet view to enter data, or enter data by using some other method, such as pasting, or importing.

You can begin typing data in the table at any time by switching to Datasheet view and clicking in the first empty cell. You can also paste data from another source.

Set field properties in Design view Regardless of how you created your table, it is a good idea to examine and set field properties. While some properties are available in Datasheet view, some properties can only be set in Design view. To switch to Design view, right–click the table in the Navigation Pane and then click Design View. To see a field's properties, click the field in the design grid. The properties are displayed below the design grid, under Field Properties.

3.8 Copy Data from Another Source into An Access Table :

If your data is currently stored in another program, such as Excel, you can copy and paste it into an Access table. In general, this works best if your data is already separated into columns, as they are in an Excel worksheet. If your data is in a word processing program, it is best to separate the columns of data by using tabs, or to convert the data into a table in the word processing program before you copy the data. If your data needs any editing or manipulation (for example, separating full names into first and last names), you might want to do this before you copy the data, especially if you are not familiar with Access.

When you paste data into an empty table, Access sets the data type of each field according to what kind of data it finds there. For example, if a pasted field contains nothing but date values, Access applies the Date/ Time data type to that field. If the pasted field contains only the words "yes" and "no", Access applies the Yes/No data type to the field.

Access names the fields depending on what it finds in the first row of pasted data. If the first row of pasted data is similar in type to the rows that follow, Access determines that the first row is part of the data and assigns the fields generic names (F1, F2, etc.). If the first row of pasted data is not similar to the rows that follow, Access determines that the first row consists of field names. Access names the fields accordingly and does not include the first row in the data. If Access assigns generic field names, you should rename the fields as soon as possible to avoid confusion.

3.9 Import, Append, or Link to Data from Another Source :

You might have data that is stored in another program, and you want to import that data into a new table or append it to an existing table in Access. Or you might work with people who keep their data in other programs, and you want to work with it in Access by linking to it. Either way, Access makes it easy to work with data from other sources. You can

import data from an Excel worksheet, from a table in another Access database, from a SharePoint Foundation list, or from a variety of other sources.

3.10 Open An Existing Access Database :

You can directly open a data file in an external file format, such as dBASE, Microsoft Exchange, or Excel. You can also directly open any ODBC data source, such as Microsoft SQL Server. Access automatically creates a new Access database in the same folder as the data file, and adds links to each table in the external database.

Check Your Progress :

State whether the following statements are true or false

1. A database is a collection of information centrally organized so that various programs can have access to the same information set.

2. Access is a relational database that allows you to create and maintain databases for small to medium size corporations and other organizations.

3. Access creates the database with an empty table named Tuple–1

4. Access names the fields depending on what it finds in the first row of pasted data.

5. Access comes with a variety of templates that you can use as–is or as a starting point.

3.11 Let Us Sum Up :

Microsoft Access is a full–fledged well developed and supported database application that is more than capable of meeting the needs of small to medium business operations. Very few business tasks can be completed without the use of a structured database. Some will argue what about excel ? In unit 1 we explained the limitations on Excel

In this lesson we introduced the concept of access web templates for business and highlighted the three templates that can support your business activities, whether you are selling goods or services.

We also looked at the common database functions that you will be undertaking once you are engaged in the access database environment.

As you work with databases in general and templates in particular, you may discover that you want to do more with them or better modify them to suit your needs. The how to page on the Microsoft website provides a complete step by step set of instructions on how to create and modify the access database.

3.12 Answers for Check Your Progress :

1. True   **2.** True   **3.** False   **4.** True   **5.** True

3.13 Glossary :

Microsoft Access : Access is a relational database that allows you to create and maintain databases for small to medium size corporations and other organizations.

Database : A database is a collection of information centrally organized so that various programs can have access to the same information set.

RDBMS : A relational database is a type of database that stores and provides access to data points that are related to one another. Relational databases are based on the relational model, an intuitive, straightforward way of representing data in tables.

3.14 Assignment :

• What is Microsoft Access ?

• What is database ?

• List and explain the major database activities

• Explain two ways of creating database in Microsoft Access

• How can we Import, append, or link to data from another source ?

• How can we open and existing Access Database

3.15 Activity :

• Create database for student admission data

3.16 Case Study :

• Are you currently using Excel in your business ? If yes, is it meeting all your current database needs ? If not, migrate it into Microsoft Access

3.17 Further Reading :

• http://office.microsoft.com/en–us/access–help/use–the–contacts–web–database–template–to–target–your–customer–marketing–more–efficiently–HA102420593.aspx#_Toc284427748

• http://office.microsoft.com/en–us/access–help/use–the–contacts–web–database–template–to–target–your–customer–marketing–more–efficiently–HA102420593.aspx#_Toc284427749

• http://office.microsoft.com/en–us/access–help/use–the–contacts–web–database–template–to–target–your–customer–marketing–more–efficiently–HA102420593.aspx#_Toc284427750

• http://office.microsoft.com/en–us/access–help/use–the–contacts–web–database–template–to–target–your–customer–marketing–more–efficiently–HA102420593.aspx#_Toc284427755

• http://office.microsoft.com/en–us/access–help/use–the–contacts–web–database–template–to–target–your–customer–marketing–more–efficiently–HA102420593.aspx#_Toc284427756

- http://office.microsoft.com/en–us/access–help/use–the–contacts–web–database–template–to–target–your–customer–marketing–more–efficiently–HA102420593.aspx#_Toc284427757

- http://office.microsoft.com/en–us/access–help/use–the–contacts–web–database–template–to–target–your–customer–marketing–more–efficiently–HA102420593.aspx#_Toc284427758

- http://office.microsoft.com/en–us/access–help/use–the–contacts–web–database–template–to–target–your–customer–marketing–more–efficiently–HA102420593.aspx#_Toc284427759

BLOCK SUMMARY

Tools, no matter how sophisticated, are simply tools. Moving from the right tools to a good presentation involves perspective and planning. We have learn two ways to create attractive and effective presentation i.e. Microsoft PowerPoint and Google Slide. We have also learn how to create database using Microsoft Access. We introduced the concept of access templates for business and highlighted the three templates that can support your business activities, whether you are selling goods or services.

BLOCK ASSIGNMENT

Short Questions :

• What is presentation software ?

• What is database

• What is relational database ?

• What is template ?

• What is relation in relational database ?

Long Questions :

• Write detailed note on presentation softwares

• Explain in details about Microsoft Access Template and its uses

• Describe features of Microsoft Access

❖   **Enrolment No. :** [   ]

1.   How many hours did you need for studying the units ?

Unit No.	1	2	3
No. of Hrs.			

2.   Please give your reactions to the following items based on your reading
     of the block :

Items	Excellent	Very Good	Good	Poor	Give specific example if any
Presentation Quality	☐	☐	☐	☐	——————
Language and Style	☐	☐	☐	☐	——————
Illustration used (Diagram, tables etc)	☐	☐	☐	☐	——————
Conceptual Clarity	☐	☐	☐	☐	——————
Check your progress Quest	☐	☐	☐	☐	——————
Feed back to CYP Question	☐	☐	☐	☐	——————

3.   Any other Comments

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