Cyber Quest

Windows 10 and MS Office 2019

8



Name .....

Class ..... Section ..... Roll No .....

School .....

Address .....

Phone .....

Preface

Computer is the biggest innovation of mankind and has become one of the basic necessities of human life. Computer learning has been accepted as an integral part of the school curriculum.

Kips, with its vast experience in school computer education has designed the Computer Series, **Cyber Quest**. It is based on Windows 10 and Office 2019. It incorporates tool-based learning and a number of activity-based software, like Paint 3D, eduActiv8, Scratch, etc.

Cyber Quest is one of the most comprehensive series for classes I to VIII, which is free from rote learning. The books follow the latest NEP for imparting computer knowledge. All concepts are explained using the principle of Law of Association **(LOA)**.

Cyber Quest features the latest technology in the field of computers, like MS Office 2019, PHP, Krita, Artificial Intelligence, Robotics, etc. **Coding** has been introduced from class I onwards.

Suggestions for any improvement in the content are welcome so that they may be incorporated in the subsequent editions.

Kips Content Development Team

Acknowledgements

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WORK DETAILS

S.No.	Chapter Name	Date	Teacher's Signature

Kips

My Performance

Date	Test/Exam	Marks / Grades Obtained			Highest Marks/Grade in the class	Teacher's Remarks	Parent's Signature
		Theory	Practical	Total			

IT PERSONALITIES



N R Narayana Murthy: He is the co-founder of **Infosys**. He was the chief mentor of the company and has now taken up the title of **Chairman Emeritus**.



Azim Premji: He is the chairman of the **Wipro Limited**, which is one of the global leaders in the software industry.



Sabeer Bhatia: He is an Indian-American businessman and one of the co-founders of **Hotmail.com**. He is a prime example of success story of an Indian at the Silicon Valley.



Sundar Pichai: He is the **CEO** of **Alphabet Inc.** and its subsidiary Google LLC. Under him, Google has developed many AI-based products and services.



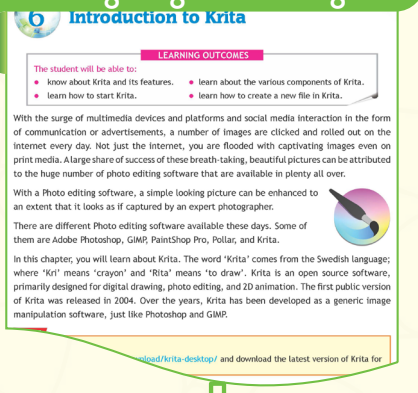
Shiv Nadar: He is the founder and chairman of **HCL** and the **Shiv Nadar Foundation**. He founded HCL in the mid-1970s which is a hugely successful IT enterprise.



Vinod Dham: He is famously known as the **'Father of the Pentium Chip'** for his contribution in making Intel's Pentium microprocessor.

Key Features

Cutting Edge Technologies


Introduction to Krita

LEARNING OUTCOMES

The student will be able to:

- know about Krita and its features.
- learn how to start Krita.
- learn about the various components of Krita.
- learn how to create a new file in Krita.

With the surge of multimedia devices and platforms and social media interaction in the form of communication or advertisements, a number of images are clicked and rolled out on the internet every day. Not just the internet, you are flooded with captivating images even on print media. A large share of success of these breath-taking, beautiful pictures can be attributed to the huge number of photo editing software that are available in plenty all over.

With a Photo editing software, a simple looking picture can be enhanced to an extent that it looks as if captured by an expert photographer.

There are different Photo editing software available these days. Some of them are Adobe Photoshop, GIMP, PaintShop Pro, Pollar, and Krita.

In this chapter, you will learn about Krita. The word 'Krita' comes from the Swedish language; where 'Kri' means 'crayon' and 'Rita' means 'to draw'. Krita is an open source software, primarily designed for digital drawing, photo editing, and 2D animation. The first public version of Krita was released in 2004. Over the years, Krita has been developed as a generic image manipulation software, just like Photoshop and GIMP.

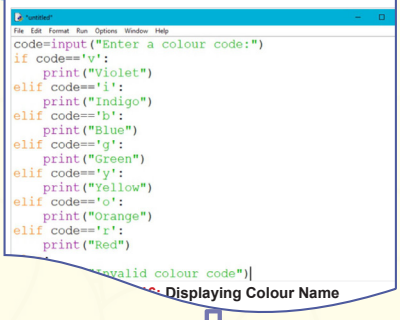
...nload/krita-desktop/ and download the latest version of Krita for

Chapters on cutting edge technologies to intrigue young minds

With self and peer assessment rubrics to encourage collaboration and creativity

Coding

Program 15: Create a program in Python t... corresponding colour code.


Untitled*

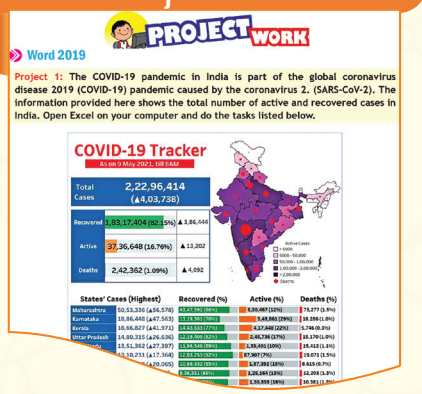
File Edit Format Run Options Window Help

```
code=input("Enter a colour code:")
if code=='v':
    print("Violet")
elif code=='i':
    print("Indigo")
elif code=='b':
    print("Blue")
elif code=='g':
    print("Green")
elif code=='y':
    print("Yellow")
elif code=='o':
    print("Orange")
elif code=='r':
    print("Red")
...
...valid colour code")
```

...Displaying Colour Name

Using the latest and age-appropriate software in all grades

Project Work


PROJECT WORK

Word 2019

Project 1: The COVID-19 pandemic in India is part of the global coronavirus disease 2019 (COVID-19) pandemic caused by the coronavirus 2. (SARS-CoV-2). The information provided here shows the total number of active and recovered cases in India. Open Excel on your computer and do the tasks listed below.

COVID-19 Tracker

As on 9 May 2021, 1:08 AM

Total Cases	2,22,96,414 (▲4,03,738)
Recovered	1,83,17,404 (82.19%) ▲3,86,444
Active	37,36,648 (16.76%) ▲13,202
Deaths	2,42,362 (1.09%) ▲4,092

States' Cases (Highest)	Recovered (%)	Active (%)	Deaths (%)
Maharashtra	50,53,336 (▲56,578)	6,90,867 (12%)	75,273 (1.5%)
Karnataka	18,86,440 (▲47,563)	5,68,886 (29%)	18,396 (1.0%)
Kerala	18,66,827 (▲41,971)	4,57,648 (22%)	5,746 (0.3%)
Uttar Pradesh	14,90,315 (▲26,636)	2,48,739 (17%)	18,179 (1.0%)
...	13,51,362 (▲27,397)	3,39,495 (20%)	15,423 (1.1%)
...	13,10,211 (▲17,364)	87,907 (7%)	19,071 (1.5%)
...	...(▲70,065)	4,97,382 (26%)	8,619 (0.7%)
...	9,34,931 (85%)	1,29,564 (12%)	10,203 (1.0%)
...	...	1,30,559 (16%)	10,583 (1.3%)

Using the latest and age-appropriate software in all grades

Artificial Intelligence


FUN with AI

Arduino Microcontroller Programming

Arduino is an open-source platform, used for building electronics projects. It consists of a programmable circuit board – a microcontroller and an IDE. The IDE runs on your computer, and is used to write and upload the computer code to the physical board. The Arduino IDE uses a simplified version of C++, making it easier to learn to program.

Arduino is the most simple and affordable, small-scale computer with a microprocessor that focuses on interaction with the outside world. Most of the computers you are familiar with are controlled almost exclusively through the keyboard and mouse, touchscreen, or trackpad. An Arduino allows you to take information from the outside world with sensors that measure temperature, light and sound levels, or even the vibrations underneath your feet and convert these measurements into motion, sound, light, and more.

The Arduino was originally developed for the students without a background in electronics and programming to create interactive objects that can scan the environments. Since the original Arduino was released in 2005, it is estimated that over 1 million have been sold. Designers, educators, engineers, hobbyists, and students have built all kinds of projects that sense and respond to the world with Adruino.

Arduino Hardware

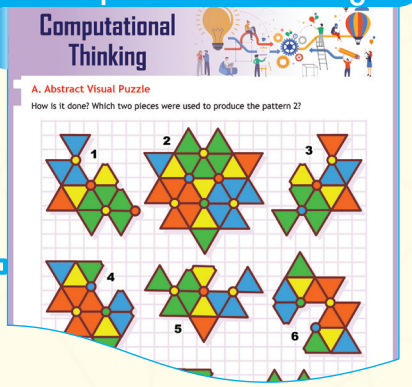
There are many versions of the Arduino, and each is designed for a specific function. The ...shows a few of the Arduino boards.

...pen Source Hardware ...the machines, ...hose

To help students become familiar with the world of AI

Includes activities to develop the critical and logical skills in a fun way

Computational Thinking


Computational Thinking

A. Abstract Visual Puzzle

How is it done? Which two pieces were used to produce the pattern 2?

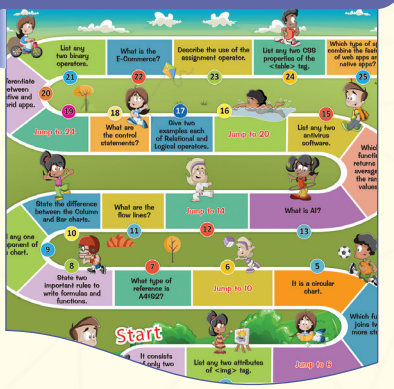
1 2 3 4 5 6

Highlights the latest NEP key points with the icons below

- Healthy Living
- Computational Thinking (Coding)
- Artificial Intelligence
- Board Games
- Cyber Ethics
- Life Skills & Values
- Art Integration
- Cross-Curricular Activities

For revision and engaging the students

Board Games



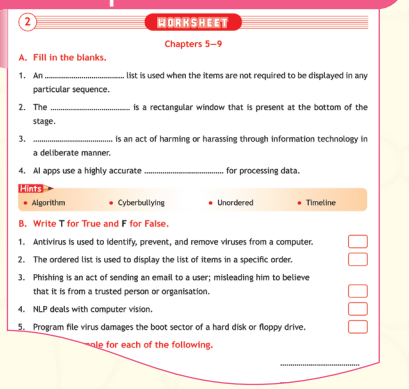
Activity Section



Includes Lab Sessions, topics for Group Discussion, Online Links for more information, etc.

To assess the progress of the students

Test Papers and Worksheets



Cyber Ethics



To make the children aware about the precautions and etiquette to be followed while using the internet

Healthy Living



To help the students imbibe good eating habits and focus on their fitness

Additional Digital Resources Include

- **CYL** – Consolidate Your Learning
- **QPG** – Question Paper Generator
- **ICL** – Interactive Classroom Learning
- **AR** – Augmented Reality App
- Lesson Plans
- Answer Keys

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Chapter 1

Networking Concepts

LEARNING OUTCOMES

The student will be able to:

- learn about the basic concept of computer network, its advantages and disadvantages.
- know about the different types of networking components, networks, network architecture, and topologies.
- know how to access a file from a shared drive.
- understand network security.

Have you ever observed the different types of networks that you come across in your daily life? Can you think of some? Let us understand this concept by some examples:



Example

- A network of roads, railway lines, canals, etc. , which is used for transportation and travel
- Communication network of telephone system, which enables you to talk to anyone, anywhere, anytime
- A network of banks/ATMs (Automated Teller Machines) for financial transactions
- Radio/Television network that broadcasts programs live across the globe
- Video conferencing, which allows discussions between people at distant/far off places
- A network of malls, schools, hospitals, etc., all over the country

The internet is one such network that is an outcome of cyber networking. Imagine how your life would be without networking—without phones, television, internet, etc. Computer networks have extended the power of a computer beyond the expanse of a room. It has transformed the world into a global village.

Networking

A computer network can be defined as a group of computers and other peripheral devices that are linked together for the purpose of sharing data and hardware resources. For example, if one of the computers in a network has a printer attached to it, then all the computers in that network can access the printer and use it to print the documents as shown in Figure 1.1, where Computers A and B in a network can give the print command to the printer attached with Computer C.

The computers in a network can communicate with each other as well as work independently. Each computer in a network is called a **Node**. The computers in a network can be linked through cables, telephone lines, radio waves, or infrared light beams.

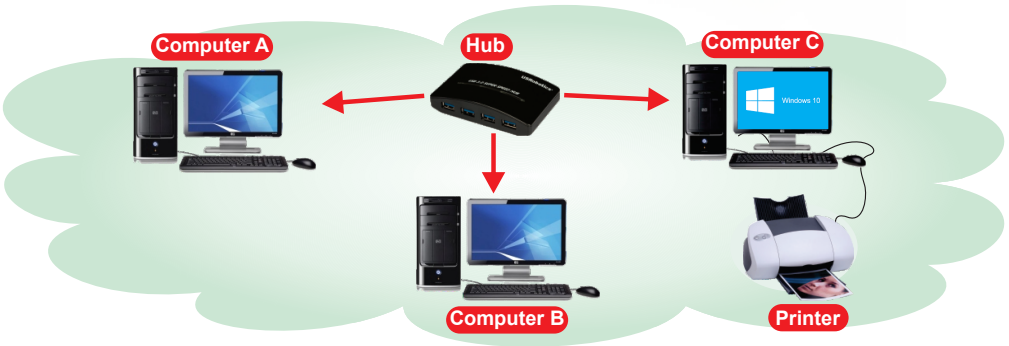


Figure 1.1: Computer Network

Advantages of Networking

Networking in computers brings efficiency, economy, and effectiveness in any organisation. Some of the advantages of networking are discussed below:

Resource Sharing

In a computer network, all the hardware and software resources are shared among the users of the network. The additional peripheral devices, such as printer, scanner, modems, fax machines, etc., can be connected to one central computer and shared among the others. Also, it becomes very easy and convenient to share the data and files among the users of a computer network. It saves the time that is spent in transferring a file from one machine to another using a storage device.

Reduction in Cost

The cost of hardware is considerably less in a computer network as all the computers share the hardware resources. The software cost can also be saved by purchasing the software and licences for the server, and distributing them to the clients.

Increased Storage Capacity

As in a network, the users can store their files on remote computers, so they get more space to store their data.

Fast Data Transfer

Networking provides a facility to transfer the soft copies from one computer to the other at a high speed.

Easy to Take Backup

It is difficult to maintain regular backups on a number of stand-alone computers. You can set the server in a network to take regular backup of data automatically.

Reduces Data Inconsistency

When multiple mismatching copies of a file are stored at different computers, it is called data

inconsistency. In a network, the deletion, modification, or updation of the file can be done at a single point only. This reduces data inconsistency and brings in more efficiency.

Reduced Redundancy

Data redundancy means duplication of data at multiple places. A computer network helps in reducing the data redundancy by providing a central server to store the data. The client computers can access the data whenever required by sending a request to the server.

Increases Security

In a computer network, the users are assigned ids' and passwords for authentication to access the data and files. Only the authorised users are allowed to access the hardware and software resources. It is the duty of the network administrators to adopt preventive measures to protect the networks from potential security threats.

Disadvantages of Networking

There are few disadvantages of computer networks. Some of them are as follows:

Additional Cost of Networking Equipment

A network's cost might get reduced by sharing the hardware resources. However, additional cost of establishing the network gets incurred.

Management of Large Network

Managing a large computer network can be a challenging task. It requires expertise and special training.

Server Breakdown

If the server breaks down in a network, then all the computers become isolated.

Security Issues

A computer network is always at the risk of getting attacked by external threats, such as unauthorised use of resources, virus attacks, and alike. If the network is not secured, then the data of the organisation may be at a high risk.

Let's Know More

When two users have simultaneous conversation via the **internet**, it is called conferencing. When this process is supplemented by a live video, it is called **Video Conferencing**.

Let's Know More

Intranet refers to a computer network restricted to an organisation. **Extranet** refers to a computer network that allows controlled access to an information source available on the internet.

Know the Fact



Bluetooth is a wireless technology, used to interconnect mobile phones, computers, and printers using short-range wireless connection.

Let's Know More

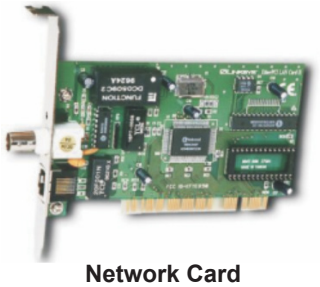
Protocols are certain sets of rules that determine how data should be transferred over networks, compressed, presented on the screen and so on.

Networking Components

To establish wired networking in a group of computers, you require some additional components that are as follows:

Network Card

A network card is used to physically attach a computer to a network, so that it can participate in network communication. **Ethernet Network Card** is the most commonly used network card. (Nowadays, most computer motherboards have an inbuilt network card.)



Network Card

Networking Cable

Modern Ethernet networks use twisted pair cable, containing eight wires. These wires are arranged in a special order, and an RJ-45 connector (similar in design, but bigger than the connector used with the telephone wire) is crimped at both the ends of the cable.



Networking Cable

Modem

A modem enables you to connect your computer to the available internet connection over the existing telephone lines. It converts the digital signals of a computer into analog signals to enable their transmission via phone lines. At the destination, the receiving modem further converts the analog signal into digital signals so that the data can be understood at the receiving end. It comes as a separate part that can be installed on the Peripheral Component Interconnect (PCI) slots found on the mother board.



Modem

Hub

A hub is a network device that is used to connect all the computers in a network with each other. When a computer sends a request in a network, it is first sent to the hub by the cable. The hub then transmits that request to all the other computers in the network, which check whether the message belongs to them or not. If not, then the message is dropped. This process is called broadcasting.



Hubs and Switches

Switch

A switch works similar to a hub. However, unlike a hub, the switch does not broadcast the message on the entire network. It transmits the message from the source computer to the destination computer only by using the physical address. This way, the switch provides a direct connection between the source and destination. As a result the speed of the network increases.

Router

A router is a device that connects two different types of networks with each other, for example, a LAN with WAN. Apart from transmitting the messages on the network from a source computer to the destination computer, a router also provides the best suitable route to deliver that message. It, therefore, helps to decrease the time of transmitting the message.

Know the Fact

Wireless is a means of communication that uses low powered radio waves to transmit the data between devices.

Wireless Networking

To establish **Wireless Networking**, you require the following components:

- **Wireless Network Cards** are used instead of the normal network cards that are used in the wired networks. Most laptop computers come with the inbuilt wireless network cards. **Radio signals** are used for transferring data, therefore the Ethernet cable is not required.
- **Access Points** or **Routers** have a wireless antenna, which increases the communication range of the radio signals. They can also be used to join a wired network, thus making the network a combination of wired as well as wireless networks.



Wi-Fi Router

Let's Know More

Wireless networking allows the networks to be deployed without cabling. Spaces, such as outdoor areas where cables cannot be laid, can have wireless networks.

Let's Know More

Wi-Fi stands for Wireless Fidelity. It represents Wireless Local Area Network. It was developed for mobile computer devices, but is now used in PCs, video game consoles, smartphones, tablets to exchange data wirelessly over the computer networks.

Types of Networks

Depending on the geographical area covered by a network, there are various types of computer networks used worldwide, which are as follows:

Personal Area Network (PAN)

PAN is a computer network that is mainly created for an individual person. It is used for communication among devices, such as laptops, mobile phones, Personal Digital Assistants (PDAs), or smartphones.

Personal area networks can either be wired or wireless. It generally covers a range of less than 10 metres (about 30 feet). You can use these networks to transfer the files including mails, calendar appointments, digital photos, and music.

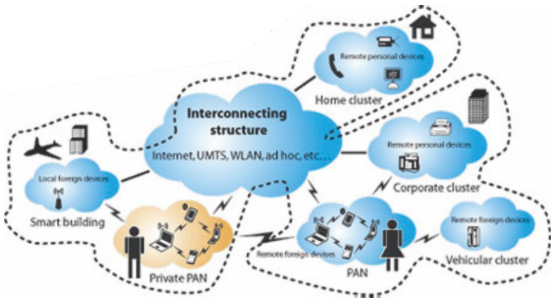


Figure 1.2: **Personal Area Network**

Let's Know More



Wireless **A**ccess **P**oint **(WAP)** is a device that connects wireless communication devices to form a wireless network.

Local Area Network (LAN)

In Local Area Networks, two or more computers and peripheral devices are connected within a small area, such as a room, an office building, or campus. In LAN, computer terminals are physically connected with wires. The data transmission speed in LAN is very fast. Since it is operated in a small area, it can be controlled and administered by a single person or an organisation.

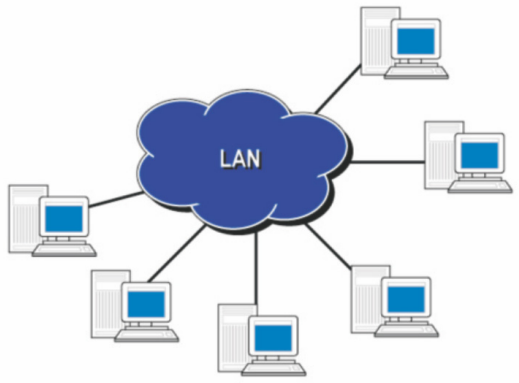


Figure 1.3: Local Area Network

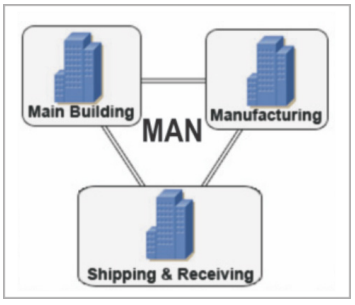


Figure 1.4: Metropolitan Area Network

Metropolitan Area Network (MAN)

MAN is a larger network than LAN and spread across a city. Since it covers an entire city, it is called **metropolitan**. The most common example of MAN is the city cable network or branches of a local bank in a city.

Wide Area Network (WAN)

This kind of network connects two or more computers located at distant places. They are linked by communication facilities, like telecommunication or satellite signals. The main characteristic of WAN is that it requires a public telecommunication media to transfer data. The common examples of WAN are:

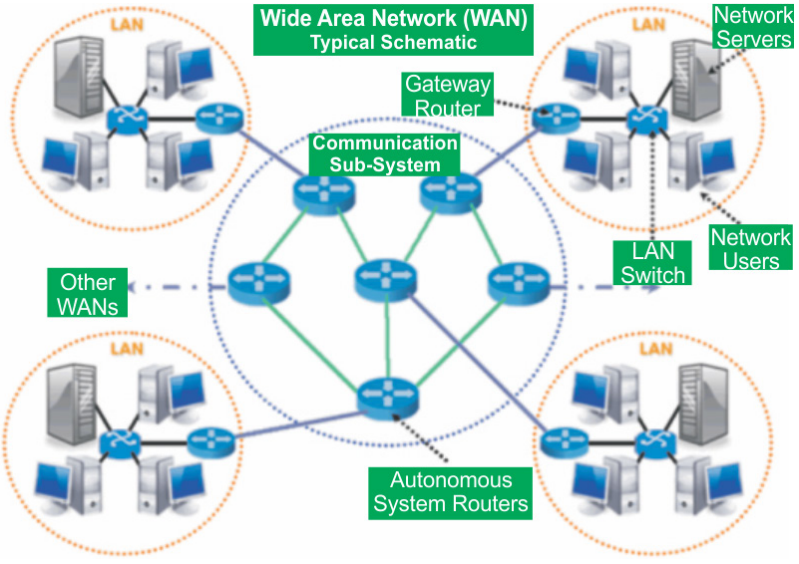


Figure 1.5: Wide Area Network

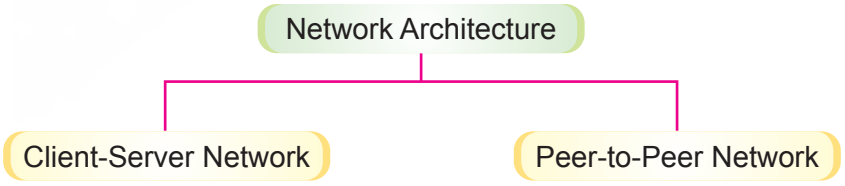


Examples

- Internet
- ATM facility
- National and multinational bank customer services

Network Architecture

A network architecture is an overall design of a computer network that describes how a computer network is configured and what strategies are being used in it. Network architectures are mainly of the following two types:



Client-Server Network

In a Client-Server network, several computers called clients or workstations are connected to the main computer called the server.

A **server** is a computer that provides services to clients and controls access to hardware, software, and other resources. **Clients** are the computers that request services, like data retrieval, storage, etc., from the server.

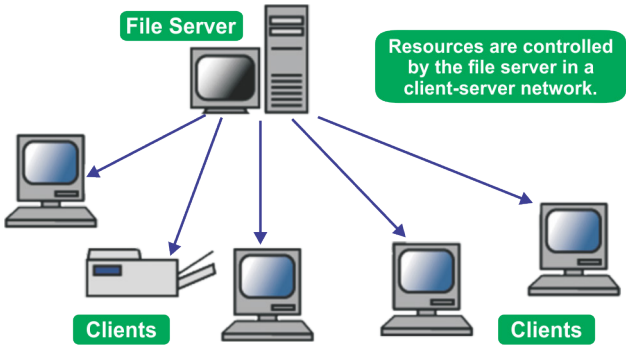


Figure 1.6: Client-Server Architecture

Peer-to-Peer Network

A peer-to-peer network is the one where a few computers of equal capacity and capabilities are connected together to use the resources available on the network. In a peer-to-peer network, there is no central server; instead each computer can act both as a server as well as a client.

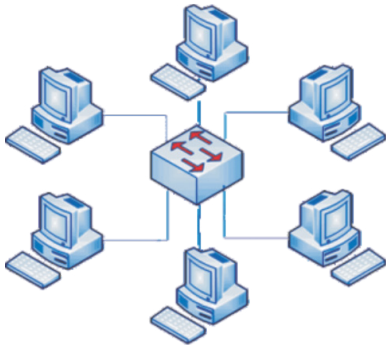


Figure 1.7: Peer-to-Peer Network

Network Topologies

Network topology refers to the layout in which the various components of a network, like nodes, links, peripherals, etc., are connected and communicate with each other. A topology can either be physical or logical. **Physical** topology is the physical layout of nodes, workstations, and cables in the network, whereas **logical** topology is the way how information flows between the different components.

Network topologies are categorised into the following basic types:

Point-to-Point

Point-to-point topology is the simplest form of network structure in which two nodes are directly connected with each other. This type of network is more suitable for small areas where computers are in close proximity. This technology provides a faster and reliable connection.

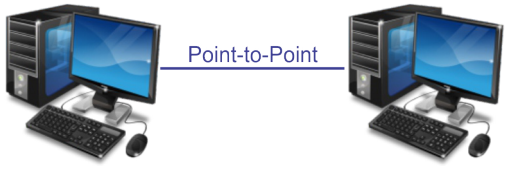


Figure 1.8: Point-to-Point Topology

Bus Topology

This topology uses a single communication line or one main cable to which all the nodes are directly connected. The main cable acts as a backbone for the network. It transmits data only in one direction. In this type of structure, one of the computers in the network acts as the computer server, that provides data to all the clients. This topology is used in small networks where cable requirement is relatively small. One of the disadvantages of such type of network is that if the main cable fails, the entire network becomes unusable. For this reason, this type of topology is not used for large networks, such as those covering an entire building.

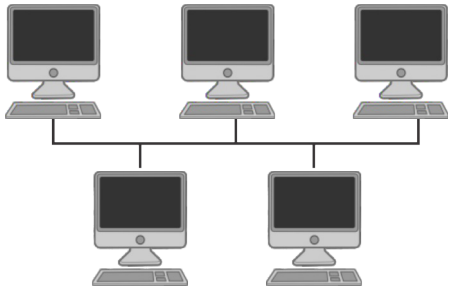


Figure 1.9: Bus Topology

Star Topology

In star topology, each device is connected to a central computer using a point-to-point connection. The central server acts as a **hub**. The devices communicate across the network by passing data through this hub. Star topology is very popular because the setup cost is low. It is easy to add a new device to the network as only one cable is required and the configuration is simple. Moreover, the network is robust; even if a connection in the network fails, the other connections remain intact. But if the central hub fails, the entire network goes down.

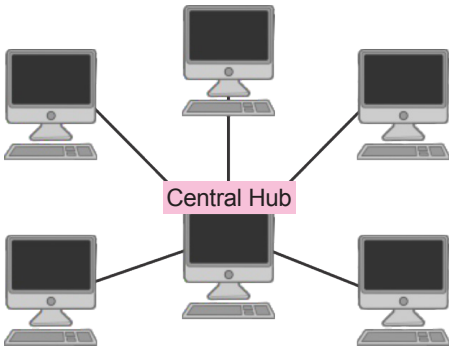


Figure 1.10: Star Topology

Ring Topology

In ring topology, all the nodes in the network are connected in a circular manner. Each node connects with exactly two other nodes, forming a single-continuous pathway for signals. When one node sends message to the other node, which is not adjacent to it, the data travels through all the intermediate nodes until it reaches its final destination. Ring topologies are used in both LAN and WAN setups. The main disadvantage of this topology is that if one workstation goes down, the entire network gets affected. Since the data being transferred over the network has to pass through each workstation, this makes it slower than the star topology.

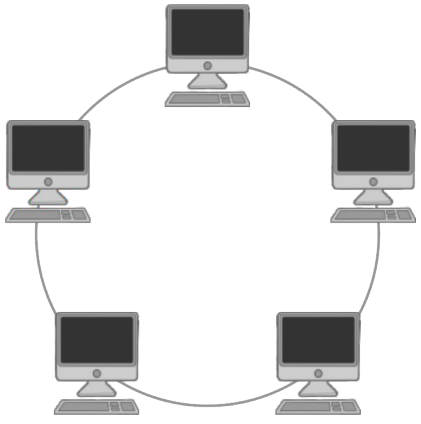


Figure 1.11: Ring Topology

Tree Topology

Tree topology is one of the most common network setups that consists of a group of star-figured workstations connected to a linear bus backbone cable. In this, one star network is connected

to the other star networks. In a tree network, a cable failure in one of the star networks will affect only the workstation that is linked to the central computer of that star network; all the other workstations will continue to function normally. However, if a central computer goes down, all the workstations connected to it will suffer either degraded performance or complete failure, but the rest of the network will continue to function normally. In case the bus gets damaged, it causes disruption in the entire network. In the tree topology, the expansion of the network is possible and easy but maintenance becomes difficult.

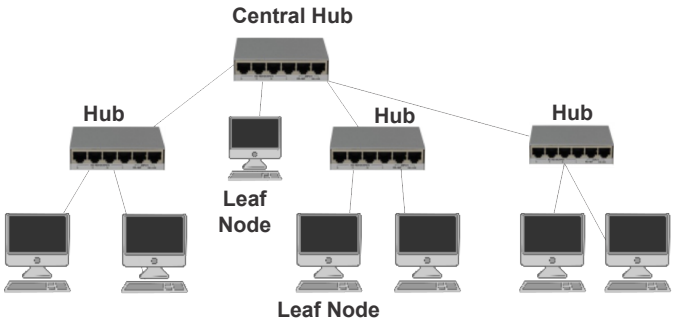
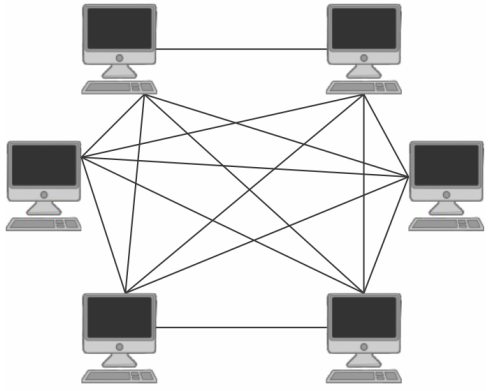


Figure 1.12: Tree Topology

Mesh Topology

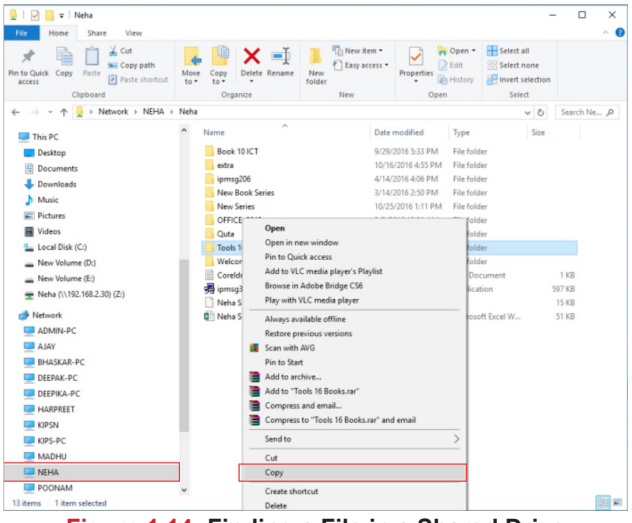
In the mesh network topology, each node is connected to every other node in the network. In this topology, every node not only sends its own signals but also relays data from the other nodes. This type of topology can handle a large volume of data traffic. It is commonly used in wireless networks. In case one of the components fail, there is always an alternative present so that the transfer of the data does not get affected. Expansion and modifications can be done in this topology without affecting the other nodes. A challenge of this topology is the expense of this network. The overall cost of this network is extremely high as compared to the other network topologies.


Figure 1.13: Mesh Topology

Accessing a File from a Shared Drive

To access a file from a shared drive, follow the given steps:

- Double-click on the **Network** icon on the Desktop.
- The **Network** window will appear, in which a list of shared drives are displayed in the **Details** pane.
- Select the required shared drive to see its contents.
- Find the required file in the drive.


Figure 1.14: Finding a File in a Shared Drive

- If you want to open the file, double-click on it.
- To copy the file, right-click on it, and select the **Copy** option from the Shortcut menu.
- In the **View** pane, select **This PC** icon to view the storage drives on your computer.
- Now, click on the drive where you want to place the copied file.
- Right-click anywhere on the **Details** pane and select the **Paste** option.
- The file will be copied to the selected drive on your computer.

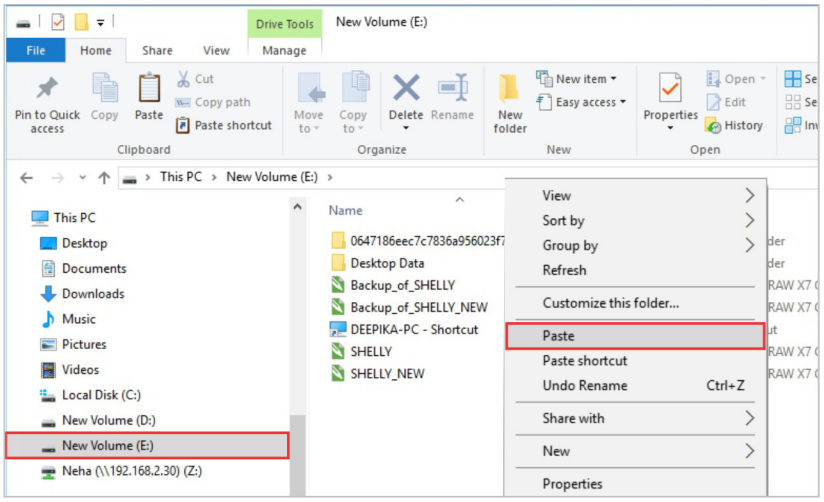


Figure 1.15: **This PC Window**

Network Security

Network Security means protecting data and resources from any unauthorised access. It is the most important aspect in computer networking. Since many users are accessing the same data, it is essential that steps be taken to ensure its proper security. The right to access or modify any data should be given only to the authorised people. Consider the following points that may happen in any organisation:

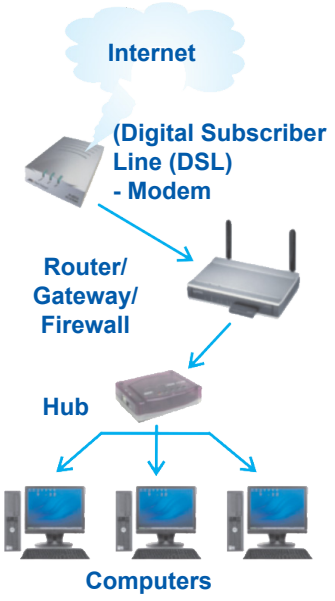


Figure 1.16: **Network Security**

- Some employees may try to change the data concerning their leave records, salaries, performance appraisals, etc.
- Accidental deletion of important data may happen.
- Former employees or some other people may try to harm the company's data.
- People outside the company may try to access the confidential data.

There are two general levels of network security. These are as follows:

Login Security: A user is given a unique login name and password.

Rights Security: Based upon the username, the user is given rights, like Read-Only Access, or Read-Write Access, or No Access at all. A combination of rights can also be granted to the same user for the different sets of data.

RECAP

- A computer network can be defined as a group of computers and other peripheral devices that is linked together for sharing data and hardware resources.
- Networking in computers brings efficiency, economy, and effectiveness in an organisation.
- A modem is used to connect a computer to the available internet connection over the existing telephone lines.
- PAN, LAN, MAN, and WAN are the various types of computer networks.
- Network architecture is an overall design of a computer network that describes how a computer network is configured and what strategies are being used.
- A server is a computer that provides services to the clients and controls access to the hardware, software, and other resources whereas, the clients are the computers that request services, like data retrieval, storage, etc., from the server.
- Network topology refers to the layout in which the various components of a network, like nodes, links, peripherals, etc., are connected and communicate with each other.
- The different kinds of network topology are Point-to-Point topology, Bus topology, Star topology, Ring topology, Tree topology, and Mesh topology.
- Network security means protecting the data and resources from any unauthorised access.

Brain developer

A. Fill in the blanks.

1. ..... is a computer network created for an individual person.
2. A computer network enables two or more computers to share ..... and hardware ..... .
3. In a network, modification or upgradation of the software or data is done at a ..... only.
4. The computers that communicate with each other are called ..... .
5. A network maintained without using wires is called a ..... network.

Hints

- Data
- Resources
- Single Point
- Nodes
- PAN
- Wireless

B. Write T for True and F for False.

1. Nodes and servers have the same function. ☐
2. Network cards are used to physically attach a computer with a network. ☐
3. In the client-server network, there is no central server. ☐
4. Mesh topology can handle a large volume of data traffic. ☐
5. In star topology, all the nodes in the network are connected in a circular manner. ☐

C. Application-based questions.

1. Mr Hemant has set up his office with 50 computers. He wants to connect them and all the peripheral devices within his office building with wires. Which type of network should he use?

   .....

2. Which type of network architecture is the most suitable, when a few computers of similar power and capacity are to be networked together?

   .....

3. Arpit wants to attach his computer to a network so that it can participate in network communication. Which card should he use?

   .....

4. Raman wants to send a few photographs and songs to one of his friends by interconnecting mobile phones, using short-range wireless connection. Which technology would be the most suitable for him?

   .....

D. Select the correct option.

1. Which is the most commonly used network card?

   a. Wi-Fi b. Bluetooth c. Ethernet Network Card

2. When multiple mismatching copies of a file are stored at different computers, it is called data ..... .

   a. Inconsistency b. Consistency c. Redundancy

3. Network ..... means protecting data and resources from any unauthorised access.

   a. Security b. Information c. Resource Sharing

4. A ..... network is the one where a few computers of equal capacity and capabilities are connected together to use the resources available on the network.

   a. Peer-to-peer b. Client-server c. Client-peer

5. Which network among the following requires a single communication line or one main cable?

   a. Bus Topology b. Star Topology c. Tree Topology

E. Answer the following questions.

1. Define networking with examples. Give two advantages.

   .....

   .....

   .....

2. Distinguish between LAN and WAN.

   .....

   .....

   .....

3. Give two advantages of Star topology.

   .....

   .....

   .....

4. Explain Client-Sever architecture in your own words.

   .....

   .....

   .....

5. Differentiate between a hub and switch.

   .....

   .....

   .....

6. What are the components required for wireless networking?

   .....

   .....

   .....

ACTIVITY SECTION



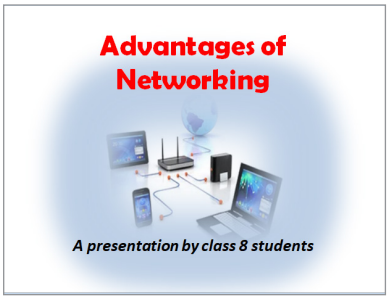
LAB SESSION

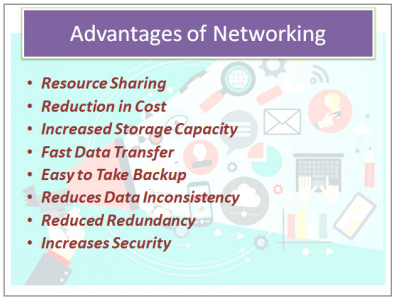
Perfection Through Practice

A. Create an informative presentation using MS PowerPoint on the topic:

Advantages of Computer Network

Apply formatting and animation effects to make it impressive.





B. Try to access a file from a shared drive and copy it to the selected drive on your computer.

GROUP DISCUSSION

For Concept Clarity



Discuss the following topics:

- **What is a computer network and why is it useful? Differentiate between the various types of networks.**
- **What sort of components are required to build a network?**
- **What are hubs, switches, and routers?**
- **How is the Peer-to-Peer network different from Client—Server network?**
- **Differentiate between star and tree topology.**

PROJECT WORK

Using Creativity



Make an informative presentation on the **Basic Networking Concepts**. Collect information about the various devices and components that are used for setting up the network and types of networks.

ONLINE LINKS

Looking For More



To clarify the basics of the networking concepts, visit the following websites:

- www.slideshare.net/makyong1/basic-concepts-of-computer-networks
- https://www.lifewire.com/computer-network-topology-817884

Chapter 2

Log on to Access

LEARNING OUTCOMES

The student will be able to:

- describe a database, its types, and structure.
- explain the advantages of DBMS.
- describe the Access window components, open, and close a database.
- create a blank database or use a template to create it.

Information is an important factor to manage your routine activities, and so it is important that it be maintained and managed well to plan effectively for the future. From a child to an old man, a professional to homemaker, everyone needs information. However, data in its raw and unprocessed form is meaningless, but when such data is converted into information, it can be easily interpreted. Hence, it is essential to provide a structure to the available data in a computer system and organise it, which can be achieved with the help of a database.

Database

A **database** is an organised collection of data. It helps you to enter, manage, access, and analyse a large amount of information, quickly and efficiently.



Example

Unknowingly, you all use database in your daily life. You maintain your personal address diaries, wherein you record addresses and telephone numbers of your friends. You maintain the information alphabetically, so that whenever any information is needed, you can browse and extract the information quickly. From time to time, you keep on adding new addresses, and also updating the contact numbers and postal addresses of your friends if there is any change. All these operations that you perform, like adding, updating, sorting, editing, deleting, etc., are the functions of a database.

Telephone directory, a dictionary, maintaining a list of friends and their addresses, keeping students records pertaining to academic and co-curricular achievements by teachers, list of groceries in a grocery store, catalogue in a library, list of customers in a bank, maintaining employees' information in offices and organisations, etc., are the examples of different types of database.

Types of Database

There are mainly two types of database:

Flat File Database: A **flat file database** refers to the data files that contain records, which have a small, fixed number of fields, without any structured relationship. For example, Microsoft Excel.

Relational Database: A **relational database** stores the data in several tables. Tables are linked together by their common fields (columns) using the concept of keys to retrieve the data. For example, Microsoft Access, Microsoft SQL, Oracle, and MySQL.

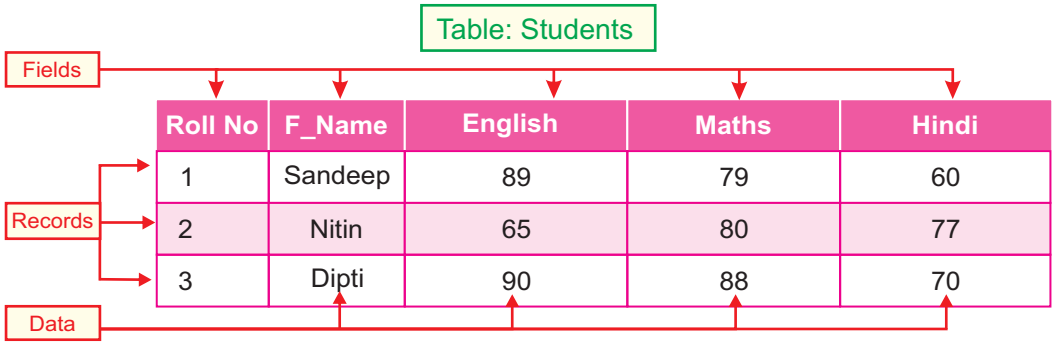
Structure of Database

A database has a specific structure to store data. Let us study some basic terms used in a database that will help you in getting acquainted with the functioning of a DBMS.

Tables: Tables are the building blocks of a database. They store the complete data in a structured manner, i.e., in the form of rows and columns. Every table has a finite number of columns and rows.

Following are the different elements of a table:

- **Fields:** All the columns in a table are called **Fields**. A field describes a particular attribute of all the records in a table. For example, the field named **Roll No** in the table 'Students', will store the roll numbers of all the students.
- **Records:** The rows in a table are called **Records**. A record has the values for all the fields that belong to a single person or an entity. For example, when you enter the data of all the fields, such as **Roll No, F_Name**, and **Marks** for a given student, it creates a new row in a table, which is called a record.



Roll No	F_Name	English	Maths	Hindi
1	Sandeep	89	79	60
2	Nitin	65	80	77
3	Dipti	90	88	70

Figure 2.1: **Elements of a Table**

- **Data:** A set of characters that represents a valid value is known as **Data**.
  For example: **3, Dipti, 90, 88,** and **70** are the data values for the specific fields of the table: 'Students'.

Queries: A database stores a vast amount of data and it can be difficult to search for the appropriate data in times of need. To retrieve the filtered data from a database, queries are used, based upon some conditions. Queries are also used to perform actions, such as delete, update, etc., on the data.

Forms: Forms provide a user-friendly interface that facilitate the process of entering data in tables and queries. A form has an attractive interface that accepts data from the user and forwards it to the corresponding table or query.

Reports: Reports are used to display the selected data in a printable format. They collect the summarised data from one or more tables/ queries and organise it in a printable form.

Quick Quiz

Give any real life example of database, apart from the ones given in the chapter.

Database Management System (DBMS)

It is very difficult to maintain a database manually when there are hundreds and thousands of records, as the chances of committing errors increase. A **Database Management System (DBMS)** is a computerised record keeping system that enables you to create, modify, store, and extract information from a database. The main function of a DBMS is to provide the users with efficient and reliable methods of data retrieval. Moreover, it reduces the chances of errors creeping into the database to a great extent. Therefore, data handling using DBMS becomes fast and efficient.



Advantages of DBMS

Some of the key advantages of DBMS are as follows:

- A DBMS provides the users with efficient and reliable methods of data retrieval.
- It facilitates the reduction of **data redundancy** (duplication of data) and eliminates the need for maintaining multiple copies of the same data at different locations.
- It increases the efficiency, speed, and flexibility in searching and accessing information, thus saving time and energy.
- DBMS facilitates the sharing of the data among the different users based on their individual needs.
- In a DBMS, the data administrator has a complete control over the database. It ensures that the data is accessed only by the authorised users.
- A DBMS also supports the **data integrity** as it ensures that the stored data follows the customised standards of an organisation. Suppose, the maximum marks of an examination are set to 100, then you can have rules to ensure that the database accepts the numbers only between the range of 0—100.

Let's Know More

Microsoft's SQL Server is an example of RDBMS that serves database requests from multiple users.



Quick Quiz

What is the difference between a file and database?

Microsoft Access

Microsoft Access is the most popular **Relational Database Management System** (RDBMS) that serves as an integral part of the Microsoft Office suite application. It has a graphical user interface. It is used to organise and manipulate a large volume of data efficiently. It organises data in the form of tables. It provides the facility to create a relationship between these tables by using the common fields. A relational database enables to prevent the duplication of data. Another important feature of Access is that you can add, update, delete, and view the data by using forms, find and retrieve the data in a desired way by using queries, and print the data in a specific layout by using reports. Some other popular RDBMS are Sybase, Oracle, and MySQL.

Let us understand the concept of relationship with the help of an example.


Example

To maintain the students' database in RDBMS; instead of entering all the records in a single table, the fields will be split into two tables: **Students Information** and **Marks**, having a common column, **Roll_No**.

Students Information Table

The 'Students Information' table consists of information about students as displayed in the table given below. To enter the details of the students' percentages and grades, you do not have to include all the fields in a separate table, which have already been included in the 'Students Information' table. You will take only a common field in the second table. By making a link on this common field, you can retrieve the desired set of records from both the tables.

Roll_No	S_Name	Father's_Name	Address	Tel_No	Date_of_Birth
101	Kanika	RK Sharma	675/4, Delhi	2577899	21-01-1991
102	Mansi	JK Gupta	212/2, Pune	2645624	16-09-1984
103	Ridhima	SP Shukla	C-46/58, Noida	2570066	24-10-1992

Students Information Table

Marks Table

Notice that the values of the **Roll_No** field in the **Marks** table are the same as the values in the **Students Information** table. You can define a relationship between both the tables using a common field, i.e., Roll_No. Thus, by splitting information in separate tables, RDBMS reduces the duplication of data.

Roll_No	Percentage	Grade
101	89%	A
102	59%	B
103	70%	B

Marks Table

Components of Microsoft Access 2019

Before learning about the various functions of Microsoft Access, let us get familiar with the various components of the Microsoft Access window.

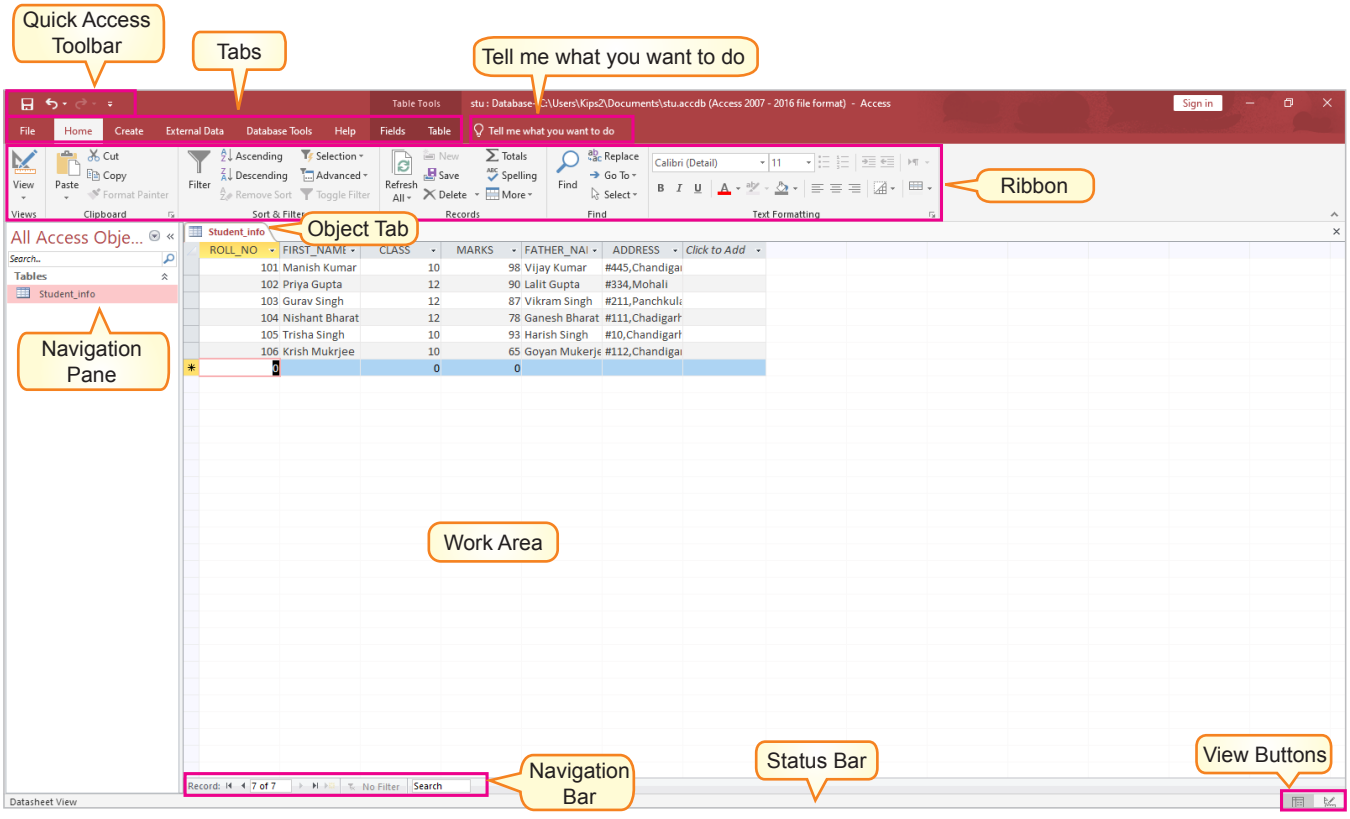


Figure 2.2: Components of Access 2019

Title Bar

It is located at the top of the window and displays the name of the current database.

Quick Access Toolbar

This toolbar is present at the top-left corner of the Access window. It contains the most frequently used command buttons. By default, it has three command buttons, which are **Save**, **Undo**, and **Redo**.

Ribbon

It has the various tabs, each with several groups of relevant commands. Some tabs appear when you work with certain objects, like Forms or Reports. Such tabs are called **Contextual tabs**.

Tell Me What You Want To Do

It is a new feature, which can be used to get quick help on topics that you are looking for or the commands that you want to use in your document.

Navigation Pane

This pane is present on the left side of the Access window. It displays the name of the objects used in the database, like Tables, Queries, Forms, Reports, etc.

Navigation Bar

As the name suggests, it helps in navigating through the records. It also displays the current record number of an object.

Object Tabs

The objects that you have opened in a database appear right above the work area in a tabbed form. Clicking on any tab displays the contents of the related object in the Work area. To close the current tab, click on the cross button on the right end of the bar.

Status Bar

This bar is located at the bottom of the window. On its extreme left, it displays the name of the current view, and on its right, it displays two view buttons: Datasheet View and Design View.

Creating a Database

In Microsoft Access, there are two ways to create a database, either by using a template or creating a blank database. An Access template helps in creating a complete database application that is ready to use. It contains four main objects— Tables, Queries, Forms, and Reports, that you need to perform a specific task.

Creating a Database Using Templates

One of the easiest ways to create a table is to use a template. Follow the given steps to create a database using the template:

- **Open** Access 2019. For this, click on **Start > Access**. The **Start** screen appears.
- You will find some listed templates on the right side of the Start screen.

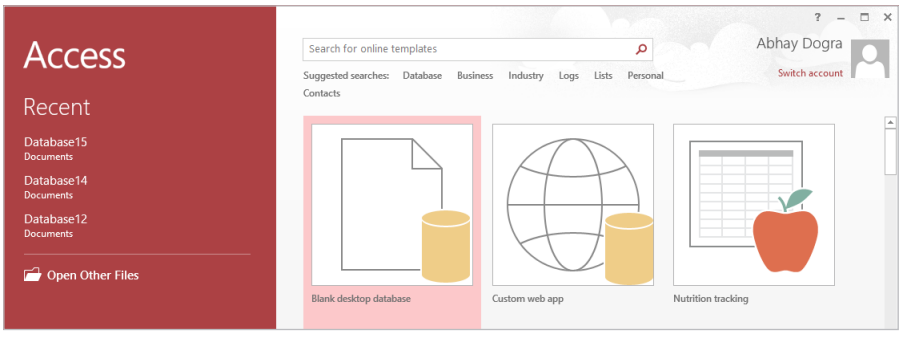


Figure 2.3: List of Templates

- Select the template from the displayed list. For example, select the **Updated:Students** template.
- You can get more templates by clicking on any category from the **Suggested searches** or use the search bar to look for the **Online templates**.
- The **Updated:Students** task pane appears on the screen.
- Specify the file name in the **File Name** text box. You can either use the default location that Access displays below the **File Name** box or click on the **Folder** icon to select another location.
- Click on the **Create** button. Access creates the database and displays the table in the **Form View**. It contains the fields that are relevant to the **Students** database.
- Click on the **Layout View** button on the bottom right of the **Status bar**. A new contextual tab: **Form Layout Tools** will appear on the **Title bar**.
- Select the **Add Existing Fields** button in the **Tools** group under the **Design tab**. The **Field List** task pane appears on the right side.
- Select the fields from the list that you want to include in the **Student List** database.

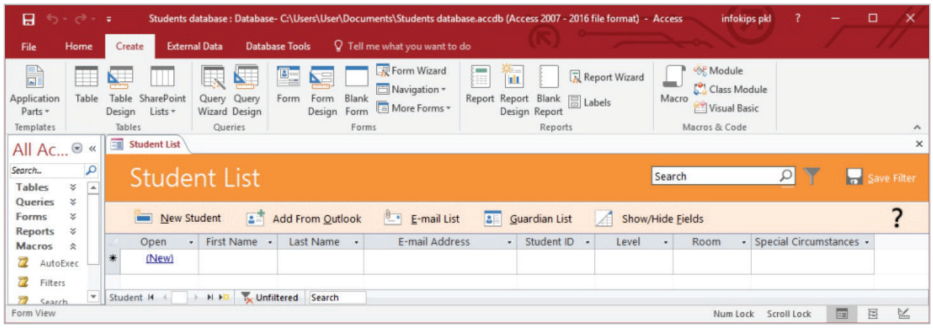


Figure 2.4: **Displaying Table in Form View**

- Drag the selected field to the table and drop it where you want to position it, when the insertion point appears.

NOTE

Access suggests a file name in the **File Name** box, and also allows you to change it as per your requirement.

Creating a Blank Database

You can also create a database from scratch. Follow the given steps to create a blank database:

Let's Discuss

Field
vs
Record



Quick Quiz

What are the different database objects in Microsoft Access?



Let's Know More

The overall design structure of a database is called the **Database Schema**, which describes the records and relationship among the common data.

- On the Start screen, click on the **Blank database** option.
- The **Blank database** window opens up that prompts you to specify the file name in the **File Name** text box.

Let's Know More

The standard file name extension for database in Microsoft Office Access 2019 is **.accdb**

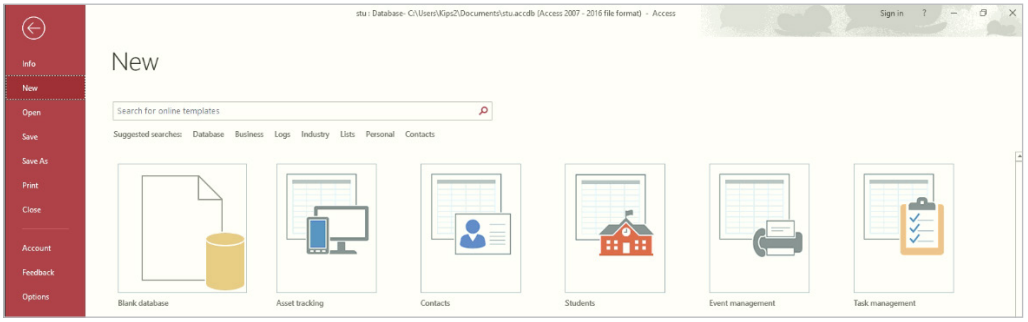


Figure 2.5: Selecting Blank Database Option

Quick View

To save the database, press **Ctrl+S** key combination or choose the **Save** option from the **File** tab.

- If required, you can change the default location by clicking on the **folder** icon placed next to the **File Name** text box.
- Click on the **Create** button. A new database will be created along with an empty table named **Table1** displayed on the **Title bar**.
- The Fields tab is selected by default. A new tab, i.e., **Table Tools** will be now visible on the **Ribbon**.



NOTE

When you open a new or existing database in MS Access 2019, the objects in your database- tables, forms, queries, reports etc., appear in the **Navigation Pane**. To view the objects, click on the drop-down arrow of **All Access Objects** in the **Navigation Pane**.

Views of a Table

You can work on a table in two views: Design view and Datasheet view.

Quick View

To close an application press the **Alt + F4** key combination.

Design View

In Design View of the table, you can enter the field names, their data types, and description. The Design View is divided into two parts:

Field Grid Pane

In this pane, you can define the field names, their data types, and description.

Let's Know More

The **Datasheet View** allows you to enter data in a table. It looks like an Excel spreadsheet.

Field Properties Pane

This section is used to set properties for the fields defined in the table.

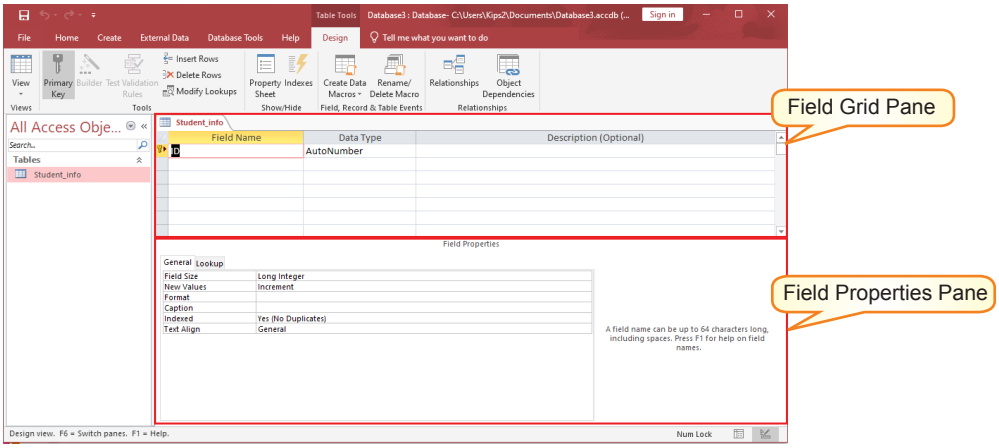


Figure 2.6: **Displaying Table in Design View**

Datasheet View

Datasheet View is used to enter data in a table. This view displays the table as a grid. The fields are displayed as columns and the records are displayed as rows. The field names are listed as the column headers. When you double click on the table name in the Navigation Pane, it opens the table in the **Datasheet View**.

Switching between Views

Microsoft Access allows you to switch from one view to the other by following either of the two options:

- Click on the **View** button present in the **Views** group either on the **Home** tab or **Fields** tab and select the desired view. Or

  Click on the **Design View** or **Datasheet View** buttons at the bottom-right corner of the **Status** bar.

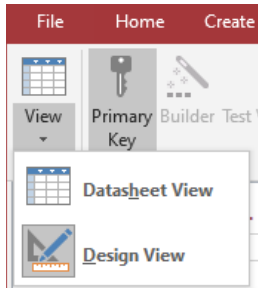


Figure 2.7: **Views of a Table**

Closing Access Application

- After finishing the work in Access, click on the **Close** option in the **File** tab to close the current database.
- To close Microsoft Access application, click on the **Close** button present at the extreme right of the Access window.

Tip

It is advisable to mention a short filename that relates to the information that you store in your database.

Opening an Existing Database

After you close the database, you can reopen it by following the given steps:

- Select the **Open** option from the **File** tab.

- Select the database from the **Recent** list (if present) or click on the **Browse** folder and select the desired database from the **Open** dialog box. Click on the **Open** button. The selected database will be opened.

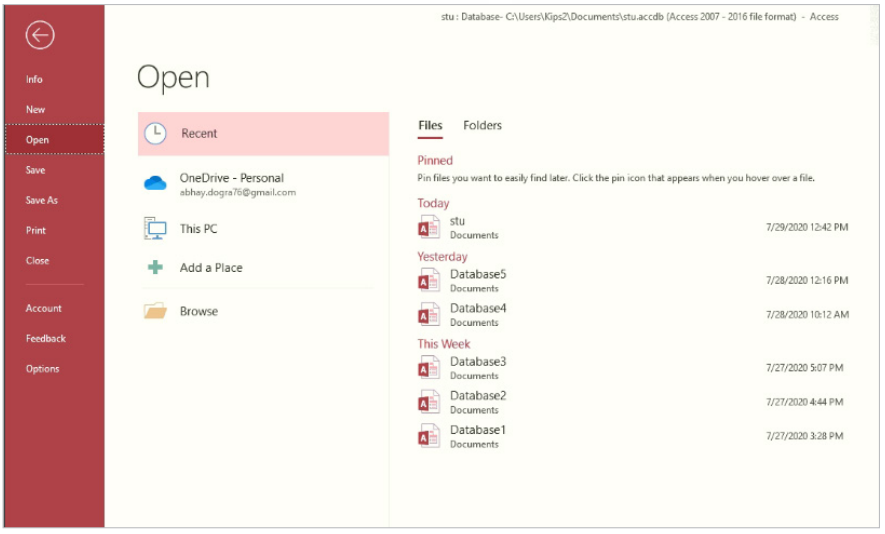


Figure 2.8: **Opening an Existing Database**

RECAP

- A database is an organised collection of data. It helps you to enter, manage, access, and analyse a large amount of information, quickly and efficiently.
- Database is categorised as Flat file database and Relational database.
- A Database Management System (DBMS) is a computerised record keeping system that enables you to create, modify, store, and extract information from a database.
- Microsoft Access is the most popular and powerful RDBMS that is used to organise and manipulate data.
- In Microsoft Access, there are two ways to create a database, either by using a template or creating a blank database.
- You can work on a table in two views: Design view and Datasheet view.

A. Fill in the blanks.

1. A ..... database refers to the data files that contain records, which have a small, fixed number of fields, without any structured relationship.
2. A ..... stores the complete data in a structured manner, i.e., in the form of rows and columns.

3. A ..... has the values for all the fields that belong to a single person or an entity.

4. ..... provide a user-friendly interface that facilitates the process of entering data in tables and queries.

5. In the ..... view of the table, you can enter the field names, their data types and description.

Hints

- Design
- Table
- Forms
- Flat-file
- Record

B. Write T for True and F for False.

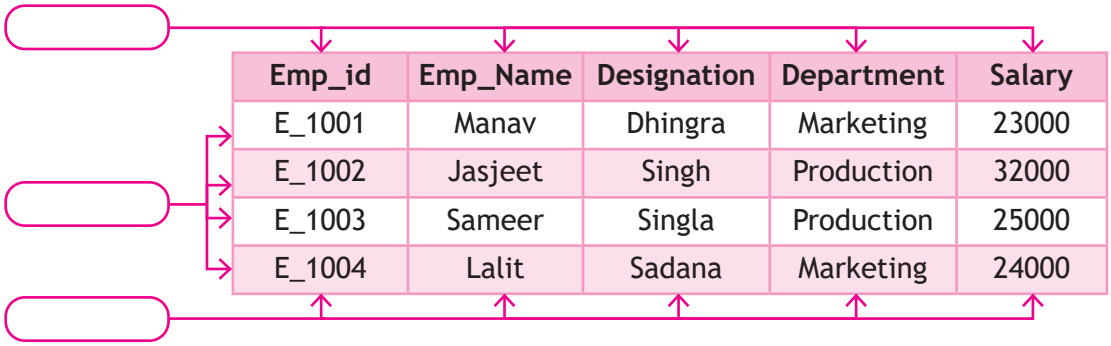
1. A set of characters that represents a valid value is known as data. ☐
2. The rows in a table are called fields. ☐
3. An Access template helps in creating a complete database application, which is ready to use. ☐
4. Forms collect the summarised data from one or more tables or queries and organise it in a printable form. ☐
5. In a DBMS, the data administrator has a complete control over the database. ☐

C. Application-based questions.

1. Samita's teacher has given her a task to collect the demographic data regarding the cities of her state, such as area, population, etc. She needs to organise this data in a tabular form. Which type of software can she use to do the same?

.....

2. Hiral has been given an assignment to recognise and write the elements of the table in the provided space. Help her in doing the same.



Emp_id	Emp_Name	Designation	Department	Salary
E_1001	Manav	Dhingra	Marketing	23000
E_1002	Jasjeet	Singh	Production	32000
E_1003	Sameer	Singla	Production	25000
E_1004	Lalit	Sadana	Marketing	24000

D. Select the correct option.

1. A ..... can be used to provide a structure to the available data in a computer system and organise it.

   a. Web Page b. Database c. Data Engine

2. A ..... database stores the data in several tables, which are linked together by their common fields.

   a. Relational b. Flat-file c. Relative

3. A field describes a particular ..... of all the records in a table.

   a. Value b. Position c. Attribute

4. To retrieve the filtered data from a database, ... are used, based upon some conditions.

   a. Tables b. Records c. Queries

5. A ..... is a computerised record keeping system that enables you to create, modify, store, and extract information from a database.

   a. DBMS b. DBMB c. BDMD

E. Answer the following questions.

1. Define Database. Write two advantages of using a database.

   .....

   .....

   .....

2. Name and explain the function of any two components of Microsoft Access 2019 window.

   .....

   .....

   .....

3. Define all the elements of a table.

   .....

   .....

   .....

4. Differentiate between a form and query.

.....

.....

.....

5. What is the full form of DBMS? Write any two advantages of a DBMS.

.....

.....

.....



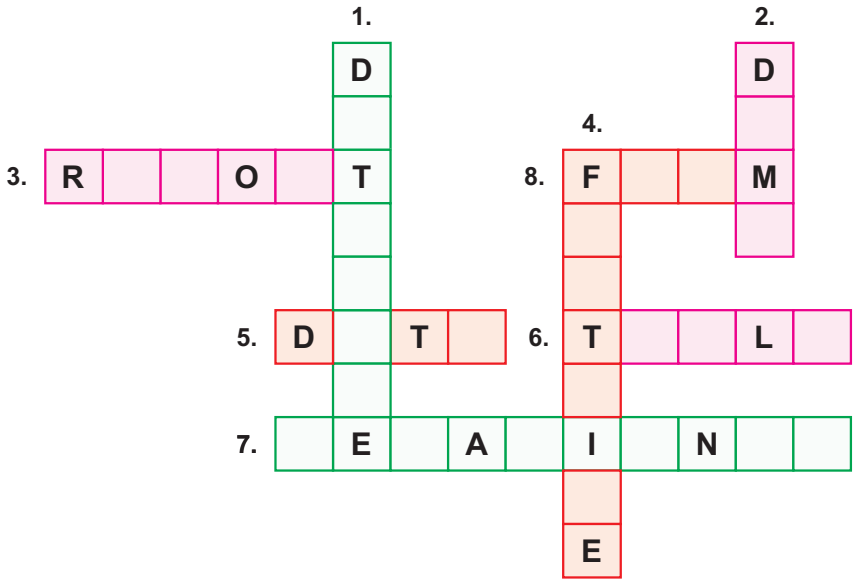
MY ACTIVITY

Learning While Playing

A. Complete the crossword with the help of the given hints.

DOWN

1. An organised collection of data
2. A computerised record keeping system that provides the users with efficient and reliable methods of data retrieval
4. A type of database having fields without any structured relationship



ACROSS

3. A database object that displays the selected data in a printable format
5. A set of characters that represents a valid value
6. The building block of a database that displays data in the form of rows and columns
7. A type of database that prevents the duplication of data
8. A database object that provides the user-friendly interface to facilitate the data entry process

B. Consider the given table and answer the questions.

Teacher_Id	Name	Salary	Dept
1	Komal	15000	Physics
2	Priya	17000	Physics
3	Sanjay	18000	History
4	Vikram	14000	Biology
5	Vineet	18000	Maths
6	Monika	16000	Commerce

1. What is the total number of the records in the table?
2. How many fields are there in the table?
3. Name the teachers who work in the same dept.
4. How many teachers are earning more than 15,000?
5. Give the Id of the teacher who works in the Maths dept.

GROUP DISCUSSION

For Concept Clarity



Discuss the following topics:

- **Differences between Flat-file Database and Relational Database**
- **Advantages of DBMS**

PROJECT WORK

Using Creativity



Your teacher has asked to collect the data of your classmates and their hobby clubs. Draw the table in your notebook and organise the collected data in the form of rows and columns as shown:

Roll No.	Student_Name	Hobby Club	Description	No. of Members

ONLINE LINKS

Looking For More



To explore more on DBMS, visit the following websites:

- https://www.w3schools.in/dbms/intro/
- https://support.microsoft.com/en-us/office/what-s-new-in-access-2019-f52c5317-3494-4105-9c56-5a2abb8e0f87

Chapter 3

Working with Tables

LEARNING OUTCOMES

The student will be able to:

- work with tables in a database.
- learn about different data types.
- understand various field properties.
- sort and filter the data in a table.

In the previous chapter, you have learnt about different elements of a database such as tables, queries, forms, and reports. A database can contain a number of tables in it. A table is a collection of data elements organised in rows and columns. In this chapter, you will learn how to work with tables in a database.

Adding a Table

Regardless of how you have created your database, you can add new tables to an existing database by using the Design View or Datasheet View.

Creating Table in Design View

To create the table in Design View, click on the **Table Design** option in the **Tables** group on the **Create** tab as shown in Figure 3.1. A table will open in Design view as shown in Figure 3.2. Now, you can add fields in the table.

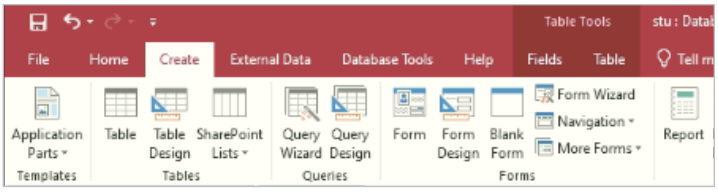


Figure 3.1: Selecting the Table Design Option

Adding Fields in Design View

- For each field in the table, type a name in the **Field Name** column. Press the **Tab** key to move to the **Data Type** column and select a data type, such as Short Text, Number, Text, etc.
- In the **Description** column, you can type a description for each field, which is optional. The description text is displayed on the Status bar when the cursor points to that field in the Datasheet view.

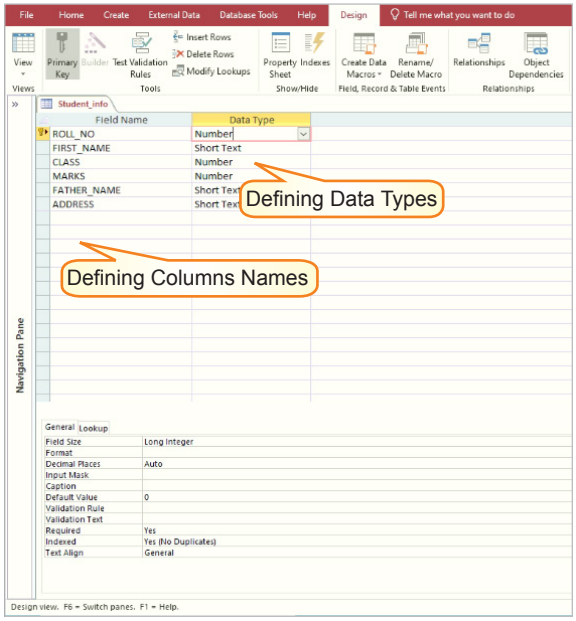


Figure 3.2: Adding Fields in Design View

- After defining all the fields, save the table by clicking on the **Save** option in the **File** tab. Or

  Click on the **Save** button present on the **Quick Access Toolbar**.

- Now, to add data in the table, switch to the Datasheet View.

Creating Table in Datasheet View

When you create a blank database, Access creates a table automatically. You can either customise this table or create another table by using the **Create** tab. To create a new table in the Datasheet View, click on the **Create** tab and select the **Table** option in the **Tables** group. A new blank table will be created and opened in the **Datasheet View**.

Adding Fields in Datasheet View

- Access automatically creates the first field called **ID**. The data type of this field is AutoNumber, which means Access will automatically generate a sequential number in this field for each new record.

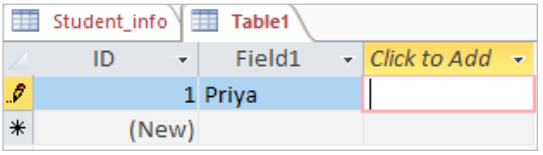


Figure 3.3: Entering Data in Field 1

- You can add a new field in the table by entering data in the **Click to Add** column. Access will automatically assign a data type based on the data you enter.

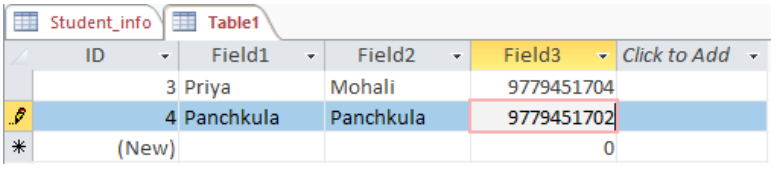


Figure 3.4: Adding More Fields

Let us enter the first record:

- Click on the empty cell below the **Click to Add** header. Enter the name of the student, for example, Priya and then press the **Tab** key. You will notice that Access has assigned value 1 to the ID field and named the second column as Field1.

Similarly, add data in the other fields as shown in Figure 3.4.

- To add new record, click on the **New** option in the **Records** group on the **Home** tab. A new record will be added to the table, enter data for each field as shown in Figure 3.4.
- Save the table by selecting the **Save** button present on the **Quick Access Toolbar**.

NOTE

A pencil icon in the row selector indicates that the record has been changed but not saved.

Rules for Naming a Field

As you already know that a table has multiple fields and each field is unique to a table. Each field has its own name and type of data. Following are some rules for naming a field:

- A field name can range from 1 to 64 characters.
- A field name can include letters, numbers, and some special characters. Generally, the underscore (_) sign is used.
- A field name cannot start with a blank space.
- A field name can be in the upper, lower, or mixed case.
- A field name cannot have a period (.), exclamation (!), or brackets ([]).
- You can change the properties of a field name, i.e., storage size, format, and validation rule by specifying certain characteristics in the **Field Properties** pane.

Data Types

Every table consists of fields and each field has its own set of properties, which describes the characteristics and behaviour of data added to that field. The most important property for a field is its data type. A field's data type determines what type of data you can enter into a field. For example, a field whose data type is 'Number' can only store numeric data and does not allow you to enter text data into it.

The following table depicts the available data types in Access:

Data Types	Functions
Short Text	It is used to store text or a combination of text and numbers that does not require calculations, such as addresses and phone numbers. The fields with this data type can have a maximum of 255 characters.
Long Text	It stores the text and numbers up to 65,536 characters. It is used for descriptive fields.
Number	It stores the numeric information that you can use for calculations. A number of data type can store integer values as well as decimal values. The maximum size of a number field can be 16 bytes.
Date/ Time	It stores date and time values. You can display dates and times in various formats. The maximum size used by this data type is 8 bytes. Calculations related to date and time can be done in this field type.
Currency	This data type is used to store currency values upto 8 bytes. The calculations can be performed on this data type.
AutoNumber	It generates a sequential number whenever a new record is added to a table. The value in the AutoNumber field cannot be changed. It stores data as 4 byte values typically used to create an identity column, which uniquely identifies each record in a table.
Yes/No	It is used at places where the field can have only one possible value. It can either be True/ False, Yes/ No, or On/ Off. For example, a student can either be a male or a female.

OLE Object	This is used to embed an object created in another application, such as Microsoft Word document, Excel Spreadsheet, or PowerPoint Presentation into the Access table. It stores up to 2 GB of data.
Hyperlink	The Hyperlink data type can store links to web pages, websites, files on an intranet or LAN on your computer. It stores up to 1 GB of data.
Attachment	This data type allows you to attach images, spreadsheet files, documents, charts, and the other types of supported files to the records in your database, much similar to the manner in which you attach files to the emails.
Calculated	This data type is used when a user creates table fields that calculate the values. The calculations can include the values from fields in the same table as well as built-in Access functions. This data type is used mostly in case of queries, forms, and tables.
Lookup Wizard	A Lookup wizard helps you to create a field whose values are chosen from the values in another table, query, or list of values. By default, Access sets Lookup fields to the Number data type.

Setting Data Type for a Field

You can set the data types for the table fields by working in either **Datasheet View** or **Design View**.

Setting Data Type in Datasheet View

When you create a field by entering data in the **Datasheet View**, Access automatically assigns a data type to the field based on the data that you have entered in the table. To define a specific data type for a field:

- Click on the drop-down arrow of the **Click to Add** header and choose the required data type from the displayed list. Or

  Click on the required data type that you want to assign to the field from the data type gallery present in the **Add & Delete** group on the **Fields** tab.

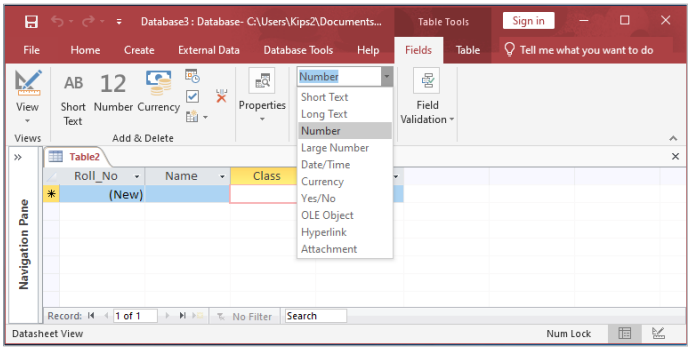


Figure 3.5: Setting Data Type in Datasheet View

- You can reset or change the data type of a field as and when required by clicking on its header and selecting the required data type from the **Data Type** drop-down menu in the **Formatting** group.

If you don't find the desired data type in the Data Type gallery, then click on the **More Fields** option present in the **Add & Delete** group.

Setting Data Type in Design View

To change or define a specific data type for a field in Design View, follow these steps:

Click on the drop-down arrow in the **Data Type** column of the field and select the desired data type from the displayed list.

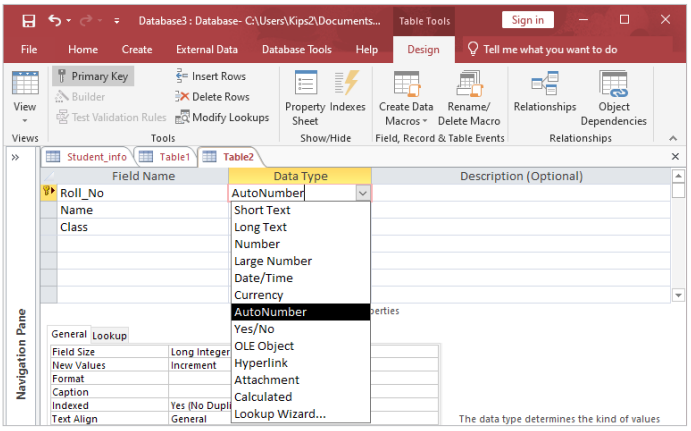


Figure 3.6: Setting Data Type in Design View

Field Properties

A field property applies to a particular field in a table and defines the characteristics of that field. Each field in a table has its own set of properties that further defines the field and how it is used in the database. You can set the properties of a field in the **Design View** as well as **Datasheet View**.

To Set Field Properties in Design View

To set the properties of a field in the Design View, follow the given steps:

- Click on the field name for which you want to set the field properties.
- You will observe that the **General** tab is selected by default in the **Field Properties** pane.
- Set the properties of all the fields as required.
- After finishing the task, you must save the table by clicking on the **Save** button on the **Quick Access Toolbar**. Or

  Click on the **File** tab and select the **Save** option.

Field Property	Description
Field Size	This property is used to specify the maximum size for the data stored. It is available for Short Text, Number, and AutoNumber data type.
Format	This property specifies the display layout of the field. It has different options for **Number**, **Date** and **Time**, and Logical data. You can select a predefined format or enter a custom format.
Input Mask	It specifies the pattern for the data to be entered in the field. For example, you can choose the input mask for a password field as *.

Quick View

Press **CTRL + W** to save the changes and close the Table.

Caption	The Caption property specifies a label for a field to be displayed as the column heading whenever the table is displayed in the Datasheet View. It can have up to 2,046 characters.
Default Value	You can use the Default Value property to specify a value that is automatically entered in a field when a new record is created. The user can either accept this value or enter a new value.
Validation Rule	With the help of this property, you can limit the values that can be entered in the field. For example, if a field's validation rule is >0, then a negative value cannot be entered into that field.
Validation Text	This property lets you customise the error message that appears when you enter a value that violates the validation rule.
Required	You can use this property to specify if a value is required in a field. It accepts two values: **Yes** (to ensure that the field is not left blank during data entry), **No** (field can be left blank).



Quick Quiz

What is a Relational Database?

Primary Key

A **Primary Key** is a standard feature of every database management system. It is a field in a table that holds a unique value for every record. It ensures that every record in a table is unique. The field that is designated as the primary key of a table can neither have duplicate data nor can it be left blank while entering the data.



Suppose, you have a Student table that contains records regarding students of a class. Here, the students **Roll_No** field can be set as a primary key, since all the roll numbers are unique for each student. You cannot consider the **Name** field for primary key as there is always a possibility that more than one student in a class might have the same name.

NOTE

If more than one field are combined to form a primary key, then it is called a **Composite** key.

Let's Discuss

Short Text Data Type
vs
Long Text Data Type

Setting a Primary Key

To set the Primary key, follow the given steps:

- In **Design View**, click on the field that you want to set as the primary key. The selected field will be highlighted. Click on the **Primary**

Key option , present in the **Tools** group on the **Design** tab. Or

Right-click on the field and select the **Primary Key** option from the context menu.

- The field will be set as the primary key indicated by a small key in the field selector column.
- Click on the **Close** button on the Table window.
- Access will prompt a message window reminding you to save the changes.
- Click on the **Yes** button to save the changes.

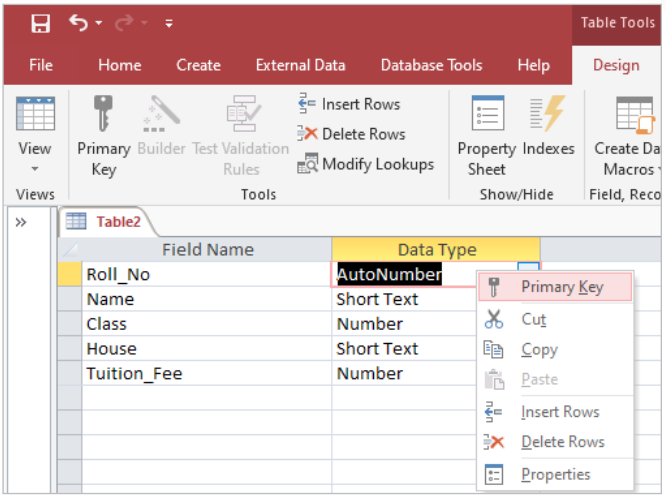


Figure 3.7: Assigning Primary Key in Design View

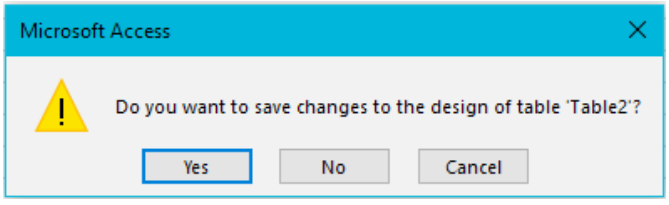


Figure 3.8: MS Access Confirming to Save Table

The **Primary Key** is a toggle key. To remove the primary key check from a field, select that field and click on the **Primary Key** option.

Editing Tables in Access

After entering data in a table, sometimes it is required to make changes in the database. This can be done in the following ways:

- To edit a record directly, scroll through the records or use the **Record Navigation** buttons to find the record to be edited.
- Double-click on the cell where you want to make changes.

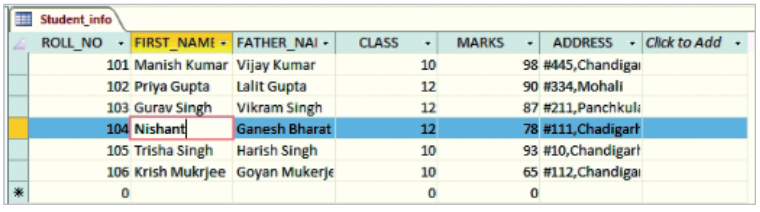


Figure 3.9: Editing Records in a Table

- Type the information in the field. A **Pencil** icon appears in the extreme right in the record selector column to indicate the **Edit** mode.
- Click outside the record to apply the change.

  Or

  Click on the **Enter** key.

Inserting/Deleting Field in Datasheet View

To insert a new field in a table, follow the given steps:

- Open a table in **Datasheet View**. Right-click on the field on the left of which you want to insert a new field. The context menu appears.

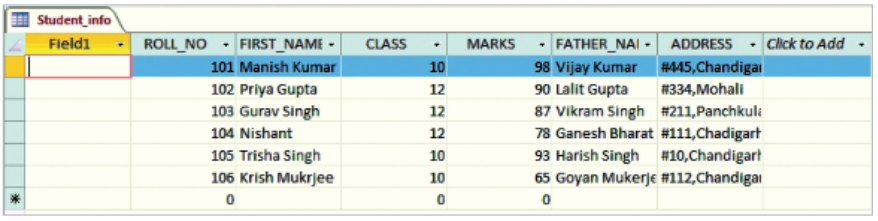


Figure 3.10: Inserting a Field in Datasheet View

- Select the **Insert Field** option.
- The new field will be inserted on the left of the selected field.

  Or

  On the **Fields** tab, in the **Add & Delete** group, click on the **More Fields** option and choose the data type for the field.
- The new field will be inserted on the right of the selected field.

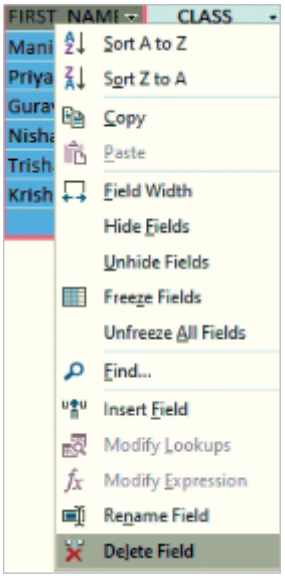


Figure 3.11: Delete Field Option

Likewise, you can delete a field in two ways:

- Right-click on the field to be deleted and select the **Delete Field** option from the context menu. Or

  Select the field to be deleted and then click on the **Delete** option in the **Records** group on the **Home** tab.

Moving a Field

You can change the sequence of fields in a table even after creating it.

- Click on the field header and drag and drop the field to the desired location.
- While dragging, you will find a thick dark line appearing between the fields. This indicates the position where the field will be placed.
- As you release the mouse button, the selected field will be placed at the new location.

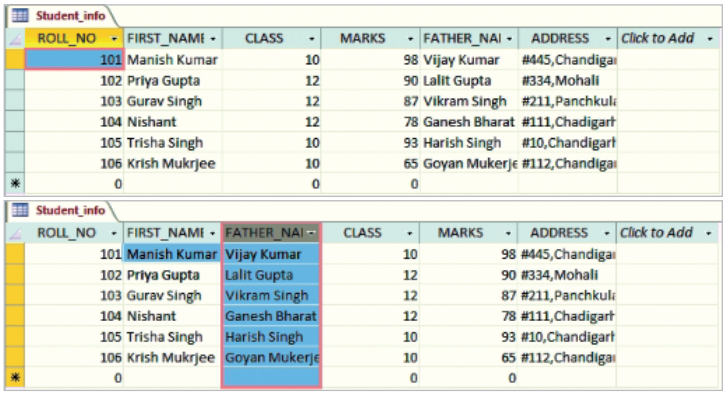


Figure 3.12: Moving a Field at the New Location in Datasheet View

Hide/Unhide Fields

Sometimes, to view the particular fields only, you need to hide the other fields. You can do so by following the given steps:

- Right-click on the column header that you want to hide and select the **Hide Fields** option from the context menu.
- To unhide the fields, right-click on any column heading and select the **Unhide Fields** option from the context menu to open the **Unhide Columns** dialog box. Select and clear the check boxes in front of the fields that should be visible.

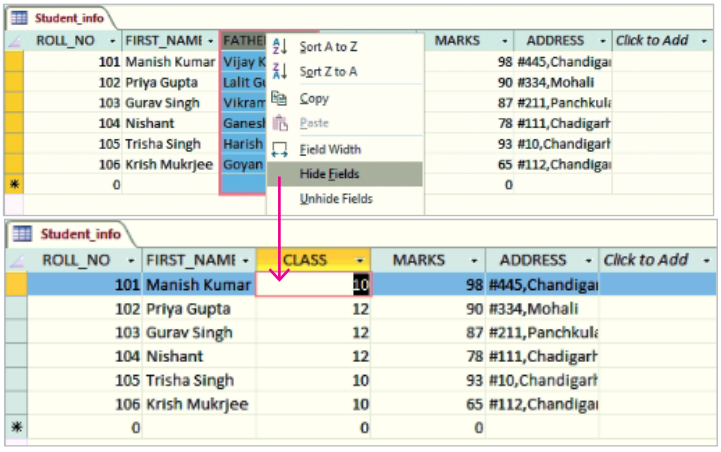


Figure 3.13: Hiding the Field

NOTE

Likewise, you can Freeze or Unfreeze the columns.

Sorting Data within a Table

Sorting means to arrange the data in ascending or descending order. You can sort the data within a table with respect to a particular field. To sort the data, follow the given steps:

- Select the field that you wish to sort.
- Click on the drop-down arrow on the header of the field or right-click on the field.
- Select either the **Sort Smallest to Largest** or **Sort Largest to Smallest** option (if the field is numeric) or select the **Sort A to Z** or **Sort Z to A** option (if the field is alphanumeric).
- Observe the changes in the table.

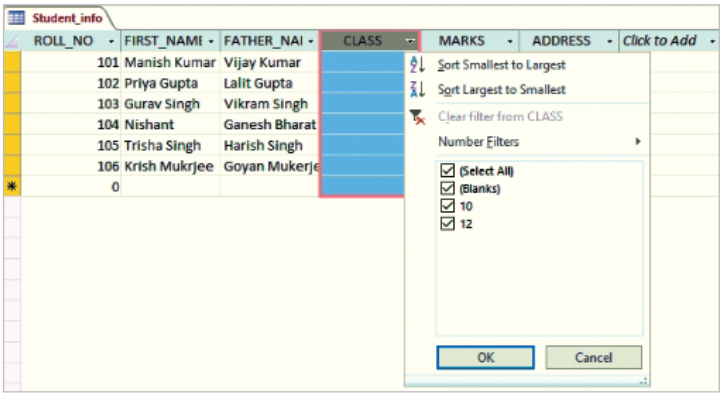


Figure 3.14: Sorting Data in a Table

Tips

- Using the **Ascending** and **Descending** sort buttons on the **Home** tab in the **Sort & Filter** group is another way to sort the data.
- To clear your sort, click on the **Remove Sort** option on the **Home** tab in the **Sort & Filter** group.

Filtering in a Datasheet

You can view the specific records of a table in datasheet with the help of the **Filter** option. The steps to filter data in a datasheet are as follows:

- Click on the drop-down arrow present at the right of the column header whose data you want to filter.
- By default, Access selects all the check boxes under the **Text Filters** option. Click on the **Select All** check box. All the selected check boxes will be deselected.

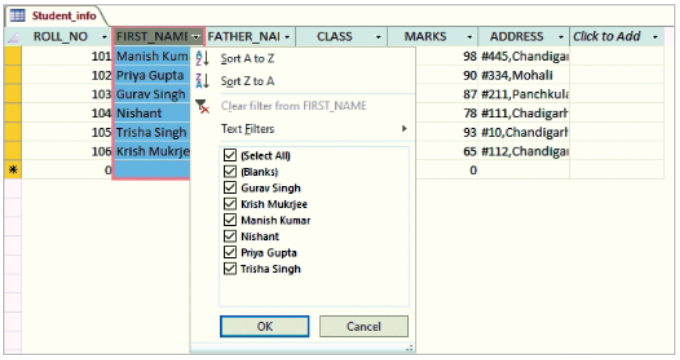


Figure 3.15: Filtering in a Datasheet

- Now, select the items that you want to display in your datasheet. You can select as many items as you want. Here, the names of only two students are selected.
- Click **OK**. The filter icon will appear at the right of the column header. It indicates that the column is filtered. If you point at the filter icon, Access shows the filter criteria.

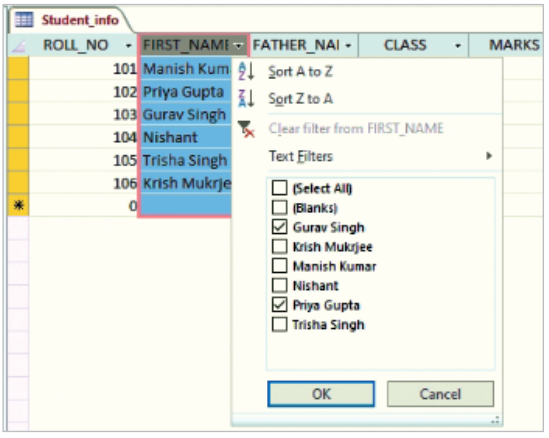


Figure 3.16: Selecting the Filter Criteria

- You can remove the filter, by clicking on the Toggle **Filter** option in the **Sort & Filter** group on the **Home** tab.

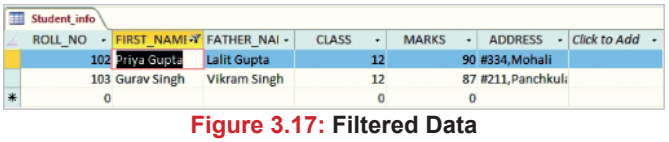


Figure 3.17: Filtered Data

- You will observe that the datasheet is restored back to its original form.

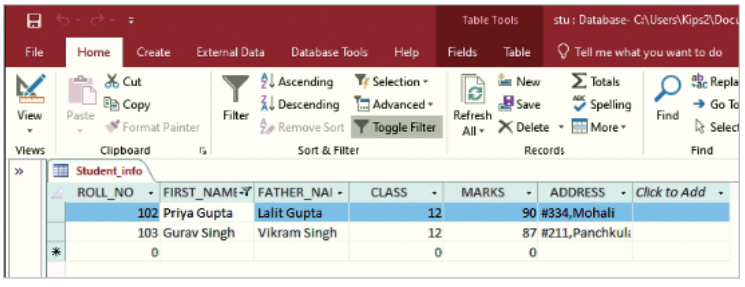


Figure 3.18: Displaying Data after Removing the Filter

Advanced Filtering in a Datasheet

An Advanced Filter is quite similar to a multilevel sort in Microsoft Excel. An Advanced Filter can really help you to narrow down your search. This is like running a miniature query only on one table.

To apply an Advanced Filter, follow these steps:

- Select the **Class** column header. Click on the drop-down arrow present at the right of it.
- Select the **Number Filters** option. A cascading menu appears.

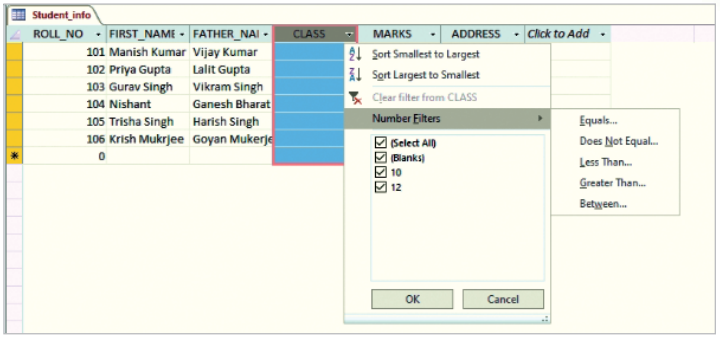


Figure 3.19: Number Filters Cascading Menu

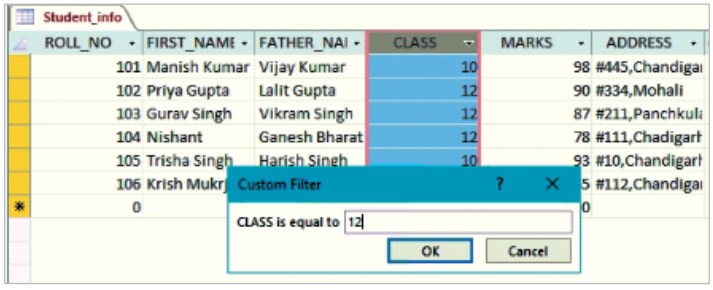


Figure 3.20: Specifying the Criteria

- Select any of the options from the list. For example, select the **Equals** option.
- The **Custom Filter** dialog box appears. Type 12 in the 'CLASS is equal to' text box and click **OK**.
- This displays all the records of class 12 students.

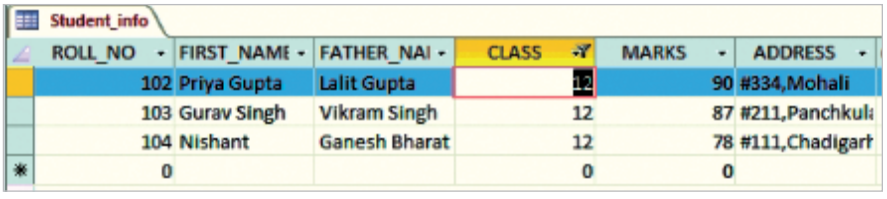


Figure 3.21: Output of Advanced Filtering

Searching in a Database

There are times when you require a particular data in your datasheet. It becomes very difficult when you are not sure about its exact location. The Search box located at the bottom of the Access window makes it easy for you to search.

- Enter a part or whole word, phrase, date, or number in the Search box and press **Enter**.
- Access highlights the corresponding characters that match your search.

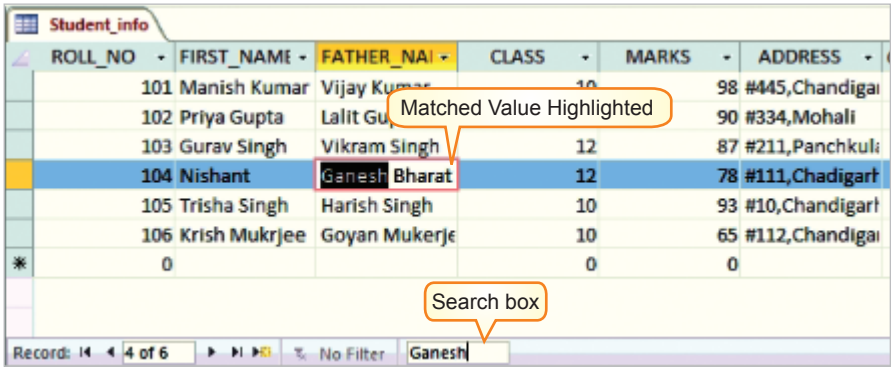


Figure 3.22: Searching in a Database

- To find the next matching record, press the **Enter** key again. Access finds all the records which match your search criteria anywhere in your datasheet.

RECAP

- A field's data type determines what type of data you can enter into a field.
- A field property applies to a particular field in a table and defines the characteristics of that field.
- A primary key is a field in a table that holds a unique value for every record.
- You can sort data within a table with respect to a particular field, either in an ascending or descending order.
- You can view specific records of a table in datasheet with the help of the Filter option.

Brain developer

A. Fill in the blanks.

1. A ..... key uniquely identifies each record in a table.
2. ..... data type is used for descriptive fields.
3. The ..... generates a sequential number, whenever a new record is added to a table.
4. You can view the specific records of a table in datasheet with the help of the ..... option.
5. ..... means to arrange the data in an ascending or descending order.

Hints

- Long Text
- Primary
- Sorting
- AutoNumber
- Filter

B. Write T for True and F for False.

1. You can set the properties of a field in the Design View only. ☐
2. Currency data type is used to store currency values. ☐
3. Advanced filter is like running a miniature query only on one table. ☐
4. A table can have only one primary key. ☐
5. It is not essential to specify data type for a field name. ☐

C. Application-based questions.

1. Shivali has to answer some questions based on the following table structure. Help her in answering them:

Emp_name	Date_of_joining	Project_name	Emp_id	Salary	Designation
Rajesh	18/11/2015	Payroll_system	A001	20000	Project associate
Mansi	10/06/2012	MIS	A002	45000	Project lead
Shruti	30/07/2014	Employee_management	A003	35000	Project manager

   a. Identify the data type for the following fields:

Emp_id	Date_of_joining	Salary .....

   b. Name the highest paid and the lowest paid person.

   .....

   c. Set the maximum number of characters to be entered in the field Project_name.

   .....

   d. Which field can become the primary key?

   .....

2. Supriya is given an assignment to add a new table in an existing database. Which option should she use to complete the task?

   .....

D. Select the correct option.

1. When you create a table in Access, automatically the first field called ..... is added to it.

   a. S.No. b. ID c. Field_ID

2. A field's ..... determines what type of data you can enter into a field.

   a. Value b. Style c. Data Type

3. The field that is designated as the ..... key can neither have duplicate data nor can it be left blank.

   a. Special b. Primary c. Secondary

4. What is the maximum number of characters that can be used to define a field name?

a. 62 b. 64 c. 46

5. Which icon indicates the edit mode in Access?

a. Clip b. Pen c. Pencil

E. Answer the following questions.

1. Define Tables. List the different elements of a table.

.....

.....

.....

2. What are Data Types? List the various data types available in Access.

.....

.....

.....

3. What is the utility of filter in a Datasheet View?

.....

.....

.....

4. Write short notes on the following:

a. Validation Text: .....

.....

.....

b. Caption Property: .....

.....

.....

c. Advanced Filter: .....

.....

.....

ACTIVITY SECTION



LAB SESSION

Perfection Through Practice

Create a table having the following fields using a blank database and name it as Books.

Field Name	Description
Book_ID	The unique identifier for a book
Book_Title	Title of the book
Publisher	Name of the Publisher
Publishing_Year	Year of publishing
Price	Price of the book

- Define a Primary key for the **Books** table.
- Set the default value 100 for the field Price.
- Set the field size to 30 for the Publisher field.
- Enter ten records in each field.
- Insert one more field No_of_Pages after Book_ID and enter data in it.
- Sort the table in the ascending order according to Book_Title field.
- Filter the records and display only those where Price > 500.
- Search for the record of a particular Book_ID.
- Delete the last two records from the table.
- Save the table and close the MS Access application.

GROUP DISCUSSION

For Concept Clarity



Discuss the following topics:

- **Searching and Sorting in a Database**
- **Data Types**

PROJECT WORK

Using Creativity



Create a database of your friends by defining the fields: ID, First Name, Last Name, Date of Birth, Email, Address, City, and ZIP/Postal Code. Enter 15 records in it.

ONLINE LINK

Looking For More



To know more about Microsoft Access 2019, visit the website:

- https://edu.gcfglobal.org/en/access/

Chapter 4

Working with Queries, Forms, and Reports

LEARNING OUTCOMES

The student will be able to:

- describe queries, forms, and reports.
- set a relationship between tables.
- create a query using Design View and Wizard.
- specify simple and multiple criteria in a query.
- create and format a Form.
- create and export a Report.
- create charts in Access.

The database of any organisation may contain a huge amount of data. Moreover, it may consist of multiple tables. When the number of records in a table increases, it becomes an uphill task for any user to extract specific records from that table. Microsoft Access provides you with a solution for this problem through queries. A **Query** is a database object that allows you to retrieve information from one or more database tables that meet a specific condition or criteria specified by you. The information retrieved on the basis of a specified criteria in the query is stored in a separate table, called the **Query table**.

Query

In simple words, a query is a simple question that you ask to find a specific information from any source. Similarly in Access, when you build a query, you are defining specific search conditions to search for specific information from the database. You can use queries to view, change, summarise, and analyse the specific data in different ways.

In your daily life, you make several types of queries to get specific information. For example, you may want to know the names of the students who have scored above 85% marks. You may also want to know the names of students who live in Sector–4, Chandigarh, and so on. You can make quick decisions depending on that criteria. Let us understand the concept of queries with the help of the given example.



Example

In the **StudentTable**, you have records of classes 8 as well as 9 students. Suppose, you want to extract the records of the student(s) of classes 8 and 9 who reside in Noida and Delhi, you can find this information with the help of queries.

StudentTable

Roll_No	F_Name	Class	Address	City	Click to Add
101	Nisha	8	#81,Sector 3	Panchkula	
102	Vivek	8	#89,Sector 2	Panchkula	
103	Naman	8	#67,Sector 21	Panchkula	
207	Gitika	9	#9,Sector 23	Chandigarh	
208	Preet	9	#89,Sector 21	Chandigarh	
0		0			

Navigation Pane

Record: 6 of 6 | No Filter | Search

Datasheet View

Figure 4.1: StudentTable

Queries are made on tables and the results are displayed in the form of a table, i.e., in a group of rows and columns with the set of records that match the given condition.

Microsoft Access provides the various types of queries: Select, Parameter, Crosstab, Action, and Structured Query Language (SQL) query.

Setting a Relationship Between Tables

Relationships are the links that associate a field in one table with the same field in another table. In Access, you can store data in multiple tables. To bring that information together, you need to define relationships between the tables. Once you have defined the relationship between the tables, data from both the tables can be used by Query, Form, or Report.

A relationship works by matching a field with the same name in both the tables. In most cases, these matching fields are a **Primary key** from one table that uniquely identifies each record in a table, and a **Foreign key** in the other table. A foreign key is a value in one table that must match with the primary key of another table.

To create a relationship, make two tables. Name one as **Students**, which has information about students, such as their Roll_No, F_Name, Class, Address, and City. Name the other as **Marks** that holds the information about the students' Roll_No, Percentage, and Grade. Open one of them in the **Datasheet View**.

Students

Roll_No	F_Name	Class	Address	City	Click to Add
101	Nisha	8	#81,Sector 3	Panchkula	
102	Vivek	8	#89,Sector 2	Panchkula	
103	Naman	8	#67,Sector 21	Panchkula	
207	Gitika	9	#9,Sector 23	Chandigarh	
208	Preet	9	#89,Sector 21	Chandigarh	
0		0			

Figure 4.2: Students Table

Observe that there is one common field, i.e., Roll_No in both the tables.

Marks

Roll_No	Percentage	Grade
101	89	A
102	90	A+
103	95	A+
207	87	A
208	60	B

Figure 4.3: Marks Table

- Click on the **Database Tools** tab. Select the **Relationships** option from the **Relationships** group.
- The **Show Table** dialog box appears as shown in Figure 4.4., Select the required table and click on the **Add** button. The selected table will appear in the **Relationships** window. Likewise, add another table to the **Relationships** window.
- You can activate the 'Queries' tab if your relationships are based on queries, or activate 'Both' tab if relationships are based on both Tables and Queries.
- Click on the **Close** button to close the **Show Table** dialog box.

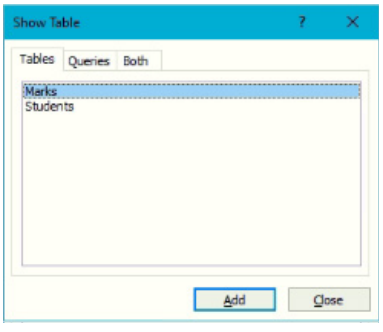


Figure 4.4: Show Table Dialog Box

- Drag the primary key of the parent table (e.g., **Students** Table) and drop it over the same

field in the child table (e.g., **Marks** Table). In the given example, Roll_No is the primary key.

- The **Edit Relationships** dialog box appears as shown in Figure 4.5.
- Click on the **Create** button. Access creates a relationship between the tables.
- A line linking the two tables will appear indicating that both have been linked on the basis of the selected field.
- Click on the **Save** button on the **Quick Access Toolbar** to save the relationship and then close the **Relationships** window by clicking on the **Close** button on the **Relationships** group.

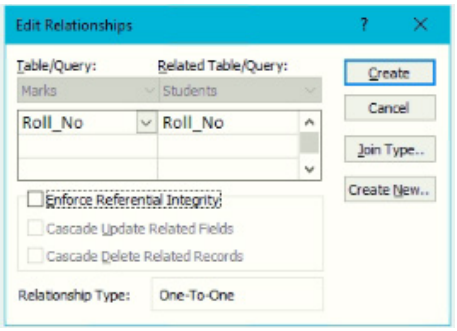


Figure 4.5: Edit Relationships Dialog Box

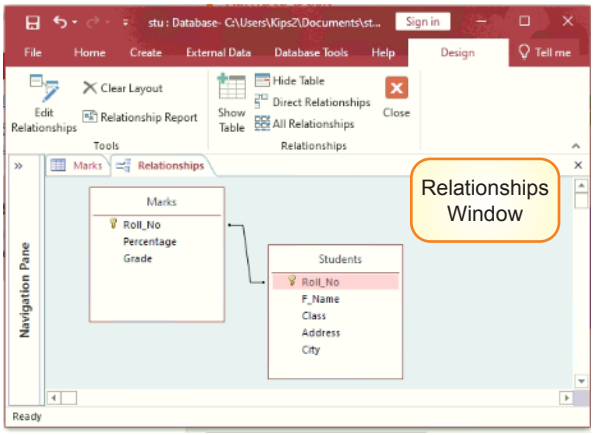


Figure 4.6: Established a Link Between Tables

> **Tip** After the relationship has been created between the two tables, you must delete the relationship before you make modifications to the fields on which the relationship is based. To delete a relationship, click on the line that connects the tables and press the **Delete** key.

Creating a Query

Access provides two ways to create a Query:

- Query Design
- Query Wizard

Creating a Query in Design View

The **Design View** gives you more control over a query. It allows you to create a query from the scratch.

- Open the database and click on the **Create** tab on the Ribbon. Now, click on the **Query Design** option in the **Queries** group.
- The **Show Table** dialog box is displayed from which you can select the record source for your query, You can select one or more **Tables** or **Queries** or a combination of the two.
- Select the table(s) from the **Show Table** dialog box on which you would like to run a query. Click on the **Add** button. After adding the table(s), click on the **Close** button.

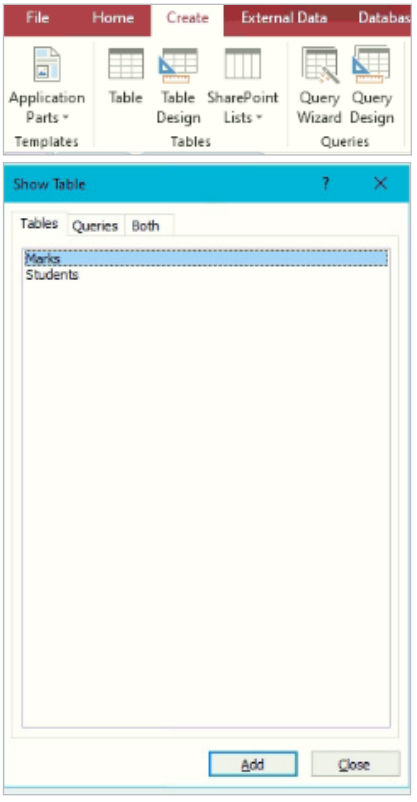


Figure 4.7: Selecting a Table

- The selected table(s) appear as a small window displaying a list of fields in the upper section of the Query window, i.e., the **Object Relationship Pane**.
- Double-click on the field names that you want to add in the query. They will be added to the **Design Grid** (the bottom section of the Query window). You can also add fields to the query by dragging them from the field list to the **Design Grid**.

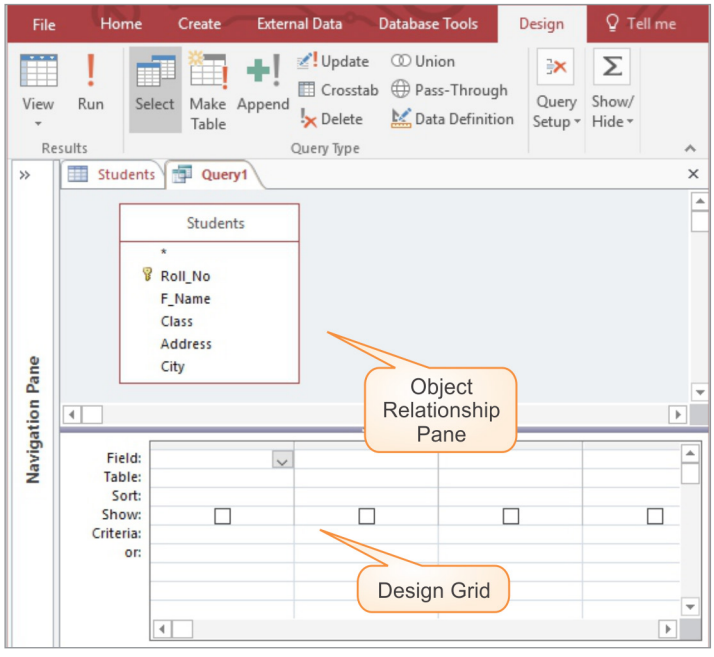


Figure 4.8: Added Table to Apply a Query in Query Window

- The Design grid is similar to a spreadsheet, with columns representing each field in the query. Let us understand the components of the **Design Grid**.

Field: The first row of the Design Grid displays the selected field names from the table.

Table: Beneath each field name is the name of the existing table.

Show: The **Show** row displays a check mark. The fields with check marks display the information when the query is run. To hide the field during run time, deselect the check mark by clicking on it.

Sort: This property is used to filter the data, either in an ascending or descending order. It is optional.

Criteria: It contains the condition on the basis of which the records will be filtered in the Query output.

Or: This property is used to set multiple criteria in a query.

Let's Know More

A **Select query** retrieves data from one or more tables and displays the record set in a datasheet. You can also use a Select query to group the data, and calculate the sum, count the average, and other types of total.



Let's Know More

A **Parameter query** is a type of Select query that prompts you for input before it runs. The query then uses your input as criteria that controls the results.



Let's Know More

An **Action query** creates a new table or alters your data or database by adding, deleting, updating, and appending the data to it.

Specifying Simple Criteria

You specify criteria in the **Criteria** row of the design grid. Specify the criteria value in the **Criteria** row and the data will be filtered accordingly in the query output.

Let us understand it with the help of the given example:

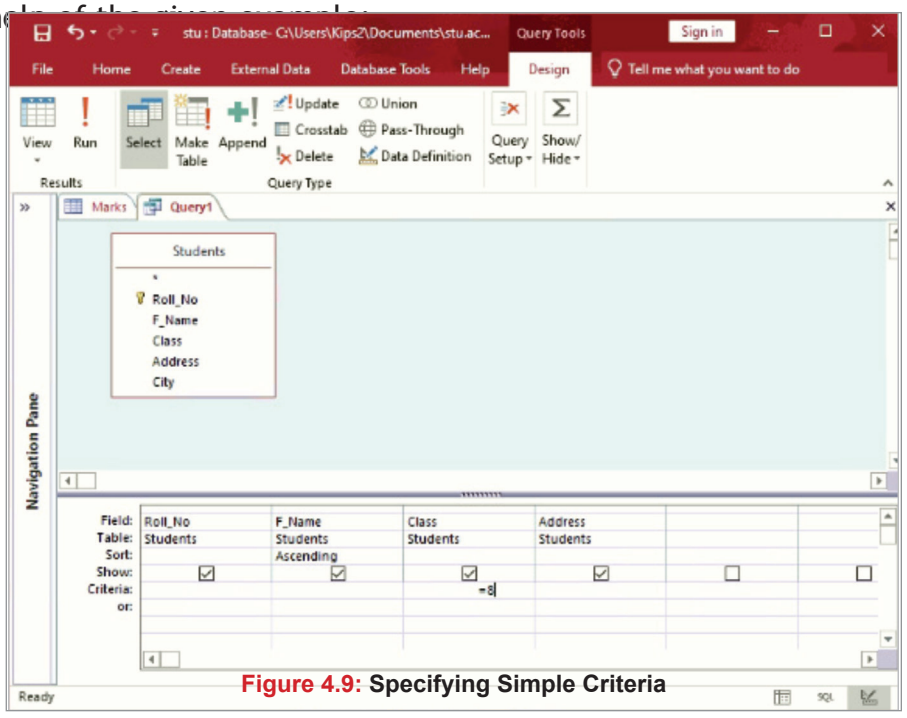
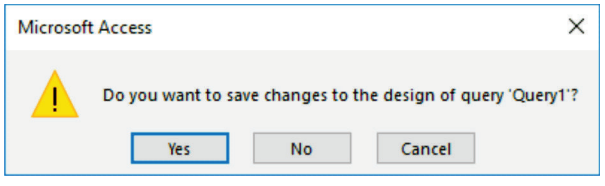


Figure 4.9: Specifying Simple Criteria

- To view the roll numbers and names of students of class 8, double-click on the required fields in the table.
- Move the cursor to the **Criteria** row and type the criteria **=8** in the **Class** field column.
- Click on the **Sort** property in the **F_Name** column and set it in the **Ascending** order.
- Click on the **Close** button of the query window to save the query. A dialog box will appear asking you to save changes to the design of Query1. Click on the **Yes** button to save the changes. The **Save As** dialog box will appear. Specify the query name and click **OK**.
- The query name will appear in the Navigation Pane (Make sure you have selected the **All Access Objects** option from the drop-down menu in the **Navigation Pane**). Double-click on the query name to view the query output.
- The query result will be displayed in the **Datasheet View**, which looks like a table.



Tip: To view the query output without saving, click on the **Run** button in the **Results** group on the **Design** tab.

Specifiying Multiple Criteria

To see information when either two or more alternate criteria are satisfied, you can make use of **or** criteria row in the design grid of the query.

- Suppose from a wide range of record you want to see the records of **Classes 8** and **9** only.
- Move the cursor to the **Criteria** row and type the condition **=8** in the **Class** field. Type the second condition **=9** in the **or** row of the same column.
- Now, run the query by clicking on the **Run** button on the **Design** tab.
- The query result will be displayed in the **Datasheet View**.

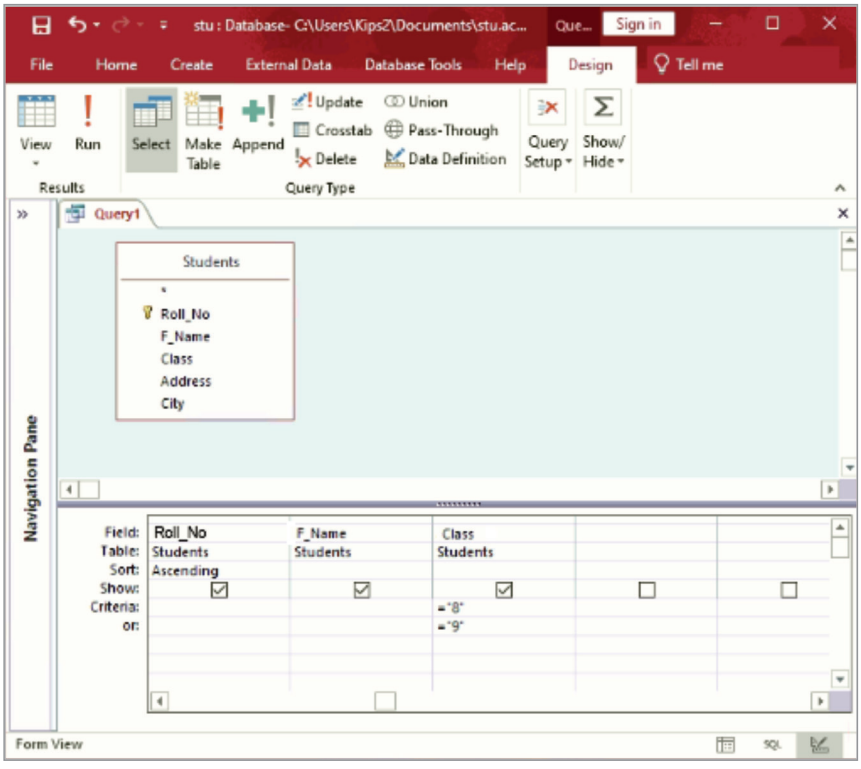
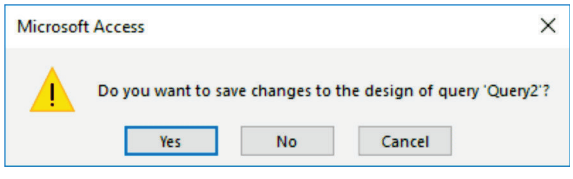


Figure 4.10: Specifying Multiple Criteria

- If you want to save your query, click on the **Save** command in the Quick Access Toolbar. When prompted to name it, type the desired name, and then click **OK**.



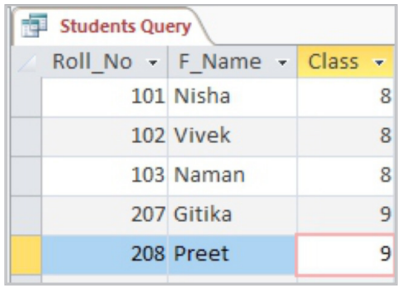


Figure 4.11: Query Output

Let's Know More

A **Crosstab** query uses row headings and column headings so that you can see your data in terms of two categories at once.

Let's Know More

To reopen the 'Show Table' dialog box, while creating relationship, click on the **Show Table** button on the **Design** tab in the **Relationships** group.



Know the Fact

All the tables you select to include in your query will appear as small windows in the **Object Relationship Pane**. Each window contains a list of the available fields within those tables.

Know the Fact

To add all the fields present in a field list to the design grid, double-click on the top bar of the table's field list and drag it to the design grid.

Let's Know More

To Zoom-in the current field in the **Datasheet View**, press **Shift+F2**.

Creating a Query using Query Wizard

To create a query in Query Wizard, follow the given steps:

- Click on the **Create** tab.
- Select the **Query Wizard** button in the **Queries** group.

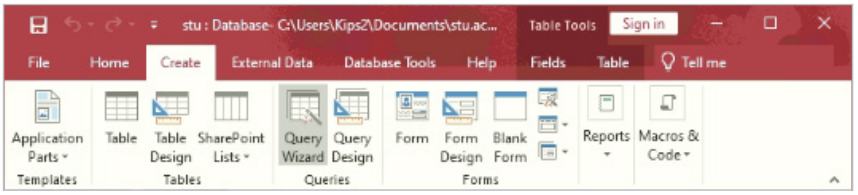


Figure 4.12: Selecting the Query Wizard Option

- The **New Query** dialog box appears. The **Simple Query Wizard** option is selected, by default. Click **OK**.

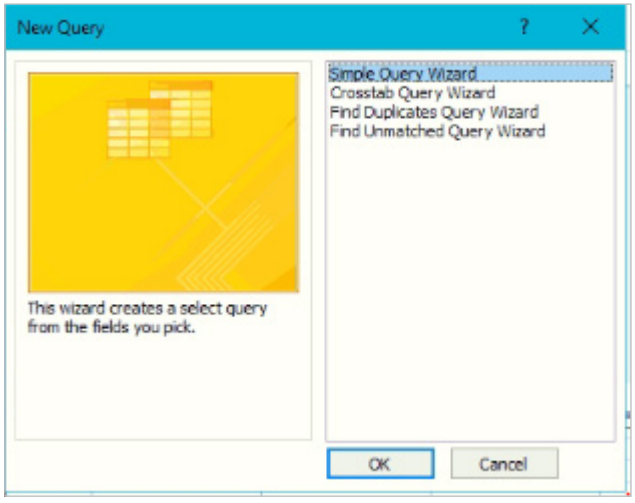


Figure 4.13: New Query Dialog Box

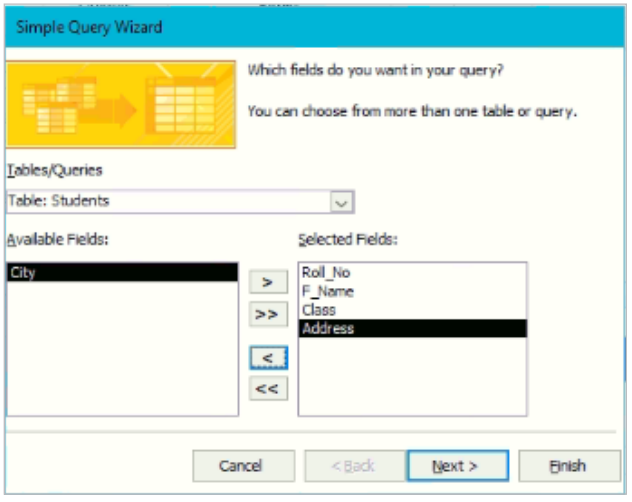


Figure 4.14: Simple Query Wizard Dialog box

- The **Simple Query Wizard** screen appears as shown in Figure 4.14. Select the table that contains the data in the **Tables/Queries** list box.
- Now, add the fields that you want to have in the query result.

To Add a Field

- Select the required field(s) in the **Available Fields** box.
- Click on the single forward arrow button [>] or just double-click on the field.
- You will notice that the selected field is shifted to the **Selected Fields** box.
- In case you want to add all the fields, then click on the double forward arrow button [>>]. It will shift all the fields at once.

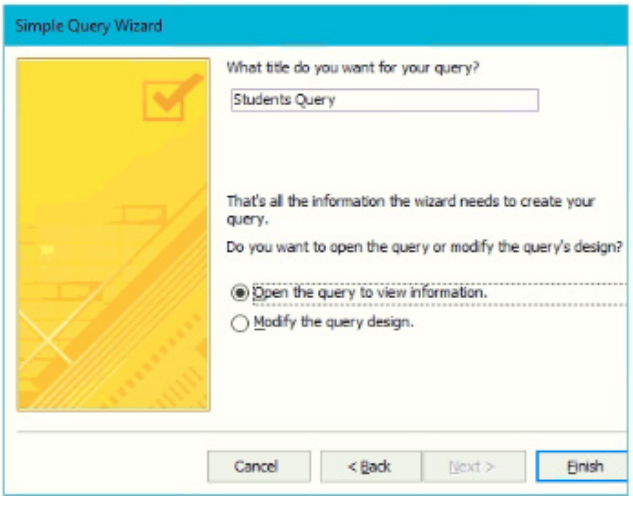


Figure 4.15: Adding Title for Query

- You can remove the selected fields from the **Selected fields** box. To remove them one-by-one, click on the single backward arrow button << or to remove all at once, click on the double backward arrow button <<.
- Once you have selected the required fields, click on the **Next** button.
- The **Simple Query Wizard screen 2 of 3** appears, prompting you to either select the **Details** or **Summary Query**. Simply, click on the **Next** button.
- In the next step, **Simple Query Wizard screen 3 of 3** appears. Enter a new title for your query.
- Observe that the **Open the query to view information** radio button is selected, by default.
- Now, click on the **Finish** button.
- The query result will appear in the **Datasheet View**. You will observe that the query name is visible in the Navigation pane.

Forms

In general, a form is a piece of paper, on which a user fills the required information in the specific fields. Likewise, in Microsoft Access 2019, they work quite similar to it and allow you to add and update data in one record at a time in a table. Although Access provides a Datasheet View, which is a convenient way of entering data, but it is not an appropriate tool for every data entry situation. Sometimes, when you work with the different users and do not want to expose the inner working of Access database, you may choose to use Access forms to create a better user friendly interface.

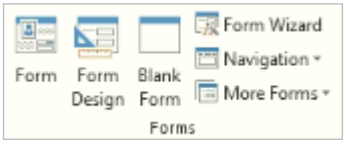


Figure 4.16: Displaying Different Options for Creating a Form

Any form you create from a table will let you view the data that is already in that table and you can also add new data. A form can have a different name from a table, yet it manipulates the same information and data to the corresponding table. If you change a record in a form, it will be reflected in a table also. Data can be inserted, updated, and deleted from a table by using a Form object.

You can work on a form in the following three views:

- **Form View:** It is used to enter, edit, and view data.
- **Design View:** It is used to adjust the design of your form. It gives you a more detailed view of the structure of a form, such as Header and Footer sections.
- **Layout View:** It is used to change the appearance and size of the various controls of a form.

Creating a Form

To create a form, select a table or query in the **Navigation Pane** that you want to use as the data source for the form.

- Click on the **Create** tab on the Ribbon. Select the **Form** option in the **Forms** group.
- A new form is created and opens in the **Layout** view, in which you can change the appearance of a form. You will notice that three new tabs: **Design**, **Arrange**, and **Format** appear on the Ribbon.
- If you want to edit or enter data in the form, click on the **Home** tab > **View** button > **Form View**.

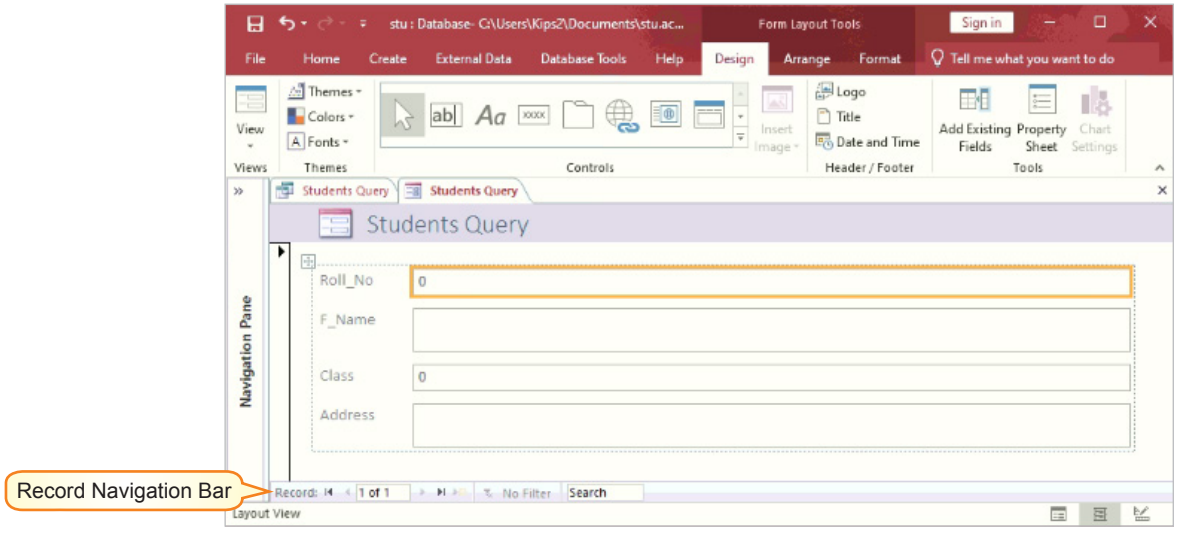


Figure 4.17: Created Form

- Use the **Record Navigation bar** to move through the records in the form.
- After finishing the data entry, save your work by clicking on the **Save** option in the **Quick Access Toolbar** or **Save** option in the **File** tab. You will observe that the Form object gets added in the **Navigation Pane**.

Formatting a Form

You can change the appearance of the form by using the various options available on the **Design** and **Format** tab.

Using Design Tab

- Click on **Logo** in the **Header/Footer** group. The **Insert Picture** dialog box appears. Select any picture and click **OK**.
- Click on **Title** in the **Header/Footer** group. Type 'Students Query' as the title of the form.
- Click on **Date and Time** in the **Header/Footer** group. The **Date and Time** dialog box will appear. Choose the desired format of the **Date and Time** and click **OK**. You will find

the Date and Time placeholders in the Header section of the form. You can move these placeholders to the Footer section also if you want to display the Date and Time there.

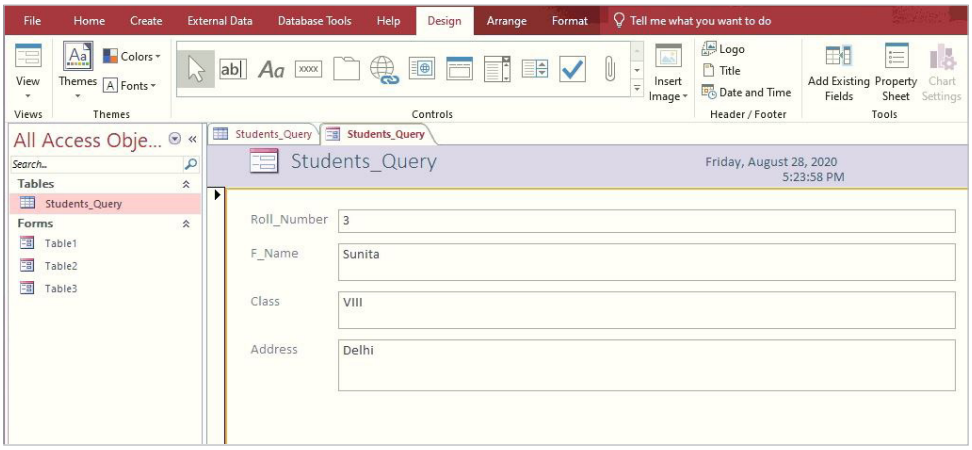


Figure 4.18: **Formatted Form**

- Click on **Themes** in the **Themes** group. Click on the desired theme from the drop-down menu.

Using Formatting Tab

- Click on the **Background Image** in the **Background** group. The **Browse** button appears. Click on it. Locate and choose the picture in the **Insert Picture** dialog box and then click on the **Open** button.
- Select the field to which you want to apply the conditional formatting, say 'Class'. Click on the **Conditional Formatting** option in the **Control Formatting** group. Click on **New Rule** in the **Conditional Formatting Rules Manager** dialog box. Under **Select a rule type**, select **Check values in the current record or use an expression**. Under the **Edit the rule description**, select the rule, apply desired formatting, and click **OK**.

Reports

A report is an effective way to organise and summarise the data for viewing or printing. A report can be created exactly in the same way as you have created a form. The only change is that after selecting the **Create** tab, click on **Report** in the **Reports** group. Access creates a report and places all the fields of the selected table in the report.

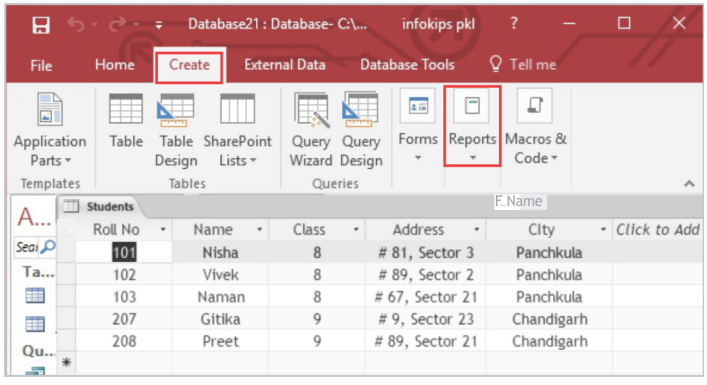


Figure 4.19: **Creating a Report**

The following four new tabs appear on the Ribbon as soon as a Report is created:

Design, **Arrange**, **Format**, and **Page Setup**.

- Click on the **Save** option on the **Quick Access Toolbar** to save the report.
- The Report object gets added in the **Navigation Pane**.

Following are the four different types of views in which a report can be displayed:

Report View: You can view the data of the report in this view but cannot make any modification in the design.

Print Preview: This view allows you to see how the report will look like when printed.

Layout View: It provides a view that closely resembles how the report will actually look like to the user. In this view, you can also edit the design of the report to some extent, such as change the size of the various controls.

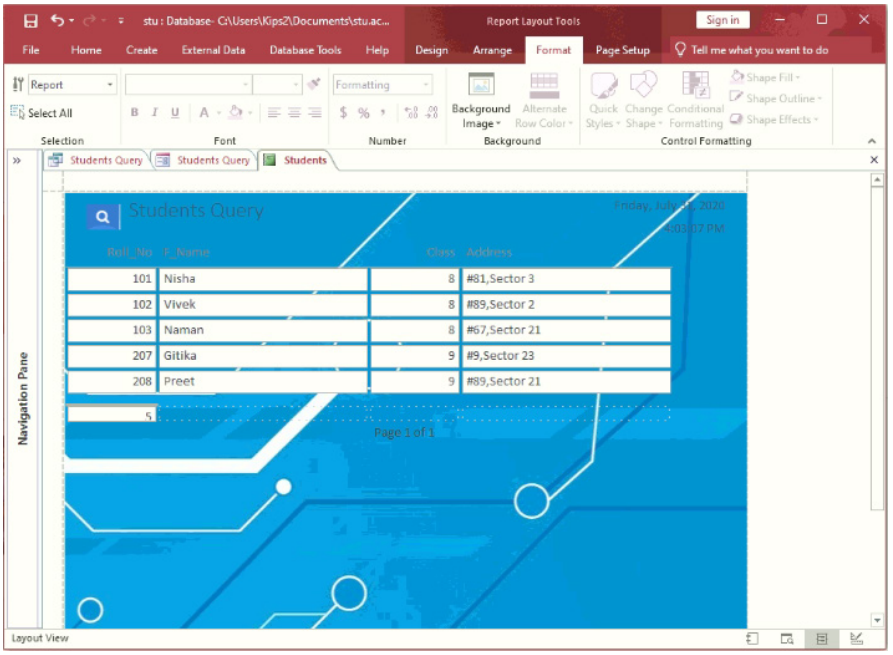


Figure 4.20: Formatted Report

Design View: This view displays only the structure of the report that can be modified and customised as per the requirement. This view does not display the underlying data, but displays the expressions that are used to generate the content. For example, you may find Date() function on the Header section of the report but not the actual date.

Formatting a Report

Like Forms, you can format a report using the different options present on the **Design** and **Format** tabs.

Printing a Report

To print a report, select the **File** tab and then click either on the **Print** option or select the **Print Preview** option.

This view displays how the report will appear on a page. It also allows you to choose the Page orientation, Page setup, etc.

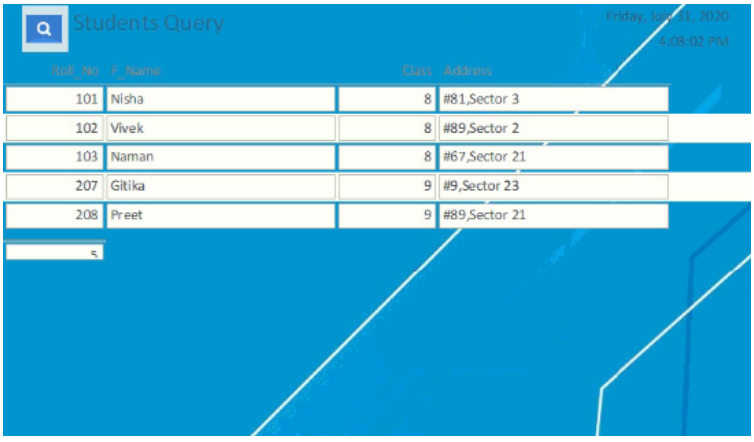


Figure 4.21: Print Preview of a Report

- If needed, modify the page size, margin width, and page orientation using the related commands on the **Ribbon**.
- Click on the **Print** option. The **Print** dialog box will appear. Set the desired print options and then click **OK**.

Exporting a Report

To export a report to some other Office application, follow the given steps:

- Click on the drop-down arrow of the **View** button on the **Home** tab and select **Print Preview** from the drop-down list of options.

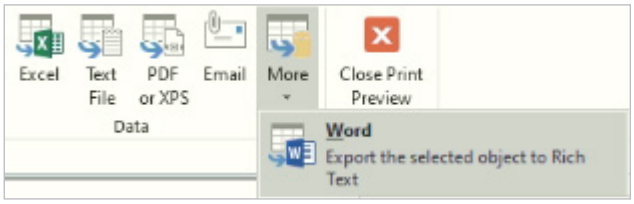


Figure 4.22: **Selecting Word Application**

- The report will be opened in the **Print Preview** layout and the ribbon will display the commands related to the Print Preview layout.
- On the **Data** group, click on the drop-down arrow of the **More** button and select **Word**.
- The **Export - RTF File** dialog box will appear on the screen. Select the location where you want to save the report and give a valid name to the report. You will also find some export options. Select the options as per your requirement.

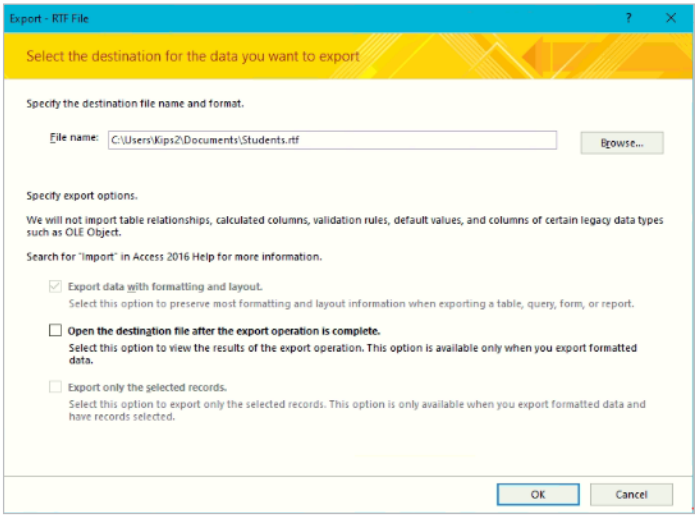


Figure 4.23: **Export - RTF File Dialog Box**

- Click **OK**. A final screen will appear on the screen notifying you about the successful completion of the exporting process.
- Click on the **Close** button.
- Locate the Word file where the report has been exported and open it.

Creating a Chart

A chart is a graphical representation of any data or any information. It can be used to display data in a compact and visual manner. In Access, you can add a chart with a form or report. You can create a chart based on a table or query and customise its various properties. For example, if you select a different category field on a form or report filter, you can see different chart values. Adding charts in Access is a new feature introduced in Access 2019. In it, you can create column, line, bar, pie, and combo charts.

Follow the given steps to insert a chart in a report:

- Click on the **Create** tab and from the **Reports** group, select the **Report Design** option.
- Now, click on the **Design** tab and from the drop-down list select the **Chart** option.
- Drag the chart on the report. The **Chart Wizard** will open.
- From the **View** pane of the Chart Wizard, select the data source.

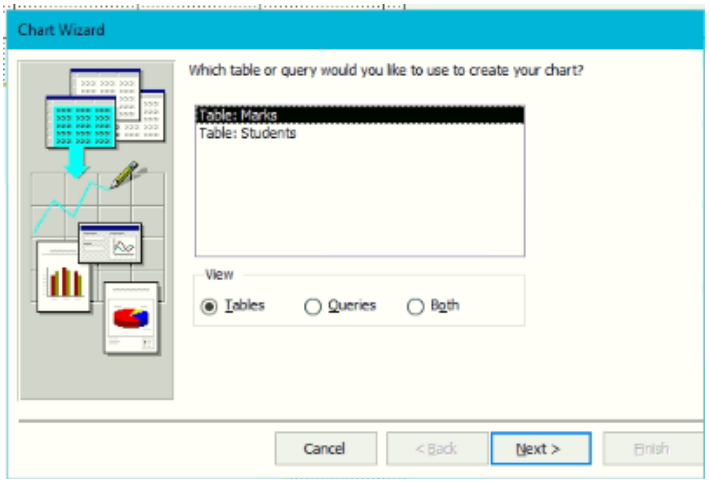


Figure 4.24: Selecting Data Source

- Select the fields that you want to show in the chart from the **Available Fields** list box.

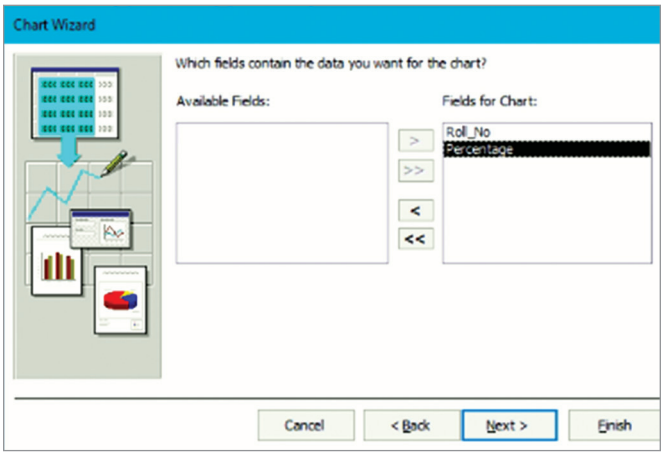


Figure 4.25: Selecting Fields for a Chart

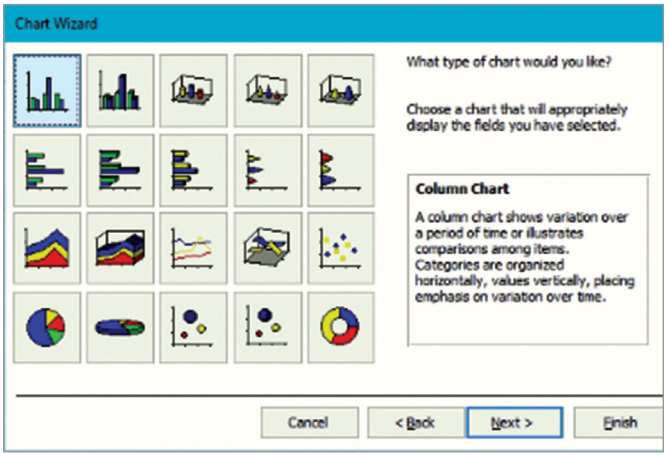
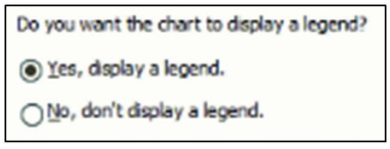


Figure 4.26: Selecting a Chart Type

- Now, select the chart type from the list of chart options displayed.
- Click on the **Next** button and select the layout for the fields.
- Click **Next** to move forward. In the last step, add a title for the chart. Also, select the option **Yes** to display a legend.



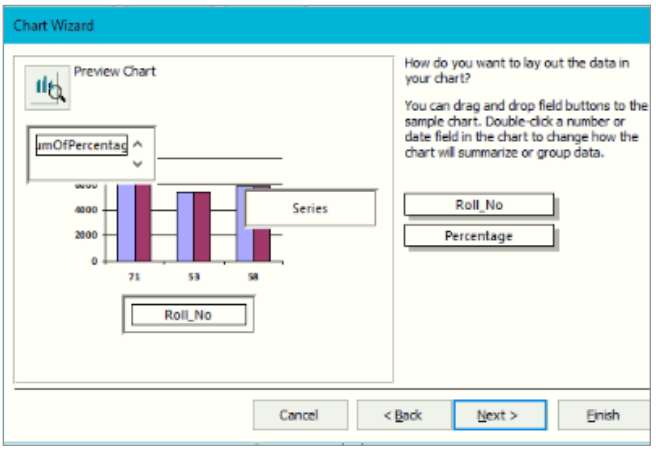


Figure 4.27: Selecting Layout for the Fields

- Click on the **Finish** button to complete the task.

RECAP

- A query is a database object that helps you to retrieve and view information from one or more database tables that meet a specific condition or criteria that is specified by you.
- Microsoft Access provides the various types of queries: Select, Parameter, Crosstab, Action, and SQL query.
- Relationships are the links that associate a field in one table with the same field in another table.
- Access provides two ways to create a query through the Query Wizard and Query Design.
- The Criteria property has the condition on the basis of which the records will be filtered in the Query output.
- A form allows you to add and update data in one record at a time in a table.
- Report is an effective way to organise and summarise the data for viewing or printing.
- A chart is a graphical representation of any data or information.

Brain developer

A. Fill in the blanks.

1. A ..... is a database object that helps you to retrieve and view information from one or more database tables.
2. You can check the condition in a query using the ..... property.
3. The ..... property is used to filter the data either in an ascending or descending order.
4. A ..... is used to add and update data in a table, one record at a time.
5. A ..... is an effective way to organise and summarise data in a printed form.

Hints

- Criteria
- Sort
- Form
- Report
- Query

B. Write T for True and F for False.

1. Queries help you to retrieve information from one table only. ☐

2. To specify the multiple criteria, the 'Or' property is used. ☐

3. You can view the data of the report in the Report view but cannot make any modification in the design. ☐

4. A relationship works by matching a field with the same name in two tables. ☐

5. You cannot add a chart in a form. ☐

C. Application-based questions.

1. Swati created a database of her classmates and entered 30 records in it. Her teacher asked her to show the data of those students who have scored less than 50% marks. Suggest how she can apply this criteria.

   .....

2. Johnson & Johnson company has a huge database of employees. It wants to maintain the privacy of each employee and has given the instructions to computer operators to update each record, one at a time. Which database object should it use to perform this task?

   .....

D. Select the correct option.

1. ..... are the links that associate a field in one table with the same field in another table.

   a. Relationships b. Queries c. Reports

2. A ..... can be used to display data in a compact and visual manner.

   a. Table b. Query c. Chart

3. Which option is used to change the appearance and size of the various controls of a form?

   a. Design View b. Form View c. Layout View

4. How many views does Access provide to display a form?

   a. Two b. Three c. Four

5. Which key defines a relationship between the two tables?

   a. Primary Key b. Candidate Key c. Secondary Key

E. Answer the following questions.

1. Define a query. Name the different parts of a query window.

.....

.....

.....

2. Define Criteria. How many types of criteria can you apply in a query?

.....

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3. What is a Form? How is it useful?

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4. Differentiate between a Form and Report.

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5. Describe the use of charts in Access.

.....

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ACTIVITY SECTION



LAB SESSION

Perfection Through Practice

- Create a database on the **Information System** related to customers using the Design View.
- Use the fields, as given in the table, in your database.
- Save the table with the name **InfoSys**.
- The **InfoSys** table icon will appear in the Database window.
- Double-click on it to open and enter data of your customers.
- Enter minimum 20 records in the table and save it.
- Further, add 10 more records in the table using Form.

S.No.	Field Name	Data Type	Field Size
1	Rec_ID	AutoNumber	50
2	Name	Short Text	100
3	Address	Short Text	50
4	City	Short Text	50
5	State	Short Text	50
6	PIN	Number	Long Integer
7	Mobile	Number	Long Integer
8	Date_of_Birth	Date/ Time	N/A
9	Anniversary	Date/ Time	N/A
10	Email_ID	Short Text	50

- Create a query to display the records where 'Date_of_Birth' falls in the month of November.
- Similarly, create a query to display the records with 'Anniversary' date falling in the month of December.
- Create a query to display the records in the descending order according to 'Date_of_Birth'.
- Create a query to retrieve the records having 'City' as Noida.
- Run the queries and save them.
- Generate a report for the above data and export it to the Word file.

GROUP DISCUSSION

For Concept Clarity



Discuss the following topic:

- **Query** vs **Form**

ONLINE LINK

Looking For More



To know more about Forms and Reports, visit the following website:

- https://www.youtube.com/watch?v=57jBdK3YVJo

Chapter 5

Iterative Statements in Python

LEARNING OUTCOMES

The student will be able to:

- understand and use the different types of control statements.

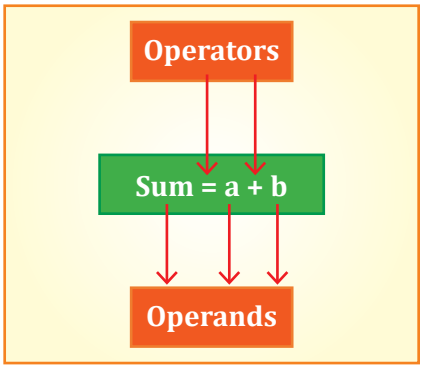
In the previous classes, you have learnt the basic concepts of Python. Let us now quickly review them.

Basic Concepts of Python

Some of the main concepts of Python are discussed as follows:

Operators

Operators are the symbols that perform arithmetic and logical operations on operands and provide a meaningful result. An operator needs one or more operands to perform any operations. The valid combination of both the operands and operators makes an **expression**, which returns a computed result.



The following table summarises the usage of the operators in Python with the help of the examples:

Operator	Function	Example
Arithmetic Operators	These operators are used to perform arithmetic operations on the data. These can be further classified as:	
	• Unary Operators: They work on a single operand. Unary + and Unary –	a=10, a=–10
	• Binary Operators: They work on two operands:	
	◦ Addition (+): To find the sum of the data values	30+20=50
	◦ Subtraction (–): To find the difference of the data values	100–30=70
	◦ Multiply (*): To find the product of the data values	10*2=20
	◦ Division (/): To divide the numbers and give the result in the decimal form	10/4= 2.5
	◦ Integer Division (//): To divide the numbers and give the result in the integer form	10//4=2
	◦ Modulus (%): To divide the numbers and give the remainder	10%3=1
	◦ Exponential (**): To find the power of the numbers	3**4=81

String Operators	String operators work on the string values. They are of two types: • Concatenation (+): It is used to join two string values. • Replication (*): It is used to repeat a string for a number of times.	>>>'KIPS' + 'Learning' >>>KIPSLearning >>>KIPS*4 >>>KIPSKIPSKIPSKIPS
Assignment Operator	The Assignment operator (=) is used to assign a value to the variable.	a=290 The value 290 is assigned to the variable a.
Relational Operators	These operators are used to show relationship between two operands. They compare the values assigned to the operands and give the output in a Boolean expression. These are: • Less than: < • Greater than: > • Less than and equal to: <= • Greater than and equal to: >= • Not equal to: != • Equal to: = =	a=100 b=30 a>b True a==b False
Logical Operators	These operators are used to combine two or more conditional statements. They provide the result in the form of True or False. They are of three types: • and: It gives the result 'True' if all the specified conditions are true. • or: It gives the result 'True' if any one of the specified conditions is true. • not: It reverses or negates the given condition. If the condition is True, it evaluates to False, and vice versa.	a=28 b=78 a<100 and b<a→ True and False → False a<100 or b<a True or False → True not a<100 → not True → False

Types of Control Structures

There are different types of **control structures** in programming that govern the flow of the control of a program.

Sequential: In sequential construct, the statements in a program are executed in a sequential manner, where one statement is followed by the other, with no possibility of branching off to another action.

Conditional: In programming languages, conditional statements (also known as decision-making statements) cause the program control to transfer to a specific location depending on the outcome of the conditional expression. Every decision involves a choice between the two alternatives, **'Yes'** and **'No'** result. If a conditional statement is true, then one set of statements is executed, otherwise, the other set is executed.

Iterative: These statements, also known as **looping** statements, enable the execution of a set of statements to be repeated till the condition is true. As soon as the condition becomes false, the control comes out of the loop and the repetition stops.

Conditional Statements

The conditional statements check the condition and execute the statements accordingly. Let us understand the various conditional statements given below:

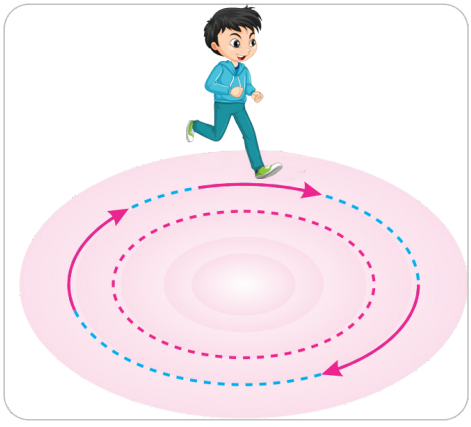
Statement	Explanation & Syntax	Example
if	This statement is used to evaluate only one condition. It performs a course of action if the condition evaluates to true, otherwise it skips the statements. Syntax: if <condition>: statements set	**Program** a=int (input ("Enter a number:")) b=int (input ("Enter another number:")) if a==b: print ("The numbers are equal") **Output** Enter a number: 34 Enter another number: 34 The numbers are equal

if...else	The if...else control structure is used when either of the two different actions are to be performed depending on the result of the conditional expression. It works with two blocks: **if** and **else**. In case the conditional expression evaluates to **true**, the statements in the if block are executed, and if the result is **false**, then the statements in the **else** block are executed.	**Program**
		a=int (input ("Enter the first number:"))
		b=int (input ("Enter the second number:"))
		if a>b:
		print (a, "is greater than", b)
		else:
		print (b,"is greater than", a)

	Syntax:
	if <condition>:
	statements set 1
	else:
	statements set 2
		Output
		Enter the first number : 456
		Enter the second number : 234
		456 is greater than 234

if...elif... else	Sometimes you need to work with multiple conditions. In this case, only using **if-else** construct does not serve the purpose. The **if-elif-else** statements provide a compact way to perform multiple tests on a condition.
	Syntax:
	if <condition>:
	statements set 1
	elif <condition>:
	statements set 2
	else:
	statements set 3
		Program
		a=int (input ("Enter the first number:"))
		b=int (input ("Enter the second number:"))
		if a>b:
		print (a, "is greater than", b)
		elif b>a:
		print (b, "is greater than", a)
		else:
		print("Both the numbers are equal")
		Output
		Enter the first number: 548
		Enter the second number: 548
		Both the numbers are equal

Concept of Loops



In the previous section, you reviewed the basic concepts of Python, such as operators and conditional statements. Now, you will learn about the iterative statements in detail. In a program, there are situations when you have to repeat one or more statements many times. This repetition can be carried out using loops in programming.

Let us understand the concept of loop with the help of a real-life example. Suppose, your instructor instructs you to run and take five rounds of the playground to warm up. Before you start running, you fix a starting point. On reaching the starting point again, you complete one round. Then, you take the second round, and so on. This way you keep a track of the number of rounds until the process of taking rounds gets completed.

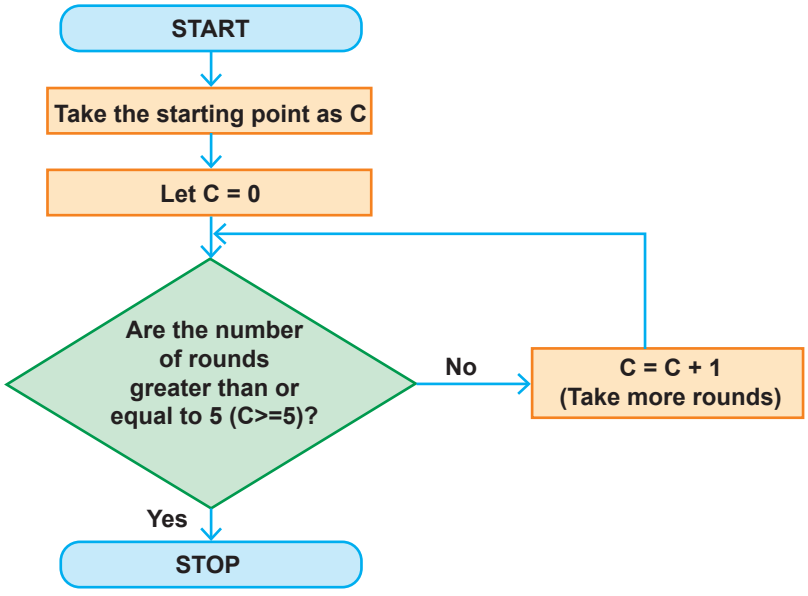
Now, let us understand the concept of looping with the help of the above example.

Let us say that the control variable is C. In this example, you have taken the initial value of C as 0. When you complete the first round, the value of C becomes 1, after the second round, its value becomes C = C + 1, i.e., 1 + 1 = 2, and so on. This value of C will get incremented each time the process repeats. After incrementing, the control variable C will be checked against the maximum number of the repetitions, which is 5 in this case.

Let's Know More

A **Control** variable in a loop is used to store the initial value and gets incremented after every loop to reach its final value. A control variable is also known as the counter variable.

Let us understand this example with the help of a flowchart:





This process will continue until the value of C becomes 5. It means, the loop will continue for five times and then it will terminate.

Let's Discuss

Conditional Statement vs Iterative Statements

The advantage of using the looping technique in programming is that it reduces the number of instructions and also memory space.



Iterative Statements

The statements that keep on repeating themselves as long as a given condition is true are called the **Iterative Statements** or **Repetitive Statements**. As soon as the condition becomes **false**, the loop terminates. These are also called the **Looping statements** or simply **Loops**.

An iterative statement is based on three values:

- A start value (initial value), e.g., C=0
- A test condition, e.g., C<=5
- A step value (increment or decrement), e.g., C=C+1

Know the Fact

By default, the step value in a loop is incremented by 1.

Every loop works with the help of a variable known as the control variable. The initial value is assigned to the control variable at the beginning of the loop, then the final value of the control variable is specified, and finally, the step value of the control variable is defined, i.e., it is either incremented or decremented by the given value at each step to reach the final value.

In Python, there are two types of iterative statements:

- for
- while

for Loop

The **for** loop is used when you are sure about how many times a loop body will be executed. It is also known as a **definite loop**. In Python, the working of for loop is based on various operators and functions.

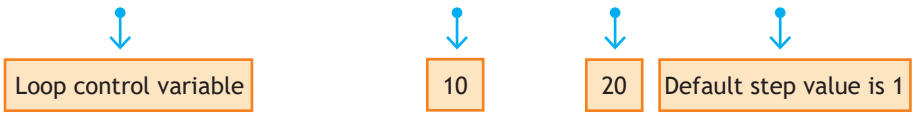
Syntax:

for <variable> in <sequence>:

loop body (statements to be executed)

Or

for <variable> in range (initial value, final value, step value):



loop body (statements to be executed)

Before proceeding further, let us understand the concept of Membership Operators.

Membership Operators

Membership operators play an important role in controlling the working of a loop. There are two membership operators, **in** and **not in**. Out of these, the **in** operator plays a significant role in the working of loops. Let us understand the 'in' membership operator.

The 'in' Operator

The 'in' operator is used to check if a given value exists in the sequence or not. It evaluates to **True** if it finds a value in the specified sequence else it returns **False**.

Syntax:

Value in [sequence]

For example, if you want to check whether the number 10 is present in a given sequence of numbers, [1, 2, 3, 10], execute the following code:

Program 1:

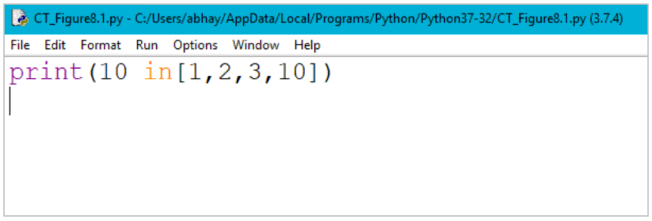
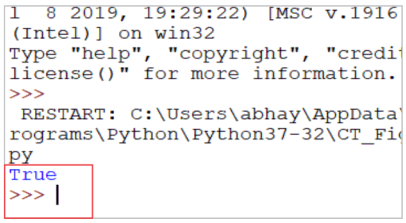


Figure 5.1: Using 'in' Membership Operator



Output

In the above example, the program checks whether the number 10 exists in the given list or not. If yes, the **in** operator will return the value **True**, otherwise, it will return a **False** value.

Similarly, if you want to check whether a number entered by the user is present in the given list or not, type the following code and observe the output:

Program 2:

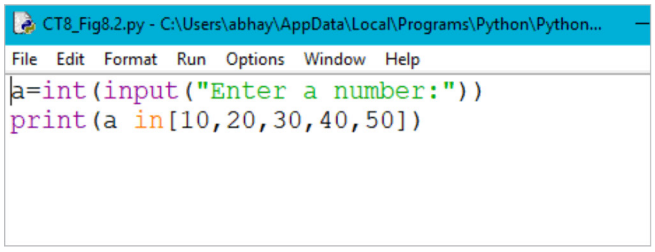
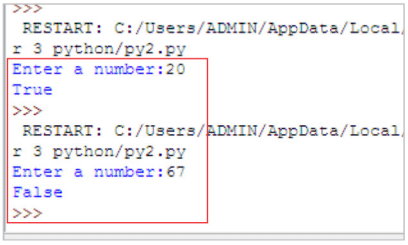


Figure 5.2: Using 'in' Membership Operator



Output

Program 3:

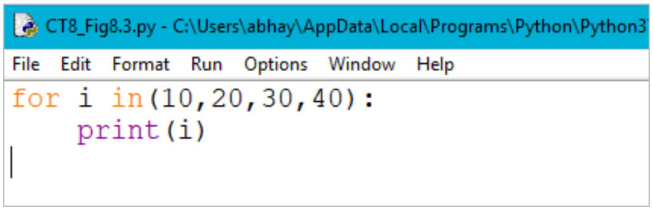
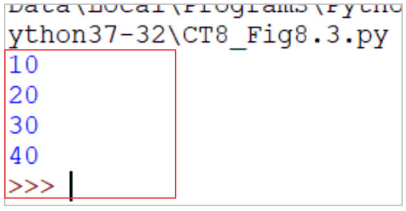


Figure 5.3: Using 'in' Operator with 'for' Loop



Output

The following steps are involved in the execution of the for statement:

Step 1: The 'in' operator will first check if the value is in the sequence. If yes, then the **in** operator will return the value **True**. If the value returned by the **in** operator is **True** then the loop control variable **i** will be assigned a value from the sequence.

Step 2: The **print** statement will print the value assigned to the variable **i**.

NOTE

Every time the **in** operator returns **True**, a new value will be assigned to the variable **i**, and it will be printed. This process of printing values will continue until the last value in the sequence is used. The loop will terminate after printing the last value.

The range() Function

The range() function used with the **for** loop in Python is helpful in generating a sequence of numbers in the form of a list.

For example, range (10) will generate the numbers from 0 to 9 (10 numbers).

Syntax:

range(initial value, final value, step value)

Here, the **initial value** is an integer specifying at which position to start, while the **final value** specifies the end, and the **step value** specifies either increment or decrement until it reaches the final value. While using the **range()** function, the final value is always 1 less than the last value in the given sequence. The use of the **range()** function can be understood by the following example:

Program 4:

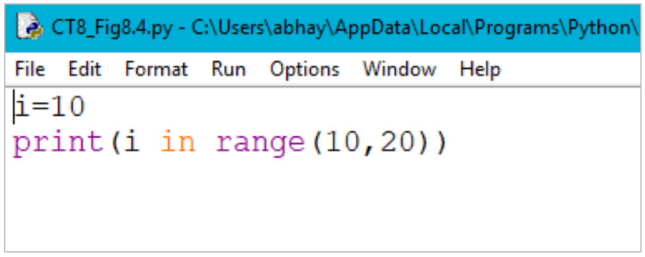
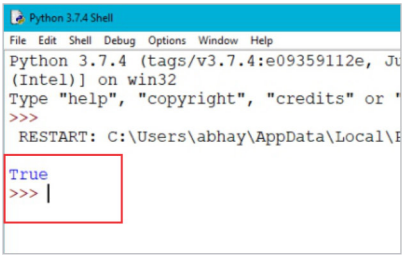


Figure 5.4: range() Function Returning True Value



Output

In the above code, the initial value of the variable i is **10** and final value is **19** (20–1=19). Each time the loop executes, the value of i is incremented by **1**. So, the final sequence will be [10,11,12,13,14,15,16,17,18,19]. Now, the variable i (in this case 10) will be checked within this range. As the value 10 is present in the given range, so the output of the program will be **True**.

Now, try some other range. The output of the program will change accordingly.

Program 5:

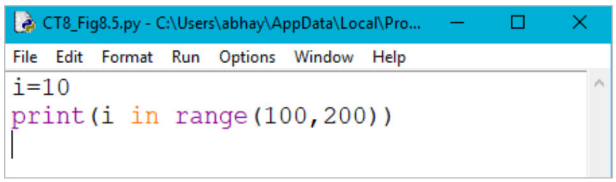


Figure 5.5: range() Function Returning False Value



Output

Step 1: The initial value of the i variable is **10**.

Step 2: Using the **range()** function, a sequence is created with all the values between 100 and 199. The **in** operator will check whether the value of the variable i exists in the sequence or not. If the value does not exist in the sequence, the in operator will return **False**.

Using range() function in for loop

You can use the **range()** function in **for** loop to iterate through a sequence of numbers. Look at the following example, where only in operator is used with the for loop.

Program 6:

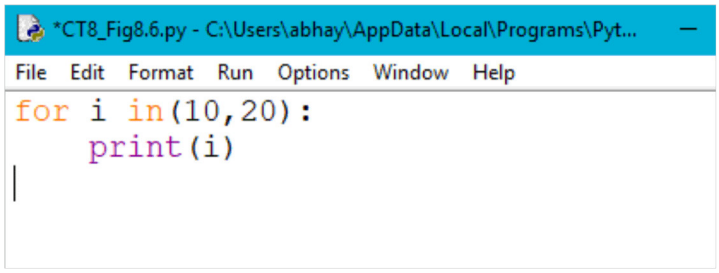
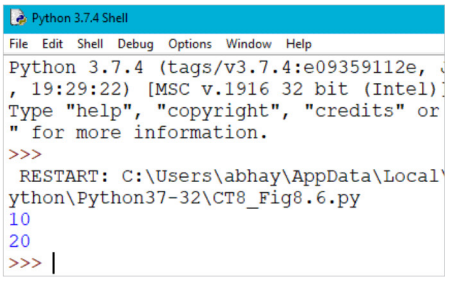


Figure 5.6: Using 'for' Loop with 'in' Operator



Output

Step 1: The **for** loop executes. The initial value, 10 is assigned to the variable **i**.

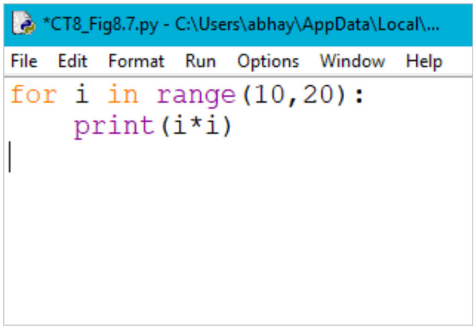
Step 2: The value of i, i.e., 10 is printed.

Step 3: The next value, which is 20, is assigned to the variable i and the same is printed.

Now, let us see how the range() function works in **for** loop.

Program 7:

Write a program to print the square of the numbers given in the range.



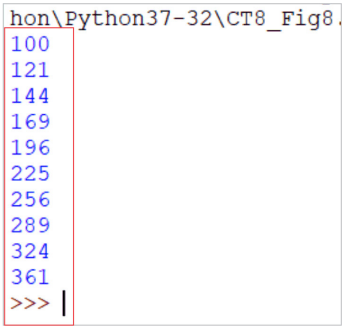


Figure 5.7: Using 'for' Loop with range() Function

Output

When you use the range() function, it creates a sequence of all the values between the initial value and 'final value – 1'. In this case, a sequence of values between 10 and 19 (20–1=19) is created, and the squares of all the values from 10 to 19 are printed.

Step 1: The **for** loop executes and the **range()** function creates a sequence of values between 10 and 19. The initial value, i.e., 10 is assigned to the variable **i**.

Step 2: The square of the value 10, i.e., 100 is printed.

Step 3: By default, the counter variable is incremented by 1 and its square gets printed.

Step 4: The step 3 continues till the last value in the sequence, i.e., 19 is assigned to the variable **i** and its square is printed.

Now, if you change the step value or increment the value in the range() function by 3, see what happens:

Program 8:

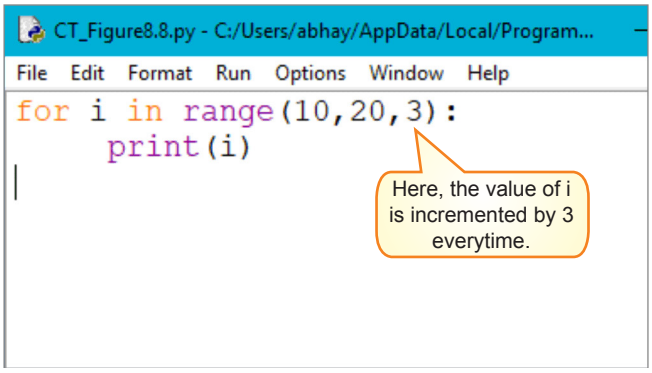
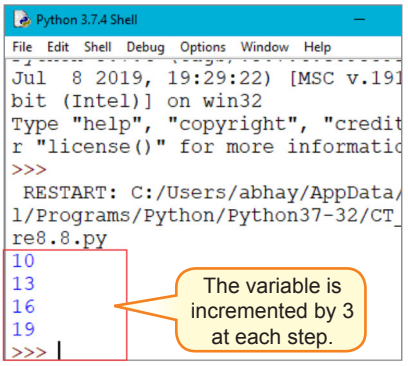


Figure 5.8: Changing Step Value in range() Function



Output

When you increment the step by 3, you will get the sequence [10,13,16,19].

Step 1: The **for** loop executes and the **range()** function creates a sequence of values between 10 and 19. The initial value, i.e., 10 is assigned to the variable **i**.

Step 2: The value 10 is printed.

Step 3: The counter variable is incremented by 3, the next value is assigned to **i**, i.e., 13 is printed.

Step 4: The step 3 continues till the last value in the sequence, i.e., 19 is assigned to the variable i and gets printed.

NOTE

The value of the counter variable can also be decremented to **n** number of steps. For example:

Example: for i in range (20,10,–3)

Program 9: Write a program to find the factorial of a number.

[Factorial of 5: 5 × 4 × 3 × 2 × 1 = 120]

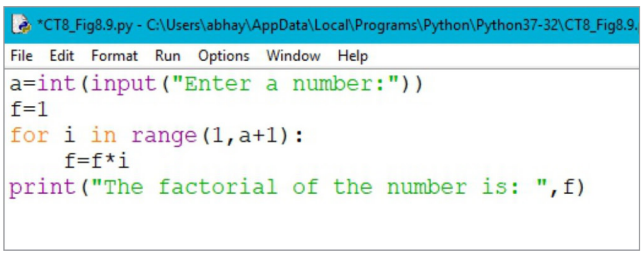
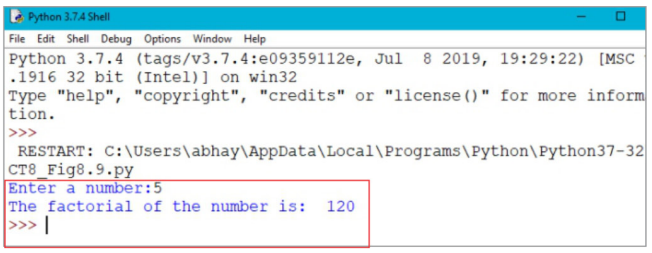


Figure 5.9: Printing Factorial of a Number



Output

Step 1: The program asks a user to enter a number, let us say, 5.

Step 2: Assign the value 1 to variable **f**.

Step 3: Specify the range in **for** loop, i.e., 1 to a+1 (where the value entered by the user is stored in the variable 'a'.).

Step 4: The factorial will be calculated as **f=f*i**.

Step 5: By default, each time the loop executes, the value of the variable i is incremented by 1.

Note: The variable f is assigned a new value each time the statement **f*i** is executed.

Step 6: Steps 4 and 5 are repeated till the last value of the counter variable is encountered.

Step 7: The final value of the factorial variable, i.e., **f** is printed.

Program 10: Write a program to print a Fibonacci series.

[A Fibonacci series is a series in which each number is the sum of the two preceding numbers, such as 0, 1, 1, 2,3, 5, 8, and so on.]

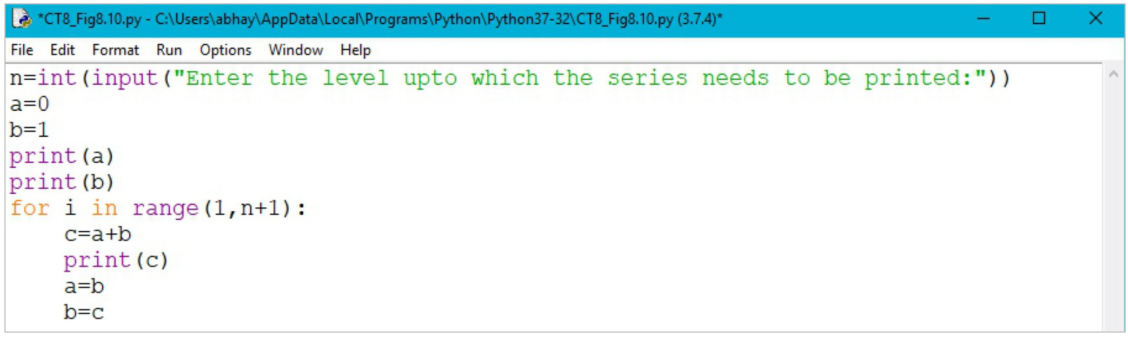


Figure 5.10: Fibonacci Series

```
python/py13.py
Enter the level upto which the series needs to be printed:8
0
1
1
2
3
5
8
13
21
34
>>>
```

Output

Step 1: The user is asked to enter a value for the variable **n**.

Step 2: The variable **a** is initialised to 0.

Step 3: The variable **b** is initialised to 1.

Step 4: The initial value of **a** is printed.

Step 5: The initial value of **b** is printed.

Step 6: Now, the **for** loop executes from **1** to **n+1**.

Step 7: The next value of the series is generated and printed by adding the previous two terms, i.e., **c=a+b**.

Step 8: The value of **b** is assigned to **a**.

Step 9: The value of **c** is assigned to **b**. Note, the value of **a** and **b** is updated every time when the loop is executed.

Step 10: The loop will terminate when the last value in the range, i.e., **n+1** is encountered.

while Loop

The while loop can be applied to a program where the number of iterations is not known beforehand. The while loop keeps on executing the block of a statements as long as the specified test condition evaluates to **True**.

The while loop has four main components:

Initialisation

It is used to assign an initial value to the loop control variable, e.g., a=10.

Condition/ Test Expression

This statement checks whether the loop body will be further executed or not. The loop keeps on executing until the condition or the test expression is **True**.

Loop Body

It contains a set of statements that is required to iterate or repeat.

Step Value

This statement keeps updating the loop control variable so that a final value is achieved and the loop terminates.

Remember

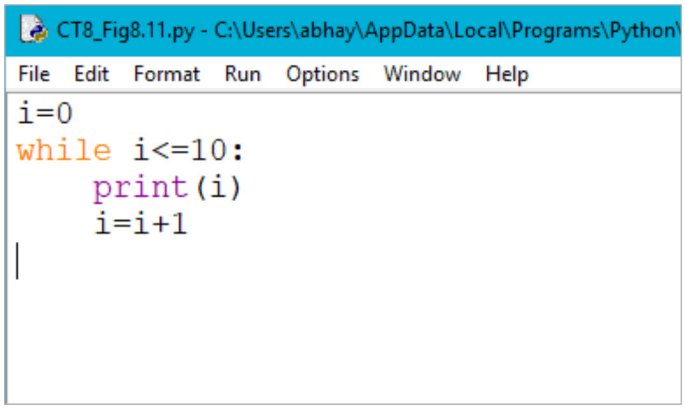
You must provide an initial value to the loop variable to execute the loop smoothly.

Syntax:

```
initialisation
while<condition>:
    loop body
    updation
```

Let us understand the working of the **while** loop with the help of the following examples:

Program 11: Write a program to print the first 10 natural numbers.



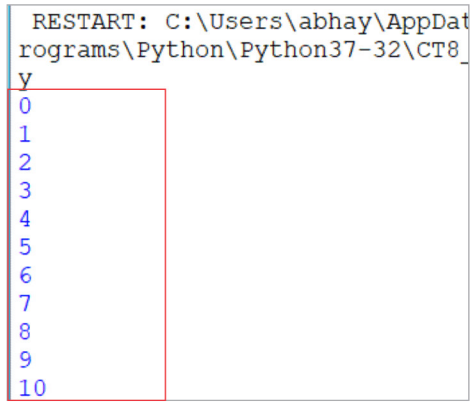


Figure 5.11: **Using while Loop to Print First 10 Natural Numbers** **Output**

Step 1: Initialise the variable i to **0**.

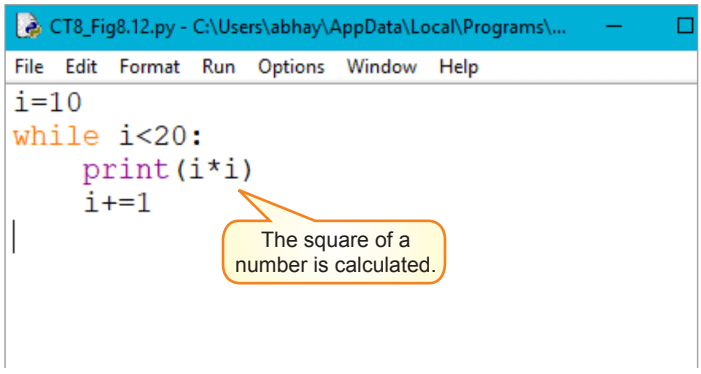
Step 2: Check the condition whether **i<=10**.

Step 3: If **i<=10**, print the value of **i**.

Step 4: Increment the value of i by **1**, i.e., **i=i+1**.

Step 5: This process will continue till the value of i is less than or equal to 10. The loop will terminate once the value of **i** becomes greater than 10.

Program 12: Write a program to print the square of the numbers between 10 and 20.



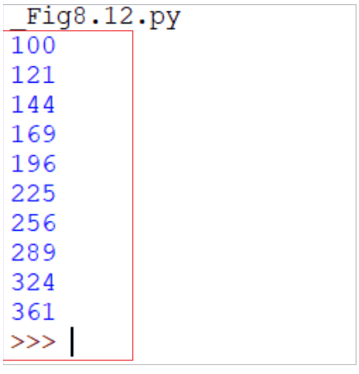


Figure 5.12: **Square of Numbers using the while Loop** **Output**

Step 1: The variable i is assigned an initial value, 10.

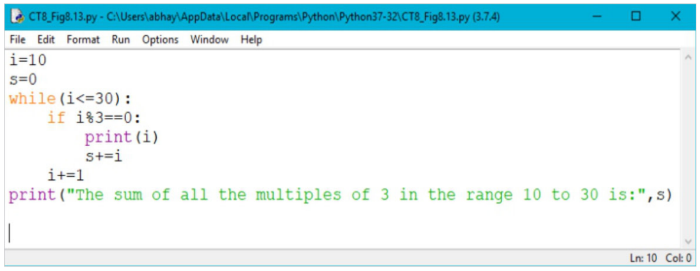
Step 2: The condition **i<20** is checked.

Step 3: If the condition evaluates to true then the statement **print(i*i)** is executed.

Step 4: Each time the loop executes, the value of i is incremented by 1.

Step 5: The control shifts back to the while loop. The while condition is checked again. If the condition is **true**, then steps 3 and 4 are repeated, and if the condition is **false**, then the while loop terminates.

Program 13: Write a program to print the multiples of 3 and their sum (in the range 10 to 30).



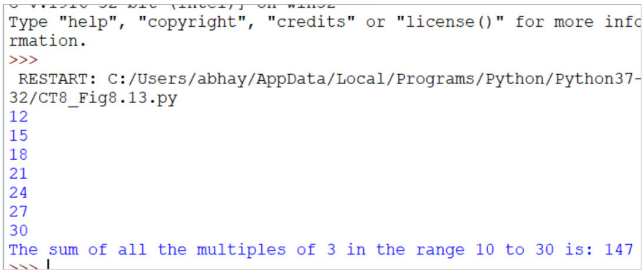


Figure 5.13: Sum of Multiples of 3 using the while Loop — Output

Step 1: The variable i is assigned an initial value, 10.

Step 2: The variable s is assigned an initial value, 0. It will store the sum of all the multiples of 3.

Step 3: The condition **i<=30** is checked.

Step 4: If the condition evaluates to **True** then the if statement checks whether the variable is a multiple of 3 or not.

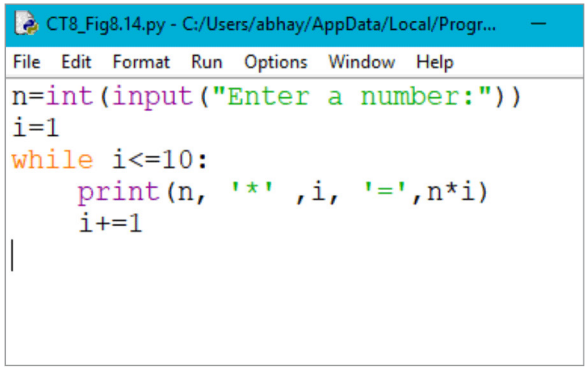
Step 5: If the condition is **true** then the counter variable is printed and is added to the previous value of s.

Step 6: Each time the loop executes, the value of **i** is incremented by 1.

Step 7: The control shifts back to the **while** loop. The while condition is checked again. If the condition is **true** then steps 4,5, and 6 are repeated, and if the condition is **false** then the while loop terminates.

Step 8: The final value of **s** is printed.

Program 14: Write a program to print the table of a number.



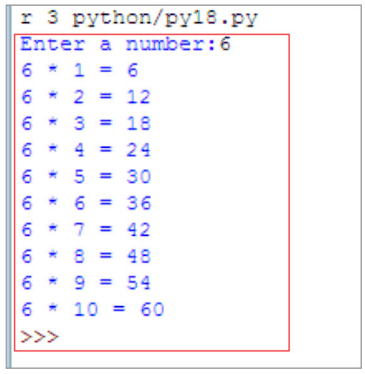


Figure 5.14: Printing Table of 6 using the while Loop — Output

Step 1: The user is asked to enter a number of his choice.

Step 2: The initial value **1** is assigned to the variable **i**.

Step 3: The while condition **i<=10** will be checked.

Step 4: If the condition evaluates to **True**, the statements after the while condition are executed and the product of **n** and **i** is printed.

Step 5: The value of i is incremented by 1.

Step 6: The control shifts back to the while loop. The while condition is checked again. If the condition is **True** then steps 4 and 5 are repeated and if the condition is **False**, then the while loop terminates.

Program 15: Write a program to display no output when the test condition is **false**.

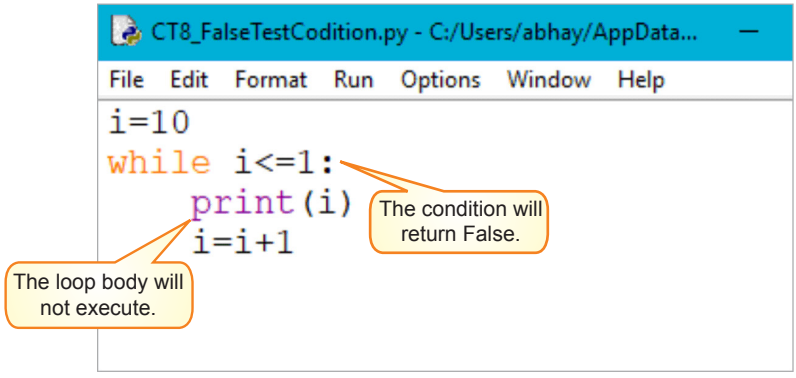
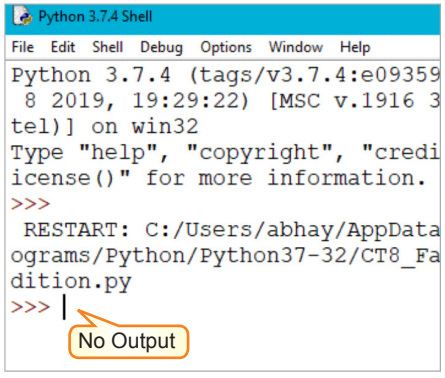


Figure 5.15: **False Test Condition in while Loop**



Output

In the above example, as the initial value of **i**, 10 is greater than 1, the condition will return **False**, and hence the loop body will not be executed even once. Hence, you do not get any output.

Infinite Loop

An infinite loop (or endless loop) is a sequence of instructions in a computer program, which loops endlessly. It happens either due to the loop having no terminating condition or the condition that can never be met. Let us consider the following example:

Program 16: Create a program to display an endless loop.

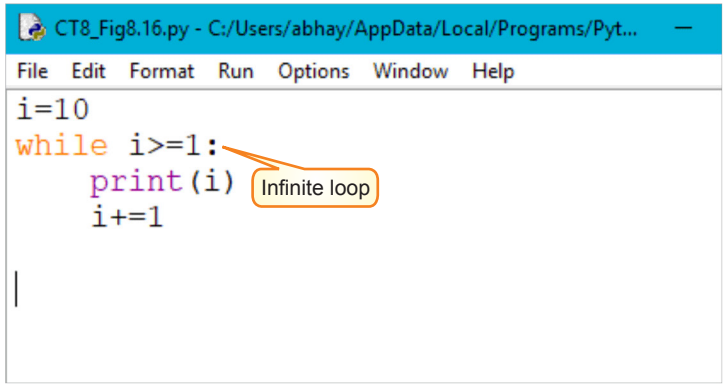
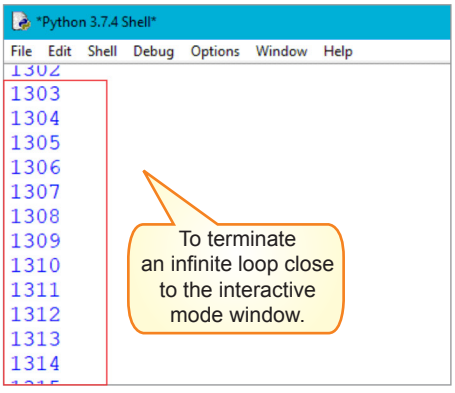


Figure 5.16: **Infinite Loop**



Output

In the given example, as per the condition, the loop will continue until the value of i is greater than or equal to 1. In the step value part, you are incrementing the value of i by 1 at every

step and hence the loop variable i will always be greater than 1. This means that at no time will the loop variable be less than 1 and hence the loop body will execute infinitely.

To come out of the infinite loop, you have to terminate the interactive mode or program execution by closing the interactive mode window.

NOTE

If the control variable does not get updated to a final value, the condition remains true forever, and the loop continues infinitely.

Loop...else

A **for** loop or **while** loop can have an optional **else** block as well. The **else** part is executed if the loop terminates normally, i.e., if all the values in the sequence get used in a standard way without the loop being forcefully terminated. Both the loops, i.e., **for** and **while** loop can use the **else** part. However, it is not mandatory to have an **else** block with the loop block. It is just a secure way to check that the loop has terminated normally.

Program 17: Write a program to print the sum of all the even and odd numbers within a range.

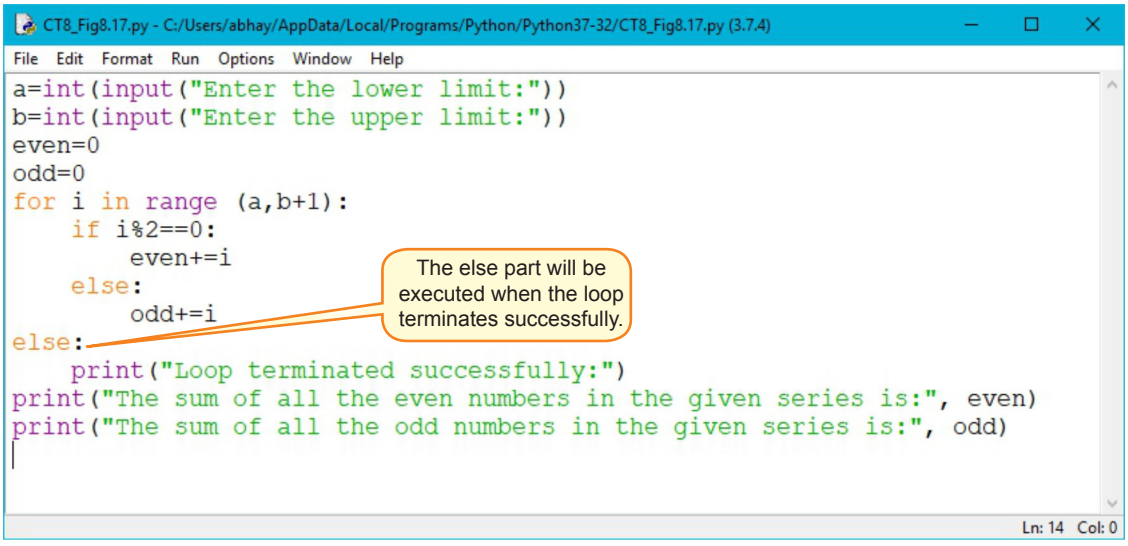
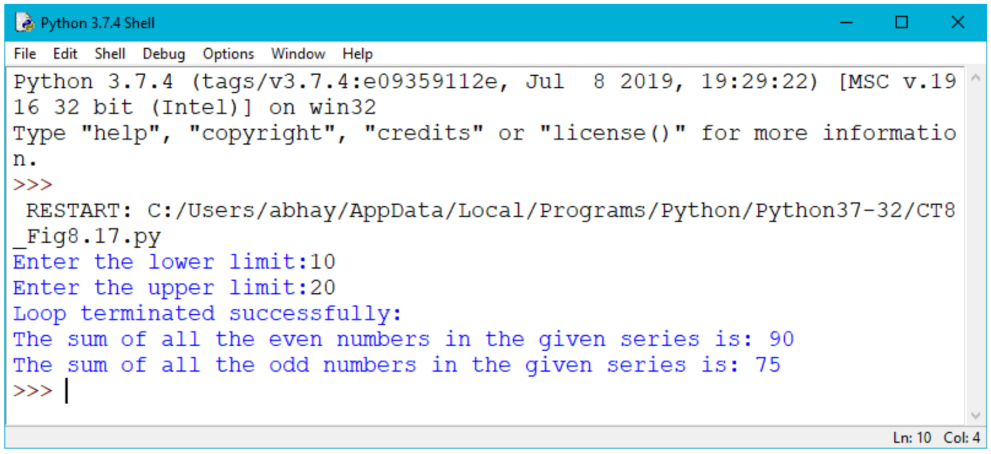


Figure 5.17: for...else



Output

Program 18: Write a program to print the series: 4.. 9.. 16.....100.

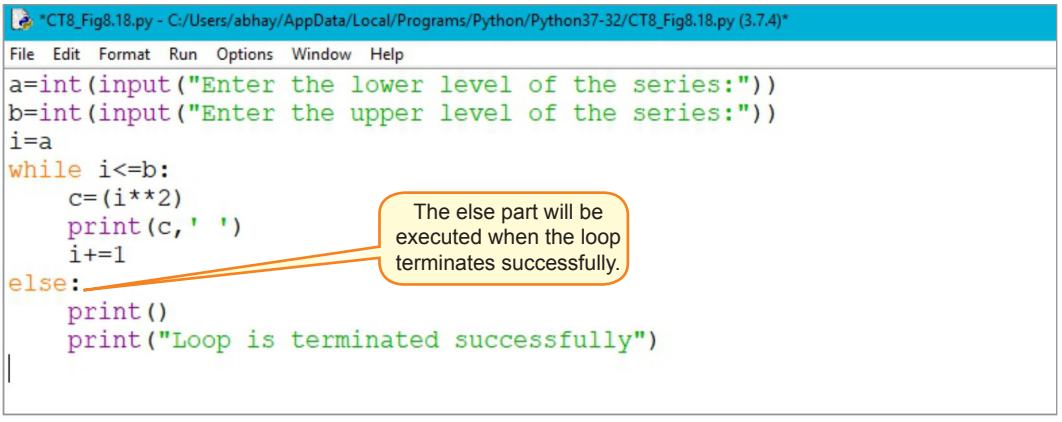


Figure 5.18: while .... else

```
Enter the lower level of the series:2
Enter the upper level of the series:10
4
9
16
25
36
49
64
81
100

Loop is terminated successfully
>>>
```

Output

RECAP

- In Python, the iterative statements keep on repeating a set of statements as long as the given condition is true.
- The iterative statements are also known as loops.
- There are two types of iterative statements: **for** and **while** loop.
- The **for** loop is generally used when you have to repeat a task a specified number of times or within a given range.
- The **in** operator checks whether a given value is a part of the specified sequence.
- The **range()** function produces a list of a sequence starting with an initial value up to a final value, updating the value at each step. By default, the value is incremented by 1.
- The while loop can be applied to a program where the number of iterations is not known beforehand. The while loop keeps on executing the block of statement as long as the specified test condition evaluates to True.

- The while loop has four main components: Initialisation, Condition, Loop body, and Step value.
- The for or while loop can have an optional else block as well.
- The loop....else statement is optional to be used in a program. The else block simply makes sure that the loop is terminated normally.

Brain developer

A. Fill in the blanks.

1. The valid combination of both the operands and operators makes an ....., which returns a computed result.
2. The ..... operator is used to concatenate or join two or more strings.
3. The statements that keep on repeating themselves as long as a given condition is true are called the ..... statements.
4. In programming languages, the ..... statements cause the program control to transfer to a specific location depending on the outcome of the conditional expression.
5. In Python, the conditional statement is terminated with a ..... symbol.

Hints

- '+'
- Conditional
- Colon
- Iterative
- Expression

B. Write T for True and F for False.

1. Unary operators can be used on more than three operands. ☐
3. An iterative statement is based on three values. ☐
4. Every loop works with the help of a variable known as the control variable. ☐
5. The iterative statements enable the execution of a set of statements to repeat till the condition is true. ☐
6. The while loop is used when you are not sure about how many times a loop body will be executed. ☐
7. The 'if-elif-else' statement is used when you need to evaluate only one condition. ☐

C. Application-based questions.

1. Sumit is converting a decimal number to binary number. He needs to calculate the remainder in each step. Which operator do you suggest him to use for this task?

   .....

2. Arif's father is a businessman. He wants to determine whether he made a profit or loss based on the revenue figures. Suggest an appropriate conditional construct that he can use to solve the problem.

   .....

D. Select the correct option.

1. An iterative statement is also known as a ..... statement.

   a. Looping b. Conditional c. Selection

2. The ..... loop is used when you are sure about how many times a loop body will be executed.

   a. while b. for c. while...else

3. If the condition in a loop is false in the first step itself, you get ..... .

   a. No output b. Infinite c. Error

4. The ..... operator checks whether a given value lies within a given set of values.

   a. between b. range c. in

5. The ..... loop can be applied to a program where the number of iterations is not known beforehand.

   a. while b. while...else c. for

E. Answer in one word or a sentence.

1. Name a loop that runs endlessly.

   .....

2. Name the two types of iterative statements.

   .....

3. Name the two membership operators in Python.

.....

4. Which function is used to check the range in a loop?

.....

F. Answer the following questions.

1. Explain Boolean operators with an example.

.....

.....

2. What do you mean by iterative statements? Give an example.

.....

.....

.....

3. Distinguish between the for and while loop.

.....

.....

.....

4. State the use of the membership operators in Python.

.....

.....

.....

5. What is an infinite loop? How is it created?

.....

.....

.....

6. What is the use of the range() function?

.....

.....

.....

ACTIVITY SECTION



MY ACTIVITY

Learning While Playing

A. Rewrite the following code of statements after correcting the syntactical errors.

1.
```
a=integer(input("First number"))
b=10
for i in range(a:b):
PRINT(a*b)
if (a>b) then
print(a)
```

2.
```
i=10
while (i=>5):
print(I)
i=I+1:
```

B. Rewrite the following for loop programs using the while loop.

1.
```
a=int(input("Enter the first number"))
b=int(input("Enter the second number"))
for i in range(a,b,3):
print(a*i)
```

2.
```
n = 100
sum = 0
for c in range(1, n+1):
  sum = sum + c
print("The sum is:", sum)
print("Program Over")
```

C. Rewrite the following code using the for loop.

1.
```
a=int(input("Enter a number"))
i=a
while i>=0:
print(a*i)
i=i–2
```

2.
```
x=10; y=100
if x==y:
print (x)
elif y > x:
print(y)
while x<10:
print(x)
x+=1
```

D. Write the output for the following code.

1.
```
a=100
b=20
s=0
while a>=b:
if a%5==0:
s+=a
a–=1
print(s)
```

2.
```
n=1
while n<5:
print(n*n)
n+=1
```

3.
```
n=10
while n<50:
print(n+n)
n+=10
```

E. Write the programs for the following.

1. To print the table of a number using the for loop
2. To print the sum of all the even numbers in the range entered by the user
3. To print the odd numbers between 1 and 30

GROUP DISCUSSION

For Concept Clarity



Discuss the following topics:

- **for loop vs while loop**

1 WORKSHEET

Chapters 1–5

A. Fill in the blanks.

1. A ..... card is used to physically attach a computer to a network.
2. A ..... contains the values for all the fields that belong to a single person or an entity.
3. ..... help us to retrieve the filtered data from a database based upon some conditions.
4. ..... provide a user-friendly interface that facilitate the process of entering data in tables and queries.
5. The ..... loop can be applied to a program where the number of iterations is not known beforehand.

Hints

- Forms
- Queries
- Network
- while
- Record

B. Write T for True and F for False.

1. PAN is a kind of network that connects two or more computers located at far away places. ☐
2. In Access, you can create a database in three different ways. ☐
3. Short Text data type is used to insert combination of text values only. ☐
4. In Python, assignment operator (=) is used to assign a value to a variable. ☐
5. The if-else statements are used when you have to evaluate only one condition. ☐

C. Select the correct option.

1. What do you call the computers that are connected to the server?
   a. Node b. Laptop c. PC
2. A ..... database refers to the data files that contain records, without any structured relationship.
   a. Flat file b. Relational c. Network
3. A ..... is an effective way to organise and summarise the data for viewing or printing.
   a. Table b. Report c. Chart
4. The ..... loop has four main components.
   a. while b. else c. for
5. The ..... operator checks whether a given value lies within a given set of values.
   a. not in b. between c. range

1 TEST PAPER

Chapters 1—5

Name: ..... **Date:** .....

A. Answer in one word.

1. Name the topology in which each device is connected to a central computer. .....
2. Where can you specify criteria in the design grid? .....
3. Into how many types is a database is categorised? .....
4. Write the full form of RDBMS. .....
5. Name the function that is used with for loop in Python and is helpful in generating a sequence of numbers. .....

B. Answer the following questions.

1. State the difference between Star topology and Tree topology.

   .....

   .....

   .....

2. Explain the importance of DBMS.

   .....

   .....

   .....

3. What is a Query? How is it useful?

   .....

   .....

   .....

4. What is the difference between if and if-else statement?

   .....

   .....

   .....

5. What are the different conditional statements that are used in Python?

   .....

   .....

   .....

Teacher's Signature: .....

Chapter 6

Links and Frames in HTML5

LEARNING OUTCOMES

The student will be able to:

- use the anchor tag to link web pages.
- use the different CSS properties to create hyperlinks.
- insert audio and video clips in web pages.
- add frames in web pages.

In the previous class you have learnt to create web pages using HTML. You have also learnt how to apply basic formatting, insert images, and tables in a web page. In this chapter, you will learn about the other important elements of a web page, like anchor element, links, frames, etc.

Linking Web Pages

A website consists of a number of web pages that give you access to the related information. HTML renders a powerful feature of linking these web pages together. This feature is called **Hyperlinking**. Using hyperlinks, one can open any linked web page on the internet in no time. When you hover the mouse pointer over a link, it will turn into a little hand.

Types of Linking

There are two types of linking as discussed below:

Internal linking: When one part of a web page is linked to another section on the same page, it is called the internal linking.

External linking: When one page is linked to another web page or website, it is called the external linking.

The Anchor <a> Tag

In HTML, the Anchor tag <a>, is used to mark the text as a hyperlink, which a user can click to display the document anchored to it. Being a container tag, it requires closing tag to mark the end of the text or image. This tag is generally used to specify the following:

- The text or image that is clicked to activate the link.
- The address that will be opened using the defined link.

You can use hyperlinks for the following:

- To jump from one section to another within the same web page

- To link to another page within the same website
- To link to another page or website anywhere on the web.

Href Attribute

It is an attribute of the <a> Anchor tag, which defines the document to which the link leads.

Syntax: CLICK HERE

where value can be:

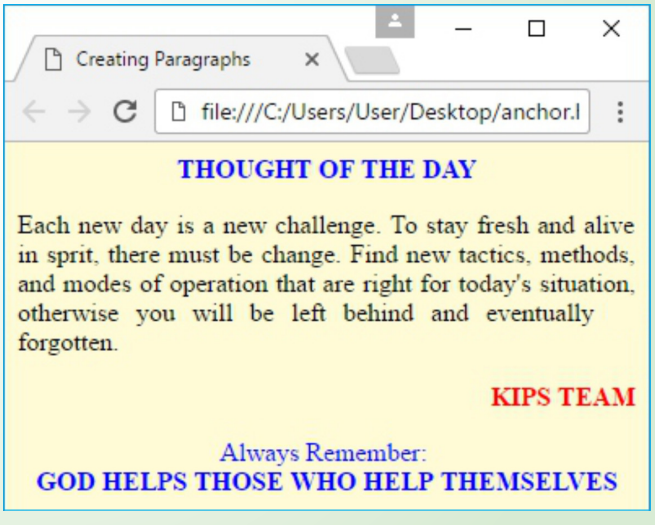
- Absolute URL: It points to another website, like <a href="http://www.google.com/ ">
- A relative URL: It points to a file within a website, like <a href="Click.html">
- Link to an email address, like <a href= "mailto:info@kips.in">

NOTE

In the syntax given above, the text "CLICK HERE" is called the **Hypertext**. It is a text that contains links to information (text, graphics, or media) on the same web page or some other web page. The browser displays this text as underlined and coloured.

Type the following code and save the file with the name click.html.

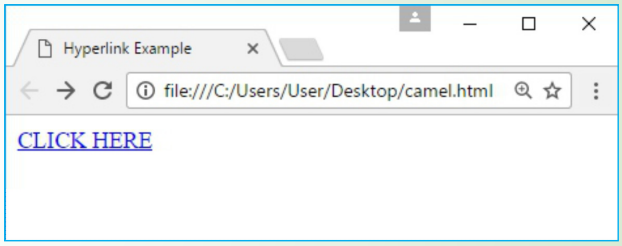
```
<html>
<head>
<title>
Creating Paragraphs
</title>
<style type="text/css">
body{background-color:RGB(255,251,214)}
</style>
</head>
<body>
<p style=text-
align:center;color:blue> <b>
THOUGHT OF THE DAY </b> </p>
<p style=text-align:justify> Each
new day is a new challenge. To
stay fresh and alive in sprit,
there must be change. Find new
tactics, methods, and modes of
operation that are right for
today's situation, otherwise you
will be left behind and eventually
forgotten. </p>
```



```
<p style=text-align:right;color:red> <b> KIPS TEAM </b> </p>
<p style=text-align:center;color:blue>
Always Remember: <br>
<b> GOD HELPS THOSE WHO HELP THEMSELVES </b>
</p>
</body>
</html>
```

Now, type the following program code in a new file and save the file with the name link.html.

```
<html>
<head>
<title>Hyperlink Example </title>
</head><body>
<a href = "click.html"> CLICK HERE </a>
</body>
</html>
```



When you will click on the text CLICK HERE, it will take you to the HTML page created in the previous example (click.html).

NOTE

Remember, if the linked HTML document exists in a different folder, you must specify the complete path and the name of the folder.

CSS and Links

CSS affects the links differently depending on the state they are in. There are four categories of link states in CSS:

- a:link – a normal, unvisited link
- a:visited – a link the user has visited
- a:hover – a link when the user moves the mouse over it
- a:active – an activated link when it is clicked

You can customise these link states by applying different text properties and colours to them.

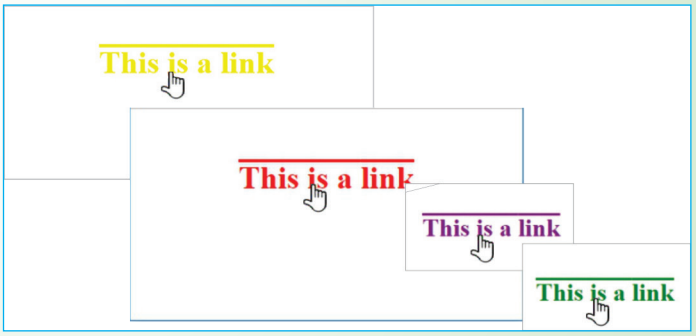
NOTE

You can set the style for several link states in a single statement. While doing so, the following rules, regarding the order in which the states are to be mentioned, should be kept in mind.

- a:hover must come after a:link and a:visited
- a:active must come after a:hover

Let us use these link states:

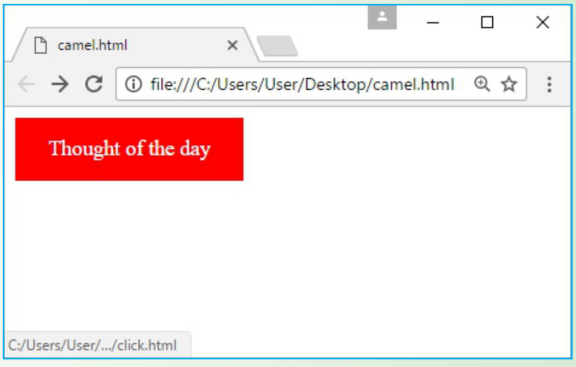
```
<html>
<head>
<title> The Link States </title>
<style type="text/css">
body{text-align:center;margin-top:50}
a:link{color:red;text-decoration:overline}
a:visited{color:yellow}
a:hover{color:purple}
a:active{color:green}
</style>
</head>
<body>
<a href="channel.nationalgeographic.com"><h1>This is a link</h1></a>
</body></html>
```



Links as Buttons

You can also display the links as buttons using the CSS styling. The following example demonstrates the same.

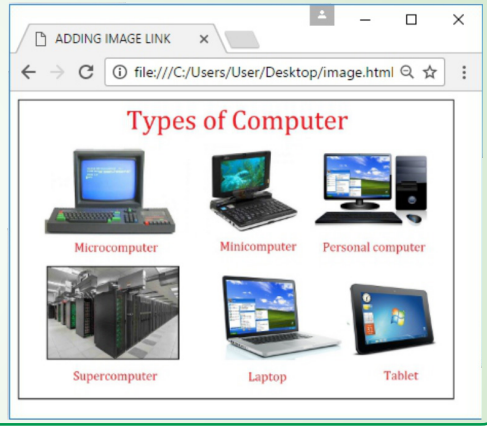
```
<html>
<head><style type="text/css">
a:link, a:visited {background-color: pink;
color: white; padding: 14px 25px;
text-align: center;
text-decoration: none;
display: inline-block;}
a:hover, a:active {background-color: red;}
</style></head>
<body>
<a href="click.html">Thought of the day</a>
</body></html>
```



Images as Links

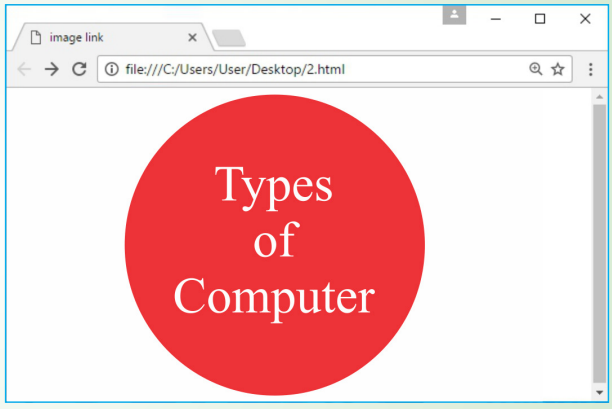
An image can also be used as a hyperlink to another document. Take a look at the example given below. Type the following HTML code in the file image.html.

```
<html>
<head>
<title>ADDING IMAGE LINK</title>
</head>
<body>
<img src= "Types of Computer.jpg">
</body>
</html>
```



Now, type the following HTML code and define the link for image.html file.

```
<html>
<head><title>image link</title>
</head>
<body>
<a href = image.html>
<img src = "Computer.jpg" height=95%
width=50%>
</a>
</body>
</html>
```



NOTE

Note that in the HTML code written above, you must replace Computer.jpg and Types of Computer.jpg with the name or path of the images you have in your computer.

Audio and Video

Until now, you have learnt about the various tags that help you to enhance the appearance of the web pages. In this section, you will know about the tags with which you will be able to incorporate multimedia in your web page and make it alive. Multimedia refers to 'multiple mediums'—the ability to add bits of sound and moving pictures to a web page.

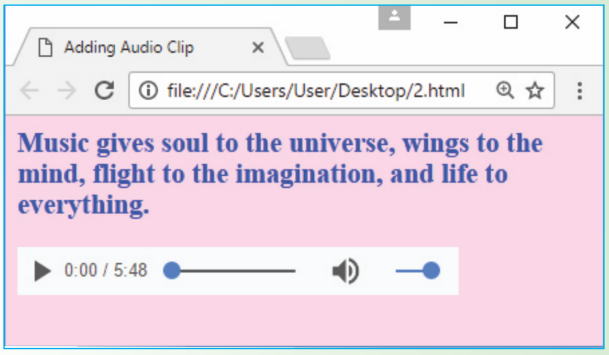
Inserting Audio

The <audio> tag specifies a standard way to insert an audio file in a web page. It can be used

for any file format, like, .mp3, .ogg, .wav, etc. The attributes of the <audio> tag are given in the following table:

Attribute	Purpose
src	Specifies the URL of the audio file
controls	Displays the controls on the web page
autoplay	Plays the audio file automatically when the web page is loaded
loop	Replays the audio file

```
<html>
<head>
<title>Adding Audio Clip</title>
<style type="text/css">
body{background-color:RGB(250,214,229)}
</style>
</head>
<body>
<h3 style=color:blue> Music gives soul to the universe, wings to the mind, flight to the imagination, and life to everything. </h3> <audio controls src="C:\Users\User\Desktop\Kalimba.mp3">
Your browser does not support the audio tag.
</audio></body>
</html>
```

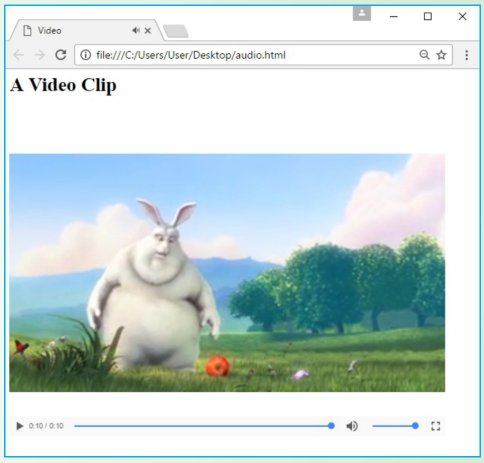


Inserting Video

You can insert video files in your HTML pages with the help of the **<video>** tag in a similar way. Supported file formats include .mp4, .webm, .ogg, etc. Attributes associated with the <video> tag are given below.

Attribute	Purpose
src	Specifies the URL of the video file
controls	Displays the controls on the web page
autoplay	Plays the audio file automatically when the web page is loaded
height	Specifies the height of the video player displayed
width	Specifies the width of the video player displayed

```
<html>
<head>
<title> Video </title>
<body>
<h1> A Video Clip </h1>
<video controls src="C:\Users\User\Desktop\
video1.mp4"
width="720" height="540" autoplay>
Your browser does not support the video tag.
</video>
</body>
</html>
```



NOTE

If the browser does not support the <audio> and <video> tags, then any text lying between the <audio> and </audio> and <video> and </video> tags will be displayed in the browser as such.

Frames

You have seen so far that an HTML document takes up the entire size of a browser window. But what if you want to display more than one HTML documents at once in a browser window? This can be achieved by using the concept of frames in HTML.

Frames are a way of organising your website. They enable the user to divide a page into a number of rectangular segments for different purposes.

Frames allow multiple HTML documents to be presented as independent windows within one browser window. This gives greater flexibility to design and maintain your website than simply dumping everything onto one page. Frames make your website interesting as you can include the website theme (image, logo, banners, etc.). The navigation menu in frames is not to be downloaded each time when you visit a new page, only you have to change the contents of the page.

Creating Frame

In HTML5, frames can be created by using the <iframe> (Inline Frame) tag. An inline frame is a new HTML document embedded inside the current HTML document. The attributes of the <iframe> tag are:

SRC

With the help of this attribute, you specify the path of the document that should be displayed in the inline frame.

Syntax: <iframe src=value>

where value=path of the document

Height and Width

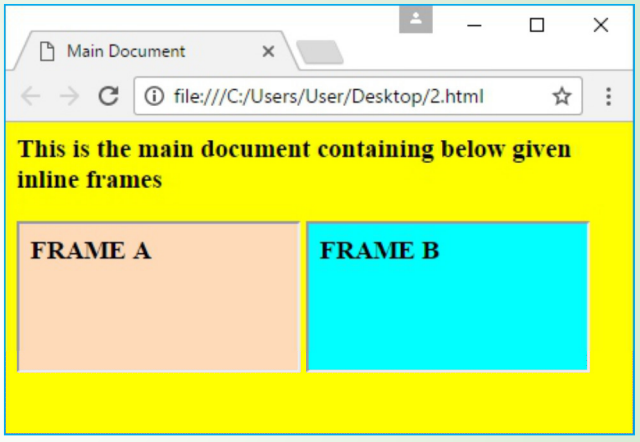
With these attributes, you can control the size of the inline frames.

Syntax: width=value in pixels

height=value in pixels

Let us use the inline frames in the following HTML document. Type the given code for the main document.

```
<html>
<head>
<title>Main Document</title> <style type="text/css">
body{background-color:yellow}
</style>
</head>
<body>
<h3> This is the main document containing below given inline frames </h3>
<iframe src="frame_a.html" height=200 width=200></iframe>
<iframe src="frame_b.html" height=200 width=200></iframe>
</body>
</html>
```



NOTE

Before creating the above main document, you should first create two files with the names 'frame_a.html' and 'frame_b.html'.

Border and Iframe

By applying the CSS property 'Border', you can display an inline frame with or without the border.

Syntax: border: value for border-width |value for border-style |value for border-color

You can also apply the individual border properties:

- border-width:value

  where value=thin, thick, medium, or a numeric value indicated in pixels.

- border-style:value

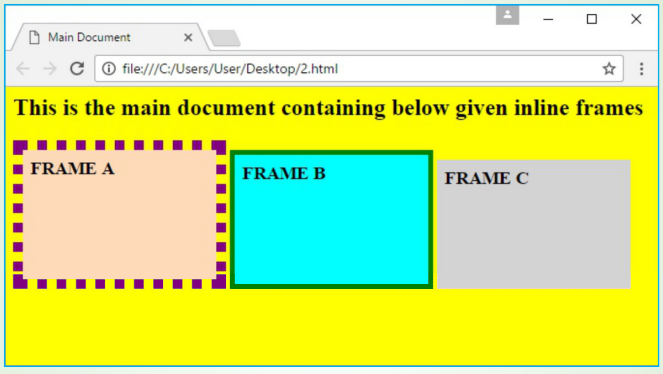
  where value can be none, hidden, dotted, dashed, solid, double, groove, ridge, inset, or outset.

- border-color:value

  where the value can be the name of the colour or its corresponding hexadecimal code.

Take a look at the example given below:

```
<html>
<head>
<title>Main Document</title>
<style type="text/css"> body{background-color:yellow}
iframe{border:10px dotted purple}
</style>
</head><body>
```




```
<h3> This is the main document containing below given
inline frames</h3>
<iframe src="frame_a.html" height=200 width=200>
</iframe>
<iframe src="frame _b.html" height=200 width=200
style="border-width:5px;borderstyle:
solid;border-color:green"></iframe>
<iframe src="frame_c.html" height=200 width=200
style="border:none"></iframe>
</body>
</html>
```

Let's Know More

By default, hyperlinks appear with the following colours:

- An **unvisited link** is underlined and blue.
- A **visited link** is underlined and purple.
- An **active link** is underlined and red.



Let's Know More

Before HTML5, the audio and video files could only be played in a browser with a plug-in.



Let's Know More

An iframe can be used as the target frame for a link by using the target attribute of the link. The target attribute must refer to the name attribute of the iframe.

For example:

<iframe src="testfile.html"
name="iframe_1">
</iframe>

< ahref=" http:/ /www.
google.com
"target= "iframe_1">
Google

RECAP

- There are two types of Linking: Internal and External linking.
- When one part of a web page is linked to another section on the same page, it is called the internal linking whereas when one page is linked to another web page or website, it is called the external linking.
- In HTML, the anchor tag <a>, is used to mark the text as a hyperlink, which a user can click to display the document, anchored to it.
- There are four categories of link states:

  a:link – a normal, unvisited link

  a:visited – a link the user has visited

  a:hover – a link when the user moves the mouse over it

  a:active – an activated link when it is clicked
- You can also display links as buttons using the CSS styling.
- You can insert audio and video files in an HTML document using the <audio> and <video> tags, respectively.
- Frames allow multiple HTML documents to be presented as independent windows within one browser window.

Brain developer

A. Fill in the blanks.

1. ..... can be defined as linking the various web pages together.
2. When one part of a web page is linked to another section of the same page, it is called the ..... linking.
3. The ..... tag is used to insert an audio file in a web page.
4. ..... allow multiple HTML documents to be presented as independent windows within one browser window.
5. The ..... tag is used to mark the text as a hyperlink.

Hints

- <audio>
- Internal
- <a>
- Frames
- Hyperlinking

B. Write T for True and F for False.

1. A hypertext contains a link to the information on the same web page or other web page. ☐
2. A link can be displayed as a button in a web page. ☐
3. Any image can be used as a hyperlink to another document. ☐
4. You can insert an audio clip or any audio file in the web page with the help of the <audio> tag. ☐
5. Frames can be created using the <iframe> tag. ☐

C. Application-based questions.

1. Rohan wants to divide a web page into four sections. Which tag should he use to accomplish this?

   .....

2. Vikram is creating a website in which he wants to use different images as links to the web pages. He is also interested in adding some video clips in his website. Can you suggest him the required tags to include the said elements in his website?

   .....

D. Select the correct option.

1. The ..... attribute of <a> tag defines the document to which the link leads.

   a. href b. src c. ref

2. A ..... URL points to a file within a website.

   a. Absolute b. Relative c. Internal

3. Which of the following specifies the colour of a link when it is clicked?

   a. Visited b. Hover c. Active

4. The ..... attribute of the <audio> tag plays the audio file automatically when the web page is loaded.

   a. Start b. Autoplay c. Auto

5. The .webm is one of the supported file formats for the ..... file.

   a. Audio b. Video c. Frame

E. Answer the following questions.

1. Why do you include hyperlinks in your web page? Give any two reasons.

.....

.....

.....

2. Distinguish between the internal and external linking.

.....

.....

.....

3. Describe the use of the anchor tag. Give syntax.

.....

.....

.....

4. List the tags that you use to include audio and video clips. Also, give syntax and attributes of these tags.

.....

.....

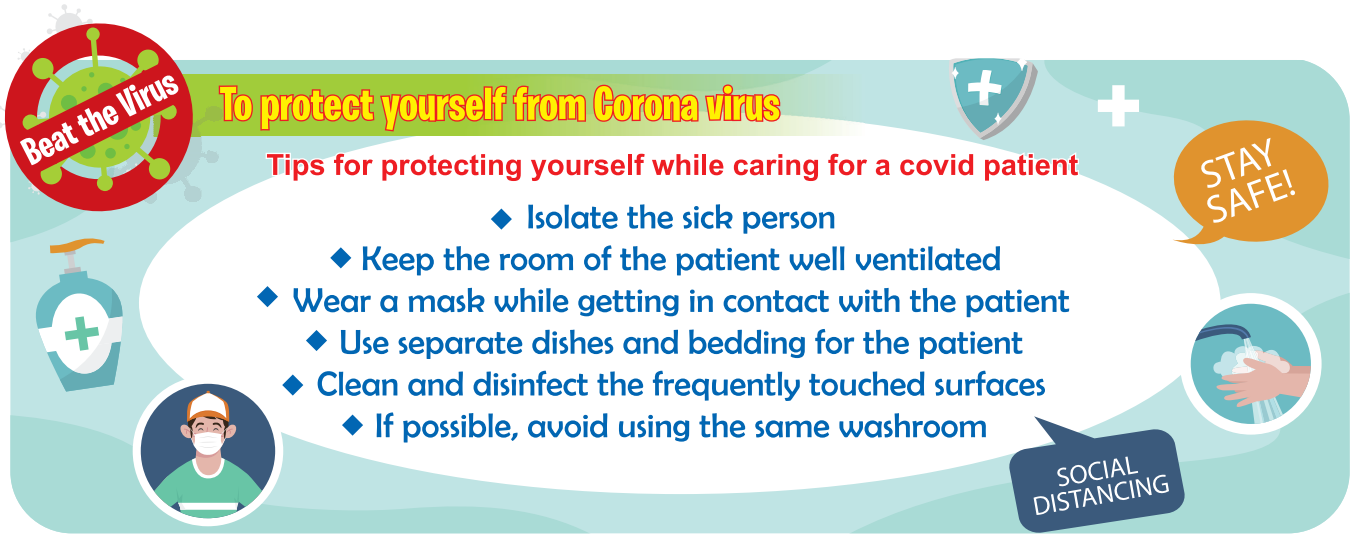
.....

5. What are frames? How are they useful?

.....

.....

.....



ACTIVITY SECTION



LAB SESSION

Perfection Through Practice

Write an HTML code to generate the following web page. (Use relevant tags and CSS properties)

- Set the heading of the page as "Global Warming". It should be in 'Arial' font and bold with size 6 and colour yellow.
- The background colour of the page should be green.
- The subheading should be in Verdana font, bold, size 4, and colour orange.
- Add a hyperlink 'Read More' at the bottom-right side of the image.
- Link the read more page with the following URL:

  https://en.wikipedia.org/wiki/Climate_change



GROUP DISCUSSION

For Concept Clarity



Discuss the following topic:

- **Different HTML Tags and Attributes**

PROJECT WORK

Using Creativity



Ask the students to create an HTML document on the topic **CSS TEXT** v/s **CSS FONTS**. The web page should contain two frames wherein one frame will display Text properties and the other Font properties. Use unordered list to display the properties in each frame.

ONLINE LINK

Looking For More



To know more about frames, visit the following website:

- www.quackit.com/html_5/tags/html_iframe_tag.cfm

Chapter 7

Introduction to PHP

LEARNING OUTCOMES

The student will able to:

- learn the basic concept of PHP.
- work with Notepad++ to write programs.
- install and use a Web Server.
- create a form and submit the form data using the Get and Post methods.

In the previous chapters, you learnt how to create and execute programming codes on the standalone computers using Python. What if you want to run these programs on the web?

Scripting is a programming technique that increases the functionality of a programming language (C, C++, Java, Python). Learning to write scripts will help you in creating web-based apps and running your programs on the web.

With the development and advancement in the internet technologies, web apps are gaining immense popularity. Organisations throughout the world prefer to use web apps as this helps them in centralising and organising their work effectively. All this has led to the wide use of web apps compared to the desktop applications. There are various languages that can be used along with HTML. Languages, like Java, Ruby, C++, Python, and PHP are some of the popular scripting languages.

The programs written in a programming language are compiled first and then executed. On the other hand, web apps written with scripting languages are only interpreted on the web server. In this chapter, you will learn how to create web apps using PHP.

PHP

Hypertext Preprocessor (PHP) is a scripting language that is widely used for creating web applications. PHP has become very popular, because it shares semantic similarity with other popular programming languages, like C and C++.

Advantages of PHP

Following are the various advantages of using PHP:

Easy to Learn: The syntax of PHP is similar to some of the most-commonly used programming languages. So, if you are familiar with any programming language, then it would be an added advantage.

Portable: The code written with PHP can run on any operating system, like Linux, Windows, and Mac operating systems.

PHP is Free: PHP is free and easily available.

Extensive Database Support: Web apps developed with PHP can use database services of different database applications, like MySQL, MS SQL, Oracle, Sybase, PostgreSQL, etc.

PHP is Secure: PHP is a sever-side scripting language. The safety features of the web server is applicable to the apps developed with PHP.

Minimum Software Requisites: Writing PHP code does not require you to install programs that require huge memory consumption for installation. You can use any text editor app, like Notepad to write PHP code.

Installing Text Editor and Web Server

In this chapter, you will be using Notepad++ as a source code editor. Notepad++ editor provides support for different scripting and programming languages. With multiple code editing tools, it makes code writing an effective and elegant task. You can download the Notepad++ app by clicking on the following link:

https://notepad-plus-plus.org/downloads/

Before you learn how to create a web application, you need to install another important component on your computer called the web server. A **web server** is an application that can be installed on a local machine or remote machine. It helps in the execution of the script and delivers the output on the web browser. Let us use **XAMPP** for executing the scripts on a local or remote computer. XAMPP is an open source application freely available on the web. You can download the XAMPP web server by clicking on the following link:

https://www.apachefriends.org/index.html

Opening Notepad++

After installing WampServer on your computer, the next step is to write the script using the Notepad++ application. To start Notepad++ app, click on the **Start** button. Scroll down and click on **Notepad++**.

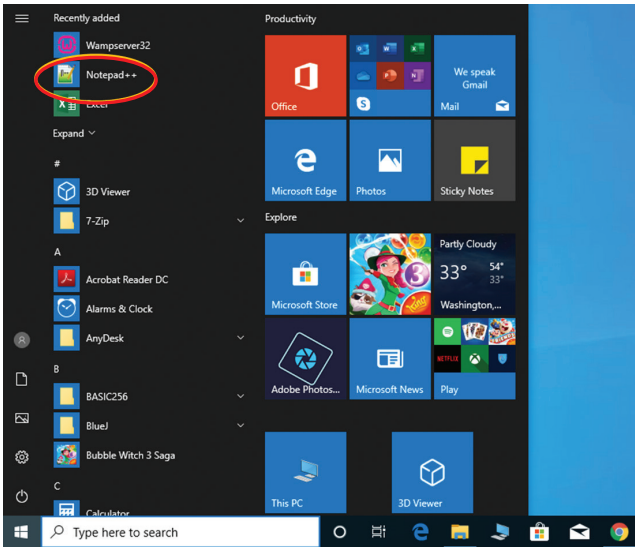


Figure 7.1: Opening Notepad++ App

Components of the Notepad++ Window

The Notepad++ window that opens has the following components:

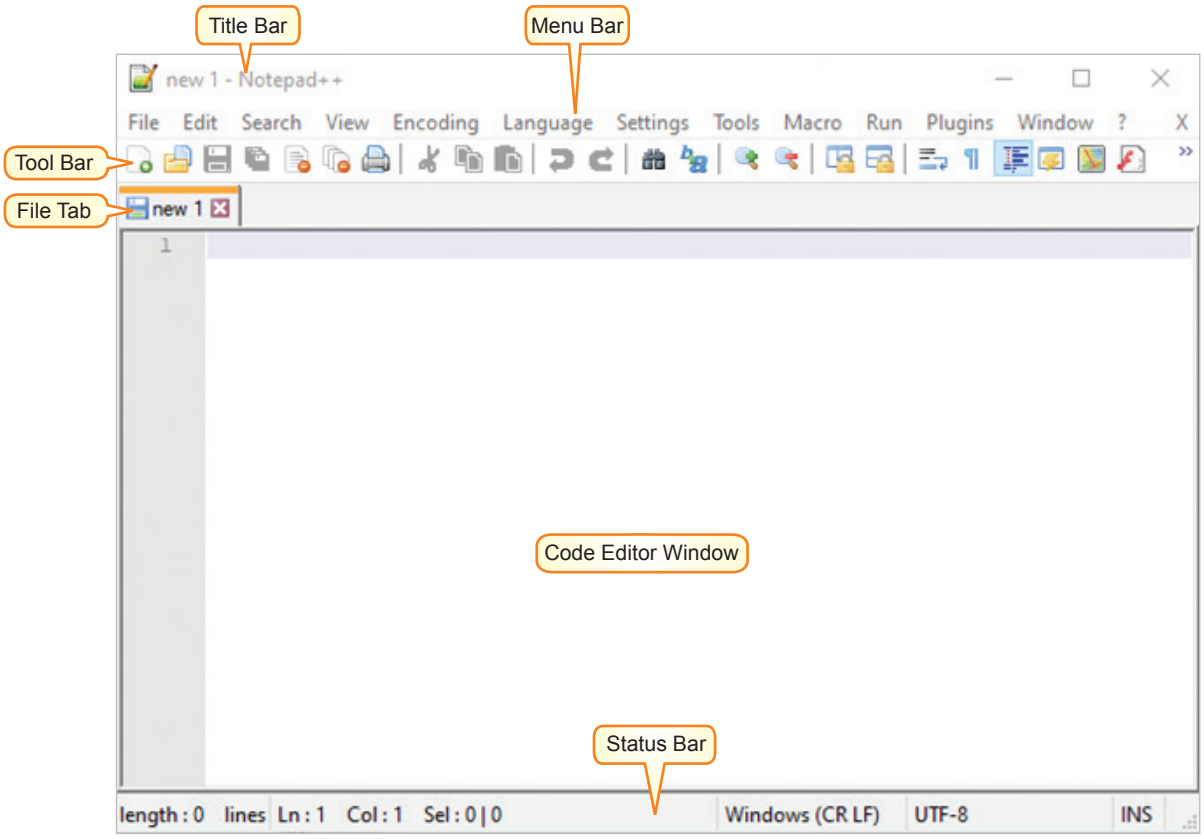


Figure 7.2: Notepad++ Window Components

Title Bar: The tile bar displays the name of the current code window. It displays the name of the saved file.

Menu Bar: The menu bar displays the various options that are used for performing different activities, such as creating, editing, formatting, and debugging the code.

Tool Bar: The tool bar consists of tools/commands that are frequently used while creating, editing, formatting, and debugging the code.

Code Editor Window: This window is used to write and edit the code.

Status Bar: The status bar displays the status related to the characters, lines, column, and selection of the current file that you are working with.

File Tab: You can work on multiple files in Notepad++. For each new file created by the user, a new tab is displayed. These tabs let you swiftly switch between multiple files just by clicking on the tabs.

HTML Code in Notepad++

You have learnt how to write HTML code. To get familiar with Notepad++, let us write some HTML code first by using Notepad++.

Observe, the code given alongside and check the colour formatting applied to different tags. Also, observe the line numbers displayed on the left-hand side of the code editor window. The line numbers and colour formatting helps the user in correcting the syntax errors. This makes the debugging process an easy task.

```
1  <HTML>
2   <TITLE>My Page</TITLE>
3  <HEAD>
4  <BODY BGCOLOR=#FF8D33>
5   <Font Color="FF3933" SIZE=5>HTML Code</Font>
6   </BODY>
7   </HEAD>
8   </HTML>
9
```

Figure 7.3: Writing Code in Notepad++

Basic Syntax of PHP

- A PHP script starts with `<?php` and ends with `?>`.
- A PHP file is saved with the extension '.php'.
- It normally has HTML tags, and some PHP scripting code.

Writing PHP Code in Notepad++

Let us take a simple example to print 'Hello world'. For this, you need to use the echo statement as shown in Figure 7.4. The echo statement is used to print the output on the screen. It can be used with or without parentheses, i.e., echo or echo(). It can take multiple parameters (or arguments) separated by commas and does not return any value.

Example: echo "This ", "is ", "fun!";

mydata.php

```
1   <HTML>
2    <TITLE>My Page</TITLE>
3   <HEAD>
4   <BODY BGCOLOR="#F645">
5   <?php
6
7    echo "Hello world";
8
9   ?>
10
11  </HEAD>
12  </BODY>
13  </HTML>
14
```

Figure 7.4: PHP Code

Saving and Executing PHP Code

Following are the steps of saving and executing PHP code:

- In Notepad++, click on **File > Save**. The **Save As** dialog box appears.
- Choose the location where the file is to be saved. For this, select the **C: drive> xampp** folder **> htdocs** folder in the left pane.
- Now, type the name of the file in the **File name** text box as **hello.php**.
- Click on the **Save** button.

```
Hello world
```

Output

- To execute the code, open up a browser and then type **XAMPP** server **URL http://127.0.0.1/**
- Type the name of the PHP file just after the server URL as given:

  http://127.0.0.1/hello.php

PHP Keywords

Keywords are the reserved words and they are language specific. Each language has a different set of keywords that are understood by its compiler or interpreter. The following table displays a list of keywords used in PHP:

abstract	and	array()	as	break
callable	case	catch	class	clone
cost	continue	declare	default	die()
do	echo	else	elseif	empty
enddeclare	endfor	endforeach	endif	endswitch
endwhile	eval()	exit()	extends	final
finally	for	foreach	function	global
goto	if	implements	include	include_once
instanceof	insteadof	interface	insset	list
namespace	new	or	print	private
protected	public	require	require_once	return
static	switch	throw	trait	try
unset	use	var	while	xor
yield	yeild from			

PHP Identifiers

Identifiers are used to name the different components of a program, such as variables, methods, objects, etc. Look at the sample code given in Figure 7.5, where `$v` is an identifier.



Figure 7.5: **Identifiers in PHP**

Identifiers Naming Convention

The rules for naming identifiers are as follows:

- In PHP, an identifier name starts with a letter or underscore `(_)`. Remember, only the variable names must start with a `$` sign.

- It can consist of any combination of letters, digits, an underscore, and the other ASCII characters from 127 through 255.
- An identifier can be of any length.
- Both uppercase and lowercase letters can be used in naming an identifier but identifier names are case-sensitive.
- Predefined keywords cannot be used as identifier names.

Examples of valid identifiers in PHP:

- `$stu_name`
- `N1Eng`
- `_Marks`
- `this_is_a_long_PHP_identifier`

Some Invalid Identifiers:

echo: It is a PHP keyword hence it cannot be used as an identifier.

2Total: It needs to start with a letter or underscore.

Total Marks: Space is not allowed in the identifier name.

Cust-Name: Special characters other than underscore (_) are not allowed.

Literals

Literals are a sequence of characters that represent values in a program and are stored in a variable. Literals are made up of digits, letters, and the other characters.

Value	Literal
"This is PHP"	String
'php'	String
22.2	Double
323	Integer
-52	Integer
Null	Null
true	Boolean

Variables

While creating programs in PHP, you may require some storage location to hold the input values to be used later. The values once stored in the memory location can be drawn out for processing. Before you store a value in the memory you need to declare a variable. A variable in PHP can be declared by prefixing a `$` sign before the variable name.

PHP Variable Naming Convention

The rules for naming variables are as follows:

- A variable name starts with a `'$'`.
- It can consist of any combination of letters, digits, and underscore.
- It can be of any length.
- Both the uppercase and lowercase letters can be used in naming a variable.
- Variable names are case-sensitive, i.e., `$name` and `$NAME` are two different variables.

- Variable names should be logical. Writing freehand names, like `'y','tee','mo'` should be avoided as this may lead to a lot of complexities when the size of the code increases.
- Variable names cannot contain space.

Practice Time

Suggest variable names for the following:

Objective	Variable Name
For storing name of a student	$Stu_Name
For storing petrol price	
For storing salary of an employee	
For storing the percentage of marks	

Using Variables in a Program

Consider the following example to understand the structure of a PHP program.

Fig2.1.php

```
1  <HTML>
2  <TITLE>Using a Variable</TITLE>
3  <HEAD>
4  <BODY BGCOLOR=#FF8D33>
5  <?php
6
7  $nm="Kips Learning Pvt Ltd.";
8  echo $nm
9  ?>
10 </BODY>
11 </HEAD>
12 </HTML>
```

Variable

Figure 7.6: Declaring a Variable

```
Kips Learning Pvt Ltd.
```

Output

Code Walkthrough:

Line 5: The PHP code starts with `<?php`.

Line 7: A variable named `$nm` is intialised. Observe the `'$'` symbol before the variable name.

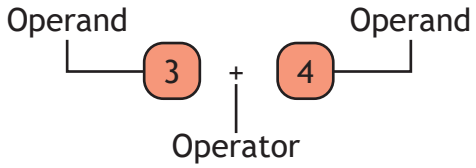
Line 8: In PHP, the echo statement is used to print messages and values. It is similar to the print() method used in Python.

Line 9: The PHP code ends with `?>`.

Operators in PHP

Operators are the symbols used to perform arithmetic or logical operations in a given expression. The variables, literals, or values are combined together to build an **expression**. The variable or literals on which an operator is applied is known as an **operand**. An operator needs one or more operands to perform any operation.

In the expression `3 + 4`, `3` and `4` are operands, whereas `+` is the operator.



Types of Operators

Following are the different types of operators:

Arithmetic Operators: Arithmetic operators are used to perform basic mathematical calculations, like addition(+), subtraction(–), division(/), and modulus(%). These arithmetic operators are considered to be binary operators because they require two operands to perform the calculation. These operators are used in the arithmetic expressions in which the operands can be a constant or variable.

NOTE

All the HTML commands can be used in PHP by enclosing the HTML tags and attributes within the double quotes (" ").

Let us learn more about the arithmetic operators with the help of a few programs.

Example: Create a program in PHP that will print sum, difference, product, and remainder of the two numbers.

Code Walkthrough:

Line 6, 7: The variables `n1,n2` are initialised.

Line 9: The expression will calculate the sum of values stored in `n1` and `n2`. The result will be stored in the variable `sum`.

Line 10: Similarly, this expression will calculate the difference of values stored in `n1` and `n2`. The result will be stored in the variable `sub`.

operators.php

```
1  <HTML>
2  <TITLE>Arithmetic Operators</TITLE>
3  <HEAD>
4  <BODY BGCOLOR=#FF8D33>
5  <?php
6  $n1=10;
7  $n2=5;
8
9  $sum=$n1+ $n2;
10 $sub=$n1- $n2;
11 $pro=$n1* $n2;
12 $mod=$n1% $n2;
13
14 echo "The sum of two numbers is:".$sum."<br>";
15 echo "The difference of two numbers is:".$sub."<br>";
16 echo "The product of two numbers is:".$pro."<br>";
17 echo "The remainder of  numbers is:".$mod;
18 ?>
19 </BODY>
```

Figure 7.7: Arithmetic Operators

Line 11: This expression will calculate the product of values stored in `n1` and `n2`. The result will be stored in the variable `pro`.

Line 12: This expression will give the remainder value when `n1` will be divided by `n2`. The result will be stored in the variable `mod`.

Line 14-17: Code statements from lines 14 to 17 are used to display the results of the expressions. Observe the use of the `echo` keyword along with the `<br>` tag and `'.'` operator.

NOTE

In PHP, all the HTML tags can be used by simply enclosing the tags within the double quotes (" ") along with the `echo` statement.

Comparison Operators: Relational operators determine the relation between two or more operands. Each relational operator returns a boolean value after an expression is evaluated. The following table displays how relational operators work.

Initial Value	Format	Expression	Result
$a=10 , $b=5	>	$a>$b	True
$a=10 , $b=5	<	$a<$b	False
$a=10 , $b=10	<=	$a<=$b	True
$a=1 , $b=10	>=	$a>=$b	False
$a=1 , $b=1	==	$a==$b	True
$a=12,$b=12	!=	$a!=$b	False

Example: Create a program in PHP that will compare two numbers and print the result as shown in Figure 7.9.

Code Walkthrough:

Line 10: This statement will return **true** as the value of `a` is greater than `b`.

Line 12: This statement will return **false** as the value of `b` is less than `a`.

Line 14: This statement will return **true** as the value of `a` is greater than `b`.

Line 16: This statement will return **false** as value of `a` is greater than `b`.

new 1 | relational.php

```
1  <HTML>
2  <TITLE>Relational Operators</TITLE>
3  <HEAD>
4  <BODY BGCOLOR=#FF8D33>
5  <?php
6  $a=10;
7  $b=5;
8
9  echo "is a greater than b:";
10 echo var_dump($a>$b)."<br>";
11 echo "is a smaller than b:";
12 echo var_dump($a<=$b)."<br>";
13 echo "is  a greater than equal to b:";
14 echo var_dump($a>=$b)."<br>";
15 echo "is a less than equal to b:";
16 echo var_dump($a<=$b);
17 ?>
18 </BODY>
19 </HEAD>
20 </HTML>
```

Figure 7.8: Relational Operators

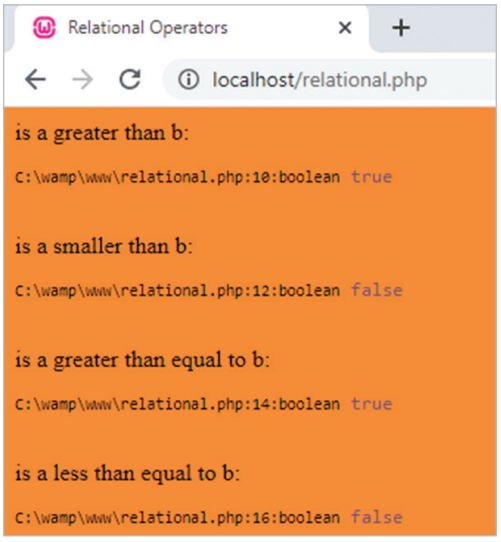


Figure 7.9: Output of Relational Operators

Logical Operators: The Logical or Boolean operators are used to combine two or more conditional statements. They provide the result in the form of **True or False**. There are three operators in PHP that are used for evaluating multiple conditions. The three logical operators are— AND, OR, and NOT.

Initial Value	Format	Expression	Result
$a=10 , $b=5, c=5	&&	$a>$b && $a<$b	True
$a=10 , $b=5	||	$a<$b || $a==$b	False
$a=10 , $b=10	!=	$a!=$b	True

Example: Create a program in PHP that will compare three numbers and print the result as shown in Figure 7.11.

Code Walkthrough:

Line 11: This statement will return **true** as both the statements are true.

Line 13: This statement will also return **true**. The reason is that you are using the or (||) operator, and the first statement in the expression is true; hence the overall outcome of the expression will be **true**.

Line 15: This statement will return **false.** The reason is that the original value returned by the expression is true. Now, as you are using the not (!) operator it will negate the original value returned by the expression.

logical.php

```
1  <HTML>
2  <TITLE>Logical Operators</TITLE>
3  <HEAD>
4  <BODY BGCOLOR=#FF8D33>
5  <?php
6  $a=10;
7  $b=5;
8  $c=5;
9
10 echo "is a greater than b and c equal to b:";
11 echo var_dump($a>$b && $b==$c)."<br>";
12 echo "is a greater than b or c greater than b:";
13 echo var_dump($a>$b || $c>$a)."<br>";
14 echo "is a greater than b:";
15 echo var_dump(!$a>$b)."<br>";
16
17 ?>
18 </BODY>
19 </HEAD>
20 </HTML>
```

Figure 7.10: Logical Operators

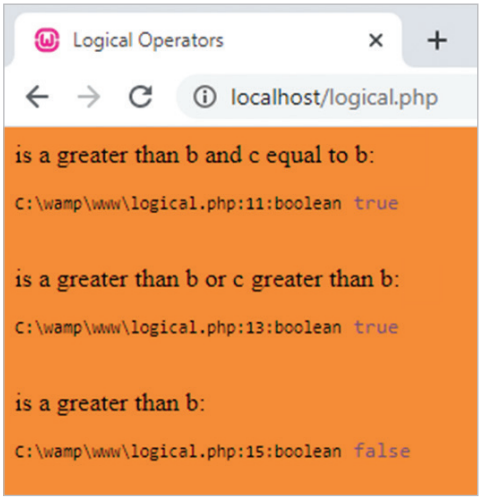


Figure 7.11: Output of Logical Operators

Get and Post Methods

There are two types of websites. The websites with multiple web pages that share the user data with each other are known as the **dynamic** websites. The websites with static data, i.e., the data in each web page remains unchanged, are called **static** websites. Nowadays, most of

the websites or web apps are dynamic and the user's data is shared among the different web pages. The **GET** and **POST** methods are significantly used by a website to share the user's data among its web pages.

The GET and POST methods are the HTTP request methods used inside the **<form>** tag to send the form data to the server.

GET Method: The GET method is used to submit the HTML form data. This data is collected by the predefined **$_GET** variable for processing. The information sent from an HTML form by using the GET method is visible to everyone in the browser's address bar. Hence, this method is not used to share sensitive information.

POST Method: The POST method is also used to submit the HTML form data. But the data submitted by this method is collected by the predefined super global variable **$_POST** instead of **$_GET**. In this method, the data collected is not visible to anyone.

Before you start using the POST or GET method, you should have a clear understanding of creating forms and its various components, like the textbox, buttons, text area, etc.

Creating a Form

Let us use the POST method with the `<form>` tag to create a form where the user can enter the data.

Syntax: `<form action="web page URL address" method="POST">`

In the syntax given above, the **action** attribute with the `<form>` tag is used to specify the URL of the web page that will receive the data from the web page by using the POST method.

Now, let us create two web pages, named Page1 and Page2. In Page1, add a label, textbox, and submit button using the code given here.

pst.php | Page1.php

```
1  <HTML>
2  <TITLE>POST Method</TITLE>
3  <HEAD>
4  <BODY BGCOLOR=#FF8D33>
5  <?php
6   echo "<br><br><br><br>";
7  echo "<center>";
8  echo "<form action='Page2.php' method='Post'>";
9
10 echo "Please Enter your Name:";
11 echo "<input type='text' size=20 name='nm'>";
12 echo "<input type='Submit' name='submit'>";
13 echo "</center>";
14 ?>
15 </BODY>
16 </HEAD>
17 </HTML>
```

Figure 7.12: Using Post Method

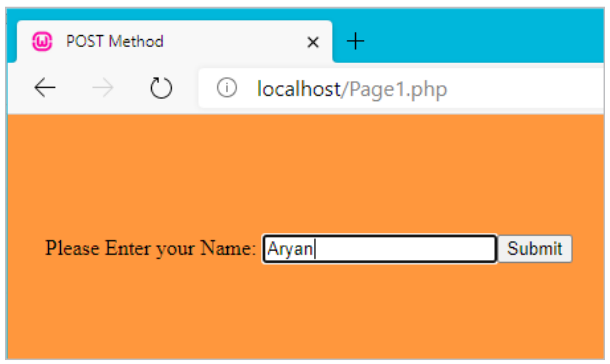


Figure 7.13: Input: Entering Name in the Form

Code Walkthrough:

Line 8: The `<form>` tag attributes action and method are used to send data to **Page2.php** with the help of the Post method.

Line 10: In this line, you are adding a label to the form.

Line 11: The `<input>` tag along with the **type**, **size**, and **name** attributes is used to add a text field with the maximum character size of 20.

Line 12: Here, the `<input>` tag along with the **type** and **name** attributes is used to add a **Submit** button to the form.

Printing the Posted Value

Now, create Page2 using the code given below, to print the name input by the user.

Page2.php

```
1  <HTML>
2   <TITLE>POST Method</TITLE>
3  <HEAD>
4  <BODY BGCOLOR=#FF8D33>
5  <?php
6    echo "<br><br><br><br>";
7   echo "<center>";
8   $name=$_POST['nm'];
9   echo "Your name is:".$name;
10
11  echo "</center>";
12 ?>
13 </BODY>
14 </HEAD>
15 </HTML>
```

Figure 7.14: **Printing the Posted Value**

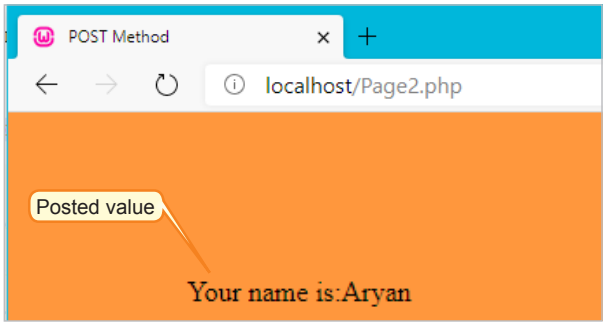


Figure 7.15: **Output**

Code Walkthrough:

Line 8: The value posted by Page1.php is stored in the variable `$name` using the POST method.

Line 9: The echo keyword is used to print the posted value.

Programs in PHP

To become acquainted with PHP, type and run the following programs.

Program 1: Create a program in PHP to enter a number and print its square.

Program1_input.php

```
1  <HTML>
2   <TITLE>Square of Number</TITLE>
3  <HEAD>
4  <BODY BGCOLOR=#FF8D33>
5  <?php
6    echo "<br><br><br><br>";
7   echo "<center>";
8   echo "<form action='Program1.php' method='Post'>";
9
10  echo "Please Enter a Number:";
11  echo "<input type='text' size=20 name='num'>";
12  echo "<input type='Submit' name='submit'>";
13  echo "</center>";
14 ?>
15 </BODY>
16 </HEAD>
17 </HTML>
```

Figure 7.16: **Square of a Number**

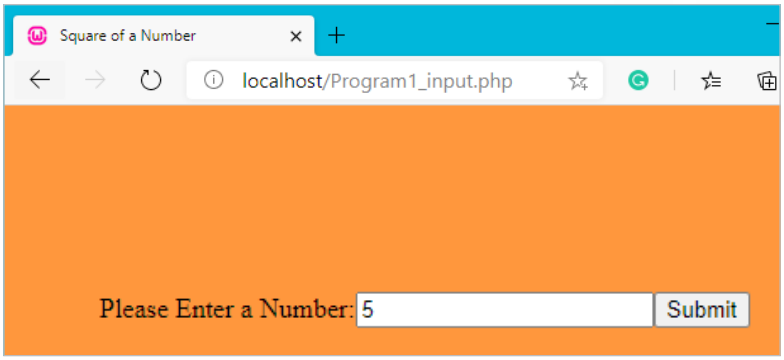


Figure 7.17: Input: Entering a Number in the Form

Program1_input.php | Program1.php

```
1  <HTML>
2  <TITLE>POST Method</TITLE>
3  <HEAD>
4  <BODY BGCOLOR=#FF8D33>
5  <?php
6   echo "<br><br><br><br>";
7  echo "<center>";
8  $n=$_POST['num'];
9  $square= $n * $n;
10 echo "Square of the number is:".$square;
11
12 echo "</center>";
13 ?>
14 </BODY>
15 </HEAD>
16 </HTML>
```

Figure 7.18: Post Method

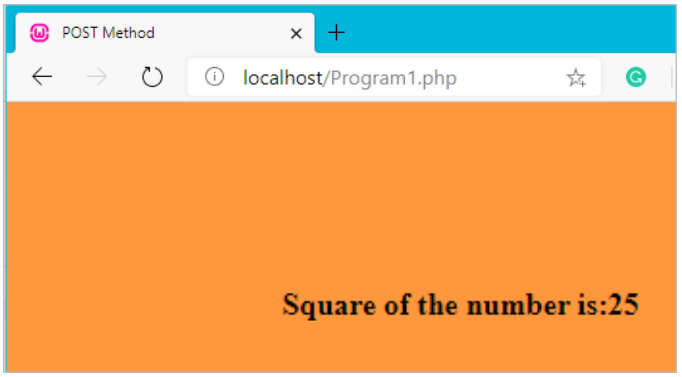


Figure 7.19: Output

Program 2: Create a program in PHP to convert the amount entered in Rupees to US Dollars.

Program2_input.php

```
1  <HTML>
2  <TITLE>Converter</TITLE>
3  <HEAD>
4  <BODY BGCOLOR=#FF8D33>
5  <?php
6  echo "<br><br><br><br><br><br><br><br><br><br><br><br><br>";
7  echo "<center>";
8  echo "<form action='Program2.php' method='Post'>";
9
10 echo "Please Enter Amount in Rs:";
11 echo "<input type='text' size=20 name='amt'>";
12 echo "<input type='Submit' name='submit'>";
13 echo "</center>";
14 ?>
15 </BODY>
16 </HEAD>
17 </HTML>
```

Figure 7.20: Converting Rupees to Dollars

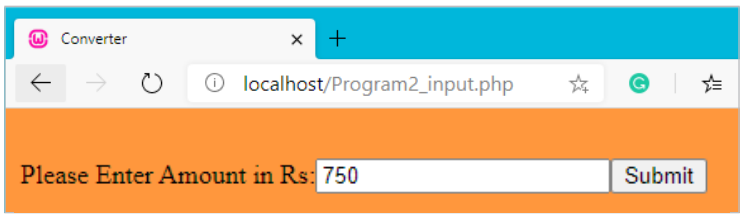


Figure 7.21: Input: Entering Value in Rupees

Program2.php

```
<HTML>
<TITLE>Converter</TITLE>
<HEAD>
<BODY BGCOLOR=#FF8D33>
<?php
$dollar=70;
echo "<br><br><br><br><br><br><br><br><br><br><br><br><br>";
echo "<center>";
$amount=$_POST['amt'];
$tot= $amount/$dollar;
echo "<Font Size=5 Color='red'>Total Dollars</Font>:".$tot;

echo "</center>";
?>
</BODY>
</HEAD>
</HTML>
```

Figure 7.22: Using Post Method

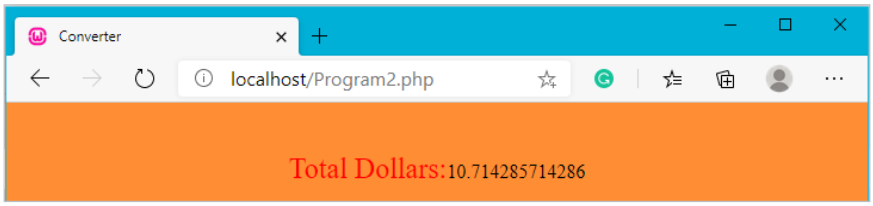


Figure 7.23: Output

Program 3: Create a web app to enter the name and marks scored by a student in three subjects. Print the name and average marks scored by the student.

Program3_input.php

```
<HTML>
<TITLE>Marks Details</TITLE>
<HEAD>
<BODY BGCOLOR=#FF8D33>
<?php
echo "<br><br><br><br><br><br><br><br><br><br><br><br><br>";
echo "<center>";
echo "<form action='Program3.php' method='Post'>";

echo "Please Enter the Name of Student:   ";
echo "<input type='text' size=8 name='nam'>";
echo "<br><br>";

echo "Please Enter Marks Scored in Science: ";
echo "<input type='text' size=8 name='sci'>";
echo "<br><br>";

echo "Please Enter Marks Scored in Maths: ";
echo "<input type='text' size=8 name='mat'>";
echo "<br><br>";

echo "Please Enter Marks Scored in English: ";
echo "<input type='text' size=8 name='eng'>";
echo "<br><br>";

echo "<input type='Submit' name='submit'>";
echo "</center>";
?>
</BODY>
</HEAD>
</HTML>
```

Figure 7.24: Creating the Form

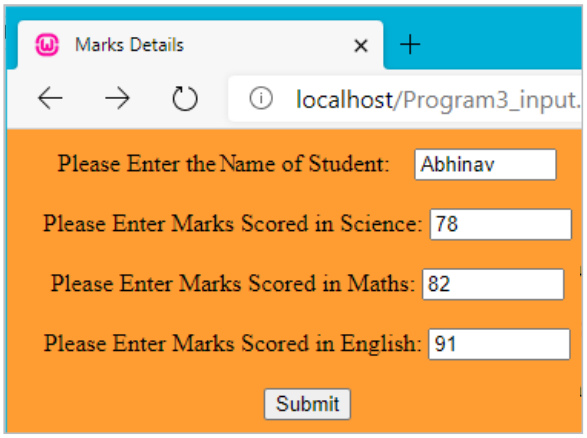


Figure 7.25: Input: Entering Values in the Form

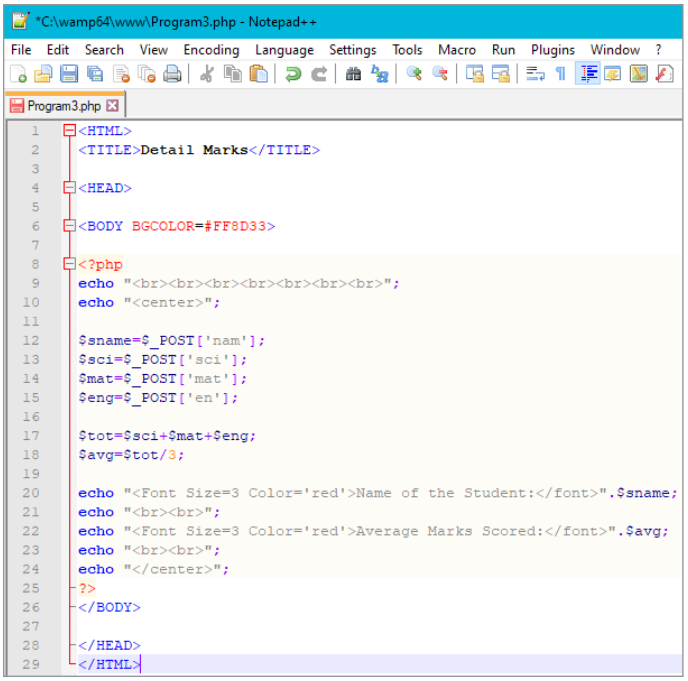


Figure 7.26: Using Post Method

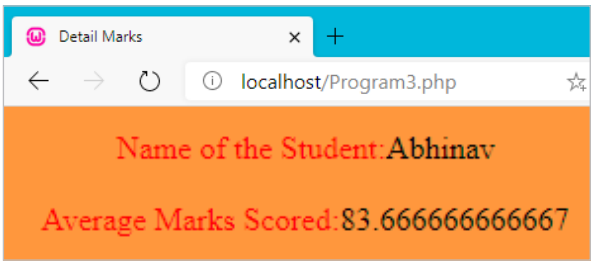


Figure 7.27: Output

RECAP

- Hypertext Preprocessor (PHP) is a scripting language that is widely used for creating web applications.
- The code written with PHP can run on any operating system.
- Writing PHP code does not require you to install programs that require huge memory consumption for their installation.
- A web server is an application that can be installed on a local machine or on a remote machine.
- In Notepad++, the Code editor window is used to write and edit the code.
- Identifiers are used to name the different components of a program, such as variables, methods, and objects.
- An identifier can consist of any combination of letters, digits, and an underscore.
- Literals are a sequence of characters that represent the values in a program and are stored in a variable.
- A variable in PHP can be declared by prefixing a '$' sign before the variable name.
- Operators are the symbols that are used to perform arithmetic or logical operations in a given expression.
- The GET and POST methods are the HTTP request methods used inside the <form> tag to send the form data to the server.

A. Fill in the blanks.

1. The ..... displays the various options that are used for performing different activities.
2. The tool bar consists of ..... that are frequently used while creating, editing, formatting, and debugging the code.
3. The ..... window is used to write and edit the code.
4. The ..... displays the status related to characters, lines, column, and a selection of the current file you are working with.
5. An operator needs one or more ..... to perform any operation.

Hints

- Commands
- Menu Bar
- Status Bar
- Operands
- Code Editor

B. Write T for True and F for False.

1. In PHP an identifier can consist of any combination of letters, digits, and an underscore. ☐
2. In PHP both uppercase and lowercase letters can be used in naming an identifier. ☐
3. The relational operators are used to evaluate two or more conditional statements. ☐
4. The POST method is used with the <form> tag. ☐
5. An identifier name starts with &. ☐

C. Answer in one word.

1. What is the ability of a code to run on any kind of operating system called? .....
2. Name the component that displays the name of the current code window. .....
3. Name the window that is used to write the code. .....
4. What are the websites that share the user data with each other called? .....

D. Select the correct option.

1. The ..... operators are used to perform the basic mathematical calculations.

   a. Arithmetic b. Logical c. Relational

2. The ..... operators determine the relation between two or more operands.

   a. Logical b. Relational c. Arithmetic

3. A ..... is an application that can be installed on a local machine or remote machine.

   a. Web Server b. Interpreter c. Compiler

4 Literals are a ..... of characters that represent the values in a program and are stored in a variable.

   a. Table b. List c. Sequence

5. In PHP, a variable name starts with a ..... .

   a. $ b. & c. @

E. Answer the following questions.

1. List any two advantages of PHP.

   .....

   .....

   .....

2. What are identifiers?

   .....

   .....

   .....

3. What is the significance of variables?

   .....

   .....

   .....

4. Briefly explain the rules for naming variables.

.....

.....

.....

5. Identify the valid and invalid variable names. Give reasons for the invalid ones.

`_roll num, 3Term, Price_Unit, new, geog-marks`

.....

.....

.....

6. What is the difference between the POST and GET methods?

.....

.....

.....

ACTIVITY SECTION



LAB SESSION

Perfection Through Practice

Create the following web page in PHP by following the given instructions:

- Start the web page by using the <HTML> tag.
- Use the <HEAD> tag to define the start of the web page.
- Using the <TITLE> tag, define the title of the web page that is "NATIONAL SALES GARAGE".
- Add the <BODY> tag and along with it, add the BGCOLOR attribute to specify a background colour for the web page. Use the <?php .... ?> tags.
- Using <H1> add a heading to your web page. To align the heading to the center of the web page, use the <CENTER> tag.

NATIONAL SALES GARAGE



Sales Record 2020-2019

Car Brand	2020	2019
Maruti Suzuki	135775	139133
Tata Motors	21600	10400
Kia Motors	21022	14005
Honda	9990	6459
MG Motors	4163	3239
Ford	3991	5392

Our Services:

1. Sale/Purchase of Old/New Cars
2. Roadside Assistance

- Similarly, add an image to the web page using the <IMG> tag. Specify the image source with the SRC attribute of the <IMG> tag.
- Add a caption on the top of the table and align it in the center. To add a caption, use the <CAPTION> tag.
- Now, to create a table, use the <TABLE> tag and give a colour of your choice by using the BACKGROUND attribute. Also, use the HEIGHT and WIDTH attribute to specify the height and width of the table.
- The <TR> tag will create the first row of the table. The consequent <TD> tags will create data values for a specific row. Use the ALIGN attribute to center align the table data.
- For each row and the data values in the row, use the <TR> and <TD> tags.
- Do not forget to close each row by using the </TR> tag and close each data value with the </TD> tag.
- In the end, close the <TABLE> tag with </TABLE> .
- Use the <CENTER> tag to align the components wherever necessary.
- To display the services offered, add a heading with the <H3> tag and create a list using the <OL> tag. Remember to specify the value for the TYPE attribute.
- To add elements to the list, use the <LI> tag. Add the elements and close the <LI> tag with </LI>.
- After adding all the items to the list, close the list tag with </OL>.
- Now, the last step is to add the video. Use the <VIDEO> tag along with the HEIGHT and WIDTH attributes.
- Use the <SOURCE> tag to add the path of your video.
- Close the <HEAD> and <BODY> tags.
- Save the file as **Cars.PHP**.
- Open the saved file in the browser that supports HTML.

GROUP DISCUSSION

For Concept Clarity



Discuss the following topic:

- **Use of Variables and Operators in PHP**

ONLINE LINKS

Looking For More



To know more about PHP, visit the following website:

- https://www.learn-php.org/

To know how to download XAMPP, visit the following website:

- https://www.edureka.co/blog/how-to-run-a-php-program-in-xampp/#installxampp

To type and execute PHP code online, visit the following websites:

- https://www.writephponline.com/
- https://onecompiler.com/php

Chapter 8

Connecting Web App to Database

LEARNING OUTCOMES

The student will be able to:

- know about database and distinguish between the different types of DBMS.
- log on to the MySQL server and create a connection with it.

The term data is widely used in the world today. With people all around the world using internet technologies, businesses and customers are involved in the selling and buying of goods online. There is a huge demand for web apps that can process a large amount of data and deliver it to the user in a format that is presentable and easy to comprehend.

Database

In simple words, data can be defined as attributes related to any object. For example, your name, age, height, weight, etc., are some attributes related to you.

A database is a systematic collection of data. The data in a database is organised, which makes data management easy.

Database Management System

To manage data on a computer, you need a database management system. The Database Management System or DBMS is a collection of programs, which enables its users to access the database, manipulate data, and help in the representation of data. Take the example of your internet service provider. Your ISP is using a DBMS to manage billing, client-related issues, handle faulty data, etc. You can find countless examples of the usage of DBMS. It was first implemented in the 1960s by Charles Bachman.

Types of DBMS

There are four major types of DBMS as listed below:

Hierarchical DBMS: This type of DBMS uses the parent-child relationship of storing data. This type of DBMS is not in use nowadays. Its structure is like a tree with nodes representing records and branches representing fields.

Network DBMS: This type of DBMS supports many-to-many relationships. This usually results in complex database structures. The dm-server is an example of a database management system that implements the network model.

Relational DBMS: This type of DBMS makes use of the database relationships in the form of tables, also known as relations. Relational DBMS usually have predefined data types that they can support. This is the most popular DBMS type that is widely used everywhere. Examples of relational database management systems are MySQL, Oracle, and Microsoft SQL Server.

Object-Oriented Relational DBMS: This type of DBMS supports the storage of new data types. The data to be stored in the database is stored in the form of objects. PostgresSQL is an example of the object-oriented relational DBMS.

MySQL

A user may request data that is stored in the database using a web app. To deliver the requested data, the web app needs to interact with the DBMS software. This two-way communication between the web app and DBMS is made possible with the help of a language known as SQL.

In this chapter, you will learn how to use MySQL (DBMS) and connect it with your web app.

Login to MySQL Server

Follow the given steps to login to MySQL server:

- Click on ^ icon on the Taskbar and select the XAMPP icon from the tray.
- The XAMPP control panel window appears. Click on the **Admin** button next to the MySQL.
- The phpMyAdmin welcome screen will open in the browser window as shown in Figure 8.2.

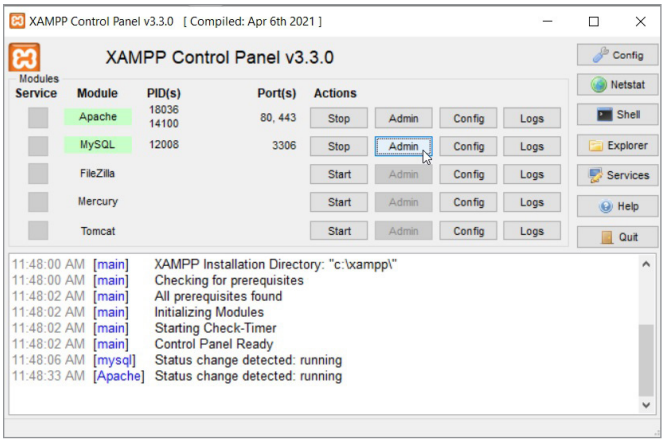


Figure 8.1: Opening phpMyAdmin

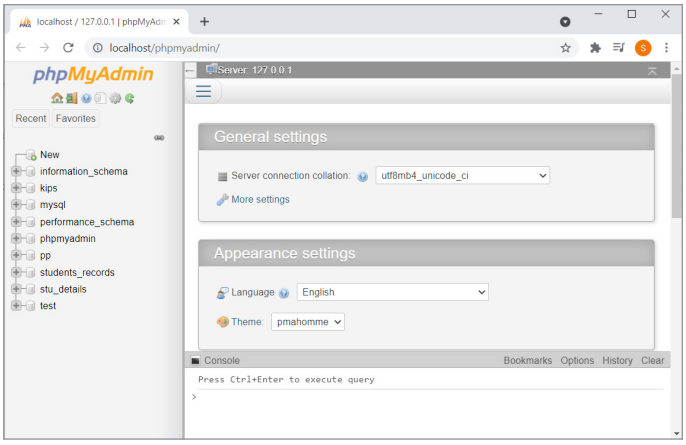


Figure 8.2: Welcome Screen of phpMyAdmin

- In order to create a new database, click on the **New** option shown in the phpMyAdmin panel.

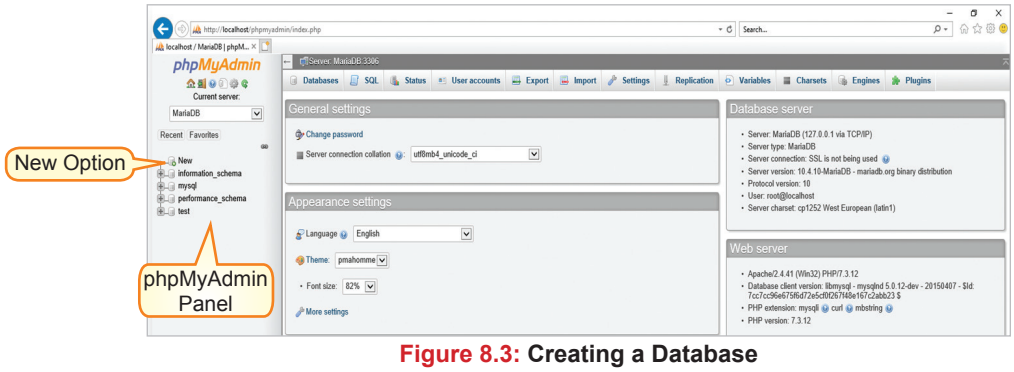


Figure 8.3: Creating a Database

- The following screen appears. Type the database name and click on the **Create** button. This will create a database with the name entered by the user. Suppose, you have created the database: **stu_details**.

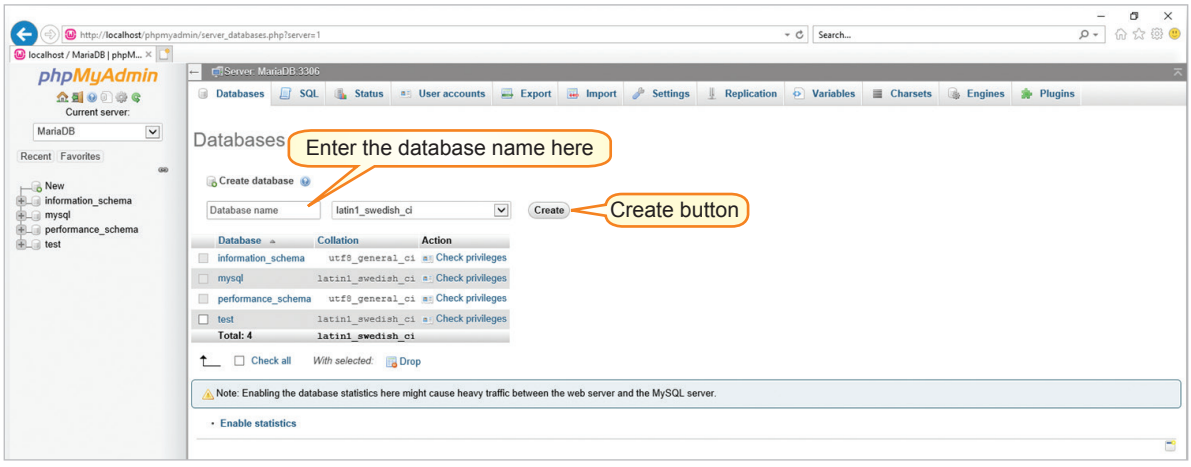


Figure 8.4: Entering Database Details

- Creating a database is only the first step of data storage and management. You need to create a table within the database, as it is the table that stores all the records within its rows and columns.

Creating a Table in the Database

Once a database is created, the phpMyAdmin window will look as shown in Figure 8.5.

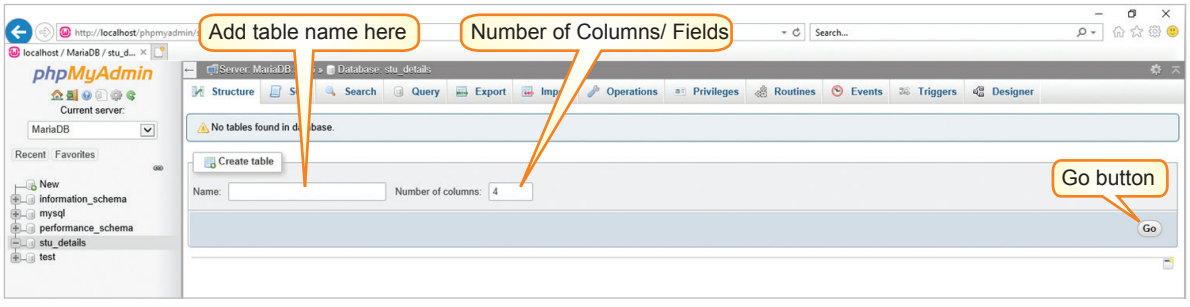


Figure 8.5: Creating a Table

- Add the name of the table and number of columns/fields the table will have.
- Click on the **Go** button to finish the process. After adding the name of the table and number of columns (For example, 4), add the column description as shown in Figure 8.6.

Defining the Table Structure

To define the table structure, follow these steps:

- Add the name of the field in the **Name** text field as **rollno**, **stu_name**, **class**, and **section**.
- Add the data type (type of values) for the fields, like name can store text(VARCHAR) values, class can store integer (INT) values, and so on.

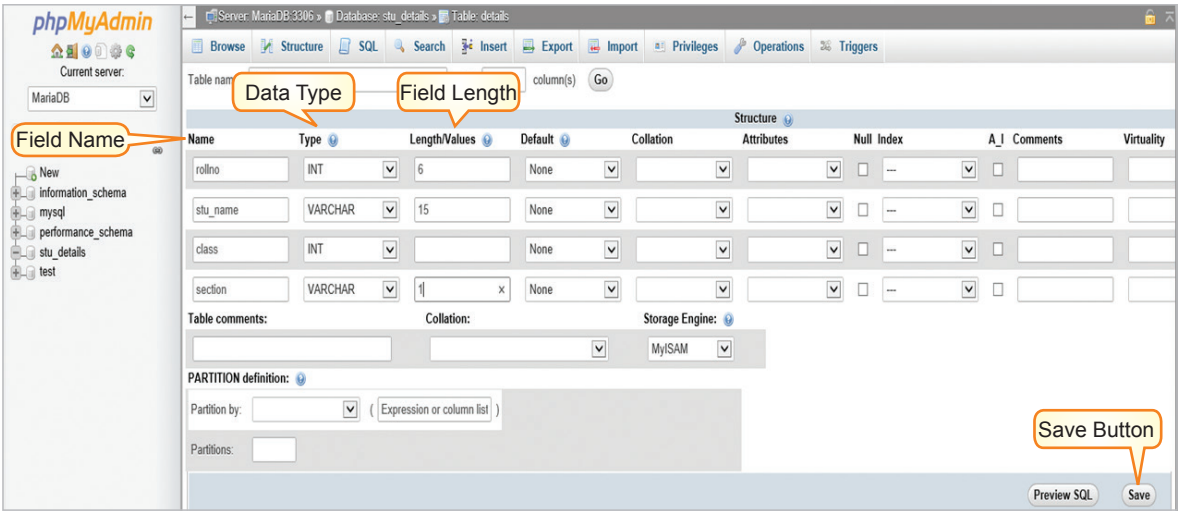


Figure 8.6: Creating Table Fields

- Add the **Length/Values** of characters or numbers a field can hold.
- After setting all the values for the table, click on the **Save** button to create the table structure.

Entering Data in Table

To insert the data into table, follow these steps:

- Click on the **table name** and then the **Insert** option. The insert window opens up. Enter the values for each column in the **Value** field.
- Once all the values have been typed, click on the **Go** button at the bottom to finish saving the values.

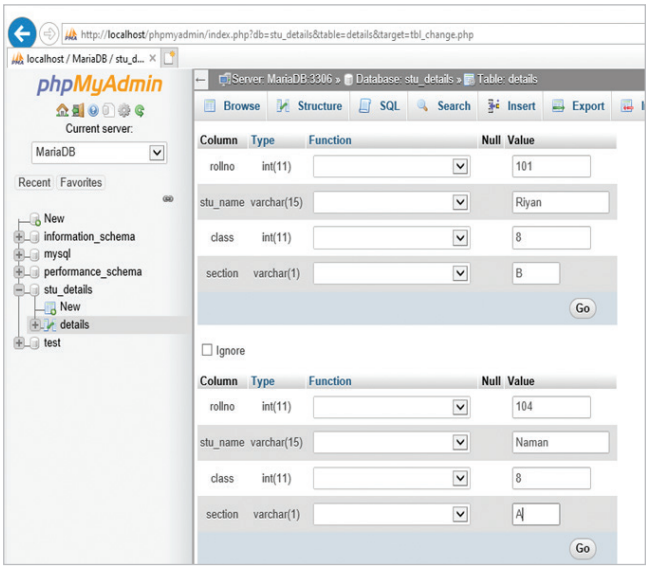


Figure 8.7: Saving the Table Structure

Creating a Connection

After creating the database and defining the table structure for the table in the database, you can connect your web app with the database. In the example below, the required details are as follows:

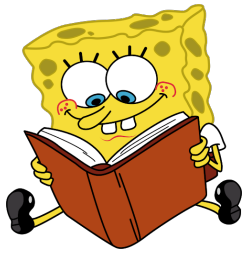
MySql server name: localhost

User name: root

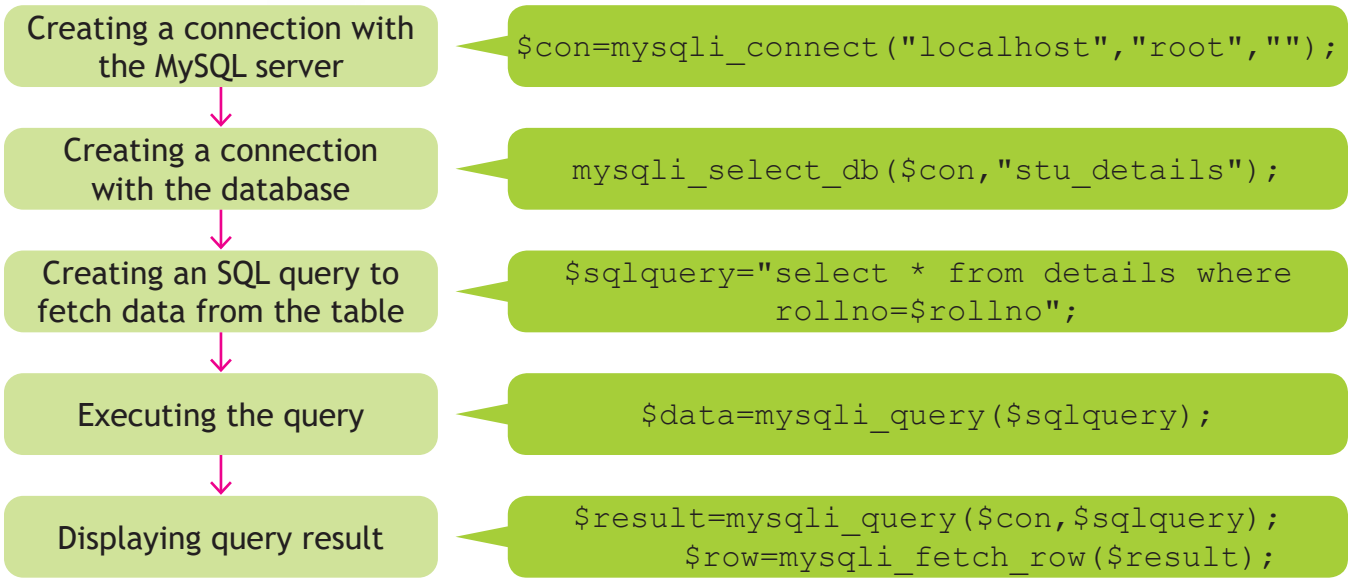
Password: keep the password blank

Database name: stu_details

Table name: details



Using this information, let us now connect the web app with the database.



Method	Description
mysqli_connect	Connects the app to MySQL Server
mysqli_select_db	Sets an active connection with the database
mysqli_query	Executes the query
mysqli_fetch_row	Fetches the record from the table

Creating a Connection with MySQL Server

To create the connection, type the following code in Notepad++.

input.php | Calculate.php | connection.php

```
1  <HTML>
2   <TITLE>Mileage Calculator</TITLE>
3  <HEAD>
4  <BODY BGCOLOR='green'>
5  <?php
6
7   $con= mysqli_connect("localhost","root","");
8   mysqli_select_db($con,"stu_details");
9
10
11 ?>
12 </BODY>
13 </HEAD>
14 </HTML>
```

Figure 8.8: Creating a Connection String

Code Walkthrough:

Line 7: The **mysqli_connect** method and its parameters are used to establish a connection with the database.

Line 8: The **mysqli_select_db** method is used to connect to the database. This method takes two parameters connection name and database name.

Creating and Executing a SQL Query

Add the code given below to create and execute the query:

query.php

```
1  <HTML>
2  <TITLE>Mileage Calculator</TITLE>
3  <HEAD>
4  <BODY BGCOLOR='green'>
5  <?php
6
7   $rollno=102;
8
9   $con= mysqli_connect("localhost","root","");
10  mysqli_select_db($con,"stu_details");
11
12  $sqlquery="select * from details where rollno=$rollno";
13  echo $sqlquery;
14  $result=mysqli_query($con,$sqlquery);
15
16
17  echo "</center>";
18 ?>
19 </BODY>
20 </HEAD>
21 </HTML>
```

Figure 8.9: Creating and Executing a Query

Code Walkthrough:

Line 12: Create an SQL query that will fetch the required data.

Line 13: The **mysqli_query** method will execute the query with the help of the connection object ($con) and store the result in the variable **$result**.

Displaying the Query Result

Type the given code to display the result of your query:

query.php

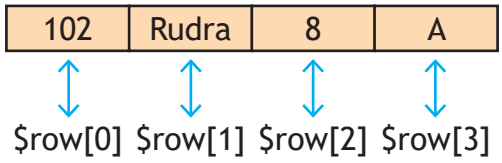
```
1  <HTML>
2  <TITLE>Mileage Calculator</TITLE>
3  <style>
4  div{
5  position:absolute;
6  top:400px;
7  right:800px
8  }
9  </style
10 <HEAD>
11 <BODY BGCOLOR='green'>
12 <?php
13
14  $rollno=102;
15
16  $con= mysqli_connect("localhost","root","");
17  mysqli_select_db($con,"stu_details");
18
19  $sqlquery="select * from details where rollno=$rollno";
20  $result=mysqli_query($con,$sqlquery);
21  $row=mysqli_fetch_row($result);
22
23 echo "<div>";
24    echo "<font color='orange' size=3 face='Verdana'>$row[0],$row[1],$row[2],$row[3]</font>";
25 echo "</div>";
26
27 ?>
28 </BODY>
29 </HEAD>
30 </HTML>
```

Figure 8.10: Displaying the Query Result

Code Walkthrough:

Line 21: The **mysqli_fetch_row** function is used to fetch the records returned by the query. The records are stored in the array variable **$row**.

Line 24: The **echo** statement is used to print the values stored in the variable **$row**.



Program: Create a web app to display the details of a student from the database 'stu_details' based on the roll number entered by the user.

student_input.php

```
<HTML>
<TITLE>Student details</TITLE>
<style>
div{
position:absolute;
top:400px;
right:700px
}
</style

<HEAD>
<BODY BGCOLOR='orange'>
<?php

echo "<div>";
echo "<form action='stu_details.php' method='Post'>";


echo "<Font size=4 face='Verdana'>Please Enter Roll No :   </font>";
echo "<input type='text' size=8 name='rol'>";

echo "<input type='Submit' name='submit'>";

echo "</div>";

?>
</BODY>
</HEAD>
</HTML>
```

Figure 8.11: Entering Student Details

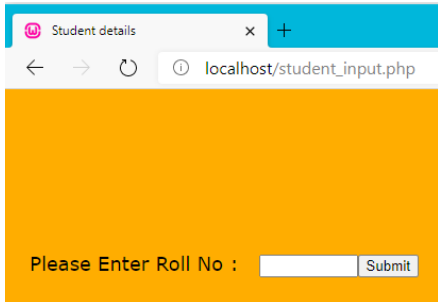


Figure 8.12: Input Search Value

query.php

```
<HTML>
<TITLE>Mileage Calculator</TITLE>
<style>
div{
position:absolute;
top:400px;
right:800px
}
</style
<HEAD>
<BODY BGCOLOR='green'>
<?php

 $rollno=102;

 $con= mysqli_connect("localhost","root","");
 mysqli_select_db($con,"stu_details");

 $sqlquery="select * from details where rollno=$rollno";
 $result=mysqli_query($con,$sqlquery);
 $row=mysqli_fetch_row($result);

echo "<div>";
   echo "<font color='orange' size=3 face='Verdana'>$row[0],$row[1],$row[2],$row[3]</font>";
echo "</div>";

?>
</BODY>
</HEAD>
</HTML>
```

Figure 8.13: Connecting to Database and Displaying the Result

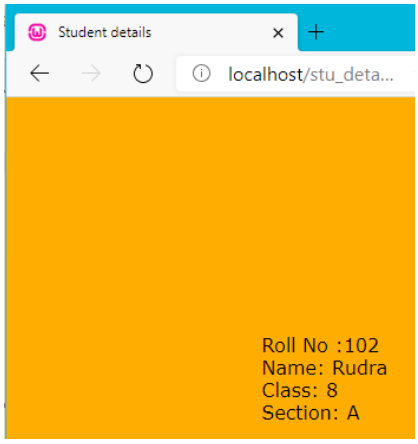


Figure 8.14: Output

RECAP

- A database is a systematic collection of data.
- DBMS is a collection of programs, which enables its users to access a database, manipulate data, and help in the representation of data.
- Hierarchical DBMS employs the parent-child relationship of storing data.
- Relational DBMS defines database relationships in the form of tables.
- To deliver the requested data, the web app needs to interact with the DBMS software.
- The mysqli_select_db function sets the active connection with the database.

Brain developer

A. Fill in the blanks.

1. The ..... function is used to fetch the records returned by the query.
2. The mysqli_query function will execute the query with the help of the ..... object.
3. The ..... function is used to connect to the database.
4. The DBMS concept was first implemented in ..... .
5. The ..... DBMS employs the parent—child relationship of storing data.

Hints

- mysqli_select_db
- mysqli_fetch_row
- connection
- Hierarchical
- 1960s

B. Write T for True and F for False.

1. The mysqli_connect function connects the web app to the MySQL Server. ☐
2. The mysqli_select_db function sets the active connection with the database. ☐
3. MySQL is a popular relational database management system. ☐
4. The objects to be stored in the database have different attributes. ☐
5. Network DBMS supports one-to-many relationships. ☐

C. Application-based questions.

1. Anil is creating a DBMS that will store details of the teachers and classes they are teaching. Suggest the kind of DBMS Anil should use.

.....

2. Akshay wants to fetch the records from a table named Teacher. He wants to create a query and execute it. Help Akshay write the syntax for the same.

.....

D. Answer the following questions.

1. What is a Database? Give examples.

.....

.....

.....

2. Differentiate between the Network and Relational DBMS.

.....

.....

.....

3. What is SQL? Name any two SQL-based DBMS software.

.....

.....

.....

4. What is the difference between mysqli_connect and mysqli_select_db functions?

.....

.....

.....

5. Write down the main steps in connecting the web app to the database to obtain result from a table.

.....

.....

.....

ACTIVITY SECTION





LAB SESSION

Perfection Through Practice

Create a table based on the structure given below in ABC database and name it as Customer. Once the table has been created, add five records in it. After adding records, establish connection to fetch the data.

Customer_ID	The unique identifier for a customer
Customer_Name	Full name of the customer
Customer_AadharNo	Customer Aadhar card number
Customer_PANNo	Customer PAN card number
Customer_PhoneNo	Customer phone number
Customer_Address	Customer address



GROUP DISCUSSION

For Concept Clarity

Discuss the following topic:

- **Network DBMS vs Hierarchical DBMS**



PROJECT WORK

Using Creativity

- Create a database of your teachers by defining the fields: **ID, First Name, Last Name, Date of Birth, Department, Email, Address, City,** and **ZIP/Postal Code**. Enter ten records in it.
- Create a web page in PHP that can access the record of a teacher based on the ID entered by the user.



ONLINE LINK

Looking For More

To learn more about PHP and database connectivity, visit the following website:

- https://www.w3schools.com/php/php_mysql_intro.asp

Chapter 9

Cyber Ethics

LEARNING OUTCOMES

The student will be able to:

- know about computing ethics and unethical practices.
- list safety measures that should be taken while online.
- know about digital footprints.

The internet has become an essential part of modern life. It is a global system of interconnected computer networks that enables the users to share information and various resources with each other. It has several advantages for every individual. However, it is a tool, which must be handled with caution, as its misuse can be hazardous.

Computing Ethics

Ethics is a set of moral principles that governs the behaviour of a group or an individual. Similarly, computing ethics is a set of procedures, moral principles, and ethical practices that regulates the use of a computer. It focuses on ethical implementation and use of computing resources, and includes new issues that are raised by new technologies. It basically aims at encouraging IT users to be responsible in order to utilise the technology tools judiciously, respect the views of others, and acknowledge the rights and properties of the people on the internet.

Some of the common ethical guidelines that should be followed while using a computer are as follows:

- Do not use computer technology to cause disruption or interference in other users' work.
- Do not spy on another person's computer data.
- Do not use computer technology to steal information.
- Do not contribute to the spread of wrong information using computer technology.
- Avoid buying pirated software. Pay for software unless it is free.
- Do not use someone else's computer resources without an authorisation.
- It is wrong to claim ownership on a work, which is the output of someone else's intellect.
- Before developing software, think about the social impact it can have.
- Be respectful and courteous with the fellow members while communicating on the internet.

Unethical Practices

Some of the common unethical practices that are prevalent in the society are discussed as follows:

Plagiarism



Plagiarism is the usage or imitation of the language and thoughts of another person projected as one's own original work. It is considered a crime or fraudulent act.

The Merriam-Webster Dictionary describes 'plagiarism' as follows:

- to steal and pass off (ideas or words of another's) as one's own.
- to use (another's production), without crediting the source.
- to commit literary theft.
- to present as new and original, an idea or product derived from an existing source.

International Copyright Laws also state that "the expression of original ideas is considered as the Intellectual Property and is protected by copyright laws", just like the original inventions. Almost all forms of expressions fall under the copyright protection as long as they are recorded in some manner (such as a book or computer file).

Plagiarism has become very easy with technological advances, like web searching and copy/paste options. Most critics have linked carelessness, laziness, lack of interest, and arrogance as the major reasons of plagiarism.

Steps to Prevent Plagiarism

The simplest way to prevent plagiarism is 'Citation'. Acknowledging the original writer and source from where the material has been taken is called 'Citation'. It includes the following steps:

- All sources are neither accurate nor do they validate the information as accurate. Therefore, one must specify the source, which informs the readers regarding the basis of one's ideas and the extent of one's research. Citation gives strength to your resource.
- To avoid plagiarism, one can rephrase the material.
- Use quotation marks around all the quoted words of another person to avoid plagiarism.
- In the education sector, students should be encouraged to present their original and innovative ideas. Even if they wish to refer to the resources, they should be made aware

of the pattern of references. In this manner, plagiarism can be avoided and the students should be motivated to work hard and bring out their originality.

Cyberbullying

It is an act of harming, harassing, or targeting a person by another person using the internet, in a deliberate manner. This includes insulting remarks and threatening messages sent by email, spreading rumours about the person either by emails or social networking sites, posting embarrassing photos and videos to hurt the person, derogatory remarks against gender, race, religion, or nationality.



Steps to Prevent Cyberbullying

You should take the following measures to prevent cyberbullying:

- Do not disclose your identity to unknown persons.
- Safeguard your password and all private information from inquisitive peers. Do not give bullies any opportunity to misuse the information on the social media platform.
- Search the whereabouts of the person you meet online and know about him fully before extending your hand for friendship.
- Restrict your online profile to be checked by some trusted friends only.
- If you are cyber bullied by someone, do not remain silent but take action against it. Do not be repulsive in your language rather block the communication with the cyberbully and share this problem with your parents.

Phishing

It is an act of sending an email to a user, misleading him to believe that it is from a trusted person or organisation. The user is asked to visit a website where he is supposed to update or validate his personal details, such as username,



Know the Fact

Cybertrafficking refers to the serious crime of selling drugs, weapons, and even human beings over the internet. Some criminals even build websites for online selling and trade of these harmful commodities.

Let's Know More

Defamation is defined as a communication that intends to harm or damage the reputation of a person, business, product, government, religion, or nation.

Know the Fact

Keylogger programs are used to check the user's keystrokes and get important information, such as passwords.

Let's Know More

Social Engineering refers to psychologically manipulation of people into performing actions or divulging confidential information.

password, credit card details, etc. In this way, the operators of the fake website steal your identity and commit crimes in your name. This could damage your reputation and cause heavy financial losses.

Steps to Prevent Phishing

- Identify suspected phishing emails that come from unrecognised senders. Guard against scam.
- Do not click on links, download files, or open attachments in emails from unknown senders.
- Beware of links in emails that ask for the personal details.
- Enhance the security of your computer by protecting it with a firewall, spam filters, antivirus, and anti-spyware software.
- Do not divulge personal information over the phone unless you initiate the call. Enter your sensitive data in secured websites only. The URL of a secured website starts with https//: and your browser displays a green coloured icon of the closed lock.
- Check your online accounts and bank statements regularly to ensure that no unauthorised transactions are made.

Hacking



Hacking refers to an illegal intrusion into a computer system or network. Hackers are highly technical people who secretly break into computers to steal important data or sometimes to destroy it. They not only steal important data but also hack applications and websites to change program logics. Hackers usually tamper with data for unethical purposes, just for an obsession to break the system's securities. Although hacking is done without any consent from the user, yet it is not always destructive. Hacking which is done for a good cause, such as national security, etc., is known as **Ethical hacking**.

There is an equivalent term to hacking, i.e., cracking. **Crackers** are technical people, who are experts in breaking into systems, to steal important data, such as financial details, or passwords, etc. Sometimes, they use key loggers for this purpose. Crackers also cause harm to computers by destroying data. Apart from this, they disturb applications by spreading malware, changing program logics, and outputs.

Steps to Prevent Hacking

- Keep your passwords secret and change them periodically.
- Update your operating systems and other software, like antivirus, frequently.

- Avoid using open Wi-Fi as it makes easy for hackers to steal the information and download inappropriate content.
- Always make use of secure websites by looking at the green lock sign or https on the address bar. This ensures that the sensitive data, which is passed from your device, is encrypted, making it difficult for the hacker to decipher the information.
- Always check permissions and authenticity on the apps before installing them. You should also ensure that the apps are not accessing unnecessary information. For example, a drawing app should not have access to your contact list or network information.
- Never store your credit card information on a website.

Let's Know More

Clickjacking is a malicious technique of tricking a web user into clicking on something different from what the user perceives he/ she is clicking on. Thus, potentially revealing confidential information or taking control of his computer while clicking on seemingly innocuous web pages.

Spamming

Spams are unwanted bulk emails that come from unknown sources. They are generally sent in large numbers for commercial advertising. In spamming, millions of copies of the same message are sent to the email users worldwide. Spam is a serious security concern as it can be used to deliver trojan horses, viruses, worms, spyware, and organise targeted phishing attacks.



Know the Fact

Vishing is the criminal practice of using social influence over the telephone system, most often using features facilitated by Voice over IP (VoiP), to gain access to sensitive information. The term is a combination of "Voice" and "Phishing".

Tip

Sometimes, spam attackers keep sending bulk mails till the mail server gets full. This practice is known as **Mail Bombing**.

How to identify a spam?

- Messages that do not include your email address in the **To:** or **Cc:** fields are the common forms of spam.
- Some spams can contain offensive language or links to the websites with inappropriate content.

Let's Know More

Bot is one of the most sophisticated types of crime-ware applications that perform a wide variety of automated tasks on behalf of the cyber criminals.

Steps to Prevent Spamming

- Install spam filtering/blocking software.
- If you suspect that an email is a spam, do not respond, just delete it.
- Consider disabling the email client's preview pane and reading emails in plain text.
- Reject all instant messages from persons who are not in your contact list.

Know the Fact

Cyberespionage is the act or practice of obtaining secrets from individuals, competitors, rivals, groups, governments and enemies for military, political, or economic advantage.

- Do not click on the URL links within instant messenger, unless it is received from a known source.
- Keep the software and security patches up-to-date.

Individual Right to Privacy

In this digital era, there has been a significant increase in the use of technology. As technology is progressing, so the privacy parameters are diminishing. The internet is commonly used for various purposes, such as for personal communication, accessing the information on any topic, and for financial transactions, etc. The use of the internet can affect the privacy rights and personal data of a person.

Privacy is one of the major concerns in one's life. The right to privacy may be defined as the claim of individuals, groups, or institutions to determine when, how, and to what extent the information about them could be communicated to the others. Privacy issues come into the picture when personal information is collected, used, and shared without the consent of the authorised person or business concerned. So, certain preventive measures should be taken to avoid the infringement of privacy.

Steps to Protect Privacy

- Be careful while sharing your personal profile on the social networking sites.
- Never share your login details with anyone.
- Delete any sensitive data that is not in use.
- Never click on a link sent to you via text or email from a stranger.
- Protect your online privacy by disabling the cookies in the web browser being used. A cookie is a small text file stored on your computer's browser directory that collects the information of your online activity and reports back to the host.
- Install security software, like antivirus, anti-spyware, or firewall to protect your system against intrusions and infections.
- Lock your system when not in use.

Software Piracy



When software is copied and distributed illegally, it is called software piracy. A licence or copyright is required to copy the genuine programs of someone else.

You encourage software piracy when:

- you purchase a single licenced copy of the software and load it onto several computers contrary to the licence's terms. This is called **Softlifting**.

- you make unauthorised copies of the copyrighted software and distribute them.
- you install unauthorised copies of software on the hard disks of personal computers.
- you make unauthorised selling of software for temporary use or sell or buy the software CDs/DVDs on rent.

Steps to Prevent Software Piracy

- Buy the licenced copy of a software. Follow the terms and conditions of the licence for each software product you purchase. Never make copies and circulate them.
- Purchase software CDs from a reputed seller to ensure that it is genuine. Avoid using illegal CDs given by your friends to listen to your favourite music or watch movies.
- If software is available online, download it directly from the manufacturer's website.
- Register your software to avoid softlifting.

Intellectual Property Rights

Intellectual Property is a term that refers to the legal property rights of a person over his/her creations of mind, both artistic and commercial. Under Intellectual Property Law, the owners are granted certain exclusive rights to ensure that the creator's hard work is safe and protected from the unauthorised copying and piracy.

Steps to Protect Intellectual Property Rights

Patent your Inventions: A **patent** is a right, relating to the new inventions that grants the inventor the sole right to make, use, and sell that invention for a specific period of time. The validity period for a patent in India is 20 years from the date of filing the patent application.

Copyright your Art and Publications: A **copyright** is a legal right granted by the law to the creator for his original work. The rights provided under the Copyright law prohibit the others to create a copy of the work, translation of the work, and the distribution of the work to the public. Legal action can be taken if someone copies the work without the permission of the author or organisation. It covers artistic and literary creations, such as novels, plays, poems, musical compositions, and architectural designs. The copyright of a work lasts for more than seventy years, even after the death of its author.

Register your Trademarks: This protects your brand names, logos, packaging, and the other distinctive designs that identify and distinguish the products of one manufacturer or seller from that of the other's. The validity period for a trademark is ten years and can be renewed.

Safety Measures while using Computer and the Internet

Let us look at the various safety measures that should be undertaken while using a computer or the internet:

- Minors should always surf the internet under the supervision of their parents.
- Parents should decide and suggest age appropriate websites to their children.
- To minimise the chances of the attack of hackers and crackers, one should use strong passwords. A strong password must consist of at least six characters (more the characters, stronger the password) that are a combination of letters, numbers, and symbols (@, #, $,%,etc.) if allowed.
- To avoid losing data privacy while transmitting the data from one site to another, encryption can be implemented. **Encryption** is the process of transforming data into unreadable code. The result is an encrypted file, which is transferred over the network. At the receiving end it undergoes a process called **Decryption**, which converts the encrypted information into a readable form.
- Set up your computer for automatic software and operating system updates to make it robust.
- Taking regular data backup is the primary and most reliable method of data protection.
- Ignore unwanted and strange emails and be cautious of attachments, links, and forms in emails that come from unknown people.
- Make use of firewalls. A firewall is a security system that prevents the unauthorised people to access your system and network. It can be either hardware or software or a combination of both. It is implemented on the gateway of a network and follows a specific set of rules defined by the user or the network administrator. Based on these rules, it controls the incoming and outgoing network traffic.

Digital Footprints

As you know footprint is the impression left by a foot or shoe on the ground or a surface, similarly a **digital footprint** is an impression or information about a person that exists on the internet because of his online activity. This is the information transmitted online via filling a registration form, email attachments, online shopping, commenting on a social networking site, uploading videos, digital images, etc., all of which leave a trail of personal information available to the others. This information gets logged in a database. A digital footprint is also known as a **digital dossier**.



Digital footprints can be categorised into **active** and **passive** data traces. The active ones are those data traces, which the user leaves intentionally. Emails, chats, social networking sites, and blog posts are some of the ways with which a user can create active digital footprints.

Passive data traces, connected to an individual, are generated by the others or gathered through the user's online activities without his knowledge. Few activities that create passive data traces, include surfing the sites for searching information, online shopping, etc.

Implications of Digital Footprints

As discussed above, all the online activities leave behind footprints or information traces. These information traces could be used positively or negatively. So, before indulging in any activity, one should think over its outcomes.

Follow the guidelines given below while being online:

- Never post any silly or abusive comment.
- Tune the privacy settings of your social media account in a way that only your family or friends can see your posts and pictures.
- Do not log on to an inappropriate website.
- Do not upload any inapt picture.
- Avoid accepting friend requests from strangers.
- Be vigilant and extra cautious while being online as your carelessness or ignorance may generate a negative digital footprint, which can spoil your reputation.

RECAP

- Computer ethics is a set of procedures, moral principles, and ethical practices that regulates the use of computer.
- Plagiarism is the usage or imitation of the language and thoughts of another person and projected as one's own original work.
- Cyberbullying is an act of harming, harassing, or targeting a person by another person using the internet, in a deliberate manner.
- Phishing is an act of sending an email to a user, misleading him to believe that it is from a trusted person or organisation.
- Hacking refers to an illegal intrusion into a computer system or network.
- Spams are unwanted bulk emails that come from unknown sources.
- The right to privacy may be defined as the claim of individuals, groups, or institutions to determine when, how, and to what extent the information about them could be communicated to the others.
- When a software is copied and distributed illegally, it is called software piracy.

- Intellectual Property is a term referring to the legal property rights of a person over his/her creations of mind, both artistic and commercial.
- Cybercrime is any illegal activity done through the internet, e.g., identity theft, where somebody can steal your email id or password and use it to send fake emails to people.
- A digital footprint is an impression or information about a person that exists on the internet because of his online activity.



A. Fill in the blanks.

1. ..... is a set of procedures, moral principles, and ethical practices that regulates the use of a computer.
2. The simplest way to prevent plagiarism is ..... .
3. ..... is an act of harming, harassing, or targeting a person by another person using the internet, in a deliberate manner.
4. An illegal intrusion into a computer system or network is known as ..... .
5. ..... is a term referring to the legal property rights of a person over his/her creations of mind, both artistic and commercial.

Hints

- Intellectual Property
- Computing Ethics
- Hacking
- Citation
- Cyberbullying

B. Write T for True and F for False.

1. Spams are unwanted bulk emails that come from strange sources. ☐
2. Hacking is the usage or imitation of the language and thoughts of another person and projection of them as one's own original work. ☐
3. You can identify the unsecured websites by looking at the green lock sign or https on the address bar. ☐
4. A digital footprint is also known as a digital dossier. ☐
5. A patent grants the inventor the sole right to make, use, and sell that invention for an unlimited period. ☐

C. Application-based questions.

1. Neha is confused in deciding whether the mail that she has received is a genuine one or spam. Can you help her in identifying the spam by specifying any indicative measure?

   .....

2. Ruby is surfing the internet to prepare for the Civil Services Examination. She wants to know whether the websites she is referring to are secure or not. Suggest any two points that she should keep in mind while surfing online.

   .....

D. Select the correct option.

1. The unwanted bulk emails that come from strange sources are called ..... .

   a. Spam b. Trash c. Junk

2. ..... is a small text file stored on your computer's browser directory that collects the information of your online activity and reports back to the host.

   a. Register b. Cookie c. Browser

3. A ..... is a legal right granted by the law to the creator for his original work.

   a. Copyright b. Patent c. Trademark

4. ..... is the process of transforming data into an unreadable code.

   a. Encoding b. Encryption c. Decryption

5. ..... is an act of sending an email to a user, misleading him to believe that it is from a trusted person or organisation.

   a. Phishing b. Spamming c. Hacking

E. Answer the following questions.

1. List any four ethical guidelines that should be followed while using a computer.

   .....

   .....

   .....

2. Define plagiarism. What steps can be taken to prevent it?

   .....

   .....

   .....

3. How can you protect the Intellectual Property Rights from getting violated?

.....

.....

.....

4. Write short notes on:

a. Spamming: .....

.....

.....

.....

b. Cracker: .....

.....

.....

.....

c. Digital Footprint: .....

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.....

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d. Software Piracy: .....

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e. Hacking: .....

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f. Phishing: .....

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ACTIVITY SECTION



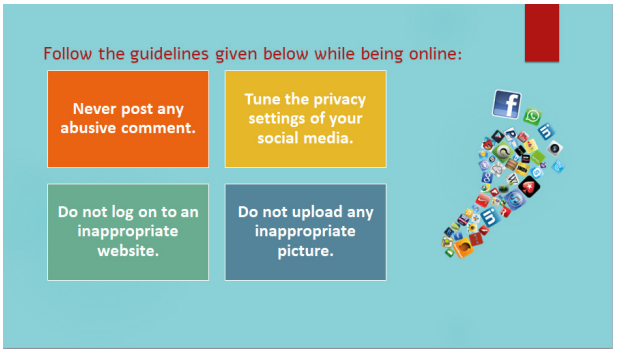
LAB SESSION

Perfection Through Practice

Create a PowerPoint presentation on the topic Digital Footprints. Apply animation and transition effects to make the presentation interesting. Two sample slides have been given here. Include the following in your presentation:

- Detailed information about digital footprints
- Type of digital footprints—active and passive
- Tips to manage digital footprints





GROUP DISCUSSION

For Concept Clarity



Discuss the following topics:

- **Common Unethical Practices**
- **Hackers vs Crackers**

PROJECT WORK

Using Creativity



Make a presentation on **Cybercrimes against organisation/society and their harmful effects**. Make use of effective pictures, audio, and video clips wherever required.

ONLINE LINKS

Looking For More



To know more about the unethical practices, visit the following websites:

- http://mediasmarts.ca/digital-media-literacy/digital-issues/cyber-security/cyber-security-spamscams-frauds-identity-theft
- https://www.ijecs.in/issue/v3-i12/45%2oijecs.pdf

Chapter 10

Introduction to Robotics

LEARNING OUTCOMES

The student will be able to:

- differentiate between robots and automatic machines.
- know about the history of robots.
- learn about the various components and types of robots.
- classify the robots and know about some famous Indian robots.
- state the role of AI in robotics.

All of you must have seen the film *Wall-E* based on robots. If yes, then you must be aware of what robots are and how they have changed human lives.

Ken Goldberg said "We're fascinated with robots because they are reflections of ourselves."

Robot



A **robot** is a machine that is programmed by a computer and can do many complex actions automatically. Robots are controlled by an external control device or from within. They can be designed in human form, but most of them are based on machine-design. They are programmed to perform all tasks, regardless of their looks.

The word 'robotics' has been derived from the word *robot*.

It was introduced to the public by the Czech writer Karel Čapek. This word comes from the Slavic word 'robota', which means *slave* or *servant*.

Robots vs Automatic Machines

The **ability to carry out complex actions automatically** is the key element of robotics but it is also true for many other machines, like washing machine, microwave, dishwasher, etc. Although, washing clothes cannot be considered a complex series of actions, but flying a plane on the auto-pilot mode definitely consists of a complex set of steps. Thus, there are many machines that are almost a cusp of automation and robots.

Programmable by a computer is another key element of robots as many automatic machines are programmed mechanically and not very flexible. But since computers are found everywhere now, so it becomes difficult to use this aspect to distinguish a robot from another machine.

How can you differentiate between a robot and an automatic machine?

- Most robots use **sensors**, which help them adapt their actions to the environment and enable them to carry out complex tasks.
- Robots can be used in any situation and for any purpose, but primarily they are used in dangerous environments (like bomb detection and deactivation), manufacturing processes, or where humans cannot survive.

History of Robots

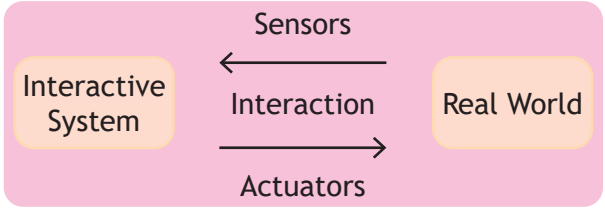
The following table gives you a quick glimpse of the history of robots.

1954: The first industrial robot Unimate was designed by George Devol. He coined the term Universal Automation. He later shortened it to Unimation, which became the name of the first robot company, in 1962.
1978: The Programmable Universal Machine for Assembly (PUMA) robot was developed by Unimation, with General Motors' design support.
1980s: By this era, the robot industry had entered a phase of rapid growth. Many institutions introduced programs and courses on robotics. These courses were spread across various branches, such as mechanical engineering, electrical engineering, and computer sciences.
2003: NASA's twin robot geologists, the Mars Exploration Rovers, were launched towards Mars on 10 June and 7 July, in 2003. They were sent in search of water on Mars. This program was a long-term effort in the field of robotic exploration of space.

Components of Robots

A robot has the following essential components:

- Robots interact with the physical world via sensors and actuators. Various sensors, like light sensors (eyes), touch and pressure sensors (hands), chemical sensors (nose), hearing and sonar sensors (ears), and taste sensors (tongue) give a robot awareness of its environment.
- Robots can easily move around and have electrical components for providing power and controlling the machinery.
- Various mechanical constructions help to shape or form the design of a robot so that they can accomplish a particular task.
- Robots have a type of **computer program** that determines what, when, and how a robot can complete its tasks. They can carry out a 'complex series of actions' automatically.



Types of Robots

Depending upon the use and application, robots can be classified into three types:

Simple Level Robots

These robots are simple and cannot carry out heavy or complex tasks. They are, basically, just able to support humans in their daily tasks. For example, washing machines.

Middle Level Robots

These robots once programmed cannot be reprogrammed and have sensor-based circuits, which can perform multiple tasks. For example, fully automatic washing machines.

Complex Level Robots

These robots can be programmed and reprogrammed easily. They have complex model-based circuits. For example, laptops or computers.



Washing Machine—An example of simple-level robots



Fully Automatic Washing Machine—An example of middle-level robots



Laptop—An example of complex-level robots

Classification of Robots

According to the Oxford English Dictionary, robots can be defined as 'A machine capable of carrying out a complex series of actions automatically, especially the one programmable by a computer.' They can be classified based on their working environment or application.

Based on Working Environment

The robots are classified as follows based on the environment in which they can be used:

Fixed Robots

These are mostly used in industries with a well-defined work environment, adapted for robots. These robots perform specific repetitive tasks, like painting parts in a car manufacturing plant. With high capacity sensors, they are also used increasingly for high-precision surgery.



Figure 10.1: Fixed Industrial Robot

Mobile Robots

They move around and perform tasks in large, uncertain environments. They are quite helpful in situations that are not defined in advance and keep on changing over time. They deal with unpredictable entities, like humans and even animals. Self-driving cars, vacuum cleaners, and drones are some common examples of mobile robots.



Figure 10.2: Drones

Based on Application

Robots have **precision**, **accuracy**, **speed**, and **dependability**. Therefore, companies are trying their best to bring robots into action.

Industrial Robots

Initially, the robots that were created were industrial robots. They were used to replace human workers for performing simple and repetitive tasks, in a well-defined environment. The simplicity of the tasks and well-defined environment simplified their design process. However, today's industrial robots can manipulate the objects in different orientations and even recognise the various objects that need to be packaged in a different order.



Figure 10.3: Industrial Robots

Service Robots

Service robots have improved sensors and interact with humans closely.

They are used to assist humans in tasks, like cleaning (vacuum cleaners), transportation (self-driving cars), defence applications (drones), medical procedures (surgery), etc.



Figure 10.4: Robot-assisted Surgery

Military Robots

Being in the army is a tough job and robots help to make the work of the soldiers easier. There are often bomb threats and the drones help in pinpointing the various locations of these bombs, which acts as a big help to the army men.

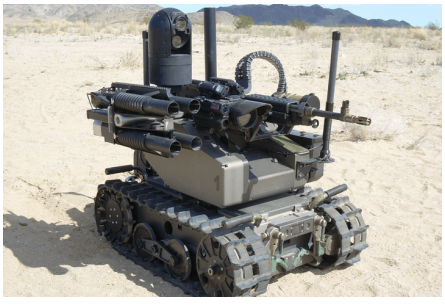


Figure 10.5: Military Robot

Space and Outer Space Robots

These types of robots are brought into play in space shuttles. They are used in international space stations, together with Mars explorers, and the other robots. They are employed in space exploration and other such activities.



Figure 10.6: Canadram 2 Robotic Arm

Some Famous Indian Robots

	**Daksh:** It is an electrically powered and remotely controlled robot. It is used for locating and destroying harmful objects safely.
	**IRA 2.0:** HDFC bank has a humanoid robot assistant to answer the frequently asked questions by customers.
	**Mitra:** It was launched by the Prime Minister Narendra Modi and Ivanka Trump at GES conference 2017.
	**Manav:** India's first 3D-printed humanoid robot. It can perform push-ups and play football.

Introduction to Robotics

Robotics is a branch of engineering and science. It deals with the design, construction, operation, and use of robots, including the design of computer systems for their control, sensory feedback, and information processing.

Most of the research today in the field of robotics revolves around making robots more autonomous by improving the sensors and enhancing intelligent controls. Efforts are made to make the robots more flexible and adaptable towards new situations based on

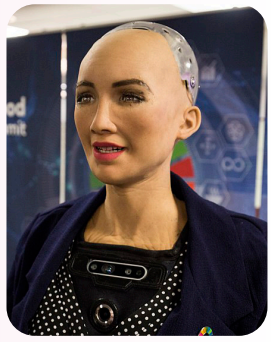
human interaction and past learning. It requires both sensing and intelligence as well as understanding the psychology and sociology of human interactions.



Example

Sophia is a social humanoid robot with the ability to display more than 50 facial expressions. It was developed by a Hong Kong-based company Hanson Robotic. Sophia was activated on 19 April 2015, and made her first public appearance in mid-March 2016 in Austin, Texas, United States.

With the granting of a Visa by Saudi Arabia in October 2017, Sophia become the first robot to receive the citizenship of any country. In November 2017, Sophia was named the United Nations Development Program's first-ever Innovation Champion, and the first non-human to be given any United Nations title.



Robotics and Artificial Intelligence

Robotics and Artificial Intelligence are often confused to be the same. However, they are totally different terms. The difference between them is shown in the image.

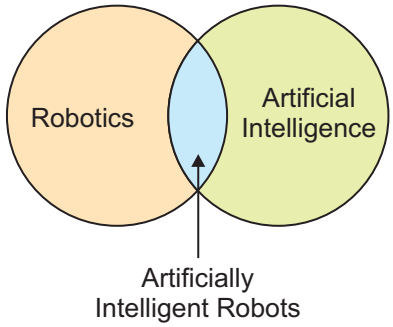


Figure 10.7: Robotics vs Artificial Intelligence

As this is clear from the image, there is a very thin line where these two fields overlap. One can say that AI is the brain while robotics is the body. It deals with the development of robots and AI is the computer science branch that helps in developing the software.

Let us consider an example. You can design a simple robot and program it to pick up an object and place it at another location. You can also add a program to repeat this task until the robot is told to stop.

Now, with the help of an AI algorithm and a camera, you can make the robot visualise the object, recognise what it is, and determine where it should be placed.

Artificially Intelligent Robots

It is clear from the above example, that artificial intelligence is the technology that is used to program robots. The robots that show intelligent behaviour after getting programmed are called **Artificially Intelligent Robots**. These are the future of technology. With the further research and development, you can expect the artificially-intelligent robots to start behaving like humans.



RECAP

- A robot is a machine that is programmed by a computer and can do many complex actions automatically.
- Depending upon the use and application, robots can be classified into three levels—Simple level, Middle level, and Complex level robots.
- Fixed robots are mostly used in industries with a well-defined work environment adapted for robots.
- Mobile robots move around and perform tasks in large, uncertain environments.
- Industrial robots can manipulate objects in different orientations and even recognise the various objects that need to be packaged in a different order.
- Service robots have improved sensors and interact with humans closely to assist them in tasks.
- Robotics deals with the design, construction, operation, and the use of robots, including the design of computer systems for their control, sensory feedback, and information processing.
- The robots that show intelligent behaviour after getting programmed are called artificially intelligent robots.

Brain developer

A. Fill in the blanks.

1. Robots are controlled by ..... control devices.
2. Most robots use ....., which help them adapt their actions to the environment.
3. Robots have a type of ..... that determines what, when, and how a robot can complete its tasks.
4. ..... robots can be programmed and reprogrammed easily.
5. Robots interact with the physical world via sensors and ..... .

Hints

- Computer Program
- Sensors
- Complex Level
- External
- Actuators

B. Write T for True and F for False.

1. Simple level robots have complex model based circuits. ☐
2. A laptop is an example of a middle-level robot. ☐
3. Fixed robots are mostly used in industries with a well-defined work environment, adapted for robots. ☐
4. Robots can never replace human workers. ☐
5. Service robots have improved sensors and interact with humans closely. ☐

C. Match the following.

First industrial robot	Service robots
Washing machine	Launched by the Prime Minister Narendra Modi
Mitra robot	Simple-level robots
Robot-assisted surgery	Unimate

D. Answer the following questions.

1. Classify the three types of robots.

.....

.....

.....

2. Give a difference between a fixed and mobile robot.

.....

.....

.....

3. What are service robots?

.....

.....

.....

4. Name two of India's famous robots and write their speciality.

.....

.....

.....

5. What are artificially intelligent robots? Give an example.

.....

.....

.....

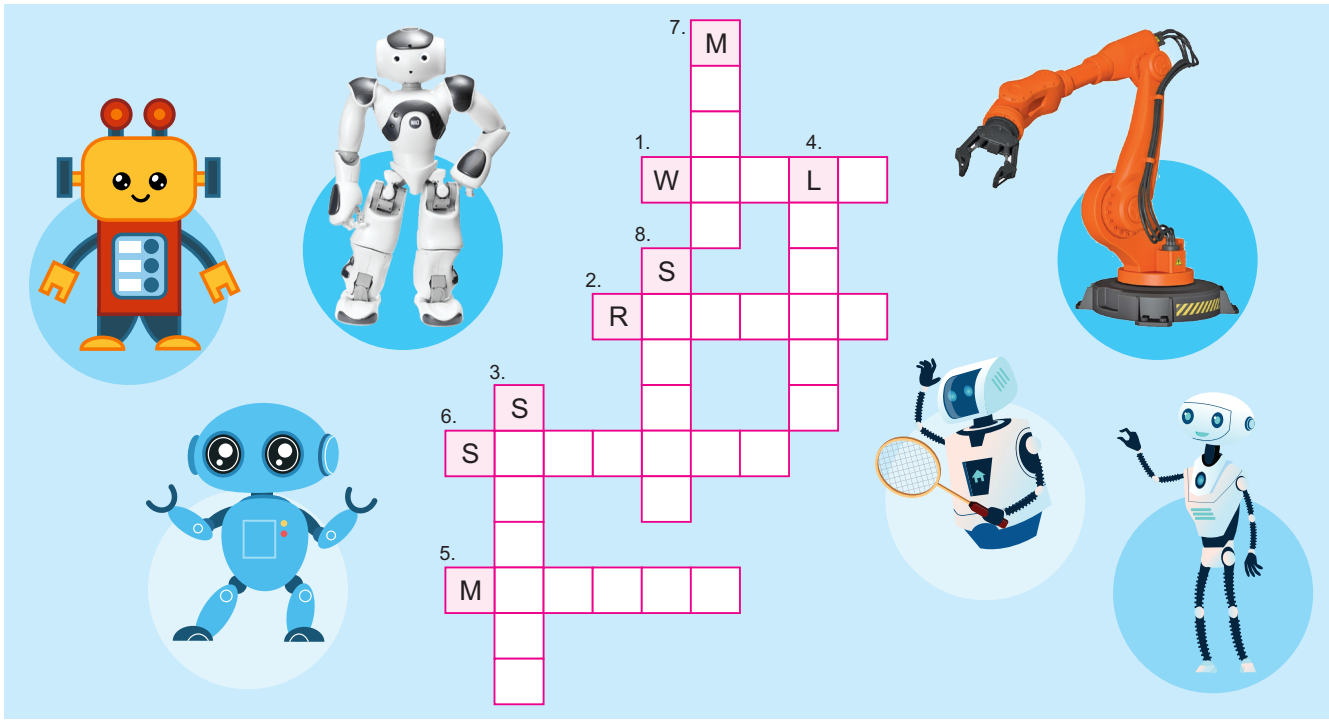
ACTIVITY SECTION



MY ACTIVITY

Learning While Playing

Solve the crossword with the help of the given clues.



Clues:

1. Name a film based on robots.
2. This word comes from the Slavic word, which means slave or serva.
3. These are used in robots, so that they can adapt their actions to the environment.
4. It is an example of a complex-level robot.

5. These type of robots are quite helpful in situations that are not defined in advance and keep on changing over time.
6. These type of robots have improved sensors and interact with the humans closely.
7. It is India's first 3D-printed humanoid robot.
8. It is a social humanoid robot with the ability to display more than 50 facial expressions.

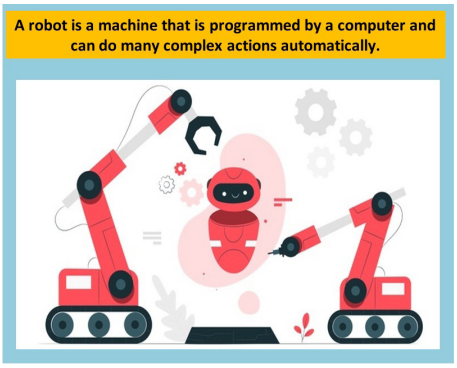


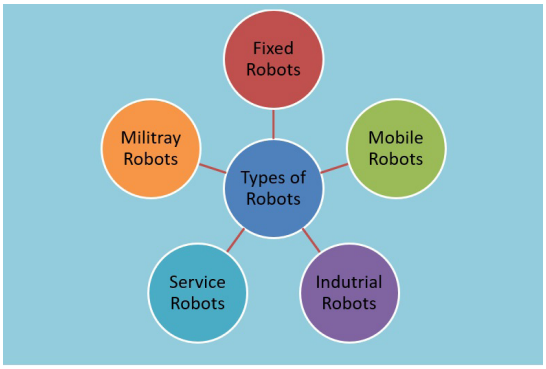
LAB SESSION

Perfection Through Practice

Create an engaging PowerPoint presentation about the evolution of humanoid robots. Two sample slides have been given here. Include the following in your presentations:

- Introduction to robots
- Detailed information on different types of robots
- Evolution of humanoid robots
- Some famous humanoid robots





GROUP DISCUSSION

For Concept Clarity



Discuss the following topics:

- **Robots: A Boon or Curse**
- **Role of AI in Robotics**

PROJECT WORK

Using Creativity



Make a model of a robot by using the waste material you find at your home. Use your creativity to give it a realistic look and feel.

ONLINE LINKS

Looking For More



To know more about robotics, visit the following websites:

- https://www.britannica.com/technology/robotics
- https://mitrarobot.com/#applications

2 WORKSHEET

Chapters 6—10

A. Fill in the blanks.

1. Linking of one part of a web page to another section on the same page, is called ..... .
2. ..... are used to name different components of a program.
3. ..... are a sequence of characters that represent values in a program.
4. When a software is copied and distributed illegally, it is called ..... .
5. ..... robots are mostly used in industries with well-defined work environment.

Hints

- Internal
- Software Piracy
- Identifiers
- Fixed
- Literals

B. Write T for True and F for False.

1. The mysqli_connect method is used to establish a connection with the database. ☐
2. RDBMS makes use of the parent-child relationship for storing data. ☐
3. In PHP, the POST method is used with the <form> tag. ☐
4. The comparison operators determine the relation between two or more operands. ☐
5. You can insert video files in your HTML pages with the help of the <video> tag. ☐

C. Select the correct option.

1. ..... enable the user to divide a page into a number of rectangular segments.

   a. Frames b. Links c. Tables

2. The ..... is used to mark the text as a hyperlink.

   a. <SRC> b. <A> c. <IMG>

3. In PHP, an identifier name starts with a ..... symbol.

   a. $ b. & c. @

4. ..... are symbols used to perform arithmetic or logical operations on a given expression.

   a. Operators b. Identifiers c. Variables

2 TEST PAPER

Chapters 6—10

Name: ..... **Date:** .....

A. Answer in one word.

1. Name the method that is used to connect a web page to a database. .....
2. Name the method that is used to fetch the record from the table. .....
3. Name the HTML tag that is used for inserting hyperlinks. .....
4. The CSS property that renders the inline frame borderless. .....
5. Name the robot developed by Unimation in 1978. .....

B. Answer the following questions.

1. Write down the difference between industrial robots and service robots.

.....

.....

.....

2. How can you protect Intellectual Property Rights from getting violated?

.....

.....

.....

3. Give two advantages of PHP. What is the use of code editor window?

.....

.....

.....

4. What is the difference between internal and external linking?

.....

.....

.....

Teacher's Signature: .....



PROJECT WORK



MS Access

Project: Online Groceries Delivery Store (OGDS) maintains the records of items sold in a database called **Items**. Create a database in Access and store all the details shown below in table **Groceries**.

The description of the table is given below:

S.No.	Field Name	Data Type
1.	Item_Id	Auto Number
2.	Item_Name	Text
3.	Item_Description	Text
4.	Date_of_Packing	Date/Time
5.	Units_Sold	Number
6.	Item_Price	Currency
7.	Item_Type	Text
8.	Barcode	Text
9.	Seller_Name	Text
10.	Seller_Address	Text
11.	Phone_No	Text
12.	Pin_Code	Number
13.	Dispatch_Date	Date/Time



Instructions:

- Add twenty records in the table.
- Select the field Item_Price and place it before Units_Sold.
- Sort the data in Item_Price field.
- Filter the data and display the details of only those items whose price is greater than 100.
- Rename the field Date_of_Packing to Packing_Date.

Create the following queries on the table:

- Display the items whose price is greater than 200.
- Display the records with Packing_Date May-31-2021.
- Retrieve the records of the goods whose Units_Sold is greater than 500.
- Run the queries one-by-one and save the database.
- Create a report showing the number of items sold every year. Add a chart in the report to show the sale of the various items according to the Packing_Date.

Python

Project: The **Healthy Times** health and fitness club has announced discounts for its membership holders. The club provides three types of memberships—Gold, Diamond, and Platinum. The membership codes for Gold, Diamond, and Platinum are 1, 2, and 3, respectively. The club also offers healthy meal plan for its members - Type A and Type B. The cost of meal plan is Type A—Rs. 250 per day and Type B—Rs. 350 per day.

Create a program that will accept the Name of a Customer, Membership Code, Meal plan, and Number of Days for which the customer wants to opt for the meal plan.

Membership/ Meal Plan	Gold	Diamond	Platinum
Type A	10%	15%	20%
Type B	15%	20%	25%



Healthy Times

Instructions:

- Write the code to input the customer name, membership code, meal plan, and number of days.
- Write the code to check the value of the membership code and apply the respective discount. Initialise the value of the corresponding variables as shown in the following table.

Membership Code	Discount Percentage	Value of Variable
1	Type A = 10%	discountTypeA=10
	Type B = 15%	discountTypeB=15
2	Type A = 15%	discountTypeA=15
	Type B = 20%	discountTypeB=20
3	Type A = 20%	discountTypeA=20
	Type B = 25%	discountTypeB=25

- After initialising the values of the variables, (discountTypeA and discountTypeB), get input for the type of meal plan, A for Type A and B for Type B.
- Check the value of the meal type and calculate the payable amount as follows:

  Bill Amount = Cost of Meal Plan per day × No. of Days

  Discount = Bill Amount × Discount on type of Meal Plan / 100

  Payable Amount = Bill Amount – Discount Amount

Project: Create a website on the topic "India is a Land of Diversity" by following the given instructions.



Instructions:

- Include different elements and attributes that you have learnt in HTML, like Images, Hyperlinks, and Frames.
- The home page of your website should look like the one shown in the figure.
- Create the hyperlinks for the following:

  Home, People and Lifestyle, State, My India My Pride, Contact Us

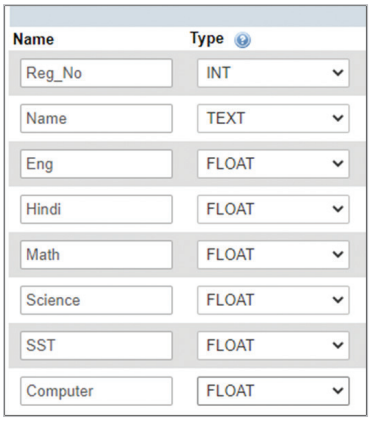
  These links should take you to their respective pages, which will give you more information.
- Use H1 heading for the title of the web page. You can use any background colour for your web page.

- When you click on the festival's image, a new page with more information should appear.
- The next set of festival images should appear when you click on the action button. You can add colourful images of your regional festivals.

PHP

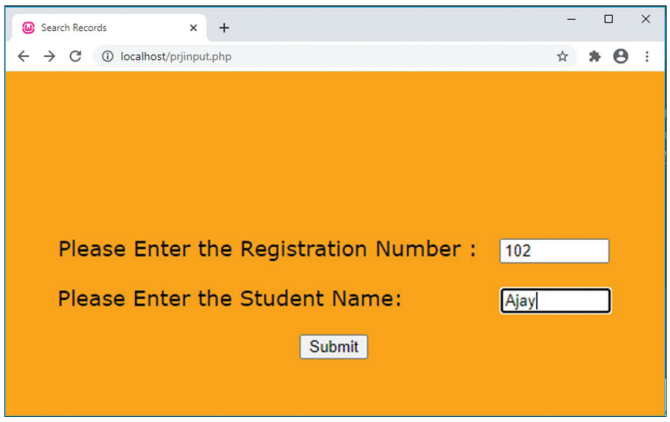
Project: Create a project in PHP that can retrieve the marks scored by the students in their semester exams. To create the project, follow the given instructions.

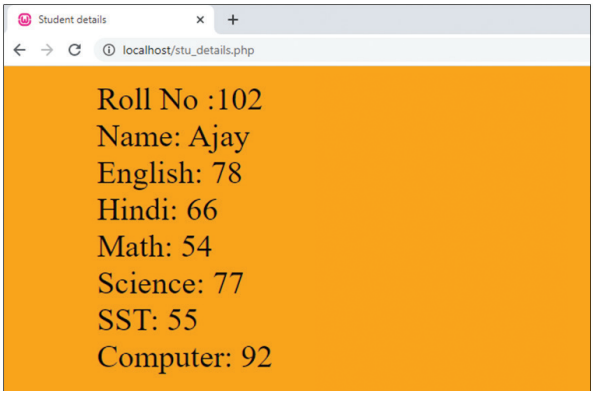
- Open phpMyAdmin and create a database named **Result**.
- Create a table named **Marks** in the database **Result** with the fields shown here.
- Add ten records in the table Marks.



Reg_No	Name	Eng	Hindi	Math	Science	SST	Computer
101	Amit	79	87	65	88	92	98
102	Ajay	78	66	54	77	55	92
103	Nikhil	76	67	58	55	77	91
104	Anmol	65	78	34	65	79	86
105	Ashna	77	78	65	98	88	97
106	Mehak	67	76	72	78	75	90
107	Amrita	88	65	77	88	82	91
108	Ritesh	89	80	66	77	72	96
109	Aditi	73	68	69	66	62	88
110	Piyush	66	78	86	85	65	89

- Now, create a PHP web page and add a Label, Textbox, and Button on the page.





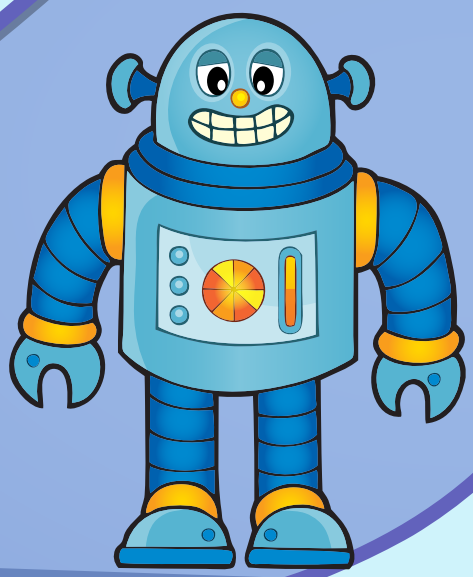
- The output page should display the marks of the students based on the values entered by the user.

Robo World

Start

1. Give two examples of networks.
2. State any one difference between a query and form.
3. Jump to 6
4. What does PHP stand for?
5. Name an Indian robot.
6. Jump to 10
7. Name any one component of a database.
8. State two important rules to define variables in Python.
9. Name the web server used to run PHP code.
10. What are scripting languages?
11. Name the two membership operators in Python.
12. Jump to 14





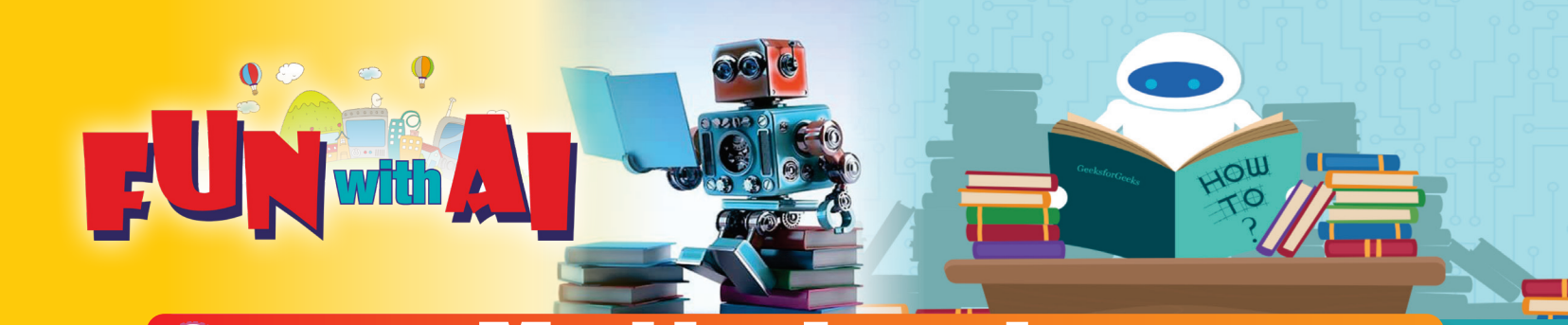




Take a dice and two counters to play the game.

Rules to play games:

- Roll the dice and move your counter.
- Answer the question correctly to move forward.
- If your answer is wrong, go back to your previous position.



Machine Learning

When you started learning, you first studied alphabet, then you learnt how to make words, and then sentences. You learn gradually and by your past experiences. Machines can also learn in the same way by their past experiences. The computers or machines which work on the instructions can also learn on their own from the data that is given to them as input. This is machine learning.

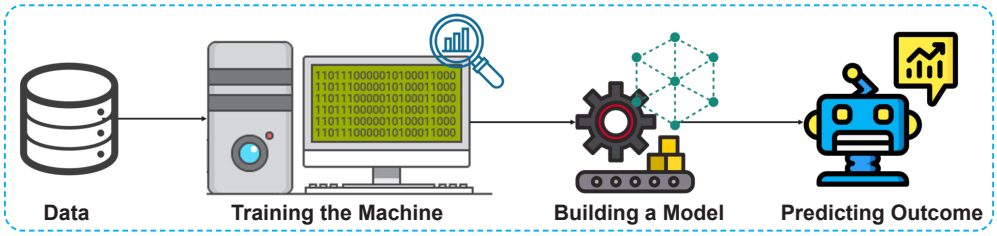
So, machine learning can be defined as the capability of a machine to learn from data automatically and improve performance through experience without being programmed explicitly.

Need for Machine Learning

Humans cannot process the huge amount of data manually. So, here comes machine learning that makes this task easy. The need for machine learning is increasing day by day, because it is capable of doing tasks that are too complex for a person to implement directly.

Working of Machine Learning System

A Machine Learning system learns from past data, builds the prediction models, and predicts the output for any new data added to it. The accuracy of the predicted result depends upon the amount of data, as the huge amount of data helps to build a better model which predicts the output more accurately. More the data, more accurate the result will be.



Machine learning algorithms can be trained by automatically analysing large amounts of data, examining it, building models, and anticipating the desired output. The cost function can be used to determine the performance of the machine learning algorithm, which is dependent on the amount of data. By using machine learning, both time and money will be saved.

Features of Machine Learning

- Machine learning uses huge amount of data to detect various patterns in a given dataset.
- It can learn from past data and improve automatically.
- It can solve complex problems, which are difficult for a human.
- It helps in decision making in various sectors.
- It helps in finding hidden patterns and extracting useful information from data.

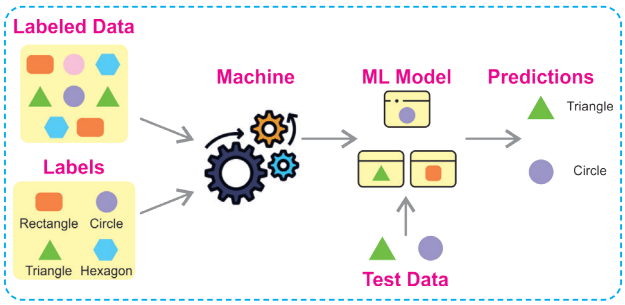
Types of Machine Learning

Machine learning can be divided into three categories:

Supervised learning | Unsupervised learning | Reinforcement learning

Supervised Learning

In supervised machine learning system, the machines are trained using well "labelled" training data. On the basis of that data, machines predict the output. The labelled data means some input data is already tagged with the correct output.



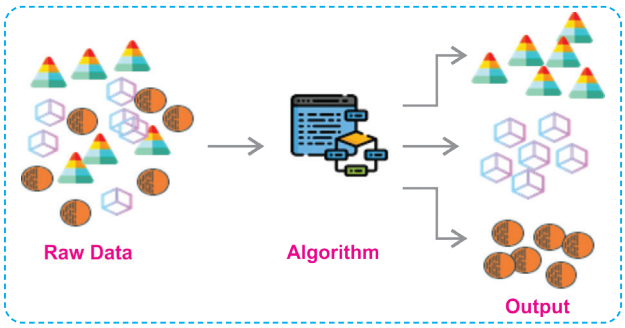
Supervised Learning

The system creates a model using labelled data to understand the datasets and learn about each data. Once the training and processing are done, the model is tested by providing a sample data to check whether it is predicting the exact output or not. The examples of supervised learning are spam filtering in emails, weather forecasting, image recognition, etc.

Unsupervised Learning

This is a learning method in which a machine learns on its own and without any supervision.

The training is provided to the machine with the dataset that has not been labelled, classified, or categorised. The machine finds the hidden patterns on its own from a huge dataset. You can compare this method to the working of the human brain while learning new things.

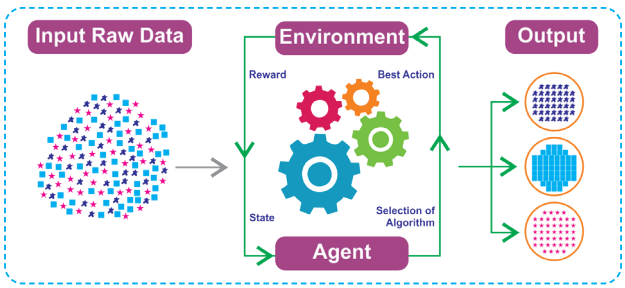


Unsupervised Learning

The examples of unsupervised learning include autonomous cars, item categorisation, and similar item recommendation.

Reinforcement Learning

Reinforcement learning is a different method than supervised and unsupervised learning. It is a feedback-based learning method, where a learning model gets a reward for each right action and gets a penalty for each wrong action. The model learns automatically with these feedbacks and improves its performance.



Reinforcement Learning in ML

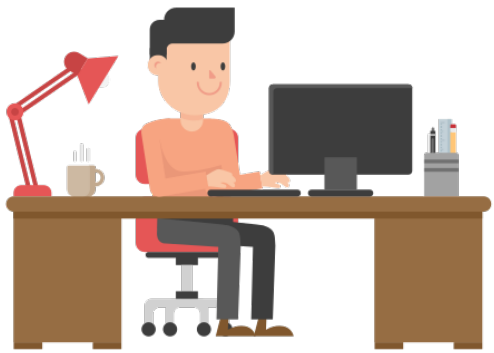
Recommendation systems and games like AlphaGo are the best examples of reinforcement learning.



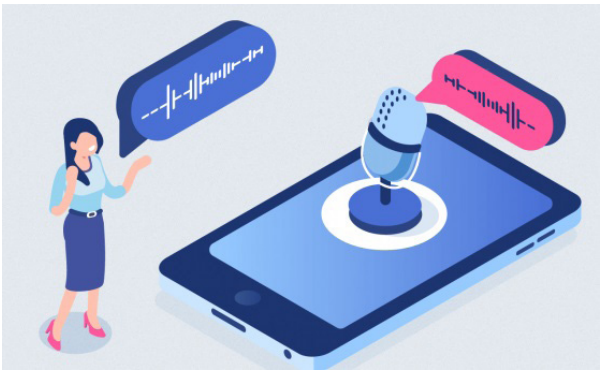
Natural Language Processing

Natural Language Processing (NLP) is an emerging technology that is going to change the way you interact with the computers. For the last few decades, humans have been interacting with the computer using text commands. These commands are fed into the computer system using some common input devices, like keyboard and mouse. The latest trend is to create machines that can think and act like human beings. This has led to the creation of an interface that is more based on speech. Although, for the last few decades technologies, like text to speech and speech to text are in use, still no technology can be used to give commands to the computers using human languages. The answer to this is Natural Language Processing. It is the process of making computers understand human languages.

You might have come across different NLP technologies, in day-to-day life. Let us look at some of these trending technologies that make use of NLP.



Input using Keyboard and Mouse



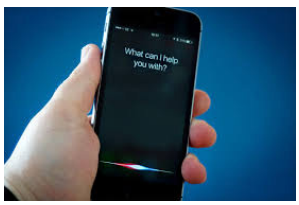
Input using NLP

Alexa

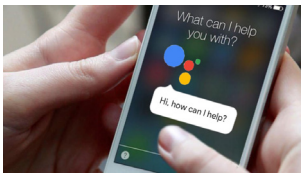


Alexa is the device that is gaining immense popularity among the users and becoming a household gadget. It makes use of NLP to interpret the voice commands and convert them into text commands. Then, it routes the interpreted command to the cloud service for taking actions.

Apple Siri



Siri is one of the most popular virtual assistants developed by Apple and used in various devices, like smartphones, smart watch, iPad, and computing devices with macOS.

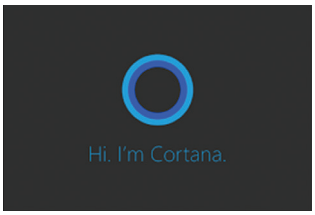


Google Assistant

Google Assistant can connect to all smart devices that make use of the Android operating system. It helps its users in managing tasks, planning a day, searching images, and answering queries.

Cortana

Cortana is a personal digital assistant developed by Microsoft. It includes the various types of features, such as calendar, reminders, alarms, photo reminders, recognise natural voices without the requirement for keyboard input, and answers the queries.



Google Maps

Google Maps is an application that is widely used for navigation. It helps the users in finding out the directions to reach a certain location. Other than that, it also shows information related to traffic in real-time, suggests alternate routes if you are travelling by foot, car, train, bicycle, and air. You can take directions by Google Maps by just pressing the mic button and speaking.



Linguistics to Natural Language Processing

All the components discussed here make use of the Natural Language Processing. Research on human languages has been going on for quite a long time. For better understanding, let us now look at the pathway of Natural Language Processing.

Linguistics

Linguistics is the scientific study of a language. It includes the study of rules that govern a language, like grammar, phonetics, and semantics. The study of these rules help in the better understanding of the languages. The linguistics study can help you in formulating new rules for a language and also assist in the translation of one language to another.

Computational Linguistics

Computational Linguistics is a twenty first century stream that makes use of the computers to study the grammar, phonetics, and semantics rules of language. The computational power of the computer system helps in processing a huge amount of the linguistic data in a short span of time. This means the complexities of a language can be understood quickly and new discoveries can be made.

Statistical Natural Language Processing

With time the computational power of the computers increased many folds. Now, the computers are capable of processing a huge amount of data. Various statistical methods are used to understand and process the linguistics rules. In 1990, the statistical machine learning was introduced, which replaced the classical method of top-down rule of evaluating a language.

Natural Language Processing

With the advent of machine learning, the focus is on building computers that can make use of the earlier studies in Computational Linguistics and Statistical Natural Language Processing research and convert it into an automated system. This system can help machines learn human languages, thereby making the communication much effective and easier.



Computer Vision

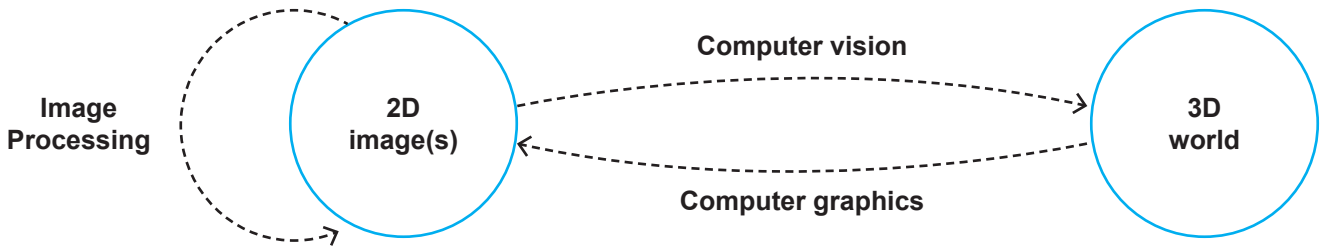


Images and videos have become a very important part of our life. Human mind can easily process digital media and recognises everything almost instantly. Do the machines also recognise the objects in the same manner? Yes! This is possible with the help of Computer Vision. Computer Vision is one of the domains of artificial intelligence.

Computer Vision vs Image Processing

Image processing is the process of image to image transformation. The input and output of this process are both images.

Computer vision, on the other hand, is the process of obtaining meaningful descriptions of the objects from their images. The output of computer vision is a description or an interpretation of the structures in a 3D scene.



There is another field, **computer graphics**, that is the opposite of computer vision. In computer graphics, a 3-D scene is represented using 2-D images.

Applications of Computer Vision

The applications of computer vision can be seen in almost every aspect of our lives these days. Some of them are discussed here:

Recognition of Facial Expressions



Face recognition systems are capable of capturing more than just features. These algorithms are programmed in such a way that they can capture all of the distinctive features of a face from numerous angles. For example, they measure and remember the distance between a person's eyes and lips!

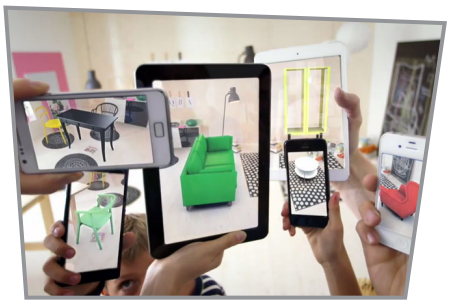
Medical Diagnosis

In the healthcare industry, computer vision has a wide range of applications. It can aid medical practitioners in their education. Using computer vision, doctors can effectively interpret medical images obtained through procedures such as X-ray and MRI.



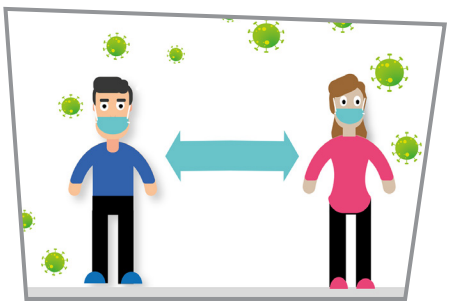
Augmented Reality

Augmented Reality (AR) starts with a real-world setting and then adds computer-generated input. Several elements from both the real and augmented surroundings can interact and be digitally altered. As a result, AR can simply be defined as a combination of the two realities. It produces a three-dimensional registration of real and virtual objects.



Social Distancing

In the current Covid-19 pandemic, every single human life is at risk of infection, and social distance is the need of the hour. Here, computer vision cameras and sensors can be used to effectively monitor public venues, track social separation, and enforce the laws and regulations on those who break them.



Unmanned Aerial Vehicles (UAVs)

Computer Vision-enabled drones or UAVs can be used for a variety of reasons during COVID-19.

Emergency food and testing kits are being delivered and disinfectant is being sprayed to sanitise public areas using them. The cameras are used to detect uncovered citizens. Speakers are used to communicate the advisory. The movement of people can also be monitored in the quarantine shelters.



Heavy Industry

In heavy industry, computer vision can be utilised to provide image-based automation for business activities such as process control, automated inspection, robot navigation, and so on.



Self-driving Cars



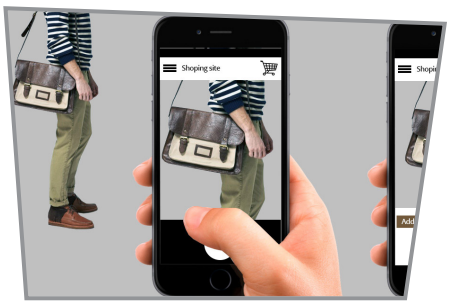
Over the last few years, self-driving cars have been at the forefront of the automotive industry, and computer vision has promised to make this vision a reality. YOLO (You Only Look Once) is a widely used computer vision technique for autonomous driving that can detect items in the path quickly.

Optical Character Recognition



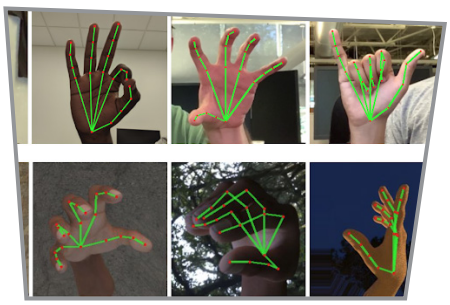
The computerised conversion of photographs containing handwritten text into machine-encoded text is known as OCR. Text processing in various forms, such as a snapshot of a document, a scanned document, subtitles overlay on an image, or a scene-photo, are included. Matrix matching, for example, is one of the computer vision algorithms utilised in OCR technology.

Visual Search



Visual search looks for relevant photos, websites, blogs, or other postings using images rather than text as keywords. The Visual Search Engine has been designed to bridge the time gap between your search and the results. Google Lens, for example, allows users to search for items using the lens and receive similar results to their picture search.

Gesture Recognition



Multiple techniques for detecting human gestures and postures exist in the computer vision field, which is unsurprising. They are capable of deciphering human gestures that arise from any movement or state of the human body. A store supervisor, for example, could use emotion recognition to determine whether or not consumers are satisfied with the services provided.

Conclusion

Computer vision is a growing field that is used to process data in the form of images and videos by a variety of industries. After all, even after processing trillions of GBs of data, a computer can never become fatigued. It is the time to push the boundaries of computer vision and realise its full potential.

CYBER SAFE BOOK

THINK

Think cautiously before you post anything on social media. It can be misused by a mischievous person.



POST

Do not post your photos and updates when you are on a vacation with your family. Do that when you get back.



BE KIND



Never post something that might hurt someone.

FRIENDS



You should only add your friends to your network. Do not share any personal information with strangers.



SAFE BROWSING



https://

Stop! If a green padlock sign is not present in the address bar, avoid visiting that site and do not submit any sensitive information.

PASSWORD

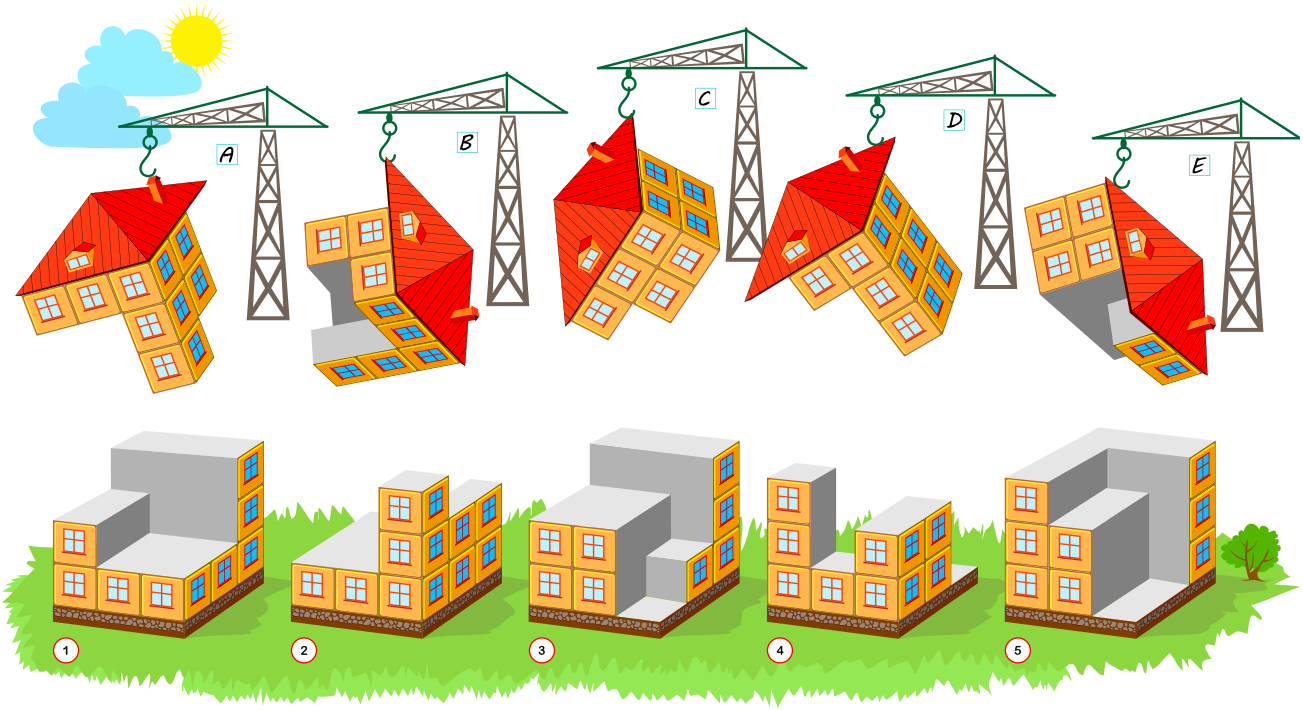


Never share your password with anyone. Keep a strong password which should contain letters, digits, and special characters.

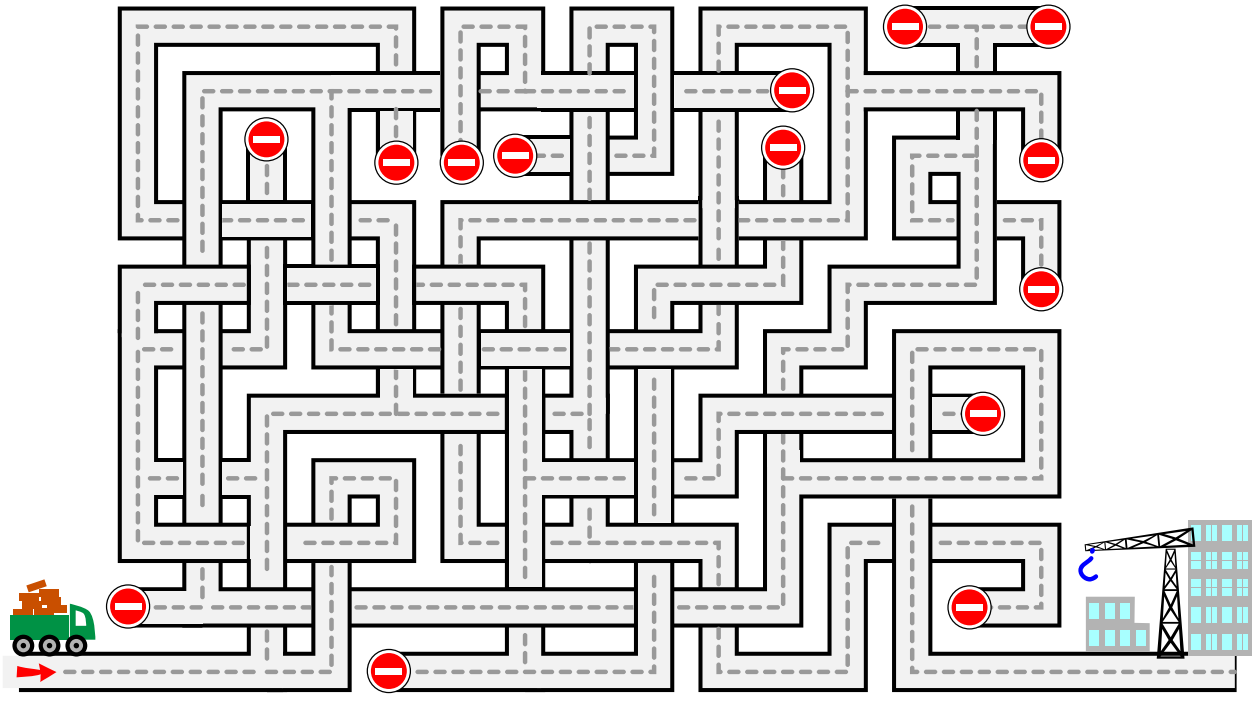
Computational Thinking



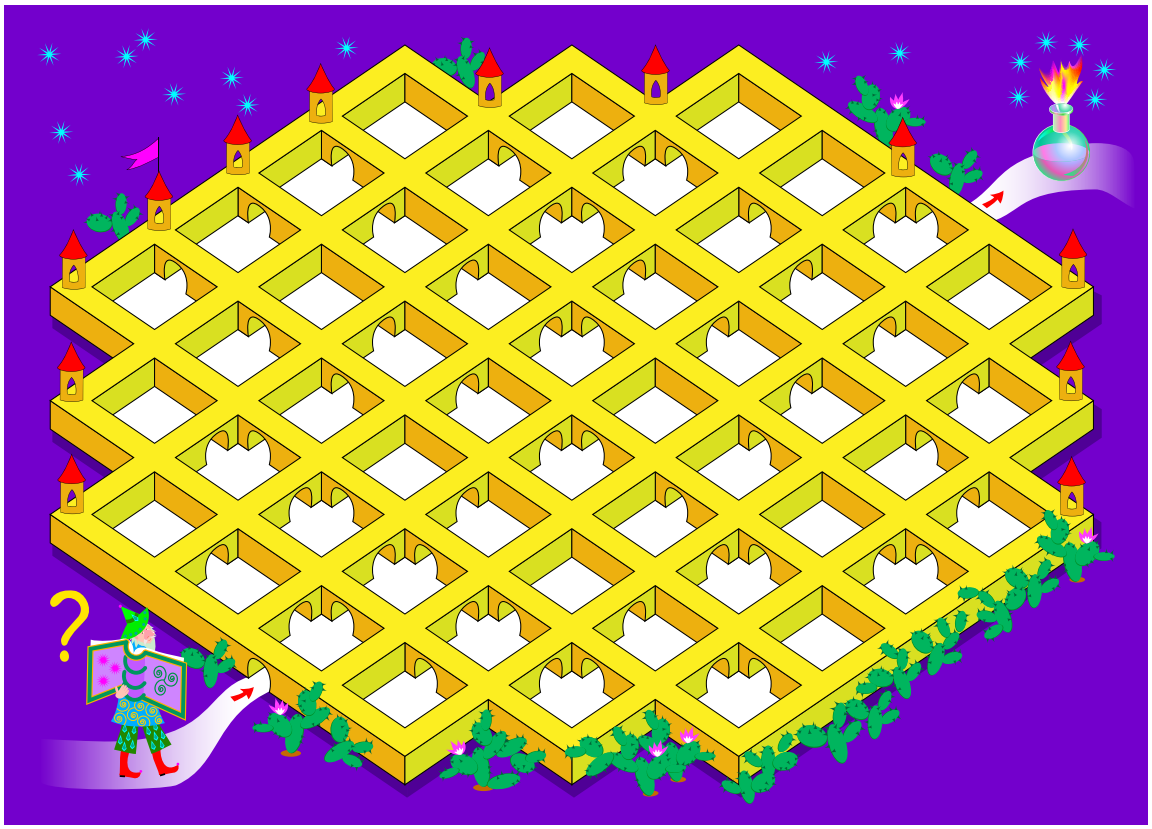
A. Find the missing part of each building.



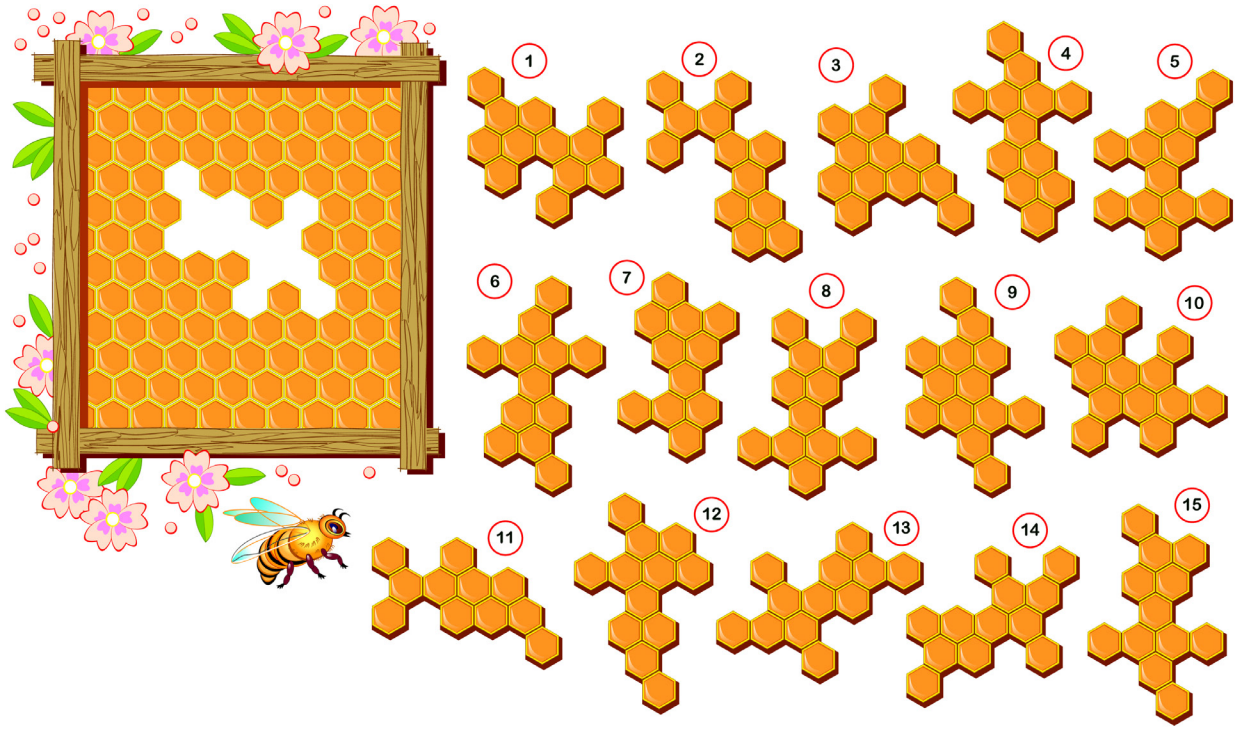
B. Find the correct route for the loaded truck to reach the crane.



C. Find the way in the castle to get the alchemist magic bulb.

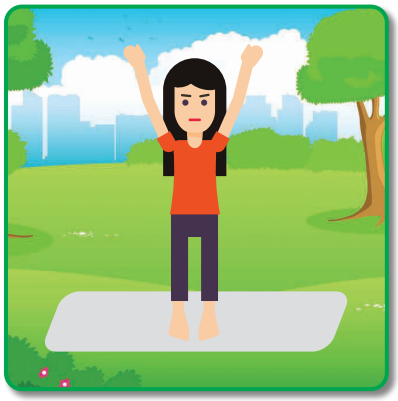


D. What part of the honeycomb fell out? Tick (✓) the correct part.



Everyday Yoga!

Do yoga everyday to stay calm and healthy.



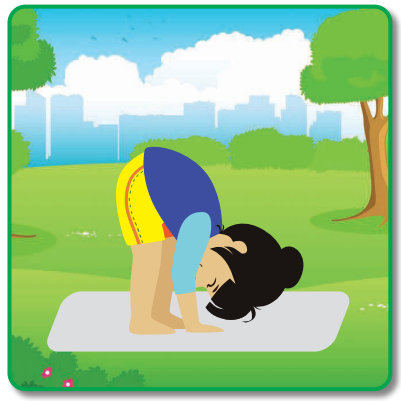
Raised Hands Pose

- Strengthens the legs and improves posture
- Stretches the shoulders and armpits
- Regulates the digestion and tones the belly

- Stretches and strengthens the ankles, knees, and legs
- Stretches the hamstrings, spine, waist, chest, and shoulders



Extended Side Angle Pose



Standing Forward Bend Pose

- Stretches the hips, hamstrings, and calves
- Strengthens the thighs and knees
- Stimulates the liver and kidneys

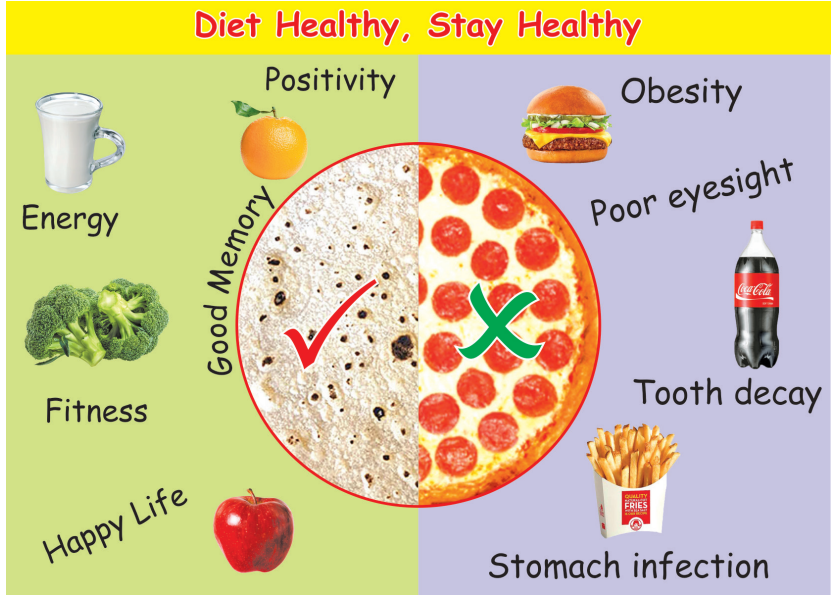
Healthy Food vs Junk Food!

Which food do you prefer? Give two reasons for your choice.

1. .....

2. .....

Stop! Rethink and develop healthy food habits! At first you make your food habits, then your food habits make you! Do you agree?



SCIENCE OLYMPIAD FOUNDATION

SAMPLE PAPER SYLLABUS 2020-21

CLASS **8**

NCO

Total Questions : 50 | Time : 1 hr.

PATTERN & MARKING SCHEME			
Section	**(1) Logical Reasoning**	**(2) Computers & IT**	**(3) Achievers Section**
No. of Questions	10	35	5
Marks per Ques.	1	1	3

SOF NATIONAL CYBER OLYMPIAD

SYLLABUS

Section – 1 : Verbal and Non-Verbal Reasoning.

Section – 2 : Fundamentals of Computers, Internet & Viruses, HTML-[Html, Head, Title, Body (Attributes: Background, Bgcolor, Text, Link, Alink, Vlink), Font (Attributes: Color, Size, Face), Center, BR, HR (Attributes: Size, Width, Align, Noshade, Color), Comment tag(<!-- -->), <H1>..<H6>, <P>, <B>, <I>, <U>, <IMG>, Html Elements: A, UI and OI (Attributes: Type, Start), Li], Flash CS6, MS-Access, Networking, MS-Word (Exploring File tab, Language and Translate options, Tracking features -Comments, Reviewing Pane, Tracking Changes, Comparing, Combining and Protecting documents, Working with References), MS-PowerPoint (Exploring File tab and Slide Show tab, Comparing, Combining and Protecting presentations), MS-Excel(Exploring File tab, Useful Formulas and Functions - IF,Even, Odd, LCM, GCD, Power, Product, Round, Sqrt, Sum, Min, Max, Average, Count, Upper, Lower And Replace, Cell referencing, Using Defined Names group), Memory & Storage Devices, Basics of Cyber Crimes, Cyber Laws, Operating Systems(Introduction, Features, Types-single user and multi-user), Latest Developments in the field of IT.

Section – 3 : Higher Order Thinking Questions - Syllabus as per Section – 2.

Questions are based on Windows 7 and MS-Office 2010.

LOGICAL REASONING

1. If in a certain code language, SAND is written as VDQG and BIRD is written as ELUG, then how will LOVE be written in the same language?

(A) PRYG (B) ORTG

(C) NPUH (D) ORYH

2. Which of the following Venn diagrams best represents the relationship among, "tennis fans, cricket players and students"?

(A)  (B) 

(C)  (D) 

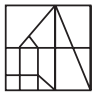
3. A, B, C, D, E and F, not necessarily in that order, are sitting on six chairs regularly placed around a round table facing inside. It is observed that A is between D and F, C is opposite to D, D and E are not on neighbouring chairs. The person sitting opposite to B is _____.

(A) A (B) D

(C) E (D) F

4. In which of the following figures, Fig. (X) is exactly embedded as one of its parts?


Fig. (X)

(A)  (B) 

(C)  (D) 

5. Find the missing term in the given series.

DMP, FLN, HKL, JJJ, ?

(A) MII (B) LIH

(C) III (D) MIF

COMPUTERS AND INFORMATION TECHNOLOGY

6. Which of the following is NOT available as a category in Control Panel of Windows 7?

(A) System and Security

(B) Programs

(C) Bluetooth settings (D) Ease of Access

7. Which of the following will you use to convert the selected text into a hyperlink in MS-Word 2010?

(A)  (B) 

(C)  (D) 

8. Which of the following is CORRECT in HTML?

(A) <hr> (B) <HR>

(C) <B> Bold Text </B> (D) All of these

9. Computers use the seven digit code called ASCII. What does ASCII stand for?

(A) American Standard Code for Information Interchange

(B) Association of Software Coding and Information Institute
(C) American Standard Computing and Information Institute
(D) American Scientists Convention for Information Interchange

10. Which of the following is NOT a valid function of MS-Excel 2010?
(A) COUNTIF (B) SUMIF
(C) COUNTA (D) COUNTUP

11. In Flash CS6,  is called ____ tool.
(A) Fill color (B) Paint bucket
(C) Ink bottle (D) Lasso

12. In MS-PowerPoint 2010, Format Painter is used to _____.
(A) Copy formatting from one place and apply it to another
(B) Reset the position, size and formatting of the slide
(C) Format text to the left
(D) Increase the indent level

13. Which of the following statements is INCORRECT about memory and storage devices?
(A) Cache memory makes memory transfer rates higher and thus raises the speed of the processor.
(B) A storage device is a hardware component that writes data to and reads data from a storage medium.
(C) ROM loses its data when you turn off the computer.
(D) Hard disks can be divided into one or more logical disks called partitions.

ACHIEVERS SECTION

14. Rearrange the steps given below to insert a motion tween in Flash CS6, first and last steps are given for you.
First : Draw a shape at Frame 1
(i) Drag the playhead to a new frame and reposition your object
(ii) Select the shape and convert it to a symbol
(iii) Go to Insert tab → Motion tween
Last: Press Ctrl

+

to play the tween.
(A) (ii) → (iii) → (i) (B) (i) → (iii) → (ii)
(C) (iii) → (i) → (ii) (D) (iii) → (ii) → (i)

15. Which of the following statements is CORRECT about 'Sneakernet'?
(A) Transferring computer files between computers by physically moving removable media such as CDs, flash drives.
(B) Unauthorised access of information from a wireless device.
(C) The process of converting data in a form so that an unauthorised person cannot understand it.
(D) A private computer network in which multiple PCs are connected to each other.

SPACE FOR ROUGH WORK

ANSWERS

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