

MULTIMEDIA (BCA-11)

What is multimedia:-

It produces **virtual reality** in which sound, text, graphics, animation and video create effect of reality by means of multimedia hardware and software.

Or

Integration of animation, audio, graphics, text, and full-motion video through computer hardware and software for education, entertainment, or training.

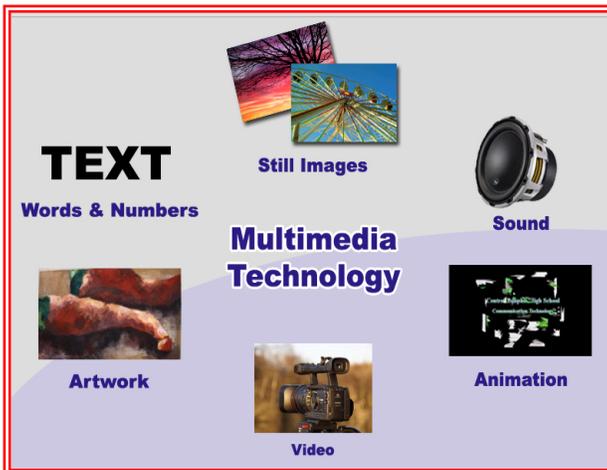
Or

Multimedia is the field concerned with the computer-controlled integration of text, graphics, drawings, still and moving images (Video), animation, audio, and any other media where every type of information can be represented, stored, transmitted and processed digitally.

A **Multimedia Application** is an Application which uses a collection of multiple media sources e.g. text, graphics, images, sound/audio, animation and/or video.

Virtuality extends the interaction –oriented features of multimedia by the concept of cyberspace.

MULTIMEDIA=Sound+Text+Graphics+Animation+Video → (Produce effect Virtual reality)



- Power Point.
- Paint Brush.
- VLC.
- Win Amp.
- Window Media Player.
- Internet Explorer.
- Real Time.
- Photoshop.
- Coral Draw.
- Master Blaster.
- HP Director.
- Director.
- Premier.
- FLASH.
- Wave front.
- FrontPage.

etc.

Example of Multimedia H/W-

- ☞ DVD Digital video disk
- ☞ CD ROM Compact Disk Read Only Memory
- ☞ Speaker
- ☞ Woofer
- ☞ **QWERTY** Key board/Multimedia Keyboard.
- ☞ Scanner.
- ☞ Printer.
- ☞ Web cam.
- ☞ VDU(CRT/LCD/LED/PLASMA/PROJECTOR)
- ☞ PLOTTER.
- ☞ LIGHT PEN.
- ☞ TOUCH SCREEN SYSTEM.
- ☞ MODEM (Modulator And Demodulator).
- ☞ MOUSE.
- ☞ CPU.
- ☞ BLU RAY DISC.
- ☞ USB (Universal Serial BUS).
- ☞ PEN Drive.
- ☞ Mike.

☺ CARD READER.

Etc.

Photoshop:-

It is used for editing images for industry digital imagine.

Wavefront:-

It is used for making 3 D tools for games, films.

FLash:-

It is vector based animation tools.

Front Page:-

It is used for designing web page.

Premier:-

It is used for making digital video.

Coral Draw:-

It is used for designing.

PowerPoint:-

It is used for making presentation, based on any topics.

Scanner:-

It is used for scanning images into digital form.

Window Media Player:-

It is used for playing video film.

Paintbrush:-

It is used for simple drawing.

Etc.

Extension Name/Secondary File name of Multimedia Software:-

.ppt power point
.wav sound
.mov Video file
.VOC For Sound
.PCD Photographs stored in CD
.gif graphics interchange format
.jpeg image file (Joint Picture Expert group).
.flc (High Quality photographs)
.mff (Music file).
.bmp bit map picture.
.mp3 audio file.

Components of Multimedia:-

1. Textual Information
2. Images
 - a. (Bitmap Image)
 - b. (Vector Image)
3. Animation
 - a. (2D Animation) Two Dimensional Animation
 - b. (3D Animation) Three Dimensional Animation
4. Digital Audio
5. Digital Video

1. Textual Information:-

This component of multimedia can have various types of fonts and type sizes to suit the professional presentation of the multimedia software.

Example:-1

Times New Roman
Tahoma
Verdana
ALGERIAN
Etc.

Example:-2

Word Art.
Font Color.
Style of Fonts (Bold, Italic, Underline).
Alignment (Left|Right|Center|Justify).

Format Painter.

2. Images:-

It is interesting components of multimedia. People do not like reading large amount of textual matter on the screen. Image describe all information with respect to text. There are two types of images

- a) Bitmap Images.
- b) Vector Images.

Bitmap Images.

It consist of two dimensional squares, which are called **pixels (Picture elements)** Or **dots** on the screen. Quality of pictures depends upon number of pixels. Pixels are organized in rows and columns. One pixel consists of one bit.

0	Black
1	White

Example: - Paintbrush.

Vector Image:-

An image is formed as a **set of straight line or curved instead of dots.**

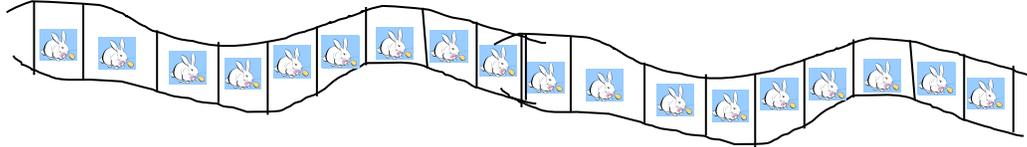
A line can be represented by mathematical equations, whose number can be stored as a set of binary codes.

Example: - **CAD** (Computer aided design).

CAM (Computer aided Manufacturing).

3. Animation:-

An animation is just a **continuous series of still images** that are displayed in a sequence.



Types of Animation:-

1:-2 D Animation.

2:-3 D Animation.

2 D Animation: - It is pixels based animation, which produces flat images. There are two effect produces.

Morphing.

Warping.

3 D Animation: - It produces realistically portray with depth. It includes X, Y and Z-axis. There are three steps for making 3 D animations.

- Modeling Steps.
- Animation Steps.
- Rendering Steps.

Morphing:-It takes two images seamlessly changes one image to another.

Warping:-Image actually seems to grow out of the first one.

4. Digital Audio:-

Digital audio is always embedded in the sound to provide additional capabilities without affecting the CPU. A common digital sound file existing in personal computers are known as **.WAV** files. The **MIDI** (Musical Instruments Digital Interface) sound saves disk space as it only stores the instructions about how to play a musical instruments. It is two-way transformation

Analog \longleftrightarrow Digital

There are following components for audio and video.

Examples:-

Sound cards.

Speaker.
 Mike.
 Digital Recorder.
 Voice speech Synthesizer.
 Winamp.
 Window media Player.
 VLC(Video Lan Client Media Player).
 Etc.

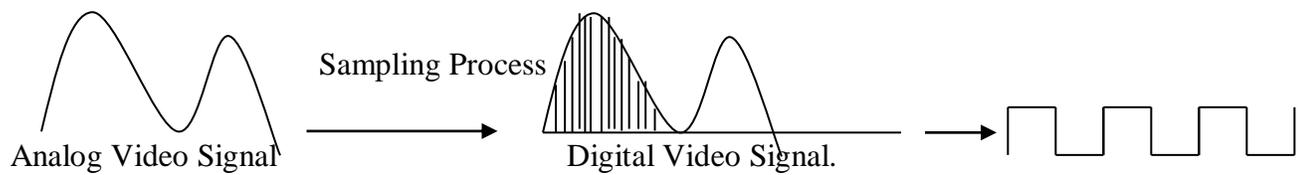
5. Digital Video:-

Digitized video is one of the many technologies used in the development of interactive multimedia. It offers a wide range of flexibility as compared to standard video signal. The process of converting analog video signal to digital video signal is called **sampling**.

Example:-

MPEG (Moving Picture Expert Group).

AVI (Abstract Video Interface).



Difference Between CD ROM and DVD:-

<u>PARAMETER</u>	<u>CD-ROM</u>	<u>DVD-ROM</u>
DIAMETER.	120MM	<u>120 MM</u>
THICKNESS.	1.2MM	1.2MM
TRACK PITCH(Distance between successive turns of a spiral)	1.6 μ M	.74 μ M
Min Pit Length.	.83 μ M	.40 μ M
Laser wavelength.	780nm	640nm
Layers.	1	1,2, or 4
Data Capacity.	.65GB	4.7 GB
Data Capacity (Per layer).	.650 GB	4.7 GB single side single layer. 8.5 GB Single side Dual Layer 9.4 GB Double Side Single Layer.

Multimedia Design production and Distribution:-

All the development works are based on three basic principles.

- ❖ Planning.
- ❖ Design.
- ❖ Production.
- ❖ Distribution.

Planning:-

During this phase, all the aspects of the related multimedia projects in carefully thought about and planned.

Design:-

It is bridge between problem and solution. Designers are responsible for providing multimedia system developers with complete and clearly out lined multimedia features specifications.

Production of Multimedia:-

The process of creating the related media elements in a multimedia projects including graphics, sound, animation and digital video is called production.

Distribution of Multimedia:-

All the elements are combined together using authoring software there are bundled into a package and stored in various storage media for distribution.

Question 1:-What is multimedia?

Question 2:-What are various components of multimedia?

Question 3:-What is sampling process in multimedia?

Question 4:-What is animation in multimedia?

Question 5:-What are different types of images in multimedia?

Question 6:-What are different types of H/W and S/W for multimedia?

Question 7:-Differentiate between CDROM and DVD?

Question 8:-What are different types of multimedia extensions?

Application of Multimedia:-

In following area multimedia used in wide range. Such as

- ❖ Entertainment.
- ❖ Edutainment.
- ❖ Business Communication.
- ❖ Knowledge Transfer. (CBT) Computer Based Tutorials.
- ❖ Public Access.

Entertainment:-

Multimedia used widely in entertainment. Such as

- a) Cartoon Film.
 - b) Movies Example Gravity, Titanic, Zoorasic Park, Ra One, Robot, End of 2012 etc.
 - c) Video Game.
- etc.

Edutainment:-

It is nothing but educational entertainment. Many computer games with focus on education are now available.

Example: -Sierra.

Business Communication:-

Multimedia is a very powerful tool for enhancing the quality of business communication.

Example:-

Advertisement.

Video conferencing.

On Line Business.

Etc.

Knowledge Transfer:-

Such types of application involves transmission of piece of information with the maximum impact.

Example:-

CBT (Computer Based Tutorial).

Public Access:-

Public access is an area of application where many multimedia applications will soon be available.

Example:-

Tourist Information.

E-Ticketing.

Status Checking for reservation, passport, Pancard ,ATM ,E-Money order,UID etc.

Multimedia In Publishing Industries:-

Multimedia in publishing industries used by following ways.

- ❖ Presentation of Information using text.
- ❖ Publishing by using electronic Media.
- ❖ By Means of tutorials (CD/DVD/Blu Ray Disc of Amway Business).
- ❖ By means of **www**(World Wide Web/Internet).

Communication technology and multimedia services:-

There are following services may be included:-

- ❖ Basic Television services.
- ❖ Interactive entertainment.
- ❖ Digital Audio.
- ❖ Video On demand.
- ❖ Home Shopping through E-mail.

- ❖ E-Commerce. (On line share trading, Mutual fund trading, Commodity Trading, Bulian trading etc).
- ❖ Digital Multimedia Libraries.
- ❖ Electronic version of news papers, magazines etc.

Multimedia In Business:-

Multimedia can be used in many applications in business.

We will focus on the facilities with respect to business.

- ❖ Global Team.
- ❖ Voice mail.
- ❖ E-Mail.
- ❖ FAX(Facsimile Automated Xerox)
- ❖ Audio conferencing
- ❖ Video conferencing
- ❖ Document conferencing.
- ❖ E-Commerce Based Business.
- ❖ Website Hosting and Publishing.

Multimedia Pedagogues:-

It is interactive system for **teaching and learning**. There are following examples of pedagogues.

1:-**Simulations**

It is an important area of pedagogy where a student is engaged in situations of problem solving. It is categorized into two forms.

A) **Scenario Based simulation.**

B) **Knowledge based Simulation.**

A) **Scenario Based simulation.**

It includes sound, graphics, animations, video etc.

B) **Knowledge based Simulation.**

This simulation based on text based knowledge information.

Example:-

Cardiac Tutor.

It was developed by **Chus Eliot**, at **university of Massachusetts**, computer science department. It provides following clues to the students.

- ❖ Spoken Advice.
- ❖ **Emergency room sounds.**
- ❖ Graphical indications such as ECG, MRI, CTSCAN etc.

2:- Multimedia Composition

These activities of pedagogues may include aspects like.

- ❖ Creation of text, drawing, or digitized pictures.
- ❖ Organization
- ❖ Access of documents, which involves searching of patterns and indexing or filtering certain types of items.

3:- Multimedia and Explanatory Systems.

The explanatory systems who are using it can select the media for displaying information. It consists of all types of media for explanation.

Concept of Distributed Learning System:-

The process of learning and motivation for learning are influenced by a variety of factors.

Following means are used for distributions

- a) **CBT** (Computer Based Tutorials).
- b) Distance Cooperation.
- c) **Real Time Communication.**
- d) Distributed data.

CBT (Computer Based Tutorials):-

Computer Based Learning, sometimes abbreviated CBL, refers to the use of computers as a key component of the educational environment. While this can refer to the use of computers in a classroom, the term more broadly refers to a structured environment in which computers are used for teaching purposes.

Distance Cooperations:-

An important use for the World Wide Web is to support long distance learning, also called e-learning, characterized by the physical distance of the student to the teacher. Among all the existent technologies on the Internet, the Web provides the most capabilities for distance learning.

Real Time Communication:-We live in an era of real-time – we expect to find information when we want it, answers when we need them and access to find both of these on our own. Self-service, social media, live chat, video conferencing and unified communications and collaboration are all possible today because of developments in real-time communications.

Distributed data in Multimedia:-

Distributed multimedia systems consist of multimedia databases, proxy and information servers, and clients, and are intended to for the distribution of multimedia content over the networks.

Question 1:-What are pedagogues?

Question 2:-What is Simulations?

Question 3:-What is cardiac Tutor?

Question 4:-What are various areas of applications of multimedia?

Question 5:-Discuss multimedia feature in business?

Question 6:-Discuss multimedia feature in publishing industries?

Question 7:-Describe about communication technology and multimedia services?

Question 8:-Describe about MEDNET system?

MEDNET:-

It is multimedia system which is used in hospitals and many diagnostic and laboratories. It provides following services.

- a) A real time monitoring and multiparty consultation.
- b) Collaboration during brain surgery.

Meaning of Collaboration:-Collectively doing a particular work .There is no any physical work presence.

Multimedia authoring Tools:- Most Important

Authoring systems are generally menu-driven systems intended to easy to use by the multimedia developer. Authoring languages are specially designed programming languages and have some distinct advantages over generic languages. By using authoring s/w CBT become most effective.

Feature of Authoring S/w:-

1. Integrated Multimedia Elements.

It produces better interactivity and control over multimedia system.

2. Script Language Programs.

Script Languages are used for facilitating logical effect in multimedia system. It consist of HTML, Javascript, VB Script etc.

3. Icon Based Programs.

Authoring s/w facilities icon based multimedia system.

4. DLLs for extending features.

Authoring s/w also facilitates extending features. With other multimedia system.

5. Supporting CD ROM/DVD/BLU RAY Disc.

6. Supporting video for windows.

7. Hypertext.

It facilitates one file with another file.

8. Cross Platform capability.

It is an important consideration with authoring programs is their capability to altered for presentation on Macintosh or Other H/W platforms.

9. Runtime player for distribution.

Example of Authoring Tools:-

1. Authorware
2. Everest Authoring System
3. Icon Author
4. ImageQ
5. Macromedia Director.
6. Quick Time
7. Hypertext

Authorware:-

This s/w facilitates multiple people to contribute to an application. Artist can load a library with media, Programmers can provides templates for complex interaction and interface designers can put everything together.

Authorware can run timers, change the flow in response to a user, keep score and access laser disc via dialog box.

Everest Authoring System:-

This s/w is best suited for the developers of CBT applications. Who seek a powerful but easy to use windows based authoring environment.

Icon Author:-

Icon author s/w is used for making icon based multimedia products.

ImageQ:-

This s/w is used for making presentation with highly interactive feature.

File saves with an extension .hkf files or .bmp

Macromedia Director:-

It is better suited to multimedia presentations. It includes following features.

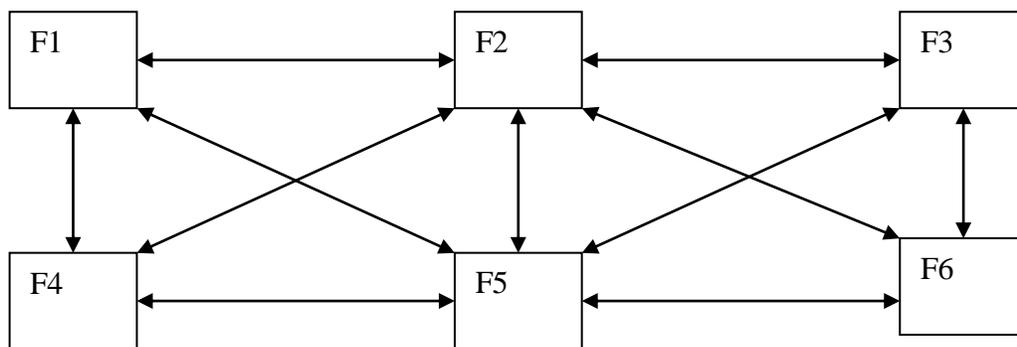
- ❖ Timing Control.
- ❖ Crossplatform capability.
- ❖ Animation features.
- ❖ Extensive architecture to add functionality.

Quick Time:-

It is a s/w developed by Apple that supports time based media on the macintosh system. It stores video digital form.

Hypertext:-

This feature of hypertext includes linking of many files with each others.



Anchor tag:-

The anchor tag is used to create links between different objects like HTML page files, web site (URL→Uniform/Universal Resource Locator).

```
<a href="HTML page files or URL">Text or Graphics</a>
```

What is Hypermedia:-

An extension to hypertext providing multimedia facilities, such as those handling sound and video.

Or

Computer based medium combining text, audio, video, hypertext, animation, and other devices for instruction, entertainment, or information management. Typically stored on a CD or DVD.

Example: - The World Wide Web (WWW) is the best example of hypermedia applications.

Application of Hypertext:-

1. Computer Applications.

- On line Documentation.
- User Assistance.
- S/w Engineering.

2. Business Application.

- Trade shows, Product catalogs, and Advertising.
- Dictionaries and reference books.
- Law.

3. Educational applications.

- Foreign Languages.(Includes Audio,Video)

4. Entertainment and Leisure Applications.

- Hypertext provides several opportunities for pure enjoyment.

Example:-News, Newspapers and Magazines.

Elements of Hypertext:-

- ❖ Nodes (A point in a network or diagram at which lines or pathways intersect or branch.)
- ❖ Links(The definition of a link is a word or group of words that act as a way to cross reference to other documents or files on the computer. A link is defined as a ring or loop that makes up a chain.
- ❖ Annotations.
- ❖ Buttons.

- ❖ Editors.
- ❖ Browsers
- ❖ Trails
- ❖ Built In Programming.

Nodes:-

Hypertext is a network nodes. A node is a collection of data organized around a specific topic and related or linked to another body of information.

Links:-

Links are another fundamental unit of hypertext besides nodes. A hypertext link has two ends.

Annotations:-

It is a special type of link, which provides specific information.

Button:-

It is visual cue in node that alerts a user that a link exists. In another words a button is a visual representation of a link in a node.

Editors:-

It is a s/w for writing programming.

Example:-

Notepad.

Editor of C Compiler.

Editor of Basic Compiler.

Etc.

Browser:-

It is a s/w which is used for displaying effect of HTML codes (Web Page).

Example:-

Internet Explore.

Netscape navigator.

MOSAIC.

Mozilla/ Fire fox.

Chimera.

Google Chrome.

Safari.

Opera etc.

Trails:-

A trail is a record of the nodes that a user accessed in viewing a hypertext networks.

Built in programming Language:-

It includes some specific feature to represent knowledge.

Example:-

Hypercard/Hypertalk.

Description of AuthoringTools:-

Multimedia authoring tools provide the important framework you need for organizing and editing the elements of multimedia like graphics, sounds, animations and video clips. Authoring tools are used for designing interactivity and the user interface, for presentation your project on screen and assembling multimedia elements into a single cohesive project.

Authoring software provides an integrated environment for binding together the content and functions of your project. Authoring systems typically include the ability to create, edit and import specific types of data; assemble raw data into a playback sequence or cue sheet and provide structured method or language for responding to user input.

Introduction of CorelDRAW:-

CorelDRAW is a vector graphics editor developed and marketed by Corel Corporation of Ottawa, Canada.

This is a popular drawing program for the Windows market. We don't support Corel Draw specifically but can usually import its files into Macromedia FreeHand or Adobe Illustrator if needed. Saving your drawings as an EPS (Encapsulated Postscript) file with all the type converted to graphics is another way we can accept this format.

Question 1:-What is authoring Tools?

Question 2:-Describe different types of features of authoring s/w.?

Question 3:-What is hypertext?

Question 4:-Describe role of ImageQ, Macromedia director & Quick time.?

Question 5:-Describe about application of hypertext?

Question 6:-What are different types of hypertext elements?

Introduction of HTML (Hypertext markup Language):-

It is used for designing web page, which consist of related information that effect display on browser. File name must be save with extension name .htm/.html.It is tag based programming language. There are two types of tags.

< > Open Tag.

</ > Closed Tag.

Format of HTML Coding:-

<HTML>

<Head>...</head>

<Title>...</title>

<Body>

....

....

....

</body>

</html>

Properties of Body:-

bgcolor="Color_name or Color_Code".

background="image file with extension name .jpg or .gif".

Text=" Color_name or Color_Code".

Size="Values in Pixels (Picture Elements)"

Color Code & Color Name:-

Color Name

ALICEBLUE

Color Code

#F0F8FF

AQUA	#00FFFF
AZURE	#F0FFFF
BISQUE	#FFE4C4
BLUEVIOLET	#8A2BE2
CORAL	#FF7F50
CYAN	#00FFFF
DEEPPINK	#FF1493
DIMGREY	#696969
FORESTGREEN	#228B22
GOLD	#FFD700
GRAY	#808080
BLACK	#000000
BLUE	#0000FF
BROWN	#A52A2A
CHOCOLATE	#D2691E
CRIMSON	#DC143C
DARKGREEN	#006400
GREEN	#008000
GREENYELLOW	#ADFF2F
INDIGO	#4B0082
KHAKI	#F0E68C
LIGHTGRAY	#D3D3D3
LIME	#00FF00
LINEN	#FAF0E6
MAROON	#800000
IVORY	#FFFFFF0

Header tag:-

<h1>...</h1>

<h2>...</h2>

<h3>...</h3>

<h4>...</h4>

<h5>...</h5>

<h6>...</h6>

The Largest Size.



The Smallest Size.

Paragraph Tag:-

<p>...</p>

Center Tag:-

<Center>...</Center>

Font formatting tag:-

...	For Bold
<i>...</i>	For Italic
<u>...</u>	For Underline
^{...}	For Superscript
_{...}	For Subscript
<Strike>...</ Strike >	For Strikeout

Font tag:-

...

Attribute:-

- 1) color=" Color_name or Color_Code".
- 2) size=" Values in Pixels (Picture Elements)"
- 3) align="left|right|center"

Line Tag:-

<hr>

Attribute:-

size=" Values in Pixels (Picture Elements)"
width=" Values in Pixels or %"
Color= "Color_name or Color_Code"

Marquee Tag :-(It is used for moving objects).

<Marquee>...</marquee>

Attribute:-

Bgcolor= "Color_name or Color_Code".
direction="left|right|up|down"
behavior="alternate or slide"

Break row Tag:-

Inline Image tag:-

Attribute:-

width="Size in pixels or %"
height="Size in pixels or %"

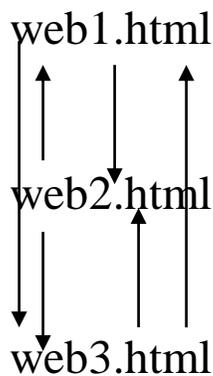
border="Values in Pixels"
vspace="Size in pixels or %"
hspace="Size in pixels or %"
align="left|right|center"

Anchor tag:-

The anchor tag is used to create links between different objects like HTML page files, web site (URL).

`Text or Graphics`

Example:-



Example of Html Code:-

```
<Html>
```

```
<Head><center><h1><u><b><font
```

```
color="red">ICSM</font></b></u></h1></center></head>
```

```
<Title>VNS</title>
```

```
<body bgcolor="green">
```

```
<p><center><h2>INDIA IS THE GREAT COUNTRY</h2></center></p>
```

```
<hr size="10" color="gold" width="90%">
```

```
<hr size="10" color="#800000" width="80%">
```

```
<hr size="10" color="#4b0082" width="70%">
```

```
<center>
```

```

```

```

</center>
<hr size="10" color="#4b0082" width="70%">
<hr size="10" color="#800000" width="80%">
<hr size="10" color="gold" width="90%">
</body>
</html>

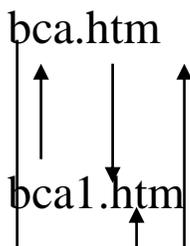
```

Example 2:-

```

<html>
<head><center><h1><u><b><font
color="red">ICSM</font></b></u></h1></center></head>
<title>VNS</title>
<body bgcolor="green">
<p><center><h2><marquee bgcolor="pink" direction="right"
behavior="alternate">INDIA IS THE GREAT
COUNTRY</marquee></h2></center></p>
<hr size="10" color="#4b0082" width="70%">
<center><h2><marquee bgcolor="pink" direction="left"
behavior="alternate">WELCOM</marquee></h2></center>
<hr size="10" color="#4b0082" width="70%">
</body>
</html>

```



↓
bca2.htm

Code1:- (bca.htm)

```
<html>
<head><center><h1><u><b><font
color="red">WELCOME1</font></b></u></h1></center></head>
<title>VNS</title>
<body bgcolor="aliceblue">
<a href="C:\Documents and Settings\anand\My
Documents\WEB\bca1.htm"><center><h1>NEXT</h1></center></a>
<a href="C:\Documents and Settings\anand\My
Documents\WEB\bca2.htm"><center><h1>LAST</h1></center></a>
</body>
</html>
```

Code2:- (bca1.htm)

```
<html>
<head><center><h1><u><b><font
color="red">WELCOME2</font></b></u></h1></center></head>
<title>VNS</title>
<body bgcolor="silver">
<a href="C:\Documents and Settings\anand\My
Documents\WEB\bca.htm"><center><h1>BACK</h1></center></a>
<a href="C:\Documents and Settings\anand\My
Documents\WEB\bca2.htm"><center><h1>NEXT</h1></center></a>
```

```
</body>
```

```
</html>
```

Code3:- (bca2.htm)

```
<Html>
```

```
<Head><center><h1><u><b><font
```

```
color="red">WELCOME3</font></b></u></h1></center></head>
```

```
<Title>VNS</title>
```

```
<body bgcolor="green">
```

```
<a href="C:\Documents and Settings\anand\My
```

```
Documents\WEB\bca1.htm"><center><h1>BACK</h1></center></a>
```

```
<a href="C:\Documents and Settings\anand\My
```

```
Documents\WEB\bca.htm"><center><h1>FIRST</h1></center></a>
```

```
</body>
```

```
</html>
```

Example:-Linking with image file

```
<Html>
```

```
<Head><h1><center><font
```

```
color="red"><u>MGKVP</u></font></center></h1></head>
```

```
<Title>BHU</title>
```

```
<body background="D:\Picture 1\j.jpg">
```

```
<p><center><h2>VARANASI IS THE OLDEST CITY</h2></center></p>
```

```
<hr size="10" width="80%" color="black">
```

```
<hr size="10" width="80%" color="white">
```

```
<center><marquee direction="right" bgcolor="silver"></marquee></center>
```

```
<hr size="10" width="80%" color="black">
```

```
<hr size="10" width="80%" color="white">
```

```
<a href="C:\Documents and Settings\anand\My
Documents\WEB\bca.htm"><center><h1>Next</h1></center></a>
```

```
<a href="C:\Documents and Settings\anand\My
Documents\WEB\bca.htm"><center></center></a>
</body>
</html>
```

In Line Video tag:-

It is used for playing video file.

```

```

Attribute:-

Height="Values in Pixels or %"

width="Values in Pixels or %"

start="mouseover"

Loop=-1 or "infinite"

Example:-

```
<Html>
<Head><h1><center><font
color="red"><u>MGKVP</u></font></center></h1></head>
<Title>BHU</title>
<body bgcolor="pink">
<center></center>
</body>
</html>
```

Background Sound tag:-

It is used for playing audio sound on back of the web page.

```
<bgsound src=" audio file with extension name" >
```

Attribute:-

Loop=-1 or "infinite"

Example:-

```
<Html>
<Head><h1><center><font
color="red"><u>MGKVP</u></font></center></h1></head>
<Title>BHU</title>
<body bgcolor="pink">
<bgsound src="D:\SONG\03 best of mukesh\001 MUKESH = DARD\037
PUSHPANJALI = JANE CHALE JAATE.mp3">
</body>
</html>
```

Multimedia Development –Issues And Suggestions

Multimedia design and development involves lot of activities.

1. Learning Interface Design

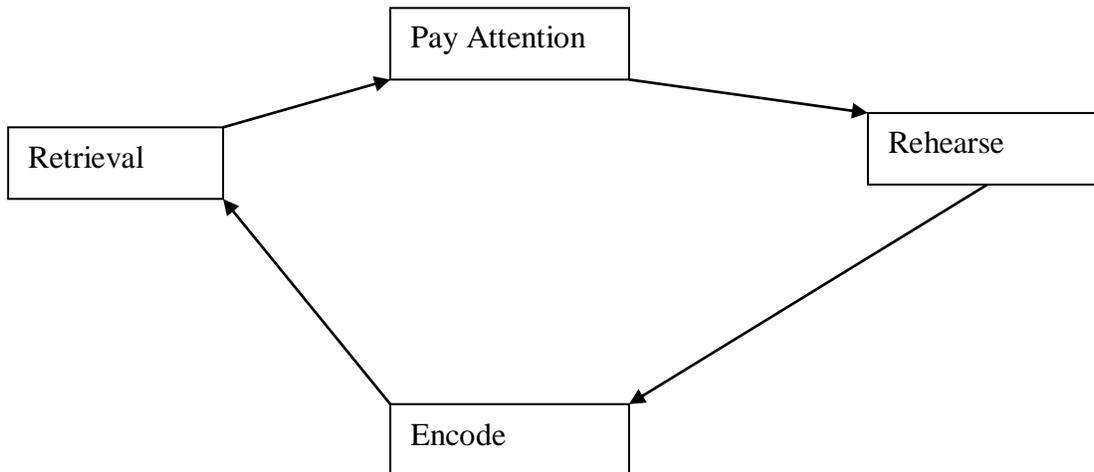
- Interface design and psychology of learning.
- Working with learning Styles.
- Considering interface design.

2. Planning the multimedia programme

- Defining the goal
- Outlining
- Logic Flow chart
- Program storyboard
- Planning for creation building blocks.
- Copyright issue and its Management.

Interface design and psychology of learning.

It associated following cycles



Pay Attention:- The information so gathered is transferred to the local working memory.

Rehearse:- This local memory continuously refreshed. This process is called rehearsal.

Encode:- The transfer of information to short term memory to the long term memory of the human is called encoding.

Retrieval:- The encoded information must be retrieved from the long term memory.

Working with learning Styles:-

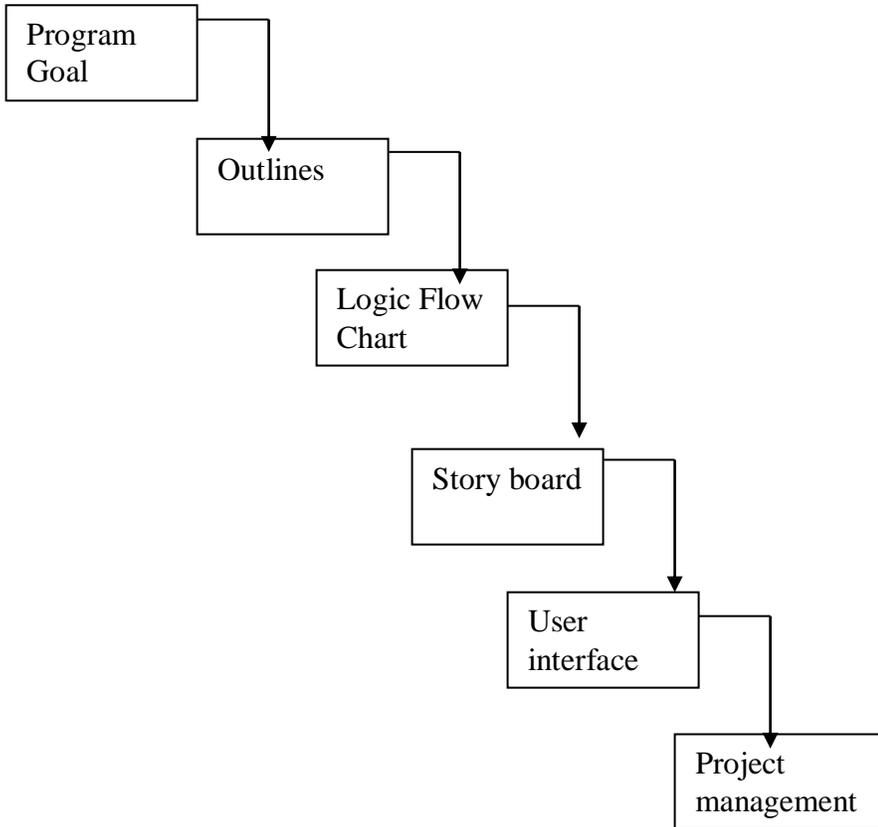
A lot of information of learning system should be effectively through movement or touching. That is it includes interactive effect of sounds, video, text, graphics etc.

Considering Interface design:-

Following fundamental rules required for multimedia design.

- ❖ Keep low cognitive load.
- ❖ Do not divide the learner's attention.
- ❖ We use judicious colors, special effects and sound.
- ❖ The information for learner available on screen.
- ❖ Encourage frequent revision.
- ❖ Encourage reinforcement of learning.
- ❖ Avoid repetition of instructions.

Planning the multimedia programme:-



Program Goal:-

We will define goal of the multimedia product/System. Our objective is to develop CBT of C language.

Outlines:-

We define complete outlines of multimedia product.

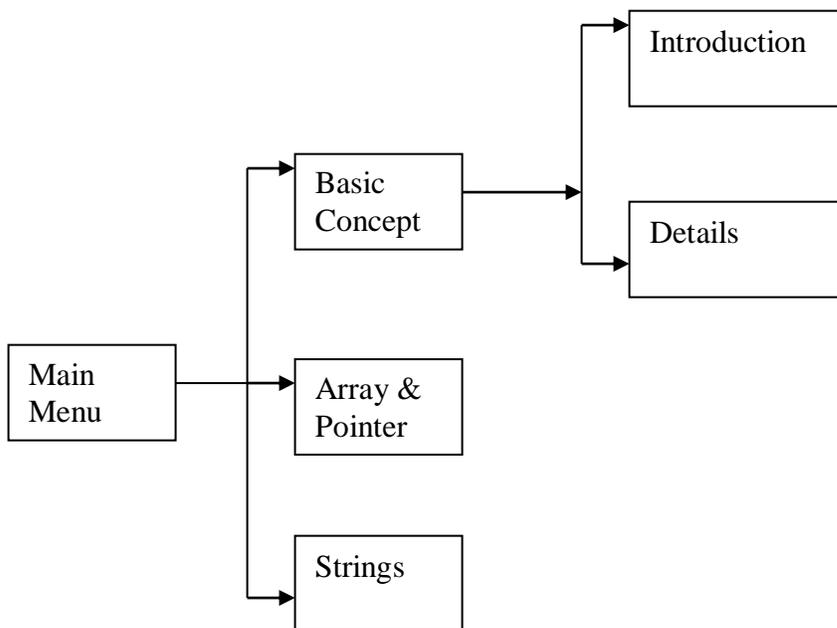
Example:-

Out Line for Making CBT of C Language:-

1. Introduction of C language
 - 1.1. Data Type
 - 1.1.1. Integer Data Types
 - 1.1.2. Real Data Types
 - 1.1.3. Character Data Types
 - 1.2. Operators
 - 1.2.1. Relational Operator
 - 1.2.2. Logical Operator
 - 1.2.3. Bitwise Operator
 - 1.2.4. Arithmetical Operator
 - 1.3. Control
 - 1.3.1. Decision Control
 - 1.3.1.1. If statement
 - 1.3.1.2. If-else statement
 - 1.3.1.3. Nested if-else statement

- 1.3.1.4. Else-if construct statement
- 1.3.1.5. Switch case statement
- 1.3.2. Looping Control
 - 1.3.2.1. For loop statement
 - 1.3.2.2. While loop statement
 - 1.3.2.3. Do-while loop statement
- 1.3.3. Jumping Control
 - 1.3.3.1. Goto statement
 - 1.3.3.2. Continue statement
 - 1.3.3.3. Break statement
- 2. Array
 - 2.1. Single Dimensional Operator
 - 2.2. Multi Dimensional Operator
- 3. Functions
 - 3.1. Built in Function
 - 3.2. User defined Function
- 4. Pointer
- 5. Strings
- 6. Structure & Unions
- 7. Stacks
- 8. Queue
- 9. Linked List
- 10. Graphs
- 11. Tree
- 12. File Organization

Logic Flow chart:-



Program storyboard:-

It is the graphical representation of the proposed multimedia project.

It includes following elements.

- ❖ Logic flow and branching sequence.
- ❖ The story board template.
- ❖ Animation sequence template.
- ❖ Button Details template.
- ❖ Audio/Video Scripting template.

User interface:-

Button, touch screen, audio, video etc facilitates interface with system.

Development Tips of Multimedia Building Blocks:-

Following important issues relating to various multimedia components.

- ❖ Text.
- ❖ Graphics in multimedia.
- ❖ Sound and Video in multimedia applications.

Text:-

This component of multimedia can have various types of fonts and type sizes to suit the professional presentation of the multimedia software.

Example:-1

Times New Roman

Arial Black

Viner Hand ITC

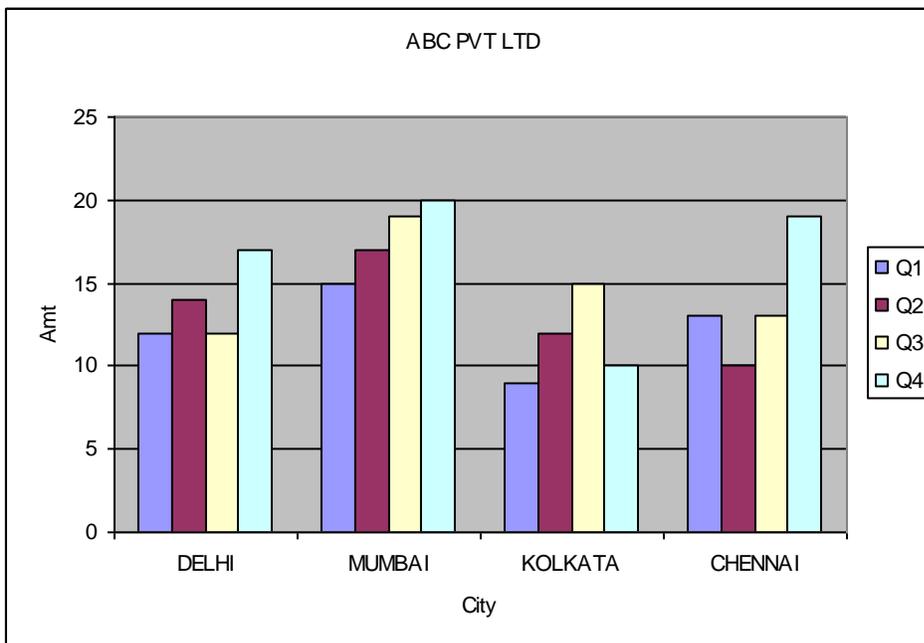
Graphics in multimedia:-

It includes following types of graphics.

- ❖ Background.
- ❖ Pictures, Photographs and 3 D pictures.
- ❖ Charts, flowcharts and organization charts.
- ❖ Buttons.

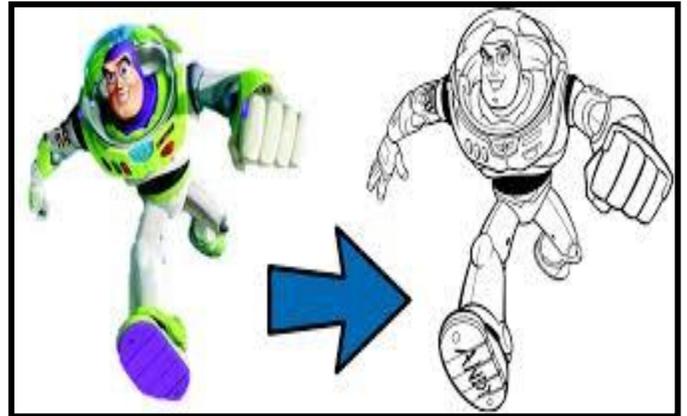
Charts:-

It is graphic components.



Digital Video:-

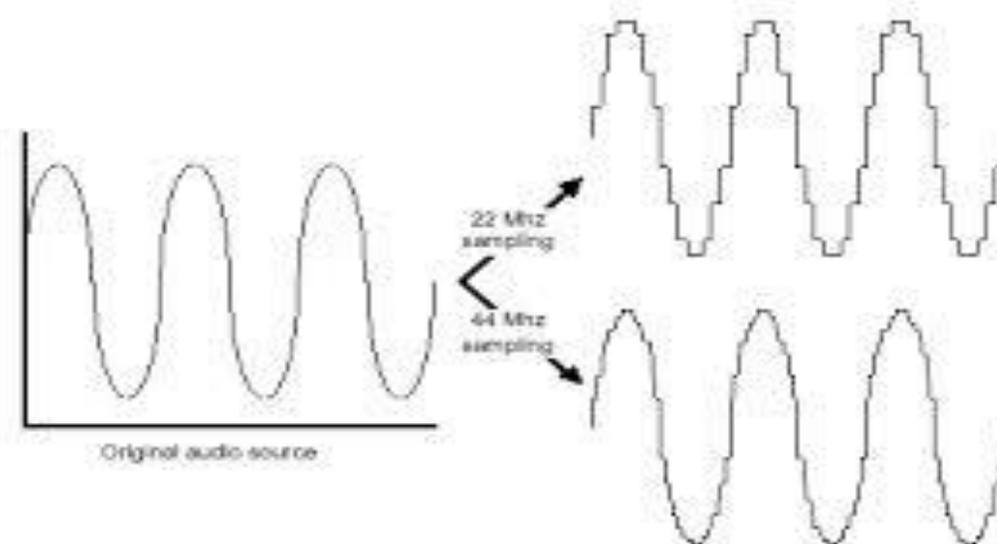
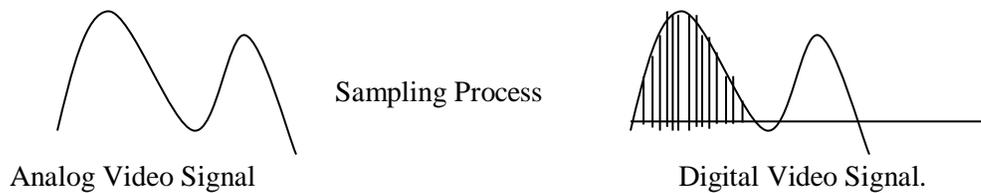
Digital video refers to the capturing, manipulation, and storage of moving images that can be displayed on computer screens. This requires that the moving images be digitally handled by the computer. The word digital refers to a system based on discontinuous events, as opposed to analog, a continuous event. Digitized video is one of the many technologies used in the development of interactive multimedia. It offers a wide range of flexibility as compared to standard video signal. The process of converting analog video signal to digital video signal is called **sampling**.



Example:-

MPEG (Moving Picture Expert Group).

AVI (Abstract Video Interface).

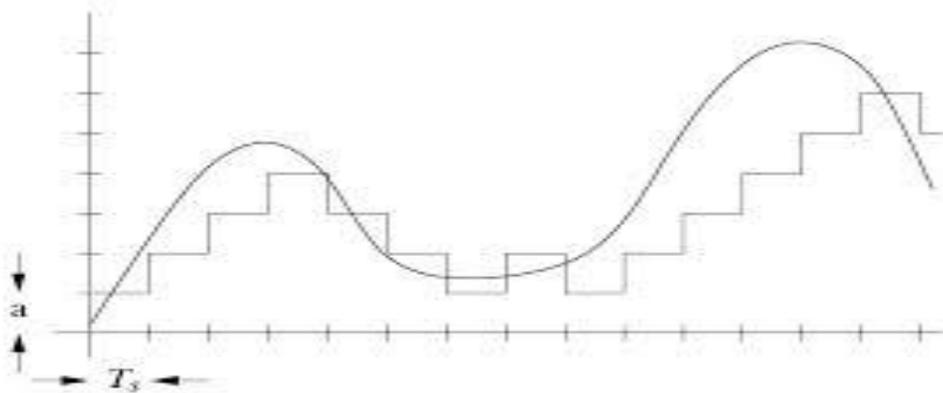


Digital Audio:-

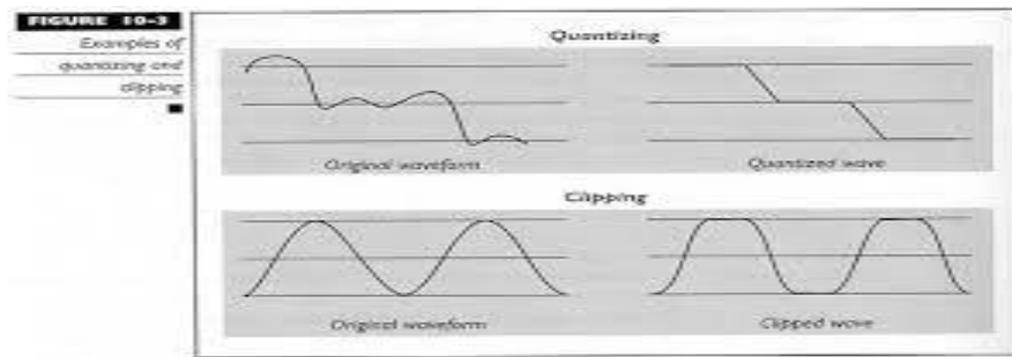
What is Sound:-

Vibrations that travel through the air or another medium and can be heard when they reach a person's or animal's ear.

- (a) For example, a speaker in an audio system vibrates back and forth and produces a longitudinal pressure wave that we perceive as sound.



- (b) Since sound is a pressure wave, it takes on continuous values, as opposed to digitized ones.



- (c) Even though such pressure waves are longitudinal, they still have ordinary wave properties and behaviors, such as reflection (bouncing), refraction (change of angle when entering a medium with a different density) and diffraction (bending around an obstacle).
- (d) If we wish to use a digital version of sound waves we must form digitized representations of audio information. → Link to physical description of sound waves.

Further Description of Digital Audio:-

Digital audio is always embedded in the sound to provide additional capabilities without affecting the CPU. A common digital sound file existing in personal computers are known as .WAV files. The MIDI (Musical Instruments Digital Interface) sound saves disk space as it only stores the instructions about how to play a musical instruments. It is two-way transformation

Analog \longleftrightarrow Digital

There are following components for audio and video.

Examples:-

Sound cards

Speaker
Mike
Digital Recorder
Voice speech Synthesizer.
Winamp
Window media Player.
VLC
etc.

Signal to Noise Ratio (SNR) :-

- The ratio of the power of the correct signal and the noise is called the signal to noise ratio (SNR) — a measure of the quality of the signal.
- The SNR is usually measured in decibels (dB), where 1 dB is a tenth of a bel. The SNR value, in units of dB, is defined in terms of base-10 logarithms of squared voltages, as follows:
$$\text{SNR} = 10 \log_{10} \frac{V_{\text{signal}}^2}{V_{\text{noise}}^2} = 20 \log_{10} \frac{V_{\text{signal}}}{V_{\text{noise}}}$$

Formula for determining the size of the digital audio:-

Monophonic = Sampling rate * duration of recording in seconds * (bit resolution / 8) * 1

Stereo = Sampling rate * duration of recording in seconds * (bit resolution / 8) * 2

- The sampling rate is how often the samples are taken.
- The sample size is the amount of information stored. This is called as bit resolution.
- The number of channels is 2 for stereo and 1 for monophonic.
- The time span of the recording is measured in seconds.

Notes:-

Multimedia Authoring:-

There are four basic function provided by almost all authoring software.

- ❖ Importing.
- ❖ Creating.
- ❖ Integrating.
- ❖ Delivering.

Importing:-

It should be able to import different types of media components.

Example:-

Quick Time
Winamp
Window Media Player
VLC etc.

Creating:-

It should allow some basic features for creation of text, graphics and may be sound if not video.

Integrating:-

It allows sequence and linking of multimedia elements.

Delivering:-

It should allow developing, self-running and encryption of application data.

Clip Art

A clip art collection may contain a random assortment of images, or it may contain a series of graphics, photographs, sound, and video related to a single topic. For example, Corel, Micrografx, and Fractal Design bundle extensive clip art collection with their image-editing software.

[End of Multimedia](#)

[RDBMS LAB\(BCA-12\)](#) [MS Access](#) [Relational database management System](#)

[What is Database:-](#)

It is collection of well-organized related records in coherent manner. These records stored in the form of table. It consists of rows and columns. Rows are known as **tuples** and columns are known as **attributes**.

Example: -
Employee records,
Students records,
Telephone Directory,
Inventory/Stock control,
Patients records, etc.

[EMP \(Table\):-](#)

Eno	Ename	Job	Sal	Deptno
101	Ajay	Steno	12000	10
102	Vijay	Manager	22000	20
103	Mukesh	Clerk	10000	10
104	Rajan	Salesman	9600	20

Eno, Ename, Job, Sal, Deptno Fields Name/Attributes Name/Column Name

Number of Attributes=5

Number of Tuples=4

Cardinality of EMP table=4

Degree/Arity of EMP=5

[DBMS:-](#)

It is an efficient system/software by which we manage database.

[RDBMS:-](#)

A relational database management system (RDBMS) is a database management system (DBMS) that is based on the relational model/Tabular Model as invented by E. F. Codd, of IBM's San Jose Research Laboratory. Many popular databases currently in use are based on the relational database model.

[Example:-](#)MS Access, Oracle, SQL Server, DB-2, Ingress, FoxPro etc.

[Functions/Tasks of DBMS:-](#)

- ☞ Creation of New database.
- ☞ Deletion of existing database.
- ☞ Renaming database.
- ☞ Updating database.
- ☞ Searching of records.
- ☞ Sorting of records.(A To Z or Z To A).
- ☞ Indexing of records.
- ☞ Creation of View (Logical table).

- ☞ Performing efficient query on database.
- ☞ Applying constraints (**validation rules**) on database.
- Etc.

RDBMS:-

A relational database management system (RDBMS) is a database management system (DBMS) that is based on the relational model as invented by E. F. Codd, of IBM's San Jose Research Laboratory. Many popular databases currently in use are based on the relational database model.

RDBMS stands for Relational Database Management System. RDBMS data is structured in database tables, fields and records. Each RDBMS table consists of database table rows. Each database table row consists of one or more database table fields.

RDBMS store the data into collection of tables, which might be related by common fields (database table columns). RDBMS also provide relational operators to manipulate the data stored into the database tables. Most RDBMS use SQL(Structure Query Language) as database query language.

Example:- The most popular RDBMS are MS SQL Server, DB2, Oracle and MySQL.

Three View of Data:-

1. Logical View.
2. Conceptual View.
3. Internal View.

Logical View:-

EMP (Table)

Eno
 Ename
 Job
 Sal
 Deptno
 Date_Of_Join
 Address
 Age

Conceptual View:-

EMP (Table)

Eno	Number.
Ename	Text.
Job	Text.
Sal	Currency.
Deptno	Number.
Date_Of_Join	Date.
Address	Text.
Age	Number

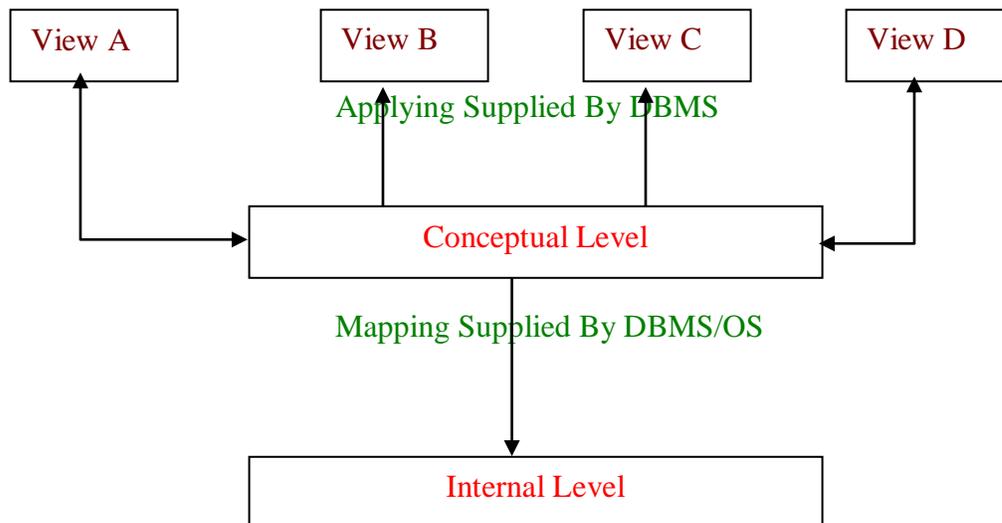
Internal View:-

EMP (Table)

Eno	Number.	12
Ename	Text.	25
Job	Text.	16
Sal	Currency.	10
Deptno	Number.	10
Date_Of_Join	Date.	8
Address	Text.	25
Age	Number	5

Three Level Architecture Proposals for a DBMS:-

1. External level (Defined by User).
2. Conceptual Level (Global Level (Defined DBA).
3. Internal Level(DBA defined for optimization).



Types of DBMS USERS:-

1. Naïve Users.
2. Online Users.
3. Applications Programmers.
4. Database Administrators(DBA).

Naïve users:-

Users who need not be aware of the presence of the database system or any other system supporting their usage are considered naïve users.

Online user:-

These users may communicate with the database directly via an online terminal or indirectly via a user interface application programs. These Users Are Aware of the Presence of Database System. and may have acquired a certain amount of expertise in the limited interaction they are permitted with the database through the intermediately of the application program.

Application Programmers:-

Professionals programmers who are responsible for the developing application programs or users interfaces utilized by the naïve and online users fall into this category.

DBA (Database Administrator):-

A person or group of persons under the supervision of high-level administrator experts centralized control of the database. This person or group of person is referred to as the DBA.

Or

A database administrator (DBA) is an IT professional responsible for the installation, configuration, upgrading, administration, monitoring, maintenance, and security of databases in an organization.

DBA Responsibilities:-

The job of the DBA seems to be everything that everyone else either doesn't want to do, or doesn't have the ability to do. DBAs get the enviable task of figuring out all of the things no one else can figure out. More seriously though, here is a list of typical DBA responsibilities:-

- Installation, configuration and upgrading of Oracle server software and related products
- Evaluate Oracle features and Oracle related products
- Establish and maintain sound backup and recovery policies and procedures
- Take care of the Database design and implementation
- Implement and maintain database security (create and maintain users and roles, assign privileges)
- Perform database tuning and performance monitoring
- Perform application tuning and performance monitoring
- Setup and maintain documentation and standards
- Plan growth and changes (capacity planning).
- Work as part of a team and provide 24x7 supports when required.
- Perform general technical trouble shooting and give consultation to development teams.

Advantages of DBMS:-

1. Centralized Control.
2. Data independence allows dynamic changes and growth potential.
3. Data quality enhanced.
4. Security enforcement possible.

Disadvantages of DBMS:-

1. Problems associated with centralization.
2. Cost of Software/Hardware and migration.
3. Complexity of backup and recovery.

Concept of E-R model (Entity –Relationship) model:- **Most Important**

Entity:-

It is an object, which is distinguishable from other object.

Example:-

Enrollment =02181050001.

SB A/C number =234567.

Passport Number =AB968754.

Entity Set:-

Collection of entity is called entity set.

☞ Employee table.

☞ Students Records table.

Relationship (Mapping):-

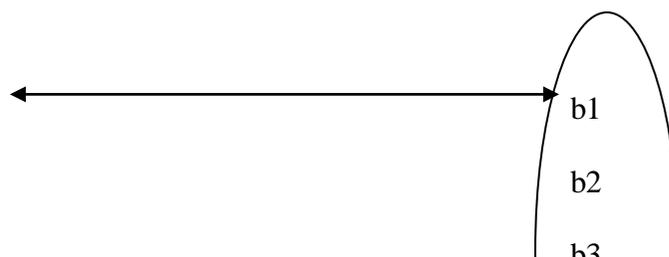
Relations between attributes of two entity sets is called mapping.

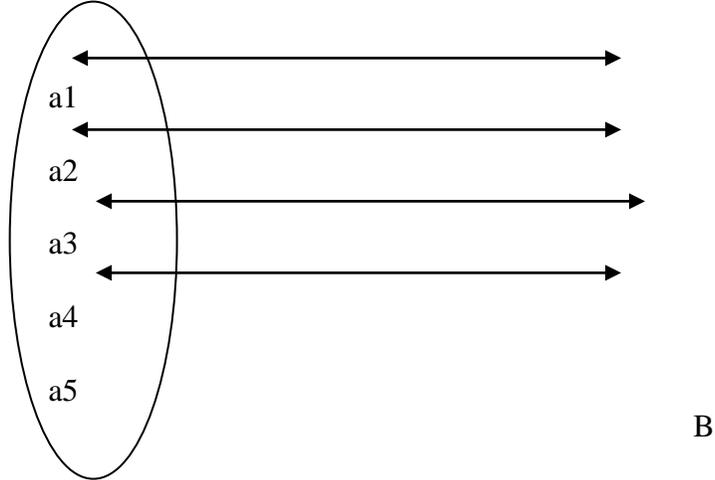
There are following types of relationships.

1. 1:1(One: One) Mapping.
2. 1: M (One: Many) Mapping.
3. M: N (Many: Many) Mapping.

Example:-

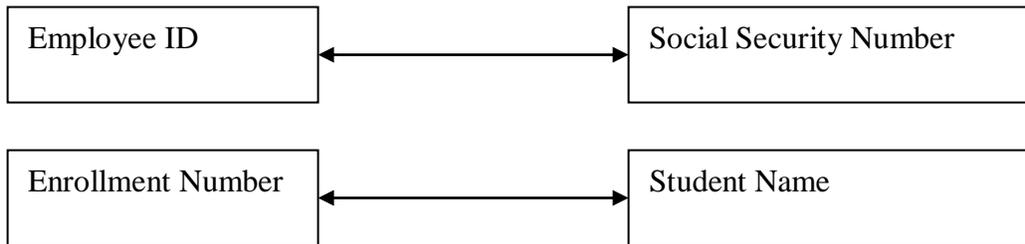
1:1(One: One) Mapping



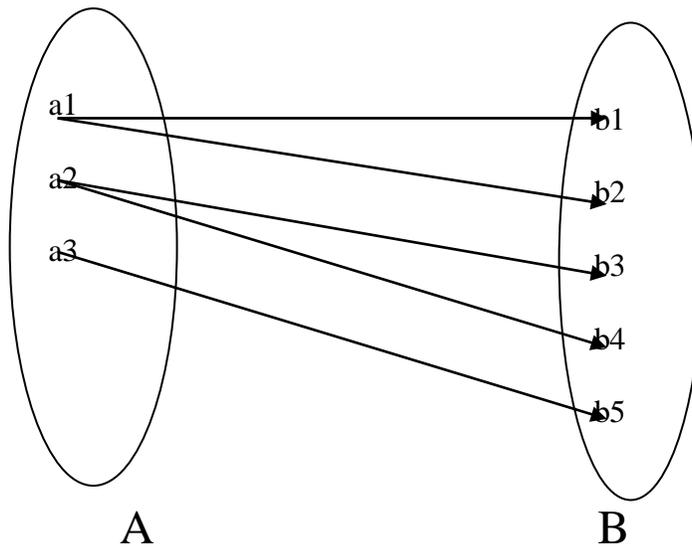


☞ Relationship between enrollment number and student.

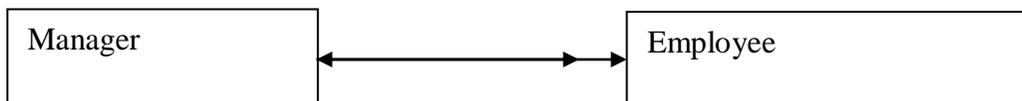
☞ Relationship between Passport number and person.



1: M (One: Many) Mapping.

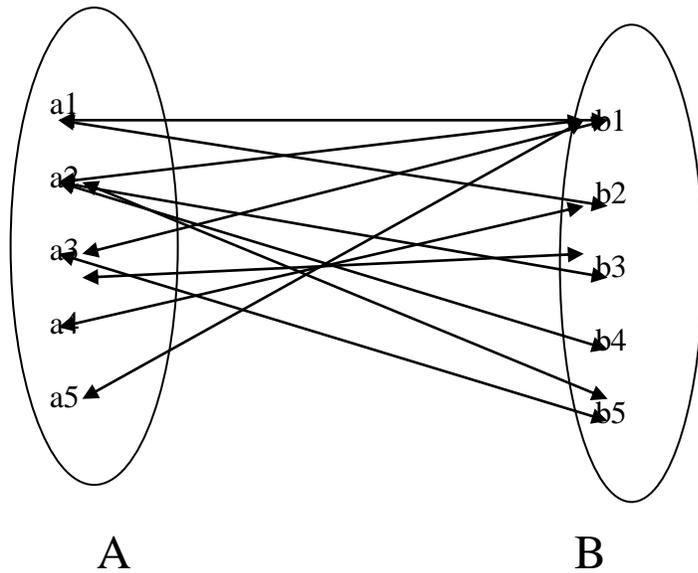


Relationship between Manager and Employee.

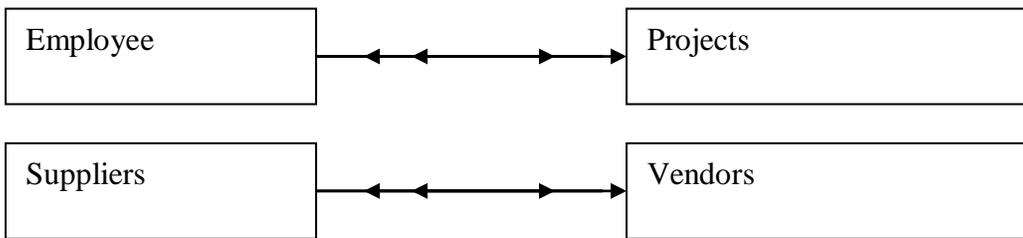


Example:-

[M: N \(Many: Many\) Mapping](#)



Example:-1 Relationship between suppliers and vendors
 Example:-2 Relationship between Employee and Projects



Types of Entity:-

- ❖ Strong Entity
- ❖ Weak Entity

Strong Entity:-

An entity object which gives almost maximum related attributes information is called strong entity.

Example:-

- Passport Number.
- SSN (Social security Number).
- UID.

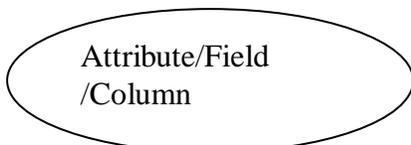
Weak Entity:-

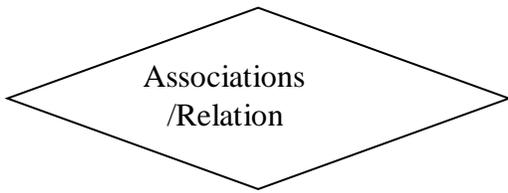
An entity object which gives minimum related attributes information is called weak entity.

Example:-

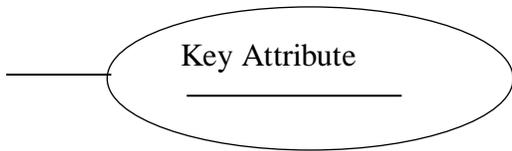
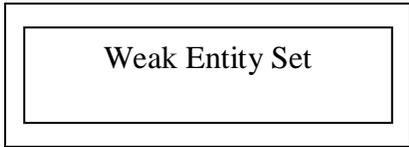
- Voter Id.
- Deptno.

Symbols Used In E-R Model:-



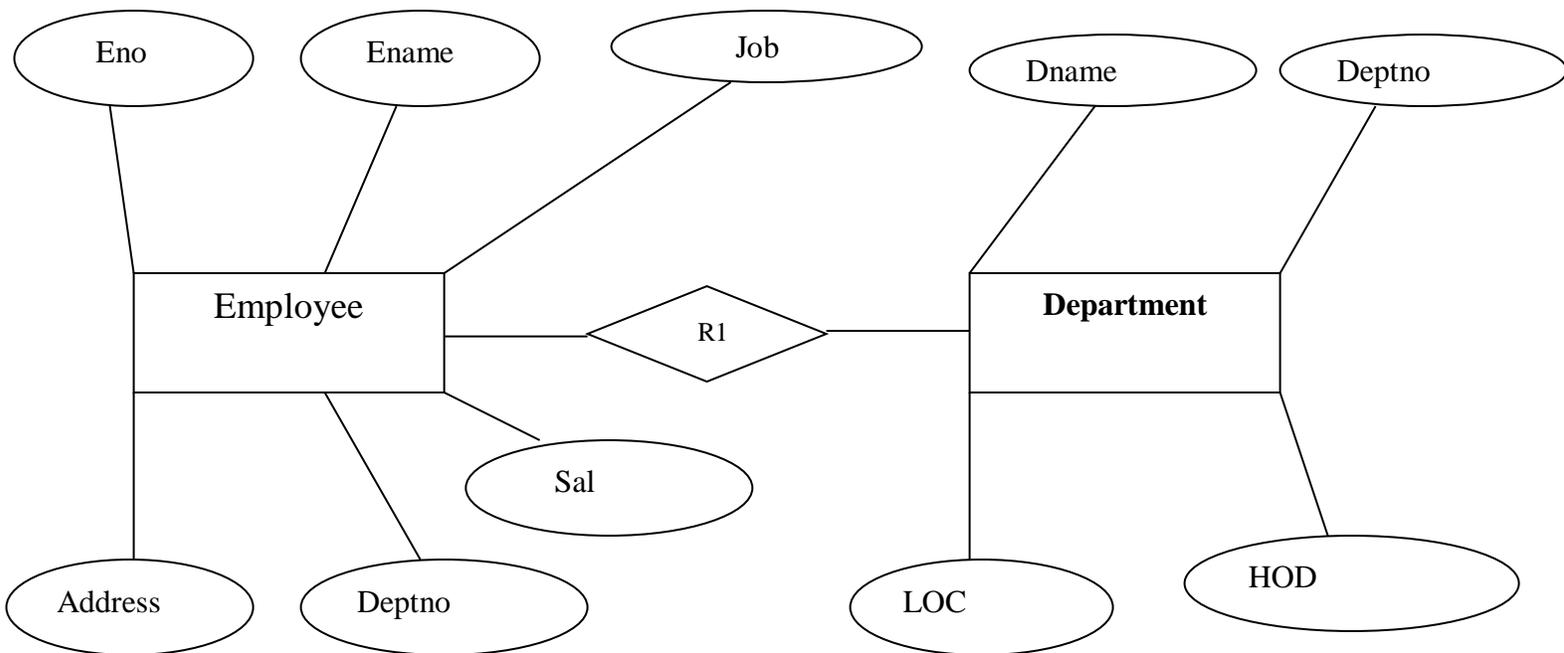


Link



Example of E-R Model:-

Employee- Department



Describe Concept of Abstraction, generalization, Specialization and Aggregation:-

Abstraction:-

It is simplification mechanism used to superfluous details of a set of objects; it allows concentrating on the properties that are interest to the application.

Example:-Car is an abstraction of a personal transportation vehicle.

Generalization:-

It is the abstracting process of viewing sets of objects as a single general class. By concentrating on the general characteristics of the constituents sets suppressing or ignoring their differences.

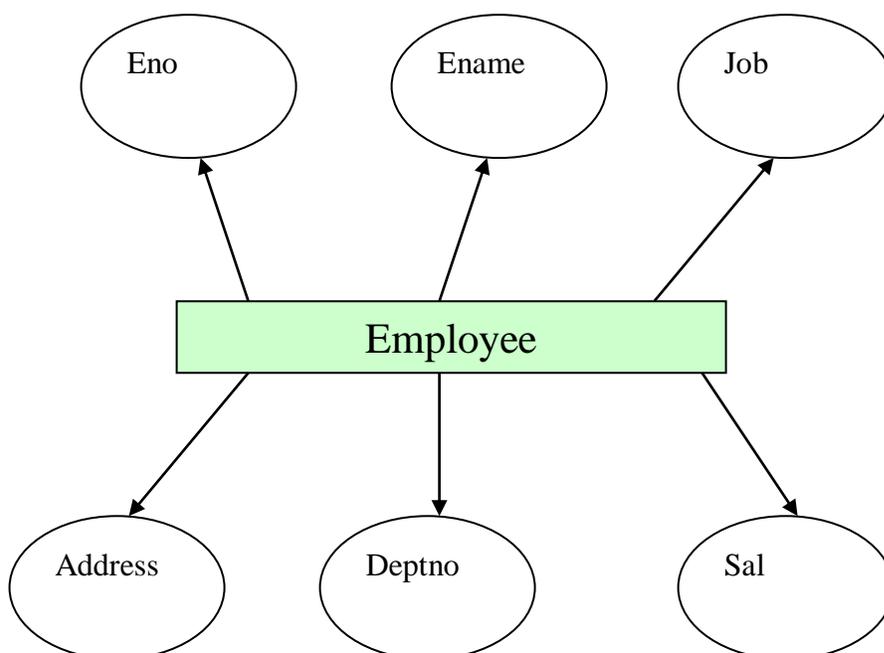
Specialization:-

It is the abstracting process of introducing new characteristics to an existing class of objects to create one or more new classes of objects.

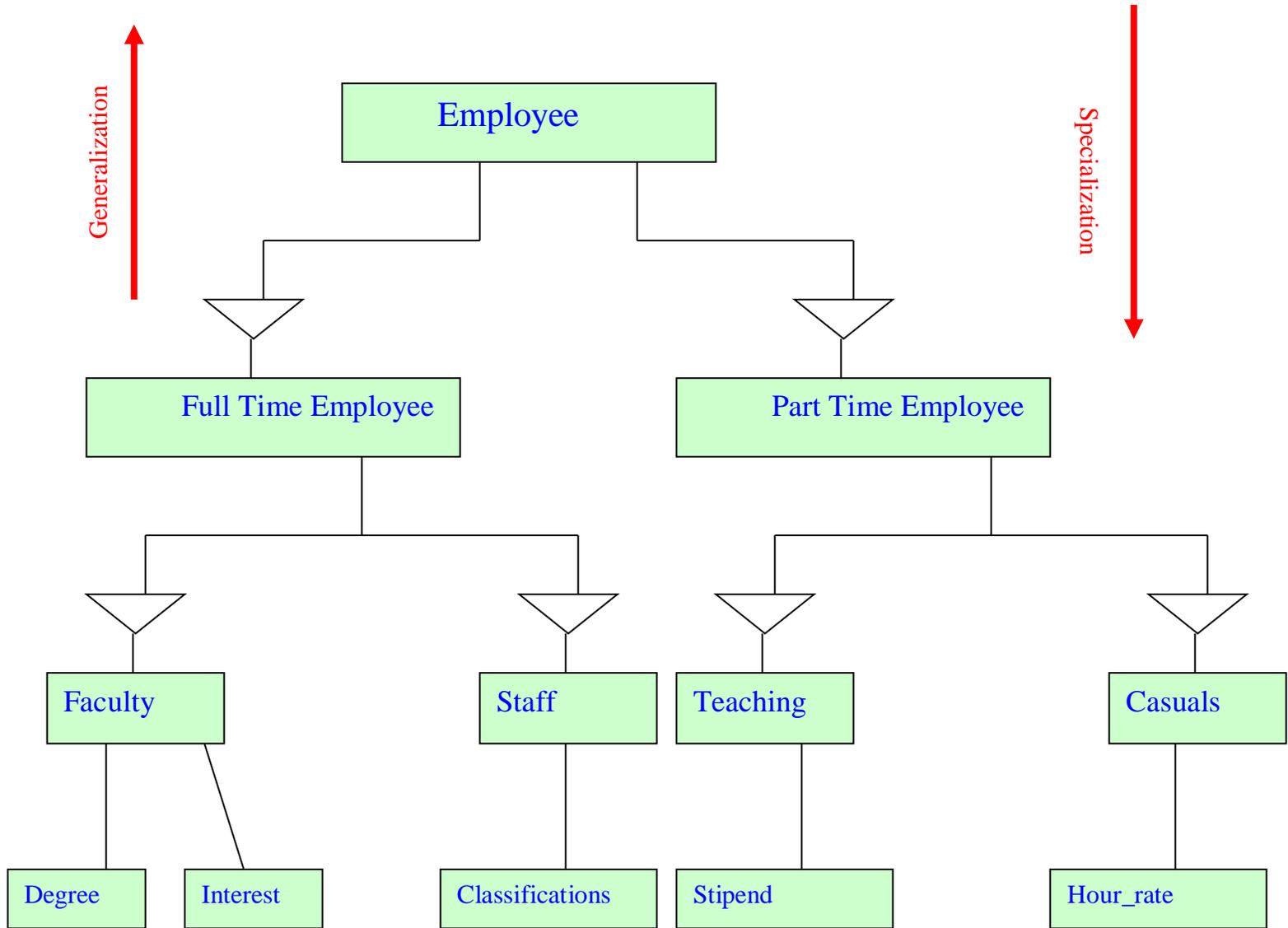
Aggregation:-

It is the process of compiling information on an object, thereby abstracting a higher-level object.

Example: - (Aggregation)



Example: - (Generalization and Specilization)



MS Access: (Extension name .mdb)

Data Types:-

1. Text
2. Memo(For Large Amount Of text)
3. Hyperlink(for Linking)
4. OLE(For image)
5. Currency(For monetary Values)
6. Yes/No(For Boolean values)
7. Autonumber(For generating automatic number)
8. Number
9. Date

Concept of Constraints (Validation rules/Business Rule):-

It is used for validating records in table. There are following types of constraints.

1. Primary key(Integrity Rule1)
2. Foreign Key/Reference Key(Integrity Rule2)
3. Not Null
4. Unique Key
5. Check constraints.

6. Default constraints.

Primary key:- (Integrity Rule 1)

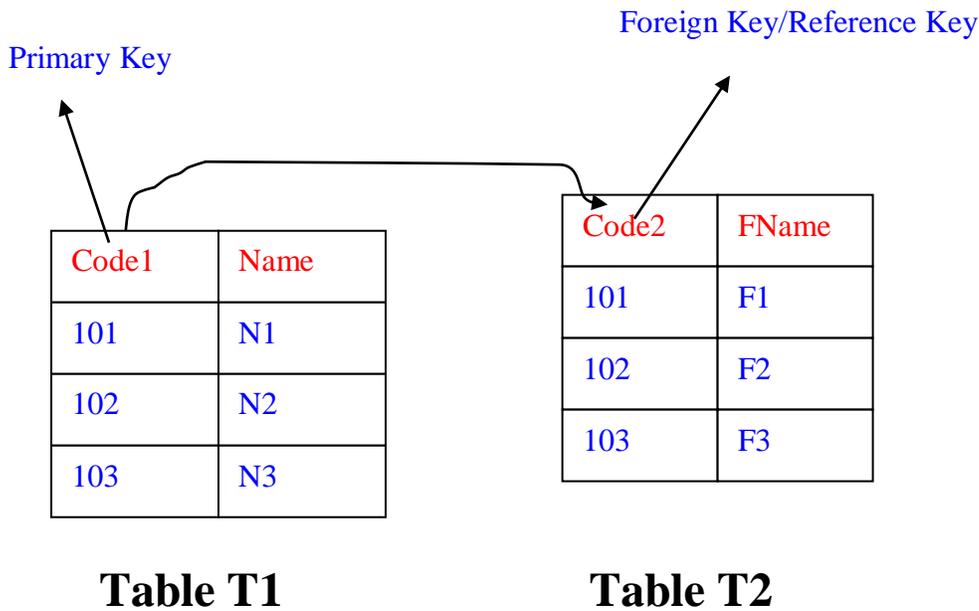
Column Value cannot accept null and duplicate values.

Example:-

Enrollment Number	Primary key
Saving Bank A/c Number	Primary Key
Passport Number	Primary Key
Voter ID card	Primary Key
PAN Card Number	Primary Key
Etc.	

Foreign Key/Reference Key: - (Integrity Rule2)

Column value referred by column of master table (Main Table). There are two tables must be necessary.



Not Null:-

It can accept duplicate values but cannot accept null values.

Unique Key:-

It cannot accept duplicate but can accept null values.

Check Constraints:-

It accepts only predefined values during definition of tables.

Example: - Check (city in ("VNS", "ALD", "Kan", "Luck", "Delhi")).

Default Constraints:-

It may accept predefined default values.

Example

Default sal (8000);

NORMALIZATION:- (Gauranteed)

To reduce redundancy or duplicacy from database is called Normalization technique. It is anomalous behavior of database. There are following technique to reduce or optimize redundancy/duplicacy.

- A:- 1 NF (First Normal Form).(Flat File)
- B:- 2 NF (Second Normal Form)
- C:- 3 NF (Third Normal Form)
- D:- BCNF (Boyce codd Normal Form)

Concept of Functional dependency (FD):-

Let A and B be two attribute sets. We say that attribute B is functionally dependent on attribute A if and only if all data items of B is dependent on Attribute set A.It is denoted by:-

A \longrightarrow B

It means B is functionally dependent on A.

A \longrightarrow B, C.

It means B and C both functionally dependent on A.(Composite dependency)

Example:-1

Enrollment \longrightarrow Sname
Courese_Code \longrightarrow Cname
Item_Code \longrightarrow Item_name

Example:-2

Order_No, Item_Code \longrightarrow Quantity, Price

Concept of Decomposition of Relation (Table) Scheme:-

Let R is a relation scheme which consist of Attributes $A_1, A_2, A_3, A_4, A_5 \dots A_n$. we decompose the relation in such manner $R_1, R_2, R_3, R_4 \dots R_n$. in such a Way.

$$\bigcup_{i=1}^n R_i = R$$

Or

$$R_1 \cup R_2 \cup R_3 \cup R_4 \dots R_n = R$$

Concept of key and Non-Key:-

Key Attributes

Apply primary key Constraints.

Non Key Attributes

Not apply primary key Constraints

1NF/Flat File: -

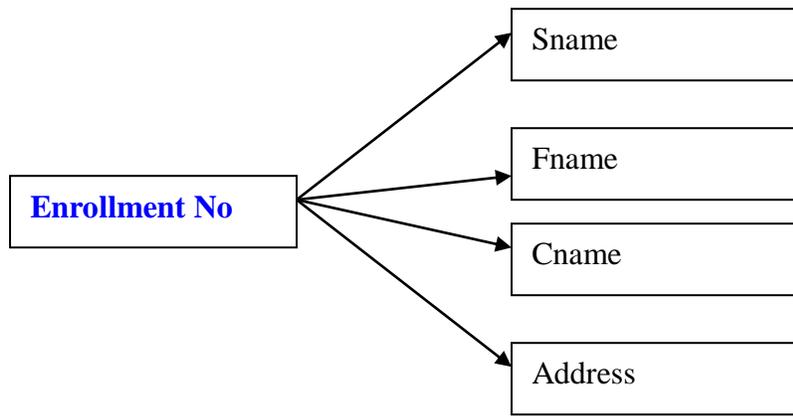
In first normal form, all non-key attributes totally dependent on a prime key attribute.

Example:-

Student (Enroll, Sname, Fname, Cname, Address)



Primary key



2NF: -

A relation is in 2 NF if it is in 1NF and every non Key Attribute is fully dependent on each candidate key of the relation. All non key attributes dependent on composite key attributes.

Example:-

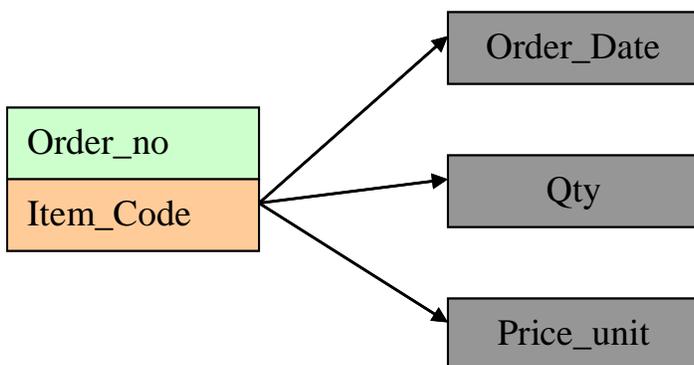
Order_Details (Order_no, Item_Code, Order_Date, Qty, Price_unit)
 (Order_no, Item_Code) → Composite Keys.
 In Composite key dependency may not be occurring.

Order_Detail

Order_no	Item_Code	Order_Date	Qty	Price_unit
10	C1	19/11/2015	100	10
10	C2	19/11/2015	50	40
20	C1	22/11/2015	150	10
20	C2	22/11/2015	200	40
20	C3	22/11/2015	75	55
30	C1	27/11/2015	113	10
30	C3	27/11/2015	170	55

- R1 (Order_no, Order_Date).
- R2 (Item_Code, Price_unit).
- R3 (Order_no, Item_Code, Qty).

$$R1 \cup R2 \cup R3 = R(\text{Order_Details})$$



R1 (Table)

Order_no	Order_Date
10	19/2/2012
20	22/2/2012
30	27/2/2012

R2 (Table)

Item_Code	Price_unit
C1	10
C2	40
C3	55

R3 (Table)

Order_no	Item_Code	Qty
10	C1	100
10	C2	50
20	C1	150
20	C2	200
20	C3	75
30	C1	113
30	C3	170

3NF:-

A relation R is in third normal form if it is in 2NF and every non key attribute of R is non transitively dependent on each candidate key of R.

Example:-

Student (Enrol, Sname, Cname, Year, ⇔ Hostel).

Student

Primary Key

Enroll	Sname	Cname	Year	Hostel
1234	Archana	MCA	1	Narendra_dev
2345	Vivek	MCA	2	Brocha
5432	Manoj	MBA	1	Narendra_dev
6789	Seema	MCA	3	Birala
3421	Sandeep	BCA	3	Birala
7698	Rohan	BCA	1	Narendra_dev
5689	Pravesh	MBA	2	Brocha
9006	Archana	BCA	2	Brocha

Duplicacy may occur in year and hostel.

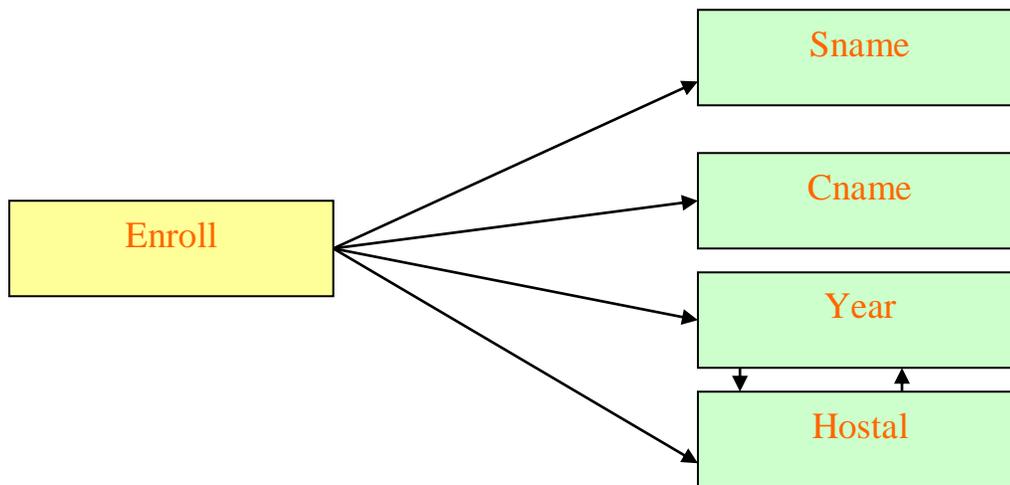
R1 (Year, Hostel).

R1 R2 (Enroll, Sname, Cname, Year).

Year	Hostal
1	Narendra_dev
2	Brocha
3	Birala

R2

Enrol	Sname	Cname	Year
1234	Archana	MCA	1
2345	Vivek	MCA	2
5432	Manoj	MBA	1
6789	Seema	MCA	3
3421	Sandeep	BCA	3
7698	Rohan	BCA	1
5689	Pravesh	MBA	2
9006	Archana	BCA	2



BCNF (Boyce Codd Normal Form):-

A relation R is said to be in BCNF if $X \rightarrow A$ holds in R, and A is not in X, then X is a candidate key for R. In other words, a relation is in BCNF if it is in 3NF and if every determinant (left hand side of a functional dependency) is a candidate key.

It should be noted that most relations that are in 3NF..... are also in BCNF. Infrequently a 3NF relation is not in BCNF and this happens only if,

- ☞ The candidate keys in the relations are composite keys (that is, they are not single attributes).
- ☞ There is more than one candidate key in the relation.
- ☞ The keys are not disjoint, That is, some attributes in the keys are common.

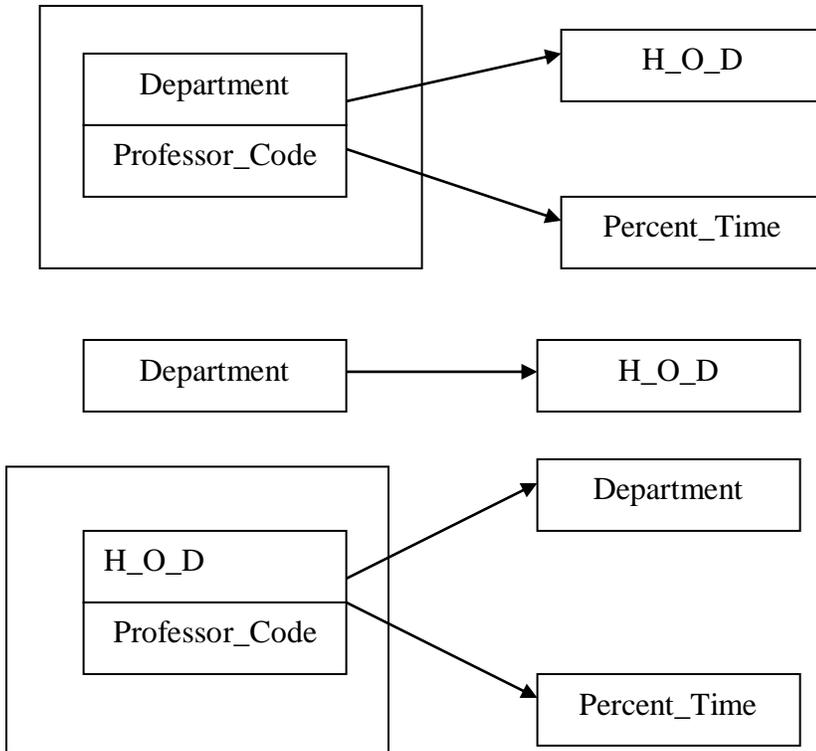
Example:-

Consider a relation scheme

Professor (Professor_Code, Dept, H_O_D, Percent_Time).

It is assumed that

1. A professor can work in more than one department.
2. The percentage of the time he spends in each department is given.
3. Each department has only one head of department.



Professor_Code	Department	H_O_D	Percent_time
P1	Physics	Ghosh	50
P1	Mathematics	Krishnan	50
P2	Chemistry	Rao	25
P2	Physics	Ghosh	75
P3	Chemistry	Rao	50
P3	Physics	Gosh	40
P2	Mathematics	Krishnan	75

R1(Department, H_O_D).

R2 (Professor_Code, Department, Percent_Time).

R1

Department	H_O_D
Physics	Ghosh
Mathematics	Krishnan
Chemistry	Rao

R2

Professor_Code	Department	Percent_Time
P1	Physics	50
P1	Mathematics	50
P2	Chemistry	25
P2	Physics	75
P3	Chemistry	50
P3	Physics	40
P2	Mathematics	75

Properties of Normalized relations:-

- ❖ No data value should be duplicated in different rows unnecessarily.
- ❖ A value must be specified attribute in a row.
- ❖ Each relation should be self-contained.
- ❖ When arrow is added to a relation, other relations in the database should not be affected.
- ❖ A value of an attribute in a tuple may be changed independent of other tuples in the relation and other relations.

Different Types of Anomalies in database:-

1. Redundancy (Duplicacy).
2. Update anomalies.
3. Insertion anomalies.
4. Deletion anomalies.

Note:-

Normalization technique should be common sense.

Instances and Schema:-

Instances:-

It is collection information in the database at a particular moment is called an instance of the database.

Database Schema:-

The overall design of the database is called the database schema.

Example:-

Table Schema (Schema for Physical table)

View Schema (Schema for Logical Table)

Index Schema (Schema for Index Table)

Differentiate between Traditional file oriented approach and Conventional or Centralized DBMS:-

Traditional File oriented approach:-

- ❖ Data redundancy and inconsistency.
- ❖ Difficulty in accessing data.
- ❖ Data isolation.
- ❖ Atomicity problem.

Benefit of Conventional or Centralized DBMS:-

- ❖ Redundancy can be reduced.
- ❖ Inconsistency can be avoided.
- ❖ The data can be shared.
- ❖ Standard can be enforced
- ❖ Integrity can be maintained (Integrity 1 and Integrity 2).
- ❖ Security restriction can be applied.(User name And Password)
 - It means database can access only authorized person.
 - Crashes during transaction processing.
 - Anomalies free database.
 - Unauthorized modification of data.

Audit Trail:-

The DBMS has certain routines that maintains audit trail or journal.

It records:-

- ❖ Who
- ❖ When
- ❖ Where
- ❖ What

MS Access Objects (Extension Name .mdb):-

There are following objects available in MS access for database.

- ❖ Table Object.
- ❖ Query Object.
- ❖ Form Object.
- ❖ Report.
- ❖ Pages.

- ❖ Macros
- ❖ Module

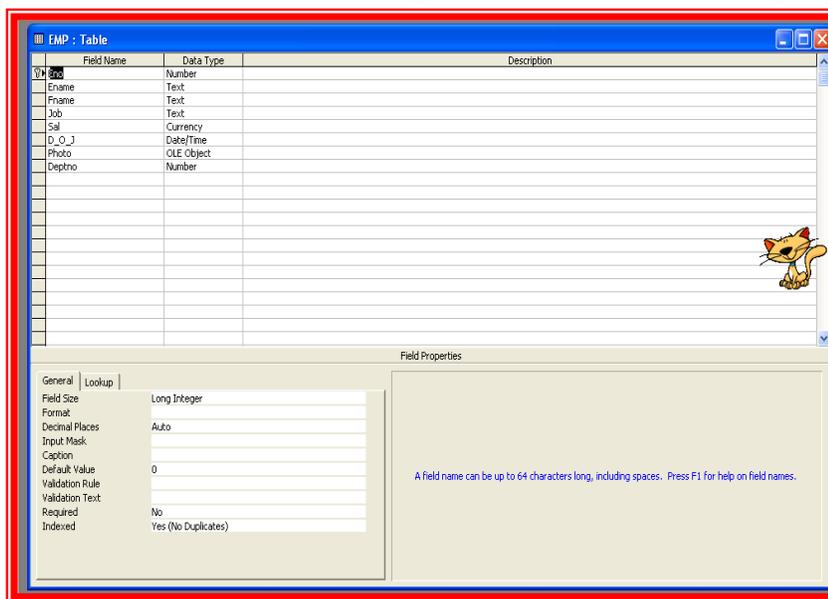
Table Object:-

There are following three techniques for creating table object.

- ❖ Creating Table Using Design View.
- ❖ By Wizard Method, (Automatic instructions provide by system).
- ❖ Direct Entering Method (Working Technique similar to spread sheet).

Creating Table Using Design View:-

Select Create Table Design View → Click Design Button →



Queries:- (Questionnaires on database):- Most Important

To access records from database is called query.

There are following three techniques for performing query on database.

- ☞ Access Design View.
- ☞ Wizard.
- ☞ SQL (Structure Query Language).

Operators used in query:-

- ☞ Relational operators(>,<,>=,<=,< >)
- ☞ Arithmetical Operators(+,-,*,/)
- ☞ Predicate (and, or, not, like, not like, between, not between, in, not in, any, all, not all).

Aggregate Functions Used in Query:-

- sum ()
- max ()
- min ()
- count ()
- avg ()

Order Types:-

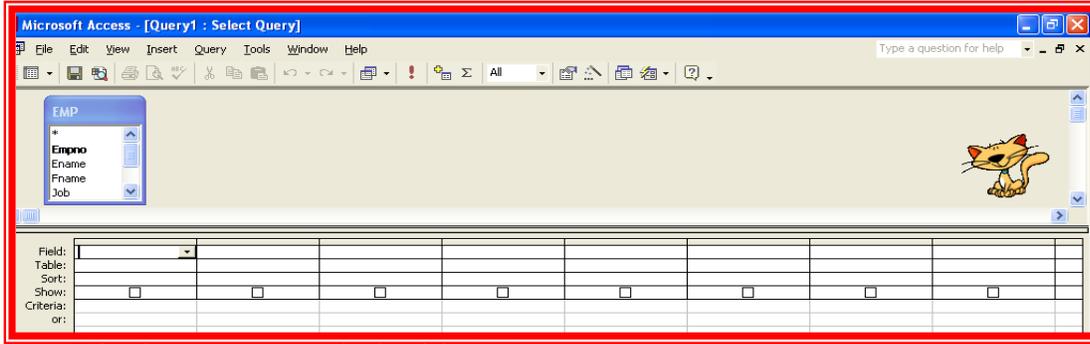
- ❖ Ascending Order.(A-Z)→(ASC)
- ❖ Descending Order.(Z-A) →(DESC)

Wild cards:-

1. * For all Characters.
2. ? For any one character.

Access Design View:-

Select Query Design → Click Design Button → Add Table → Close



1. *A Display name ended with 'A'
2. Empno in (101,102,103)
3. Empno not in (101,102,103)
4. sal between 5000 and 15000
5. Sal not between 5000 and 15000
6. Ename Like 'A*H'
7. Ename Like'?A*L'
8. Ename Ascending
9. Ename Descending
10. Sal>=20000 and sal<=25000

SQL Method of Query:-

Select <col1>, <col2>, <col3>... from <table_Name>

Where <Criteria_Expression> group by

<Aggregate_Column_name>

Order by <Column_name> asc|desc;

Example:-

Let us consider a table say EMP which is describe below
Emp (empno, ename, job, sal, deptno, address).

1:- To display all employee records.

Select * from emp;

2:- To display empno, ename and job only.

Select empno, ename, job from emp;

3:- To display employee records who is found salary more than 12000.

Select empno, ename, job, Sal from emp where sal>=12000;

4:- To display employee records who is found salary between 7000 and 13000.

Select empno, ename, job, Sal from emp where sal between 7000 and 13000;

5:- To display employee records whose job in clerk, steno, and salesman .

Select empno, ename, job, Sal from emp where job in ('clerk', 'steno', 'salesman');

6:- To display employee records whose job not exist in clerk, steno, and salesman.

Select empno, ename, job, Sal from emp where job not in ('clerk', 'steno', 'salesman');

7:- To display employee records whose name begin with 'p' and ended with 'a'

Select empno, ename, job, Sal from emp where ename like 'p*a';

8:- To display employee records whose name begin with any character followed by 'a' and remaining are any characters and ended with h.

Select empno, ename, job, Sal from emp where ename like '?a*h';

9:- To display employee records descending order by name.

Select * from emp order by ename desc;

10:- To display employee records ascending order by name.

Select * from emp order by ename asc;

Example Based on Aggregate Function:-

1:-To display average salary, maximum salary, minimum salary, total Salary and number of records in each department.

select avg(sal) as Average,max(sal) as Maximum,Min(Sal) as minimum, Sum(sal) as Total_Sal,count(*) As Total_records,deptno from emp group by deptno;

2:-To display average salary, maximum salary, minimum salary, total Salary and number of records in department 10 and 20;

select avg(sal) as Average,max(sal) as Maximum,Min(Sal) as minimum, Sum(sal) as Total_Sal,count(*) As Total_records,deptno from emp group by deptno having deptno in (10, 20);

Example Based on Nested Query:-

Select <col1>, <col2>, <col3>... from <table_Name>

Where <col_any>=(select <col_any> from <table_Name> Where <col_any>=(select <col_any> from <table_Name> Where <col_any>=(select <col_any> from <table_Name> ...))));

Example:-

1:-To display employee record who is found maximum salary.

```
Select eno, ename, job, sal, deptno from emp where sal= (select max (sal) from emp);
```

2:-To display employee record who is found minimum salary.

```
select eno, ename, job, sal, deptno from emp where sal=(select min (sal) from emp);
```

3:-To display employee record who is found Maximum or minimum salary.

```
select eno, ename, job, sal, deptno from emp where sal= (select max(sal) from emp) or sal=(select min (sal) from emp);
```

4:-To display employee record who is found second highest salary.

```
select eno, ename, job, sal, deptno from emp where sal= (select max(sal) from emp where sal<(select max(sal) from emp));
```

5:-To display employee record who is found second lowest salary.

```
select eno, ename, job, sal, deptno from emp where sal= (select min (sal) from emp where sal>(select min(sal) from emp));
```

6:-To display employee record who is found second highest or second lowest salary.

```
select eno, ename, job, sal, deptno from emp where sal=(select max(sal) from emp
where sal<(select max(sal) from emp)) or sal=(select min(sal) from emp where
sal>(select min(sal) from emp));
```

7:-To display employee records whose job is same as job of pankaj.

```
select eno, ename, job,sal from emp where job=(select job from emp where
ename='pankaj');
```

Query Based on Joining:-

To access records more than one table we join table. There are following categories of joining.

1. Inner join.
2. Left inner join.
3. Right inner join.

Inner Join:-

It retrieve common records from table T1 and table T2.

```
SELECT T1.dept1, T1.Ename, T2.dept2, T2.Ename
FROM T1 INNER JOIN T2 ON T1.dept1 = T2.dept2;
```

Left Inner Join: -

It returns all records from left table (T1) and return from table t2 only which match from table t1.

```
SELECT T1.dept1, T1.Ename, T2.dept2, T2.Ename
FROM T1 LEFT JOIN T2 ON T1.dept1 = T2.dept2;
```

Right Inner Join: -

It return all records from right table (T2) and return only those records from table T1 that match to table T2.

```
SELECT T1.dept1, T1.Ename, T2.dept2, T2.Ename
FROM T1 RIGHT JOIN T2 ON T1.dept1 = T2.dept2;
```

Form:-

A form is a type of a database object that is primarily used to enter or display data in a database. We can also use a form as a switchboard that opens other forms and reports in the database, or as a custom dialog box that accepts user input and carries out an action based on the input.

There are two ways by which we can create form.

1. Design View (Created by user).

2. Wizard technique (Automatic created with the help of instruction guideline dialogue box).

Design View.

FORM→CLICK DESIGN→CLICK NEW→SELECT TABLE →PLACE FIELD ON SCREEN→MAKE DESIRED BUTTON→ CLICK FORM VIEW FROM VIEW

EMPLOYEE RECORD MANAGEMENT SYSTEM

Empno:	<input type="text" value="101"/>
Ename:	<input type="text" value="Ajay"/>
Fname:	<input type="text" value="Ranesh"/>
Job:	<input type="text" value="Steno"/>
Sal:	<input type="text" value="\$8,000.00"/>
D_O_J:	<input type="text" value="3/2/2001"/>
Deptno:	<input type="text" value="10"/>

Toolbar icons: Run, Previous, Home, Next, End, Undo, Print, Refresh, Help, and Oracle logo.

Wizard Technique for Making Form:-

It provide instruction dialog box and we follow according our own view.

Double Click form wizard→Select Fields from Available Field→Press Next
→Select Layout of Form→Press next → Select Form Style→Press Next
→Select Open form or Modify form and then Click Finish button.

Reports:-

It produces output on hard copy (paper) or soft copy (E -Form).

There are two technique of creating report.

- ☞ Design View.
- ☞ Wizard View.

Reports in MS Access consist of five bands.

- ☞ Report header.
- ☞ Page Header.
- ☞ Detail.
- ☞ Page Footer.
- ☞ Report Footer.

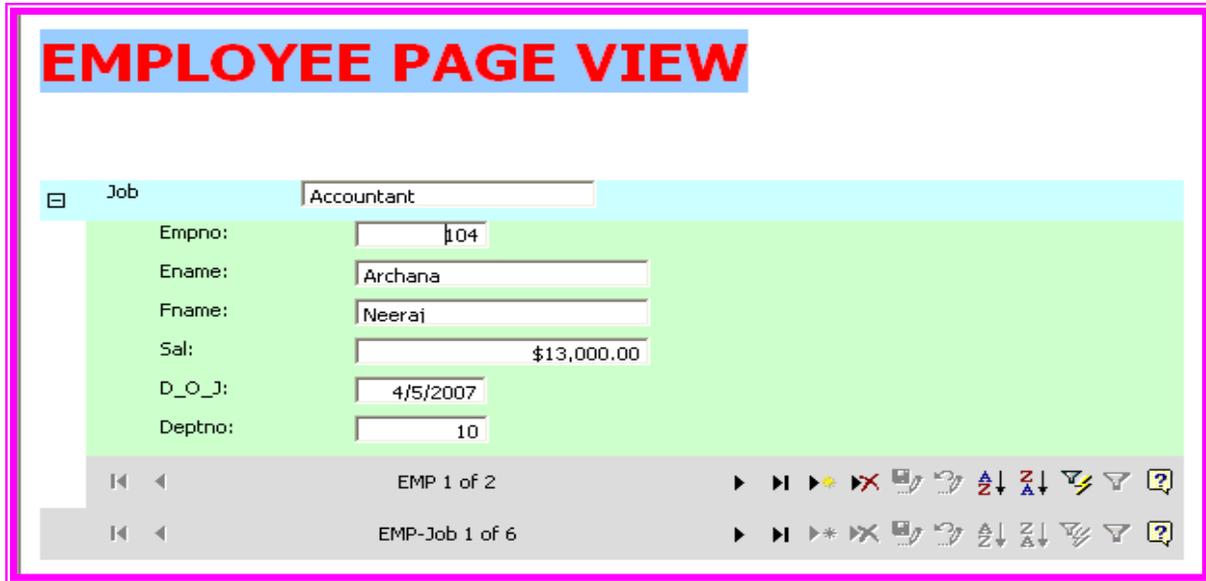
EMP						
Page Header						
Job						
Job Header						
Job						
Detail						
	Empno	Ename	Fname	Sal		
Job Footer						
Summary for ' & "Job' = ' & " & [Job] & " (" & Count() & " " & [Count()]=1,"detail record","detail recor						
Sum						=Sum([Sal])
Avg						=Avg([Sal])
Min						=Min([Sal])
Max						=Max([Sal])
Page Footer						
=Now()						
="Page " & [Page] & " of " & [Pages]						
Report Footer						
Grand Total						
=Sum([Sal])						

Pages:-

It is similar to form but its main purpose is to navigating records.

There are two techniques for creating pages.

- ☞ Design View.
- ☞ Wizard View.



Define Export & Import features in MS Access:-

Export of MS Access Database:-

Definition of Export:-

We can export a table, query, form, report, macro, or module from one Access database to another. When we export an object, Access creates a copy of the object in the destination database.

Select Table → Go To File menu Select Export → Select Save Type (Say MS Excel) And Type File Name (Say EMP) → Click Export Button

Import of MS Access Database:-

Definition of Import:-

we can bring data from one Access database into another in many ways. Copying and pasting is the simplest method, but importing and linking offer you better control and flexibility over the data that you bring, and over how you bring that data into the destination database.

Select File → Get External data → Click Import → Change file type And Select file name
 → Press Import Button → Select Work sheet → Press next → Press next →
 Press next → Press next → Select Primary key if we want to set → Press Next → Press Finish

What is Database:-

It is collection of well-organized related records in coherent manner. These records are stored in the form of **table**. It consists of **rows** and **columns**. Rows are known as **tuples** and columns are known as **attributes**.

Or

A database is a collection of related information stored so that it is available to users for different purposes. The content of a database is obtained by combining data from all the different sources in an organisation.

Example: -

- Employee records.
- Students records.
- Telephone Directory.
- Inventory/Stock control.
- Patients records, etc.

EMP (Table):-

Eno	Ename	Job	Sal	Deptno
101	Ajay	Steno	12000	10
102	Vijay	Manager	22000	20
103	Anand	Clerk	10000	10

Eno, Ename, Job, Sal, Deptno → → → → → Fields Name/Attributes Name/Column Name

Number of Attributes=5

Number of Tuples=3

Cardinality of EMP table=3

Degree/Arity of EMP=5

DBMS:-

It is combination of H/w and S/w that can be used to set up and monitor a database. and can manage the updating and retrieval of database that has been stored in it.

Or

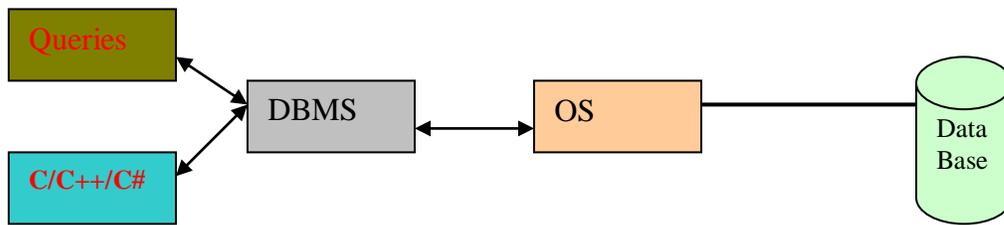
It is an efficient system by which we manage database.

Example:-MS Access, Oracle, SQL Server, DB-2, Ingress, FoxPro etc.

Functions of DBMS:-

- ☞ Creation of New database.
- ☞ Deletion of existing database.
- ☞ Renaming database.
- ☞ Updating database.
- ☞ Searching of records.
- ☞ Sorting of records.(A To Z or Z To A).
- ☞ Indexing of records.
- ☞ Creation of View (Logical table).
- ☞ Performing efficient **query** on database.
- ☞ Applying constraints (**validation rules**) on database.
- ☞ Retrieving data collectively or selectively.
- ☞ Various reports can be produced from the system.
- ☞ Mathematical functions can be performed and the data stored in the database can be manipulated with these functions.
- ☞ To maintain **integrity** (Integrity rule1 and Integrity rule2) and database use.
Etc.

Interface User and database:-



Traditional File Oriented Approach:-

Following significant disadvantages.

- ❖ Data Redundancy/Duplicacy.
- ❖ Lack of Flexibility
- ❖ Data Dependency

Motivation for Database approach:-

- ❖ The work in the organization may not require significant sharing or complex Access.
- ❖ Powerful h/w platform s/w for database management system.
- ❖ Possibility of sharing of database.
- ❖ It must be file based.
- ❖ The training of personal in the management in the use of database.

Basics of database:-

- ❖ Data Item.
- ❖ Entities & Attributes.
- ❖ Logical & Physical Data.
- ❖ Schema & Subschema.
- ❖ Data Dictionary.

Data Items:-

The Smallest unit of data is called data item.

Example:-

Eno=101

Ename=Ajay.

Entities & Attributes:-

Entity:-

It is an object, which is **distinguishable** from other object.

Example:-

Enrollment=02181050001.

SB A/c number=234567.

Passport Number=AB968754.

Entity Set:-

Collection of entity is called entity set.

☞ Employee table.

☞ Students Records table.

Attributes:-

Numbers of fields in a relation is called its attributes.

Example:-

Eno	Ename	Job	Sal	Deptno
-----	-------	-----	-----	--------

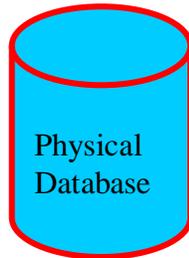
Logical & Physical Data:-

Logical data:-

Displaying of records by means of performing query on database is called logical data.

Physical data:-

Permanently storage of records in storage device is called physical data.



Schema & Subschema:-

Schema:-

The overall design of the database is called the database schema.

Example:-

Table Schema (Schema for Physical table)
View Schema (Schema for Logical Table)
Index Schema (Schema for Index Table)

SubSchema:-

It refers to same view but for the data-item types record types which is used in a particular user. It is derived from schema.

Example:-

Student (Enrol, Sname, Cname, Year ↔ Hostel). Schema Object

R1 (Year, Hostel). Sub Schema Object

R2 (Enrol, Sname, Cname, Year). Sub Schema Object

Data Dictionary:-

It holds detailed information about the different structure and data types.

It associated with different types of relationships, constraints and privileges etc.

Relationship (1:1, 1:M, M:N Mapping)

Constraints (Primary key, Foreign Key, Not Null, Unique Key, Check Constraints)

Privileges (Insert, Update, Delete)

Three View of data:-

1:-Logical View.

2:-Conceptual View.

3:-Internal View.

Logical View:-

EMP (Table)

Column name

Eno
Ename
Job
Sal
Deptno
Date_Of_Join
Address
Age

Conceptual View:-

EMP (Table)

<u>Column name</u>	<u>Data Type</u>
Eno	Number.
Ename	Text.
Job	Text.
Sal	Currency.
Deptno	Number.
Date_Of_Join	Date.
Address	Text.
Age	Number

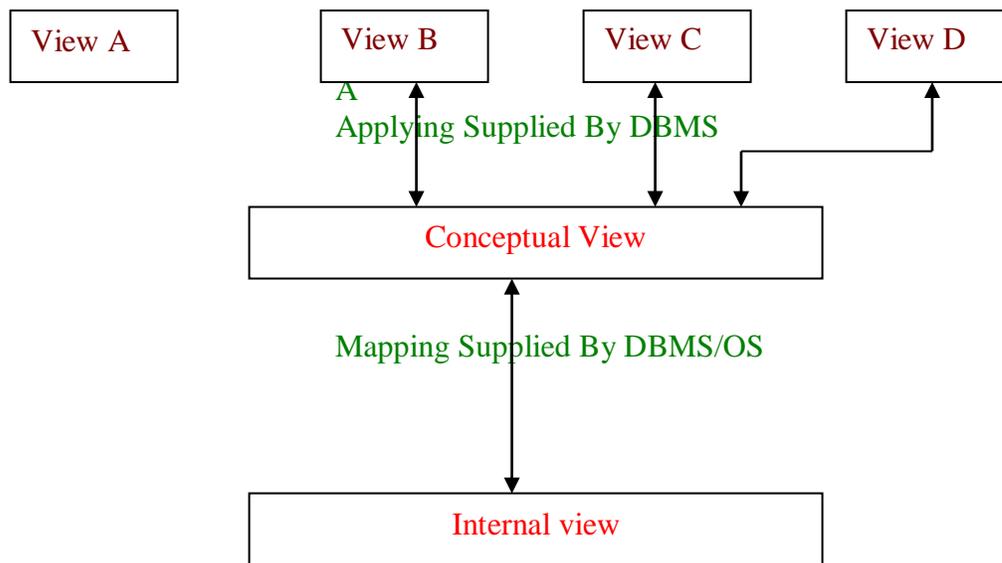
Internal View:-

EMP (Table)

<u>Column name</u>	<u>Data Type</u>	<u>Size</u>
Eno	Number.	15
Ename	Text.	20
Job	Text.	10
Sal	Currency.	10
Deptno	Number.	10
Date_Of_Join	Date.	8
Address	Text.	25
Age	Number	5

Three Level Architecture Proposals for a DBMS:-

- 1:-External level (Defined by User).
- 2:-Conceptual Level (Global Level (Defined DBA)).
- 3:-Internal Level (DBA defined for optimization).



Types of DBMS USERS:-

- 1:-Naive Users.
- 2:-Online Users.
- 3:-Applications Programmers.
- 4:-Database Administrators (DBA).

Naive users:-

Users who need not be aware of the presence of the database system or any other system supporting their usage are considered naïve users.

Online user:-

These users may communicate with the database directly via an online terminal or indirectly via a user interface application programs. These **Users Are Aware of the Presence of Database System** and may have acquired a certain amount of expertise in the limited interaction they are permitted with the database through the intermediately of the application program.

Application Programmers:-

Professionals programmers who are responsible for the developing application programs or users interfaces utilized by the naïve and online users fall into this category.

DBA (Database Administrator):-

A person or group of persons under the supervision of high-level administrator experts centralized control of the database. This person or group of person is referred to as the DBA.

Advantages of DBMS:-

- 1:-Centralized Control.
- 2:-Data independence allows dynamic changes and growth potential.
- 3:-Data quality enhanced.
- 4:-Security enforcement possible.

Disadvantages of DBMS:-

- 1:-Problems associated with centralization.
- 2:-Cost of Software/Hardware and migration.
- 3:-Complexity of backup and recovery.

Facilities of DBMS:-

Following types of facilities provided by DBMS

- ❖ DDL(Data Definition Language)
- ❖ DML(Data Manipulation Language)
- ❖ DCL(data Control Language)
- ❖ TCL(Transaction Control Language)

DDL:-

Following commands are used in DDL.These are **autocommitted** (Save automatically).

- ❖ Create.
- ❖ Alter.
- ❖ Drop.
- ❖ Rename.
- ❖ Trunc.

DML:-

These commands are **not autocommitted**.

- ❖ Insert into.
- ❖ Delete.
- ❖ Update.

DCL:-

Such categories of commands are used for controlling data in database.

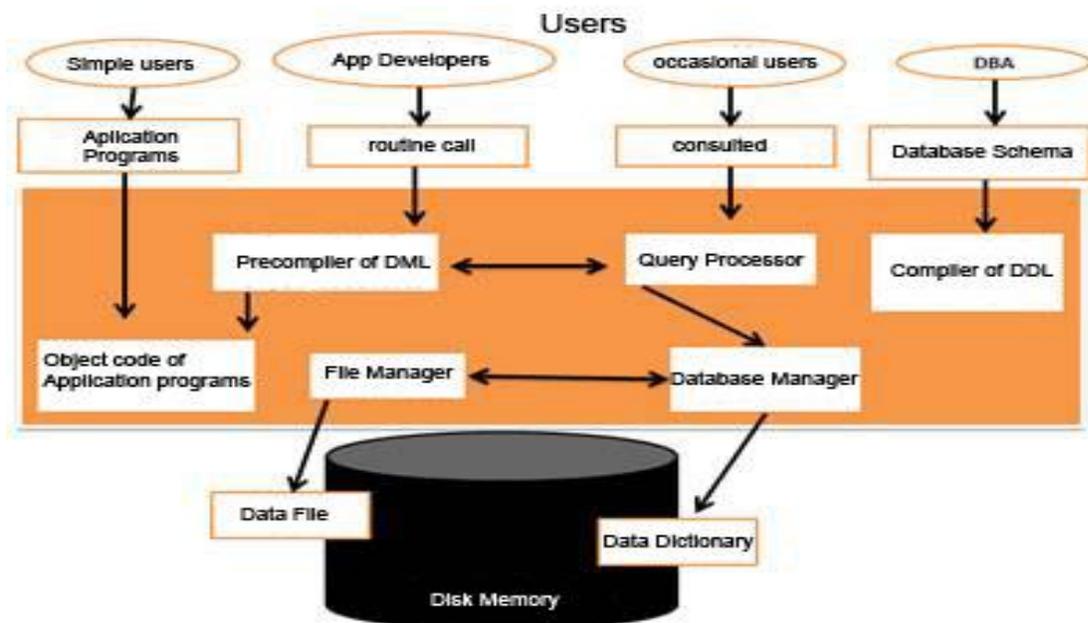
- ❖ grant (Apply privileges).
- ❖ revoke(Remove Privileges).

TCL:-

Such categories of commands are used for controlling database transaction.

- ❖ Rollback(Recall previous records)
- ❖ commit(Save)
- ❖ savepoint (For transaction purpose)

DBMS Structure:-



Advantages of DBMS:-

- 1:-Centralized Control.
- 2:-Data independence allows dynamic changes and growth potential.
- 3:-Data quality enhanced.
- 4:-Security enforcement possible.

Disadvantages of DBMS:-

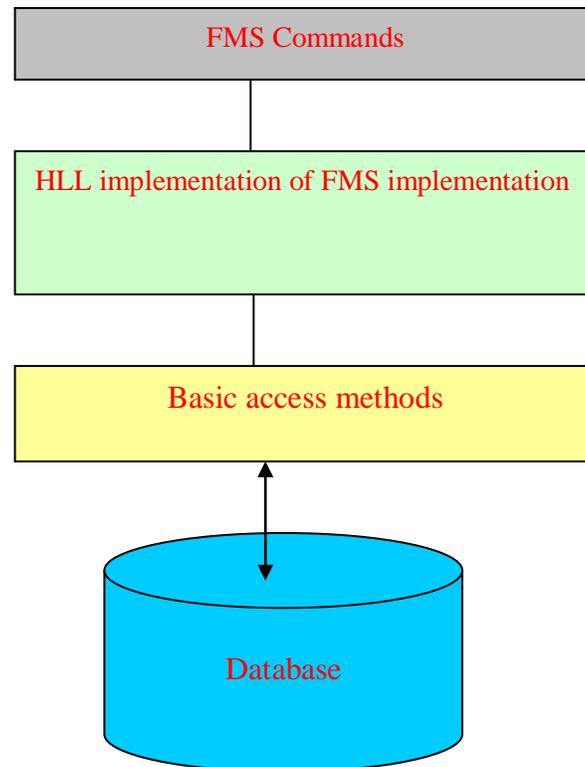
- 1:-Problems associated with centralization.

2:-Cost of Software/Hardware and migration.
Complexity of backup and recovery

Database Model & Its Implementation:-

FMS (File management System):-

The precursor to the present day database management system was File management System. In early data processing of all files is called **flat files**. A flat file is one where each record contains same types of data items. FMS behavior shown in following figure.



E-R Model (Entity –Relationship):-

Entity:-

It is an object, which is **distinguishable** from other object.

Example:-

Enrollment=02181050001.

SB A/c number=234567.

Passport Number=AB968754.

Entity Set:-

Collection of entity is called entity set.

☞ Employee table.

☞ Students Records table.

Relationship (Mapping):-

Relations between attributes of two entity sets is called mapping.

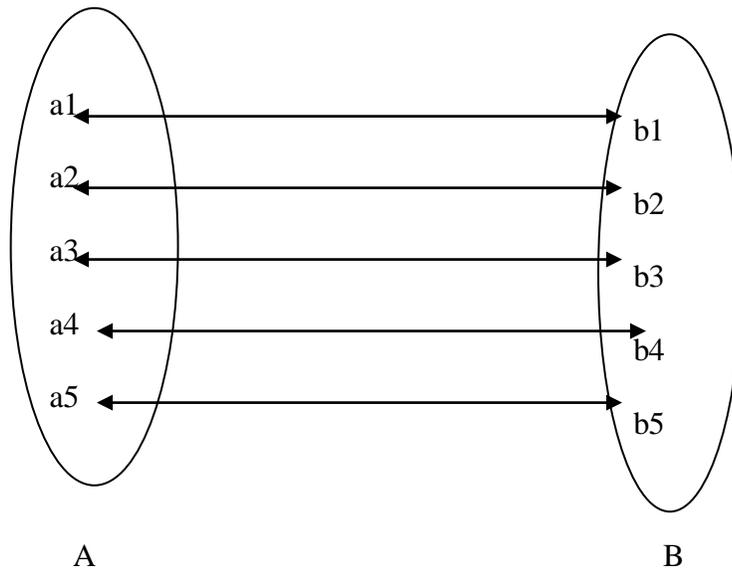
There are following types of relationships.

1:- 1:1(One: One) Mapping.

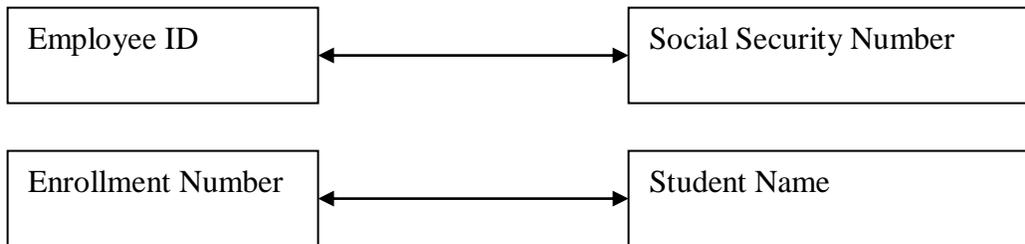
- 2:- 1: M (One: Many) Mapping.
- 3:- M: N (Many: Many) Mapping

Example:-

1:1(One: One) Mapping

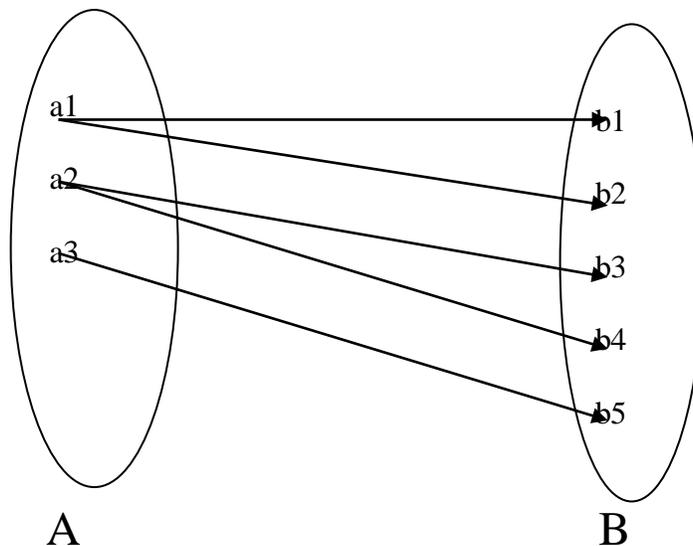


- ☞ Relationship between **enrollment** number and **student**.
- ☞ Relationship between **Passport number** and **person**.

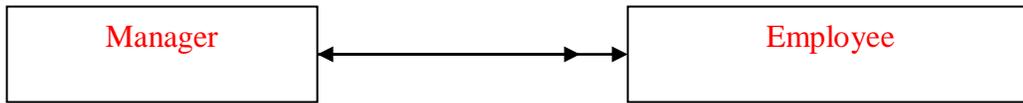


Example:-

1: M (One: Many) Mapping.

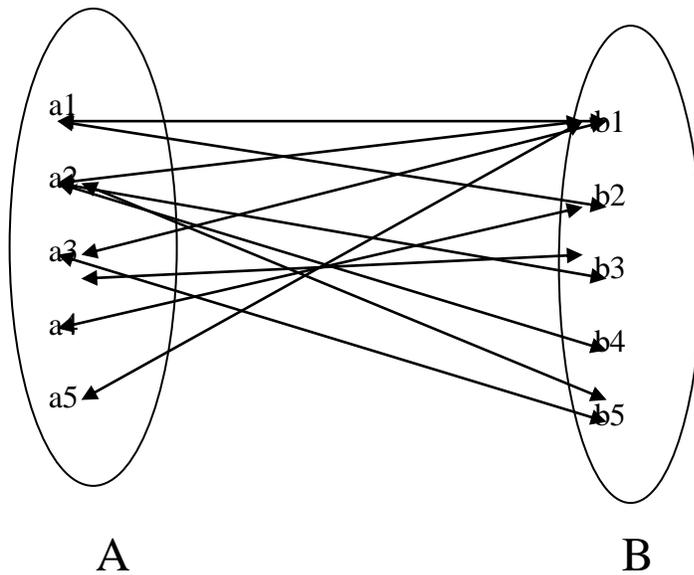


Relationship between Manager and Employee.



Example:-

M: N (Many: Many) Mapping



Types of Entity:-

- ❖ Strong Entity
- ❖ Weak Entity

Strong Entity:-

An entity object which gives almost maximum related attributes information is called strong entity.

Example:-

- Passport Number.
- SSN (Social security Number).
- UID(Unique Identification number)

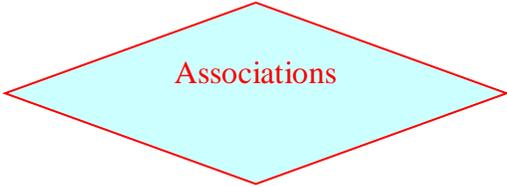
Weak Entity:-

An entity object which gives minimum related attributes information is called weak entity.

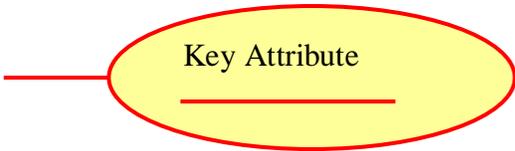
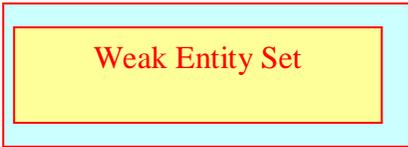
Example:-

- Voter Id.
- Deptno.

Symbols Used In E-R Model:-

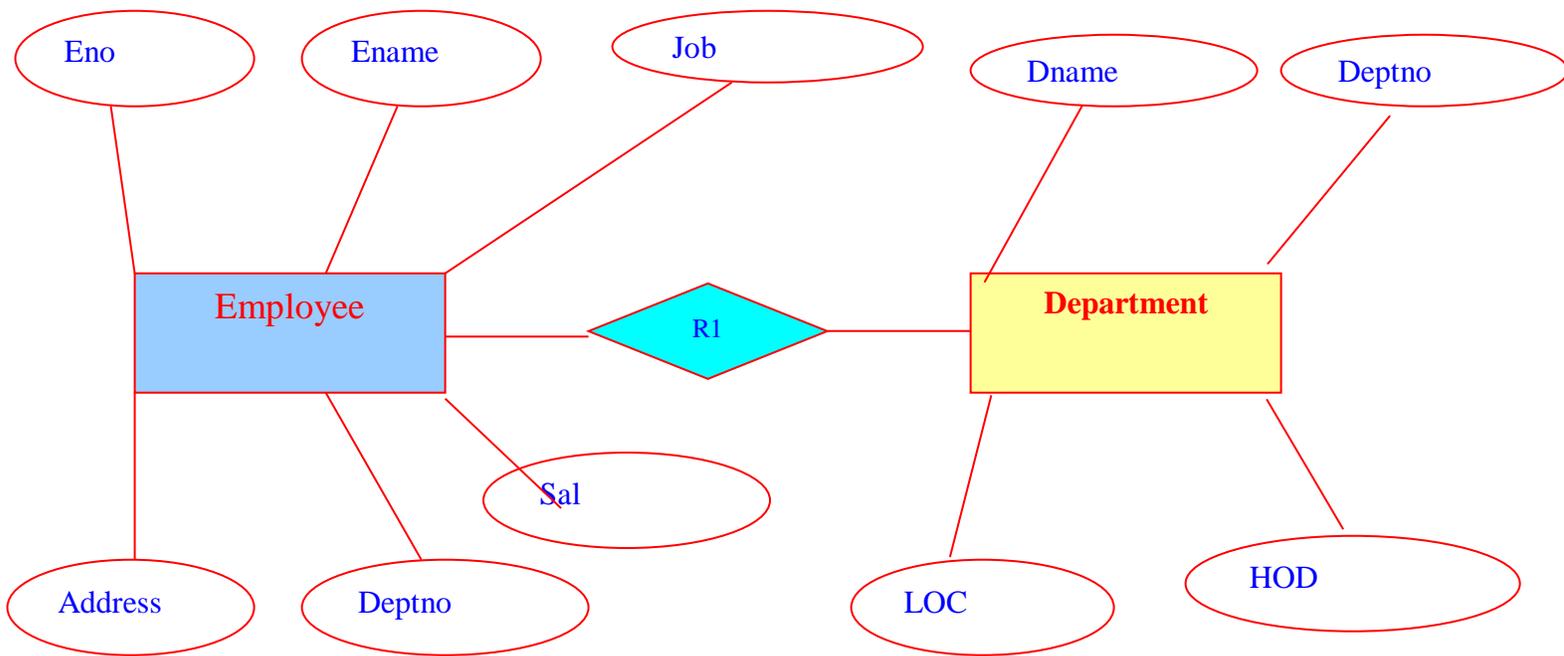


Link



Example of E-R Model:-

Employee- Department



Concept of Abstraction, Generalization, Specialization and Aggregation:-

Abstraction:-

It is simplification mechanism used to superfluous details of a set of objects; it allows concentrating on the properties that are interest to the application.

Example:-Car is an abstraction of a personal transportation vehicle.

Generalization:-

It is the abstracting process of viewing sets of objects as a single general class. By concentrating on the general characteristics of the constituents sets suppressing or ignoring their differences.

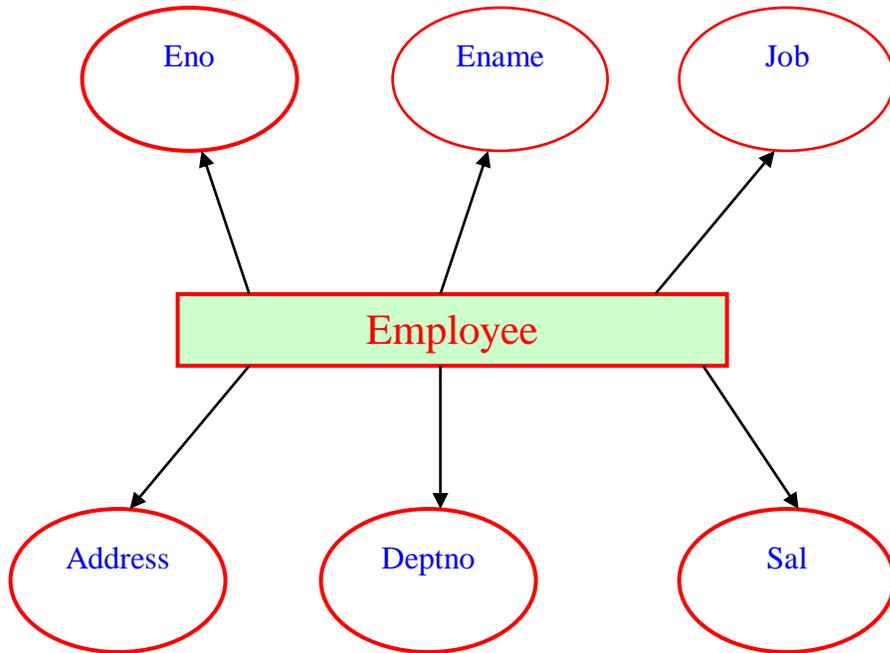
Specialization:-

It is the abstracting process of introducing new characteristics to an existing class of objects to create one or more new classes of objects.

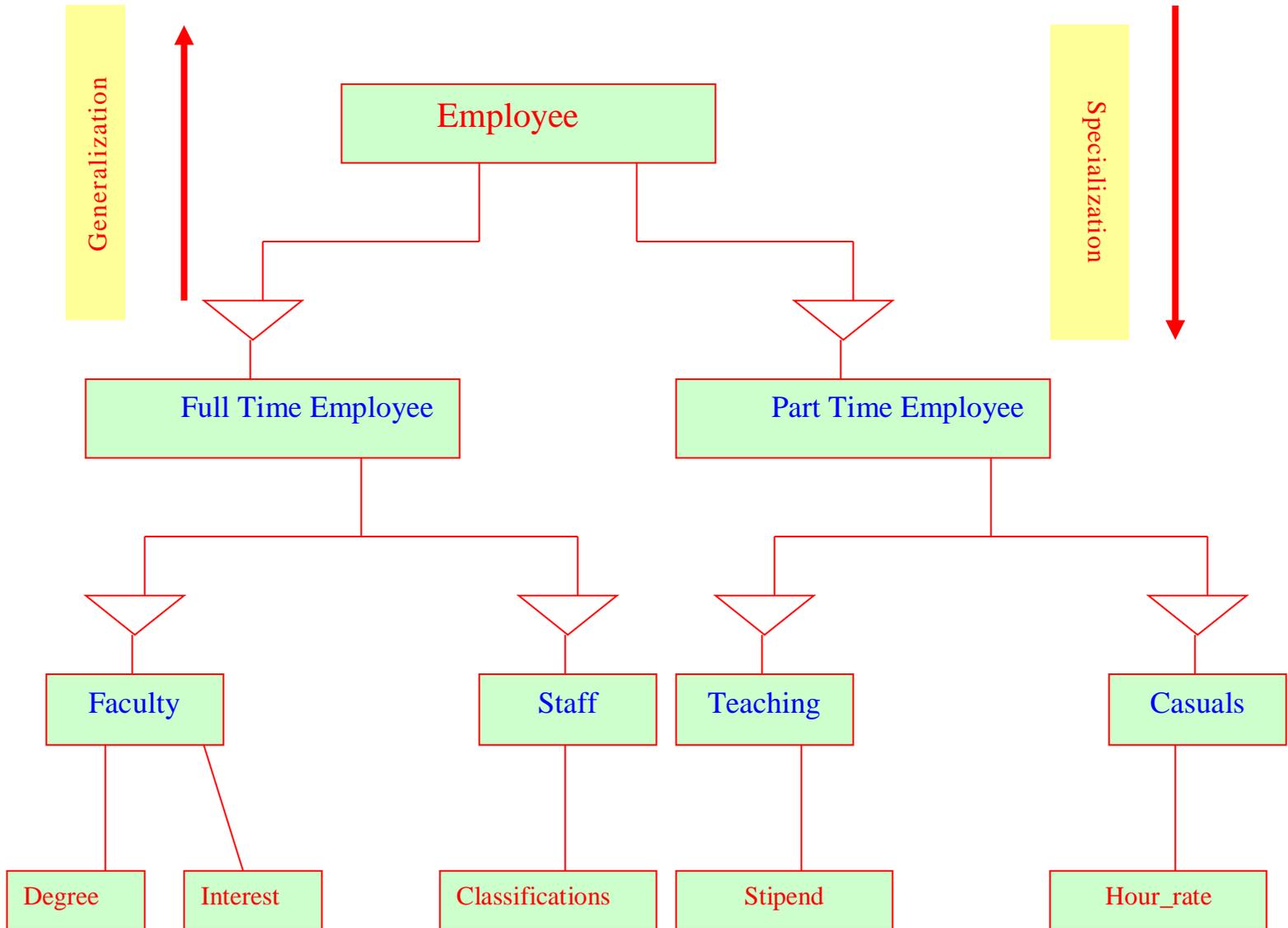
Aggregation:-

It is the process of compiling information on an object, thereby abstracting a higher-level object

Example: - (Aggregation)



Example: - (Generalization and Specilization)



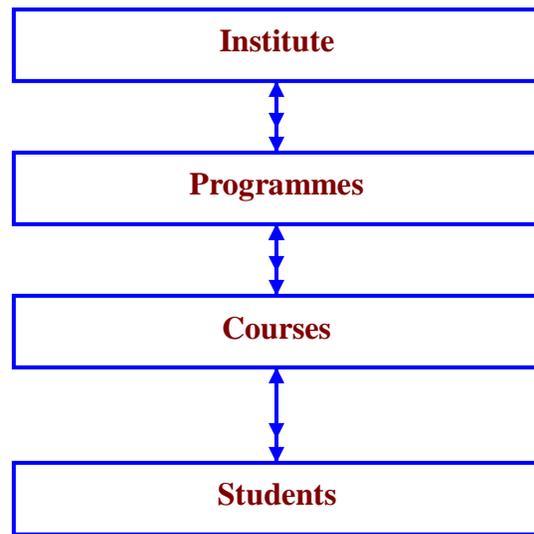
Data Model Technique:-

- ❖ Hierarchical Data Model
- ❖ Network Data Model
- ❖ Relational data Model

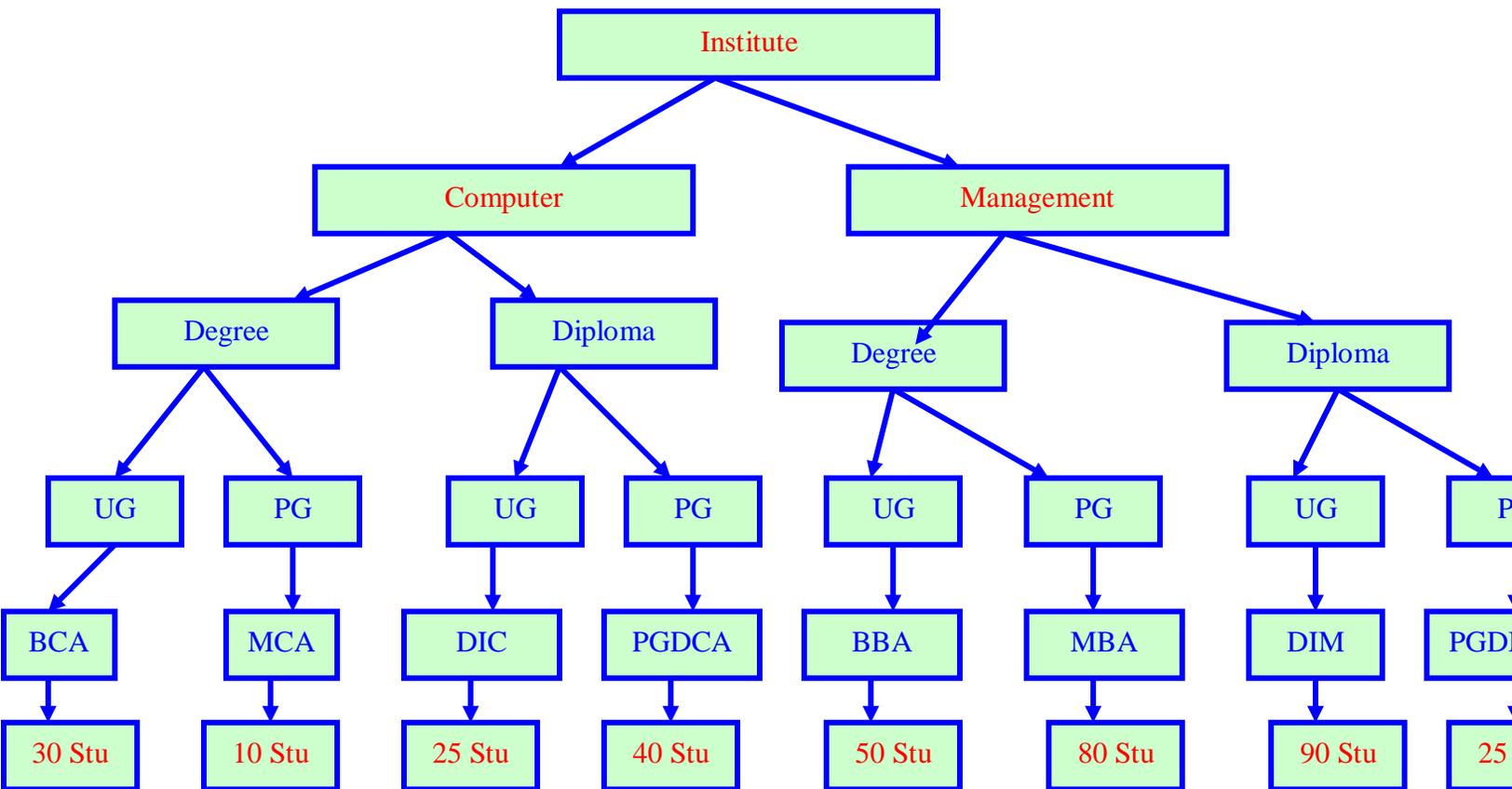
Hierarchical Data Model:-

A hierarchical model consist of collection records which are connected with each other through links. Each record is collection of fields(Attributes),each of which contains one data value. A link is an association between precisely two records.

Example:-1



Example:-2



Network Data Model:-

The network model was formalized in the late 1960 By the **database Task group of the Conference On data System Language (DBTG/CODASYL)**.The first report which has been

revised a number of times, contained detailed specification for the network data model. Many hierarchical models are associated in network model.

DBTG Set:-

It consist of following two types

- ❖ Record Types(entity type)
- ❖ Set Types. (directed relationship)

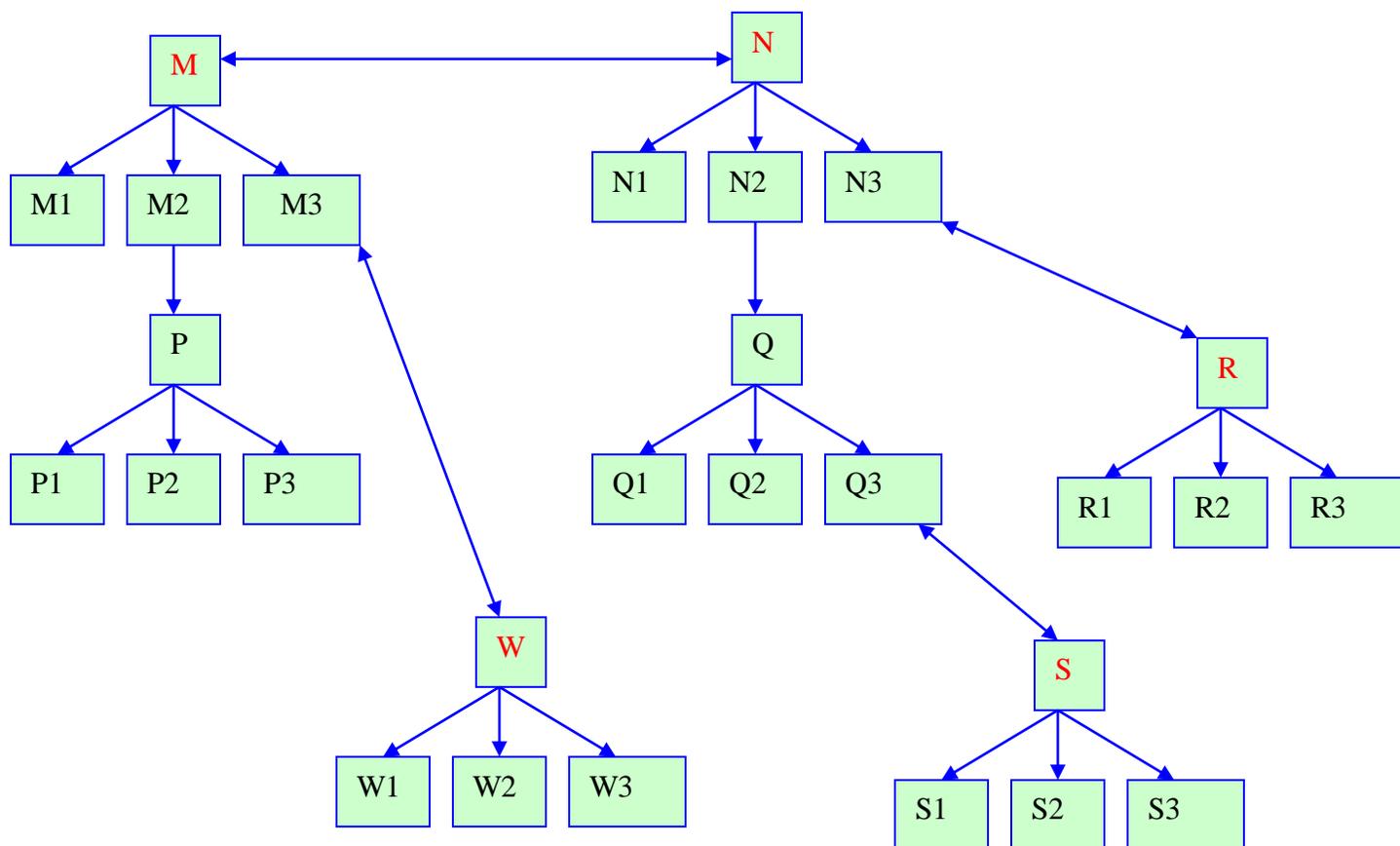
Record Types.

A record type is used to represent **entity type**. It is made up of a number of data items that represent the attributes of the entity.

Set Types.

It is used to represent a **directed relationship** between two record types.

- ❖ Owner record Type.
- ❖ Member record type.



RELATIONAL Data Model:- Most Important

This model was given by **EF codd in 1971**.He also given **twelve rules** for complete **RDBMS**. This model contains data items into tabular form.A table may consist rows and columns. **Rows are known as tuples** and **columns are known as attributes**. Number of attributes is called degree of relation and **number of tuples is called cardinality of relation**.

Advantage:-

- ❖ Ease of use
- ❖ Flexibility
- ❖ Security
- ❖ Data Independence

- ❖ Data Definition Language.(DDL)
 - Create commands
 - Alter Commands
 - Drop commands
- ❖ Data Manipulation Language.(DML)
 - Insert into commands
 - update Commands
 - Delete commands
- ❖ Data Control Language.(DCL)
 - grant commands
 - revoke Commands
- ❖ Transaction Control Language.(TCL)
 - Rollback
 - Commit
 - Savepoint

EMP (Table):-

Eno	Ename	Job	Sal	Deptno
101	Ajay	Steno	12000	10
102	Vijay	Manager	22000	20
103	Mukesh	Clerk	10000	10

File organization for conventional DBMS:- MImp

Concept of File:-

It is heart of any application s/w.It is collection of related informations.There are following types of files.

- ❖ **Master File** (Permanent Storage/Physical Storage).
- ❖ **Transaction file**(Logical File).
- ❖ **Table** (It is created by DBMS. Which consist of **rows** and **columns**).
- ❖ **Backup**(It is for further use if files accidentally losses).
- ❖ **Dump File**(It is mainly used for making a copy of software for further use).
- ❖ **Archive File**(It is created by user when save.It automatically created by system for taking backup).

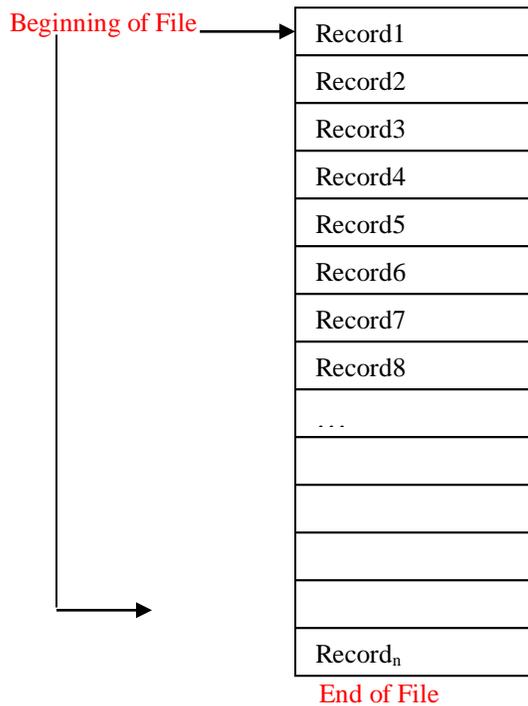
File Organization:-

There are following four categories of file organizations.

- ❖ Sequential file Organization.
- ❖ Relative File Organization.
- ❖ Indexed Sequential File Organization.
- ❖ Multi Key File organization.

Sequential file Organization:-

In this file organization file records are written **consecutively** when the file is created and must be accessed consecutively when the file is later used for input in a sequential file, records are maintained in the logical sequence of their primary key values.



Index-Sequential File Organization:-

To retrieval of records by using indexed table in sequential manner. Indexed table may consist of **key value** and **address**. It is suitable for large files. It improve query response.

Types of indexes:-

- ❖ Primary Indexes.
- ❖ Clustering Indexes.
- ❖ Secondary Indexes.
- ❖ Multilevel Indexing Schema.

Primary Indexes:-

It is an index specified on ordering key field of an ordered file of records. It associated with two fields.

- 1:-Ordering Key field.
- 2:-Pointer field to a disk block.

Block1:-

Eno	Ename	D O_B	Job	Sal	Gender
101	Aman	5/5/1977	Clerk	12000	Male
102	Atharv	15/5/1975	Steno	20000	Male
103	Rajesh	25/4/1978	Manager	30000	Male

Block2

:

Eno	Ename	D_O_B	Job	Sal	Gender
****	****	****	****	****	****
****	****	****	****		
				****	****
****	****	****	****	****	****

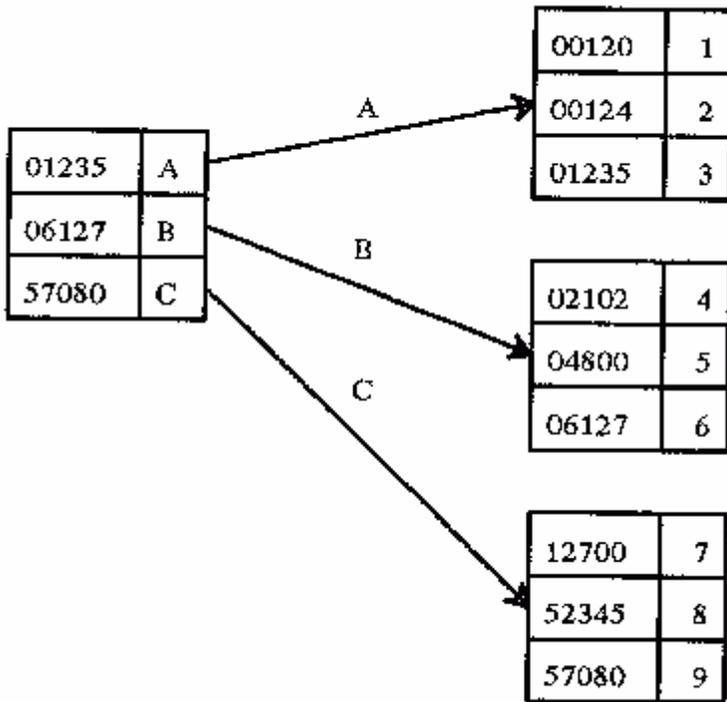
Block3:

...
...

Eno	Ename	D O_B	Job	Sal	Gender
****	****	****	****	****	****

...

Blockn:



Clustering Indexes:-

If records of a file are physically ordered on a nonkey field that does not have a distinct value for each record, that field is called the clustering field of the file. Now we will create a different type of index, called clustering index. It increases speed of accessing of records. It is shown in following figure.

CF
BP

Cluster Field
Block Pointer

CF	BP
1	•
2	•
3	•
4	•
5	•

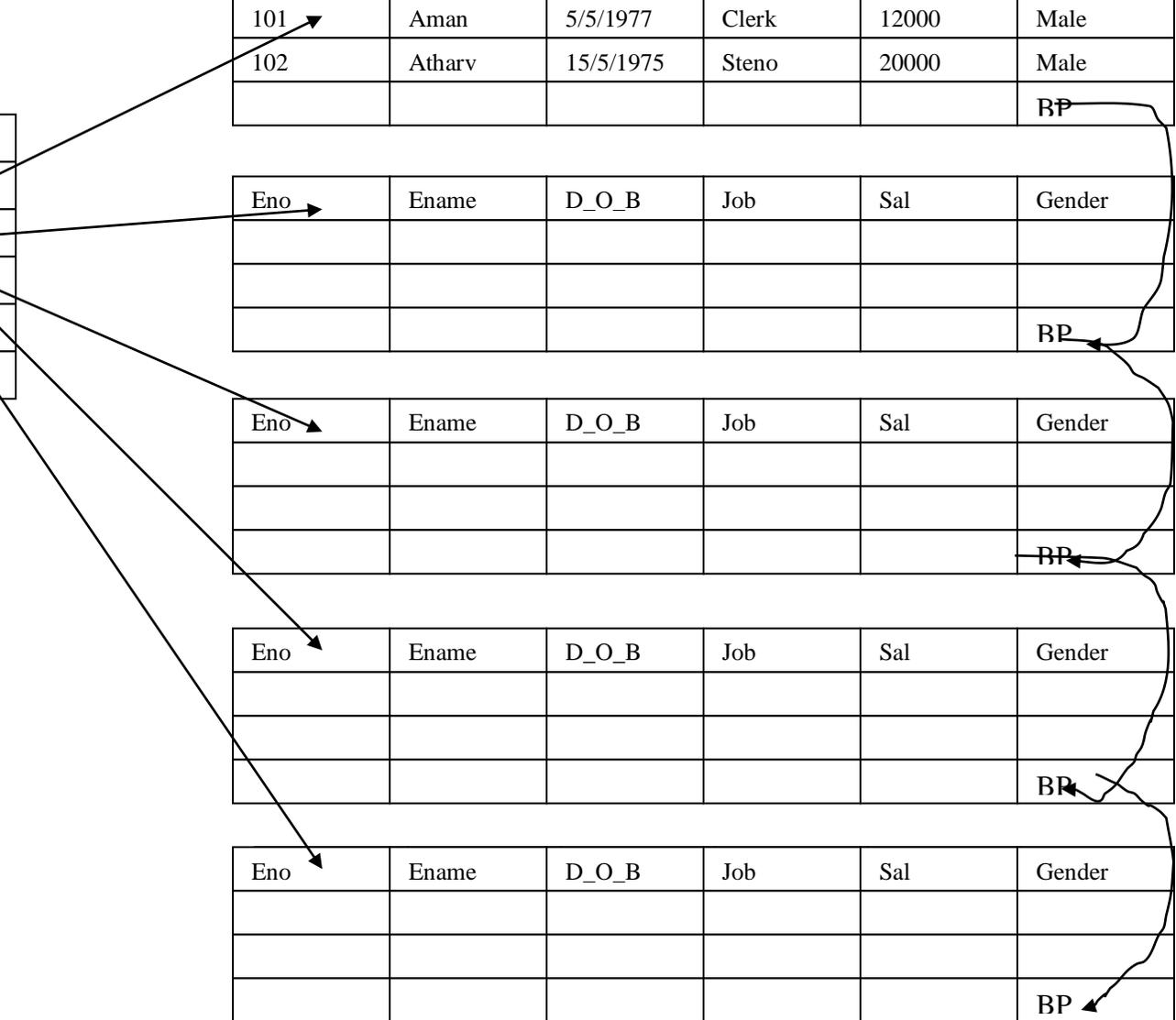
Eno	Ename	D O B	Job	Sal	Gender
101	Aman	5/5/1977	Clerk	12000	Male
102	Atharv	15/5/1975	Steno	20000	Male
					BP

Eno	Ename	D_O_B	Job	Sal	Gender
					BP

Eno	Ename	D_O_B	Job	Sal	Gender
					BP

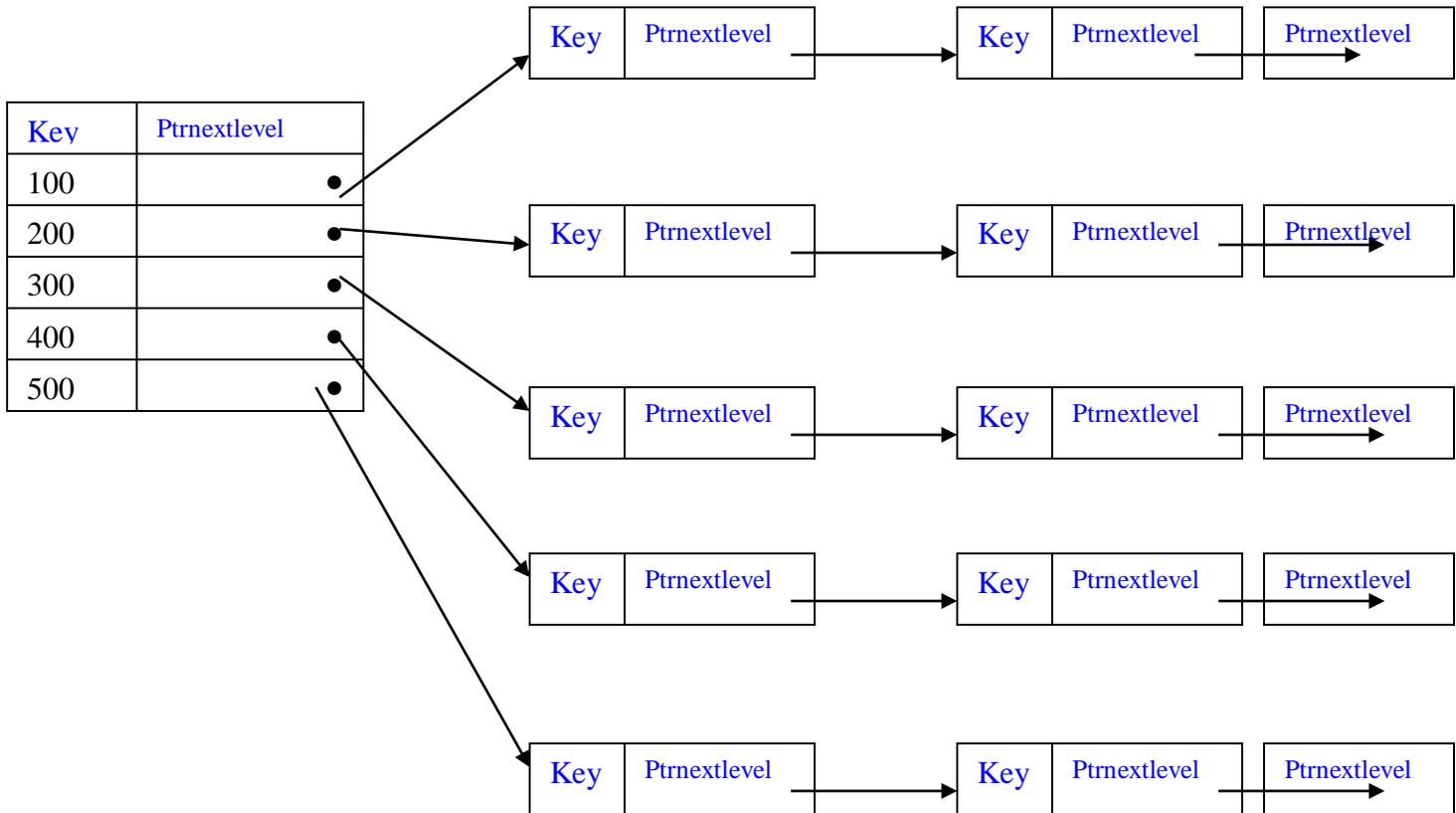
Eno	Ename	D_O_B	Job	Sal	Gender
					BP

Eno	Ename	D_O_B	Job	Sal	Gender
					BP

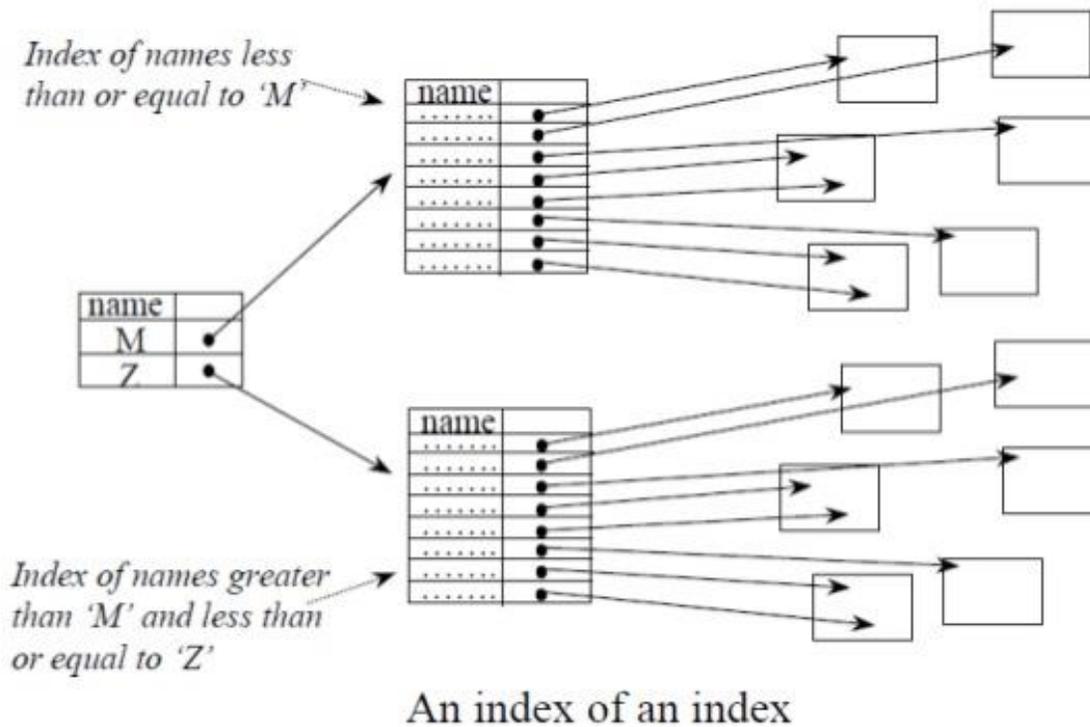


Multilevel Indexing:-

For full indexing scheme, the address of every record is maintained in the index. In small file index would be small and can be processed very efficiently in main memory. For large file the index's size would pose problem. It create a hierarchy of indexes.



Multi-Level Index



Components of Index Sequential

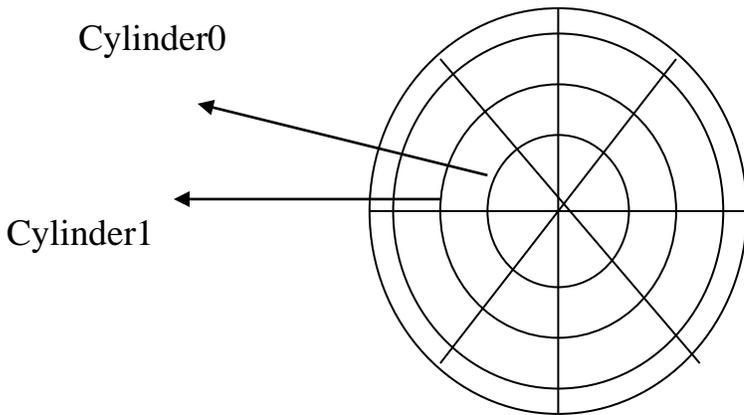
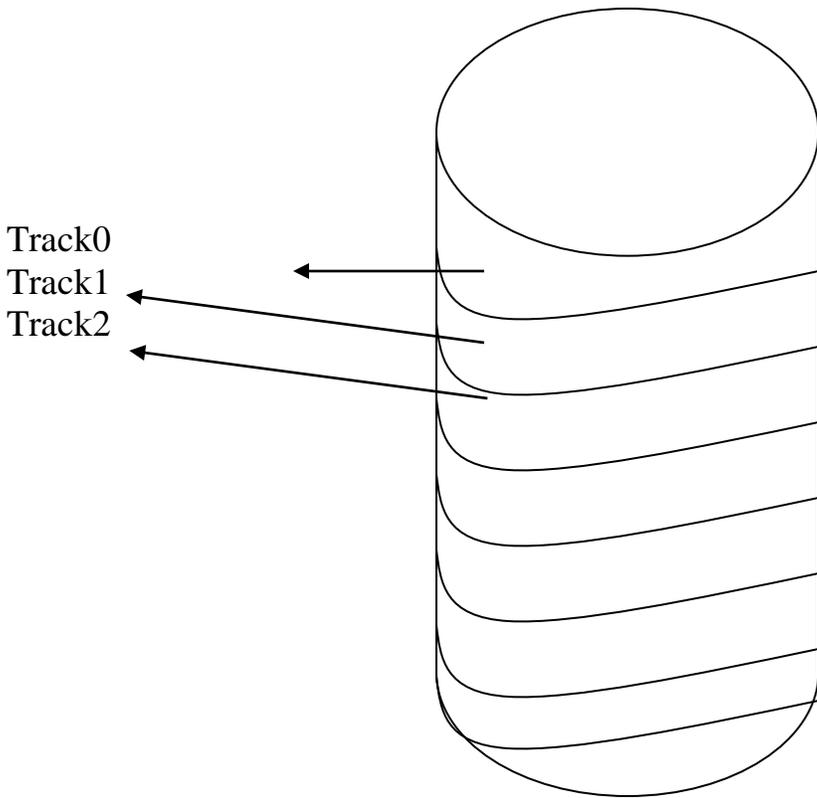
- ❖ A primary data storage area
- ❖ Overflow area
- ❖ A hierarchy of indices

Important technique of Building Index:-

- ❖ ISAM(Index Sequential Access Method)
- ❖ VSAM(Virtual Storage Access Method)

ISAM:-

When record is stored by ISAM ,its record key must be one of the fields in the record.ISAM will always maintains the records in the sorted order Each record stored on one the tracks of disks. It is shown in following figure:-



ISAM file is spread over **several cylinders**; There is more than one **track index**.

The cylinder index is not associated with any particular cylinder of the file and is stored in a separate area or on another disk together.

Overflow records in ISAM:-

-	-	-	21	22	23	24	25
---	---	---	----	----	----	----	----

Next record is added in next track

-	-	-	30	29	28	27	26
---	---	---	----	----	----	----	----

Algorithm:-

Step 1:-Find the first available position in the overflow area.

Step 2:-Move the record to this position

Step 3:-If this record is the record of the lowest key in the overflow area, place the pointer to this Record in the overflow entry of the track index and move the old value in the track index.

Advantage:-

- ❖ It is good for static tables.
- ❖ There are fewer disk I/O required to access data, provided there is no overflow.

Disadvantage:-

- ❖ It is not quick as compare to hash organization.
- ❖ Overflow can be a real problem in highly volatile tables.

$$N=N+1$$

VSAM (Virtual Storage Access Method):-

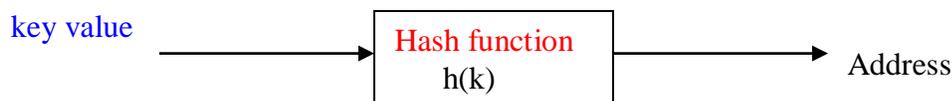
Index and data are assigned to distinct blocks of virtual storage. Which is called control interval. File are made up two components

- ❖ Index
- ❖ Data

Accessing of data performed through index in sequential manner

Direct File Organization:-

- ❖ This method of accessing records performed by hash function. which accept key value and provide address of corresponding key.



Hashing function work as below

$$h(k)=k \text{ mod } s$$

s=Super bucket address value-lower bucket addresss value+1

k is the numeric key value

Advantage:-

- ❖ Exact key matches are extremely quick.
- ❖ It is very good for long key.
- ❖ No disk space is used by this indexing method

Disadvantage:-

a:-It is very difficult to predict overflow.

b:-No sorting of data occurs either physically or logically

Multikey File Organization:-

There are numerous techniques that have been used to implement multikey file organization.

Example:-

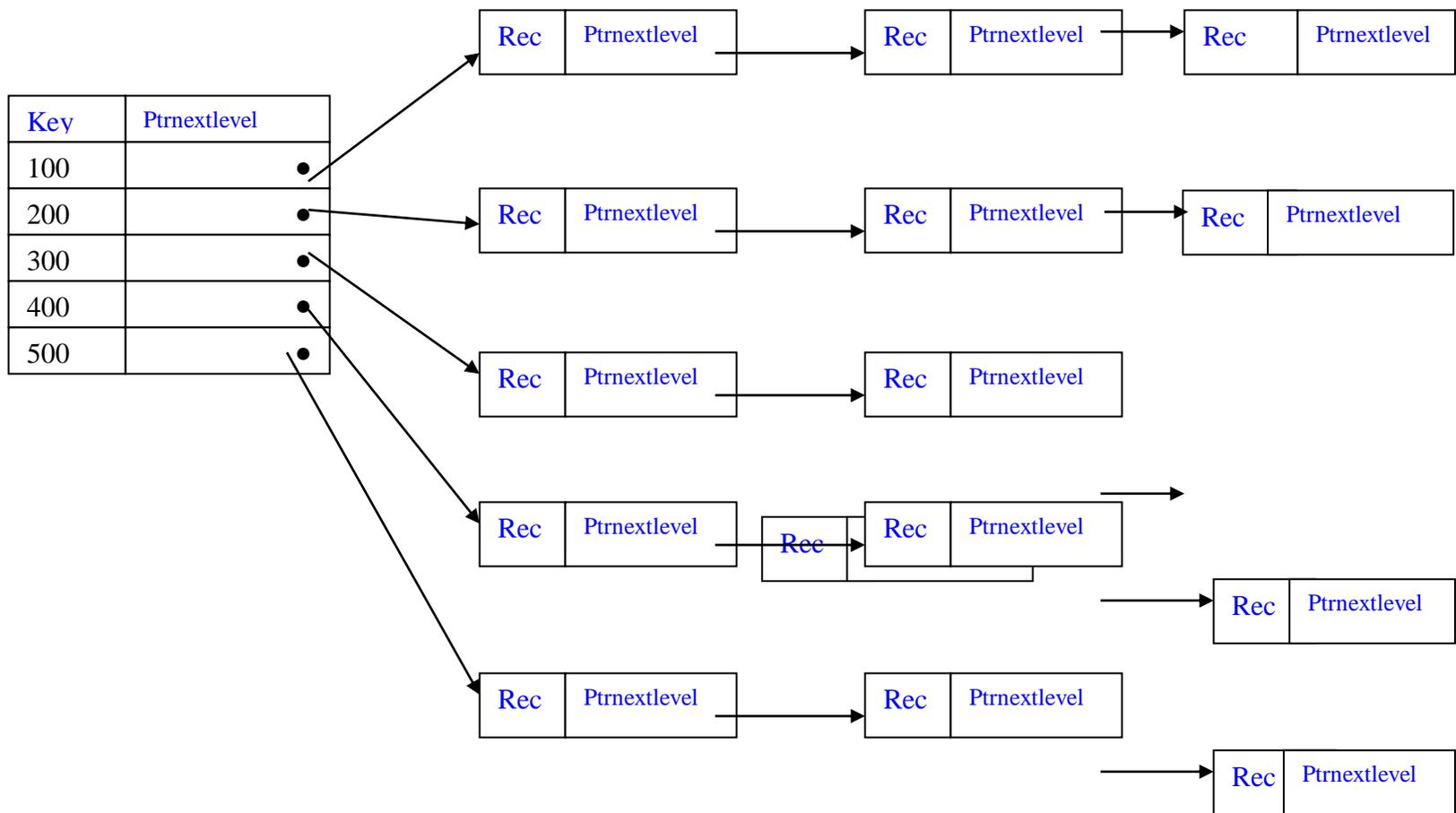
In banking system there are several types of users

Such As ATM users, Loan Officers, Branch Managers, Bank Officers, Account holders and so forth. There are two approaches for providing additional access paths into a file of data records

- Multi List File Organization
- Inverted File Organization

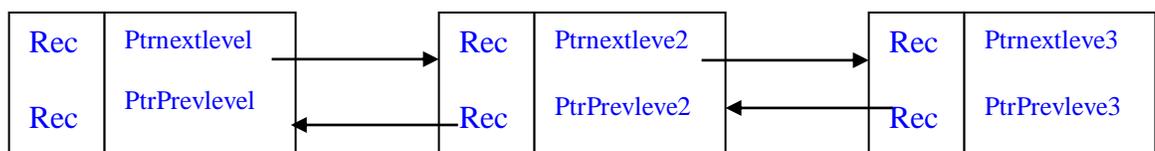
Multi List File Organization:-

In multilist file organization, record disk blocks are linked by means of pointer in sequential manner.



Coral rings:-

The coral rings structure is an adaptation of the doubly linked multi list structure.



Inverted File Organization:-

Conceptually inverted files are similar to multilists. The difference is that while in multilist records with the same key value are linked together with the link information being kept in individual records.

In case of inverted files, this link information is kept in index itself.

Emp Index

100	
200	
300	
400	

Occupation Index

President	A
Programmer	B, C, D
Analyst	E, F

Gender Index

Male	A, B, C
Female	D, E, F

City Index

ALD	A,B
LUCK	C, D
VNS	F

Salary Index

25000	A
18000	B, C, D
16000	F

Evaluation of DBMS:-

Following technical criteria could be the following for evaluation of DBMS.

1. SQL implementation
2. Transaction Management
3. Programming Interface
4. Database server environment
5. Data storage feature
6. Connectivity
7. DBMS integrity(Integrity-1,Integrity-2)

Administrative criteria for DBMS:-

1. Required H/w platform
2. Documentation
3. Vendor Support
4. Initial Cost
5. Recurring Cost

Data Storage Features:-

It is categorized into following three parts.

- a. Lost database segment
- b. clustered indexes

c. clustered tables

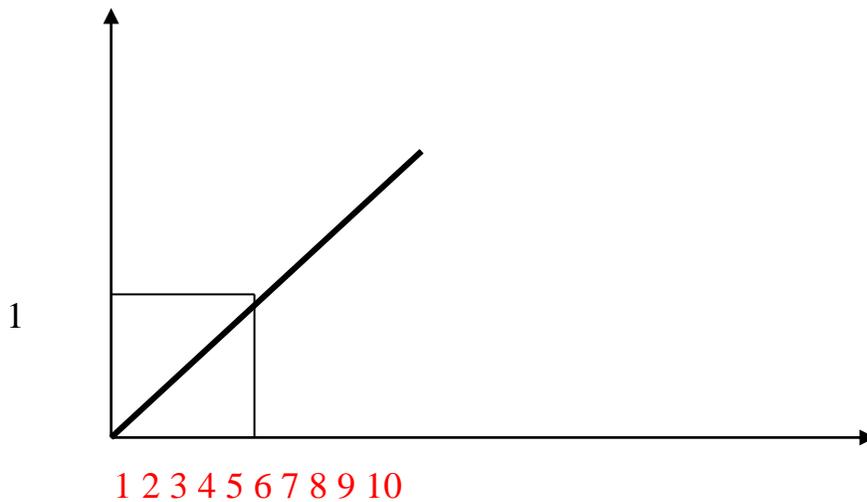
Rating Function:-

1. Linear.
2. Broken linear.
3. Binary.
4. inverse.

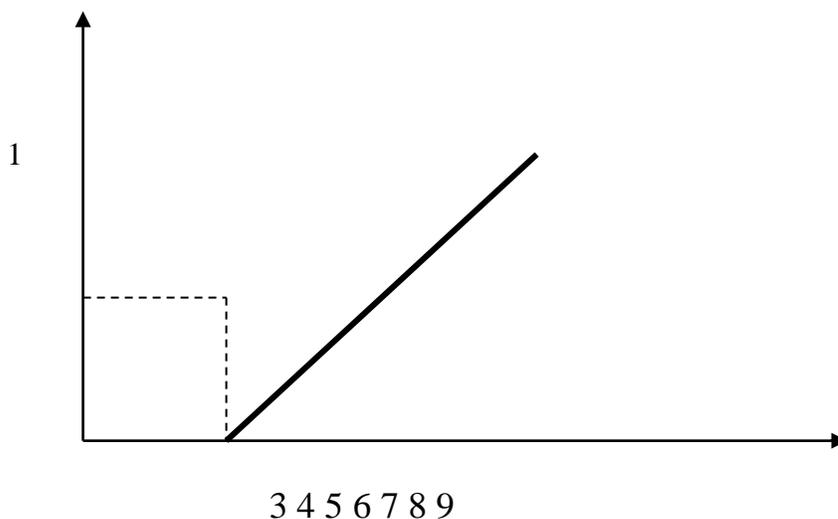
Analyst Could Use a Five Point Scale with Linear Rating Functions.

Feature evaluation	Rating point
Excellent(A)	5
Good(B)	4
Average(C)	3
Fair (D)	2
Poor (E)	1

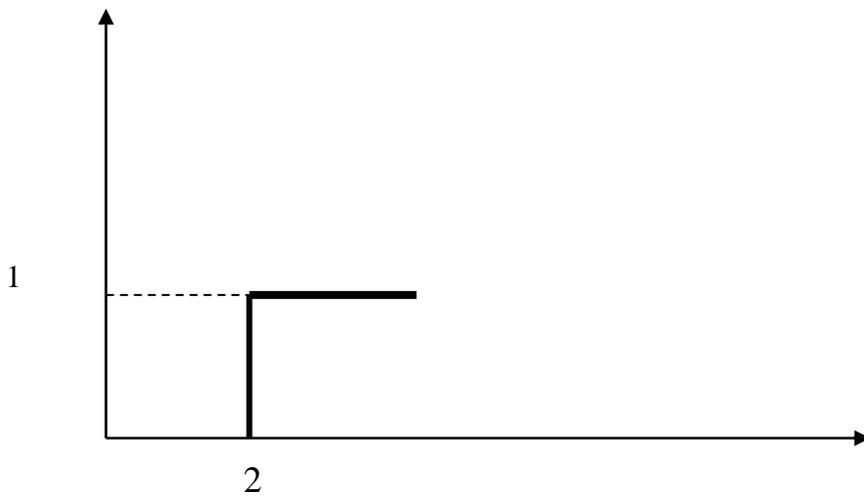
Linear:- Rating increases in proportion to higher marks.



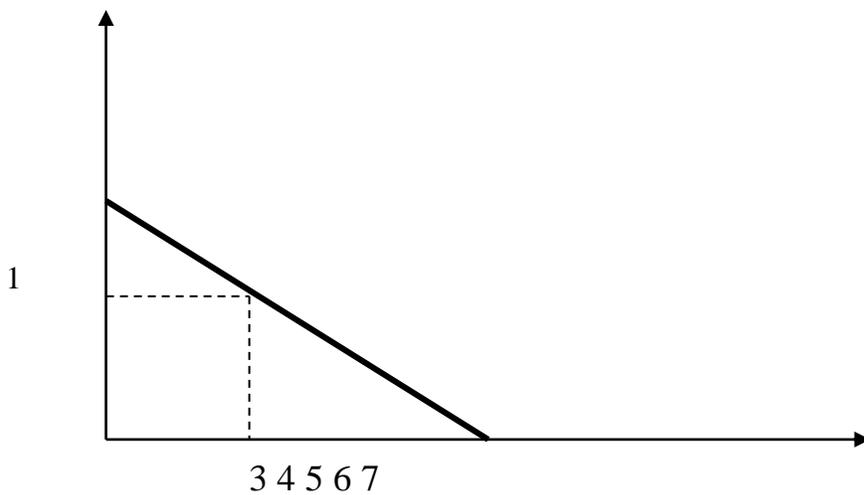
Broken Linear:- There are situations where the min threshold is essential and similarity there is saturated value above which no additional value is given



Binary Linear:- A system either does or does not have the feature or some minimum



Inverse :- Higher mark produce lower rating



Concept of Relation:-

Let A and B be any two sets. Its Cartesian product defined as

$$A * B = \{(a,b) \mid a \text{ is the element of set } A \text{ and } b \text{ is the element of set } B\}$$

Example:-

$$A = \{5,6\}$$

$$B = \{8,9\}$$

$$A * B = \{(5,8), (5,9), (6,8), (6,9)\}$$

$${}_5R_8 = (5,8)$$

$${}_5R_9 = (5,9)$$

$${}_6R_8 = (6,8)$$

$${}_6R_9 = (6,9)$$

Codd Rules for RDBMS:-

Mr E.F. Codd given twelve rules for RDBMS in 1971. These rules are described below

1. The information Rule

All information is explicitly and logically represented in exactly one way.

2. The rule of guaranteed access

Every item of data must be logically addressable by resorting to a combination of table name, primary key value and column name.

3. The systematic treatment of null values

Example:-

Field Name	Empno	Ename	Job	Sal
Data Type	Number	Char	Char	Currency
	101	Ajay	Steno	12000
	102	#	#	#
	103	#	#	0

4. Database description rule

After creating database, It must be describe by defined available commands.

Example:-

Suppose we create a table say EMP (Empno, Ename, Job, Sal, Deptno)

SQL>Desc EMP⇒Describe rule

5. The comprehensive sub language rule

It must support for following rules with respect to commands.

- ❖ **DDL(Data Definition Language)**
- ❖ **DML(Data Manipulation Language)**
- ❖ **DCL(Data Control Language)**
- ❖ **TCL(Transaction Control Language)**

DDL:-

Following commands are used in DDL.These are **autocommited**.

- ❖ **Create.**
- ❖ **Alter.**
- ❖ **Drop.**

DML:-

These commands are **not autocommited**.

- ❖ **Insert into**
- ❖ **Delete**
- ❖ **Update**

DCL:-

Such categories of commands are used for controlling data in database.

- ❖ **grant** **To provide privileges**
- ❖ **revoke** **To remove privileges**

TCL:-

Such categories of commands are used for controlling database transaction.

- ❖ **Rollback** **To recall records**
- ❖ **Commit** **To Save Records**
- ❖ **Savepoint** **For transaction purpose only**

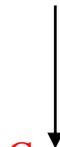
6. The View updating Rule:-

All views that can be updated in theory,can also be updated by the system.

Note:-view is an **logical object**, which mapped through master table/Main Table/Physical database.

Example:-

EMP (Empno, Ename, Job, Sal, Deptno, Contact _Number, Address,SBA/c_No) **Master table**



Create View object say (View1)

View1 (Empno, ename, job, sal)

Transaction table/Client User

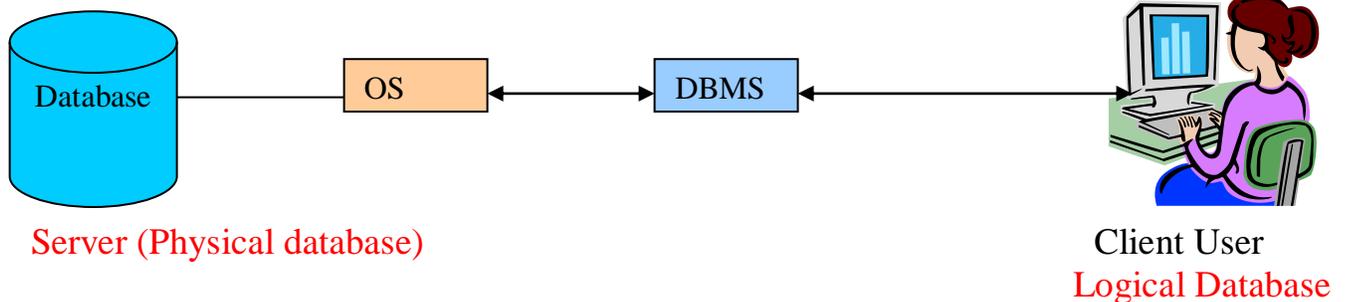
Client user may perform addition, deletion, updation, modifications of records in master table.

7 .The Insert and Update Rule:-

An RDBMS must be facilitating to insert and update any information into database.

8 .The Physical independence rule:-

User access data from database through program via terminal.



9 .Logical & Data independence rule:-

Application programs must be independent of changes made to the base tables/Master Table/Main Table.

10 .Integrity rule:- Most Important

There are two types of integrity rules.

- ❖ Integrity Rule1/Primary Key Attribute.

Primary key:- (Integrity Rule 1)

Column Value cannot accept null and duplicate values.

Example:-

Enrollment Number	Primary key
Saving Bank A/c Number	Primary Key
Etc.	

- ❖ Integrity Rule2/Referential Integrity

Foreign Key/Reference Key: - (Integrity Rule2)

Column value referred by column of master table (Main Table). There are two tables must be necessary.

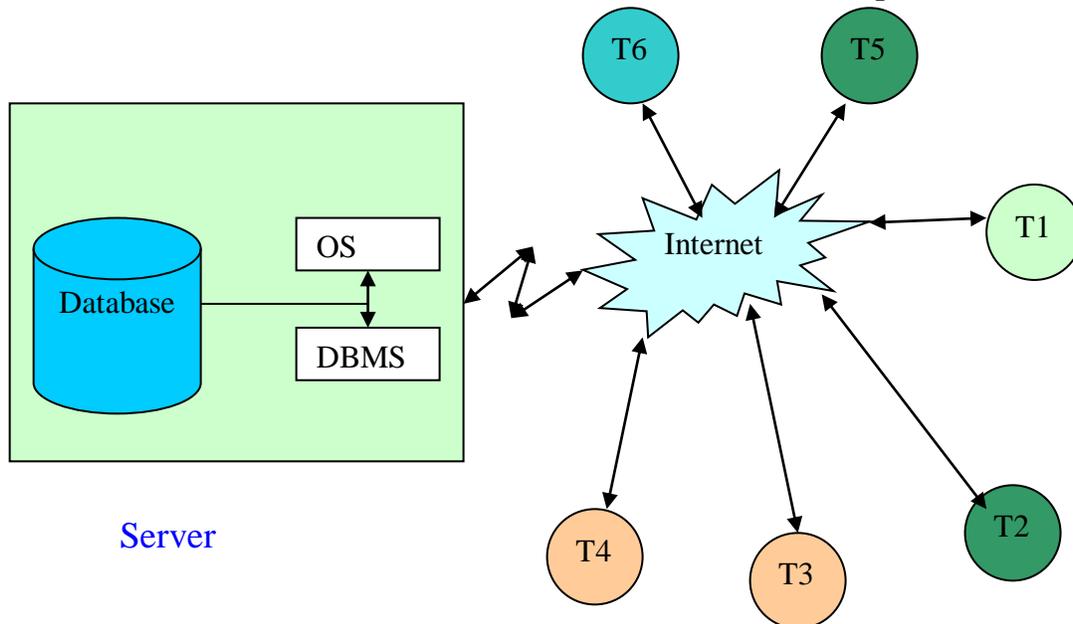
Primary Key

Foreign Key/Reference Key

Code1	Name	Code2	FName
101	N1	101	F1
102	N2	102	F2
103	N3	103	F3

11 .Distribution rule:-

A RDBMS must have distribution independence.



12 .No subversion rule:-

Under this method, any user can not be able to bypass any integrity rules or constraints of the relational language.

Relational Algebra:-

It is a **procedural language**. It specifies the operations to be performed on existing relations to derive result relations. There are following types of basic operations.

- ❖ Difference (-)
- ❖ Intersections (\cap)
- ❖ Cartesian Product (\times)
- ❖ Projection (Π)
- ❖ Selections (σ)
- ❖ Division (\div)
- ❖ Natural Join (\bowtie)

Difference (-) :-

Let P and Q are two relations

It is defined as

$R=P-Q= \{t \mid t \text{ belong in relation P and } t \text{ does not belong in relation Q}\}$

P

ID	Name
101	Amit
103	Ajay
104	Sanjay
107	Neeraj
110	Madan

Q

ID	Name
103	Ajay
104	Sanjay
106	Mohan
110	Madan

P-Q

ID	Name
101	Amit
107	Neeraj

Q-P

ID	Name
106	Mohan

Intersections (\cap):-

Let P and Q are two relations.

It is defined as

$R=P \cap Q= \{t \mid t \text{ belong in relation P and } t \text{ belong in relation Q}\}$

$P \cap Q$

ID	Name
103	Ajay
104	Sanjay
110	Madan

Cartesian Product (\times):-

Let P and Q are two relations.

It is defined as

$R=P \times Q= P \parallel Q= \{t1 \parallel t2 \mid t1 \text{ belong in relation P and } t2 \text{ belong in relation Q}\}$

$A= \{3,5\}$

$B= \{4,7\}$

$A * B= \{(3,4), (3,7), (5,4), (5,7)\}$

${}_3R_4= (3,4)$

${}_3R_7= (3,7)$

${}_5R_4= (5,4)$

${}_5R_7= (5,7)$

$B * A= \{(4,3), (4,5), (7,3), (7,5)\}$

${}_4R_3= (4,3)$

${}_4R_5= (4,5)$

${}_7R_3= (7,3)$

${}_7R_5= (7,5)$

The relation Scheme of P and Q is represented as

$R= P \parallel Q$

Degree/Arity of R is calculated as

$|R|= |P| + |Q|$

Cardinality of R is calculated as

$|R|= |P| * |Q|$

Example Based On relation:-

P(Employee table)

ID	Name
101	Amit
103	Ajay
104	Sanjay
107	Neeraj
110	Madan

Q(Project)

P_Name
S1
S2

P || Q

ID	Name	P_Name
101	Amit	S1
101	Amit	S2
103	Ajay	S1
103	Ajay	S2
104	Sanjay	S1
104	Sanjay	S2
107	Neeraj	S1
107	Neeraj	S2
110	Madan	S1
110	Madan	S2

Projection (Π):-

The projection of a relation is defined as a projection of all its tuples over some set of attributes.

Example:-

P(Employee table)

ID	Name
101	Amit
103	Ajay
104	Sanjay
107	Neeraj
110	Madan

Π_{id} P(Employee table)

ID
101
103
104
107
110



P(Employee table)

Π_{Name} P(Employee table)

ID	Name
101	Amit
103	Ajay
104	Sanjay
107	Neeraj
110	Madan

Name
Amit
Ajay
Sanjay
Neeraj
Madan

EMP

Eno	Ename	Job	Sal	Deptno
101	Ajay	Steno	12000	10
102	Vijay	Manager	22000	20
103	Mukesh	Clerk	10000	10

$\Pi_{\text{Eno, Ename, Job}} \text{ EMP}$

Eno	Ename	Job
101	Ajay	Steno
102	Vijay	Manager
103	Mukesh	Clerk

Selections(σ) :-

It is an operation that selects only some of the tuples the relations. Such operations is known as a selection operations.

Example:-

EMP

Eno	Ename	Job	Sal	Deptno
101	Ajay	Steno	12000	10
102	Vijay	Manager	22000	20
103	Mukesh	Clerk	10000	10
104	Sneha	Steno	13000	20
105	Afroj	Accountant	15000	30

$\text{EMP1} = \sigma_{\text{Eno} \leq 103} \text{ EMP}$

Eno	Ename	Job	Sal	Deptno
101	Ajay	Steno	12000	10
102	Vijay	Manager	22000	20
103	Mukesh	Clerk	10000	10

$\text{EMP2} = \sigma_{\text{job} = \text{'Steno'}} \text{ EMP}$

Eno	Ename	Job	Sal	Deptno
-----	-------	-----	-----	--------

101	Ajay	Steno	12000	10
104	Sneha	Steno	13000	20

$EMP3 = \sigma_{Eno \leq 102} (\pi_{Eno, Ename, Job} EMP)$

Eno	Ename	Job
101	Ajay	Steno
102	Vijay	Manager

$EMP4 = \pi_{Eno, Ename} (\sigma_{Eno \leq 102} (\pi_{Eno, Ename, Job} EMP))$

Eno	Ename
101	Ajay
102	Vijay

Division (÷):-

Example:-

P	
A	B
a1	b1
a1	b2
a2	b1
a3	b1
a4	b2
a5	b1
a5	b2

Q
B
b1
b2

P ÷ Q
A
a1
a5

Q
A
a1
a2
a3

Q ÷ P
B
b1

Natural Join (⋈)

EMP1

Eno	Ename	Job
101	Ajay	Steno
102	Vijay	Manager

EMP2

Eno	Ename	Sal
101	Ajay	12000
102	Vijay	13000

$EMP1 \bowtie EMP2$

Eno	Ename	Job	Sal
-----	-------	-----	-----

101	Ajay	Steno	12000
102	Vijay	Manager	13000

Normalization:- (Most Important)

Anomalies Behavior of relation:-

Anomalies in database is an **abnormal** behavior of relation, It should not found in relation, If It occurs in database we must be **remove** or **minimize** from database by using **normalization** technique.

OR

Normalization is a process of organizing the data in database to avoid data redundancy, insertion anomaly, update anomaly & deletion anomaly.

Different Types of Anomalies in database:-

- ❖ Redundancy (Duplicacy).
- ❖ Update anomalies.
- ❖ Insertion anomalies.
- ❖ Deletion anomalies.

Concept of Constraints (Validation rules/Business Rule):-

- ❖ Primary key(Integrity Rule1)
- ❖ Foreign Key/Reference Key(Integrity Rule2)
- ❖ Not Null.
- ❖ Unique Key.
- ❖ Check constraints.
- ❖ Default constraints.

Primary key:- (Integrity Rule 1)

Column Value cannot accept null and duplicate values.

Example:-

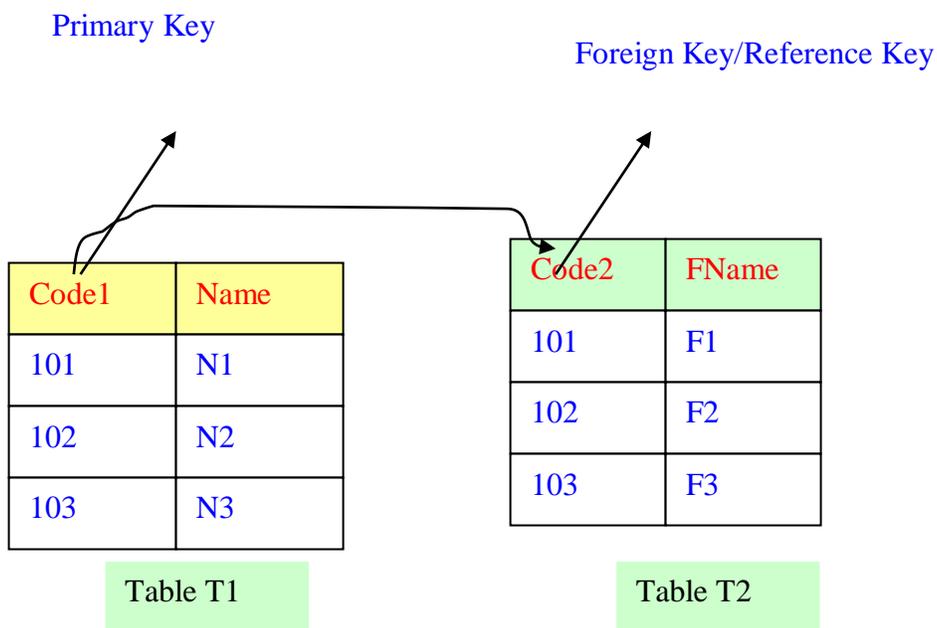
Primary Key

Eno	Ename	Job
101	Ajay	Steno
102	Vijay	Manager

Enrollment Number Primary key
 Saving Bank A/c Number Primary Key
 Passport Number Primary Key
 Voter ID card Primary Key
 PAN Card Number Primary Key
 Etc.

Foreign Key/Reference Key: - (Integrity Rule2)

Column value referred by column of master table (Main Table). There are two tables must be necessary.



Not Null:-

It can accept duplicate values but cannot accept null values.

Unique Key:-

It cannot accept duplicate but can accept null values.

Check Constraints:-

It accepts only predefined values during definition of tables.

Example: - Check (city in ("VNS", "ALD", "Kan", "Luck", "Delhi")).

Default Constraints:-

It may accept predefined default values.

Example

Default sal (8000);

Concept of Functional dependency (FD):-

In relational database theory, a functional dependency is a constraint between two sets of attributes in a relation from a database. In other words, functional dependency is a constraint that describes the relationship between attributes in a relation.

OR

Let A and B be two attribute sets. We say that attribute B is functionally dependent on attribute A if and only if all tuples of B is dependent on Attribute set A. It is denoted by:-

A \longrightarrow B

It means B is functionally dependent on A.

A \longrightarrow B, C.

It means B and C both functionally dependent on A. (Composite dependency)

Example:-1

Enrollment \longrightarrow Sname
 Courese_Code \longrightarrow Cname.
 Item_Code \longrightarrow Item_name.

Example:-2

Order_No, Item_Code \longrightarrow Quantity, Price.

Concept of Decomposition of Relation (Table) Scheme:-

Let R is a relation scheme which consist of

Attributes $A_1, A_2, A_3, A_4, A_5 \dots A_n$. we decompose the relation in such manner $R_1, R_2, R_3, R_4 \dots R_n$.
 Way.

$$\bigcup_{i=1}^n Ri = R$$

Or

$$R_1 \cup R_2 \cup R_3 \cup R_4 \dots R_n = R$$

Example:-1

Order_Details (Order_no, Item_Code, Order_Date, Qty, Price_unit)

- R1 (Order_no, Order_Date).
- R2 (Item_Code, Price_unit).
- R3 (Order_no, Item_Code, Qty).
- R1UR2UR3= Order_Details

Concept of key and Non-Key:-

Key Attributes Apply Constraints.
 Non Key Attributes No Any Constraints

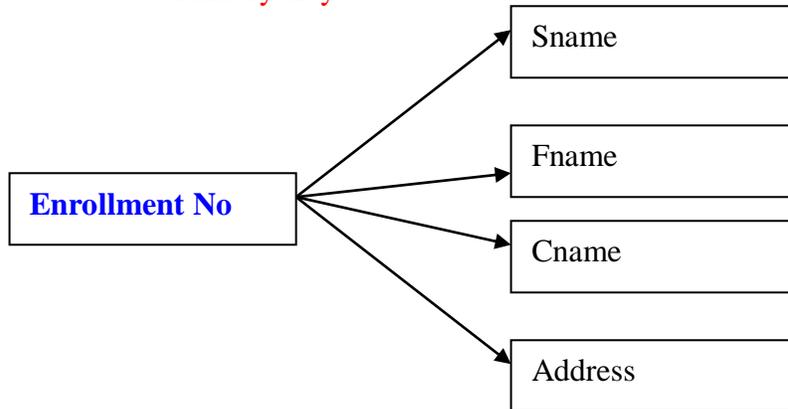
1NF/Flat File: -

In first normal form, all non-key attributes totally dependent on a prime key attribute.

Example:-

Student (Enroll, Sname, Fname, Cname, Address)

Primary Key



Primary Key

Enrollment	Sname	Fname	Cname	Address
101	Mayank	Ajay	BCA	Lanka Vns
102	Priyanka	Vijay	MCA	Sigara Vns
103	Amazad	Asalam	BCA	Akhari VNS

2NF: -

A relation is in 2 NF if it is in 1NF and every non Key Attribute is fully dependent on each candidate key of the relation. All non key attributes dependent on composite key attributes.

Example:-

Order_Details (Order_no, Item_Code, Order_Date, Qty, Price_unit)

(Order_no, Item_Code) → Composite Keys.

In Composite, key dependency may not be occur.

Order_Details

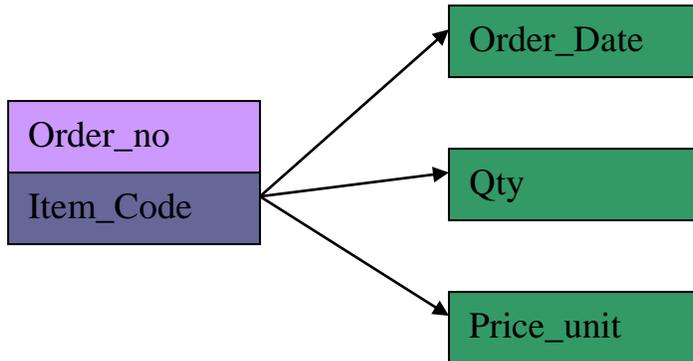
Order_no	Item_Code	Order_Date	Qty	Price_unit
10	C1	19/2/2012	100	10
10	C2	19/2/2012	50	40
20	C1	22/2/2012	150	10
20	C2	22/2/2012	200	40
20	C3	22/2/2012	75	55
30	C1	27/2/2012	113	10
30	C3	27/2/2012	170	55

R1 (Order_no, Order_Date).

R2 (Item_Code, Price_unit).

R3 (Order_no, Item_Code, Qty).

R1UR2UR3= Order_Details



R1 (Table) Order_No \longrightarrow Order_date

Order_no	Order_Date
10	19/2/2012
20	22/2/2012
30	27/2/2012

R2 (Table) Item_Code \longrightarrow Price_Unit

Item_Code	Price_unit
c1	10
c2	40
c3	55

R3 (Table) Order_No,Item_Code \longrightarrow Qty

Order_no	Item_Code	Qty
10	c1	100
10	c2	50
20	c1	150
20	c2	200
20	c3	75
30	c1	113
30	c3	170

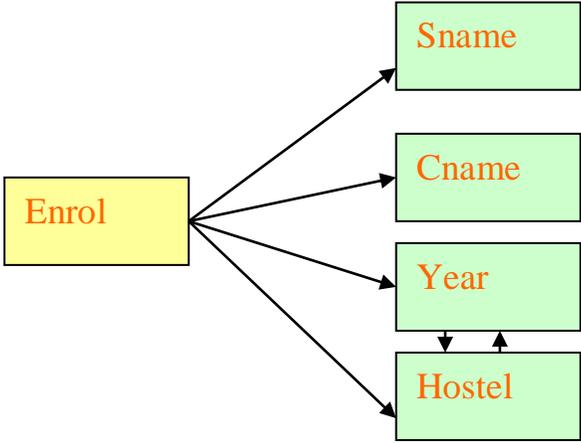
3NF:-

A relation R is in third normal form if it is in 1NF and every non key attribute of R is non transitively dependent on each candidate key of R.

Example:-

Student (Enrol, Sname, Cname, Year, \rightleftarrows Hostal).

Primary Key



Student:-

Enrol	Sname	Cname	Year	Hostel
1234	Ajay	MCA	1	Narendra_dev
2345	Vivek	MCA	2	Brocha
5432	Manoj	MBA	1	Narendra_dev
6789	Seema	MCA	3	Birala
3421	Sandeep	BCA	3	Birala
7698	Rohan	BCA	1	Narendra_dev
5689	Pravesh	MBA	2	Brocha
9006	Archana	BCA	2	Brocha

Duplicacy occur in year and hostel.

R1 (Year, Hostel).

R1 R2 (Enrol, Sname, Cname, Year).

Year	Hostel
1	Narendra_dev
2	Brocha
3	Birala

R2

Enrol	Sname	Cname	Year
1234	Ajay	MCA	1
2345	Vivek	MCA	2
5432	Manoj	MBA	1
6789	Seema	MCA	3
3421	Sandeep	BCA	3
7698	Rohan	BCA	1
5689	Pravesh	MBA	2
9006	Archana	BCA	2

BCNF (Boyce Codd Normal Form):-

A relation **R** is said to be in BCNF if $X \rightarrow A$ holds in **R**, and **A** is not in **X**, then **X** is a candidate key for **R**. In other words, a relation is in BCNF if it is in 3NF and if every determinant (left hand side of a functional dependency) is a candidate key.

It should be noted that most relations that are in 3nf are also in BCNF. Infrequently a 3NF relation is not in BCNF and this happen only if,

- ☞ The candidate keys in the relations are composite keys (that is, they are not single attributes).
- ☞ There is more than one candidate key in the relation.
- ☞ The keys are not disjoint, That is, some attributes in the keys are common.

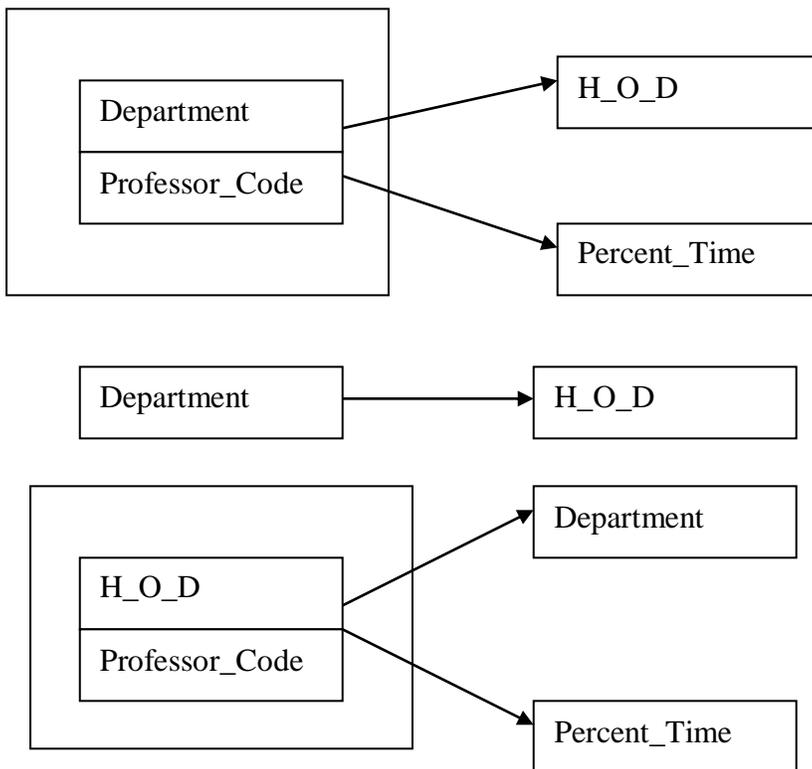
Example:-

Consider a relation scheme

Professor (Professor_Code, Dept, H_O_D, Percent_Time).

It is assumed that:-

- ❖ A professor can work in more than one department.
- ❖ The percentage of the time he spends in each department is given.
- ❖ Each department has only one head of department.



Professor_Code	Department	H_O_D	Percent_time
P1	Physics	Ghosh	50
P1	Mathematics	Krishnan	50
P2	Chemistry	Rao	25
P2	Physics	Ghosh	75
P3	Chemistry	Rao	50
P3	Physics	Gosh	40
P2	Mathematics	Krishnan	75

R1 (Department, H_O_D).

R2 (Professor_Code, Department, Percent_Time).

R1

Department	H_O_D
Physics	Ghosh
Mathematics	Krishnan
Chemistry	Rao

R2

Professor_Code	Department	Percent_Time
P1	Physics	50
P1	Mathematics	50
P2	Chemistry	25
P2	Physics	75
P3	Chemistry	50
P3	Physics	40
P2	Mathematics	75

Distributed databases:- Important

In a distributed database system, the database is stored on several computers. The computers in a distributed system communicate with each other through various communication media, such as [high speed buses](#) or [telephone lines](#) or [satellite](#) or [terrestrial system](#). They do not share main memory, nor do they share a clock. The processor in a distributed system may vary in size and function. It includes microcomputer, Work Stations, Mincomputer and large general purpose computers.

Features/Advantages:-

- ❖ Availability.
- ❖ Reliability.
- ❖ Speed up query processing.
- ❖ Data sharing and distributed control.

Disadvantages:-

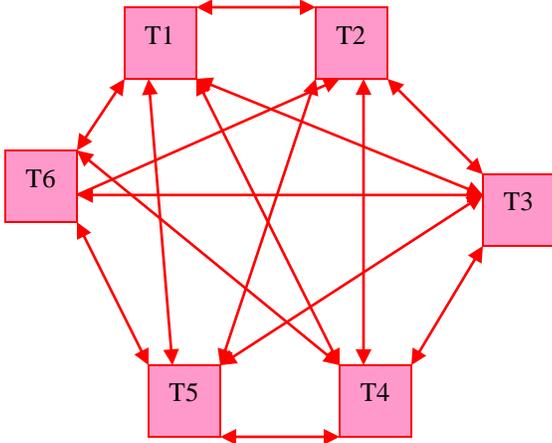
- ❖ Software development cost.
- ❖ Greater potential for bugs.
- ❖ Increased processing overhead.

Network Topology for Distributed Database:-

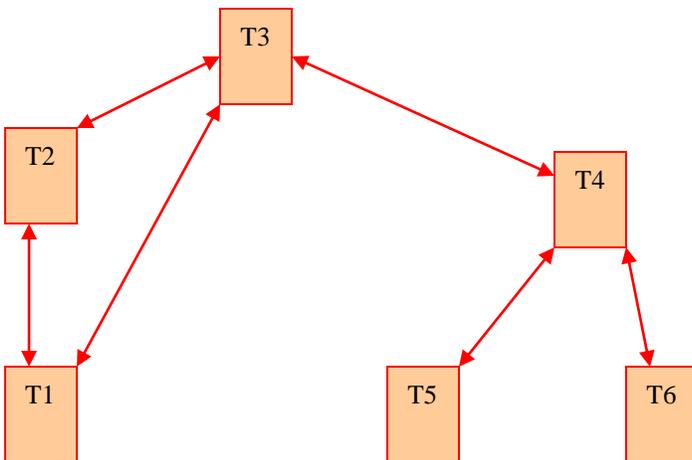
Topology:-It is physical layout of computer network.

- ❖ Fully connected network
- ❖ Partially connected network
- ❖ Tree structure network
- ❖ Star network
- ❖ Ring Network

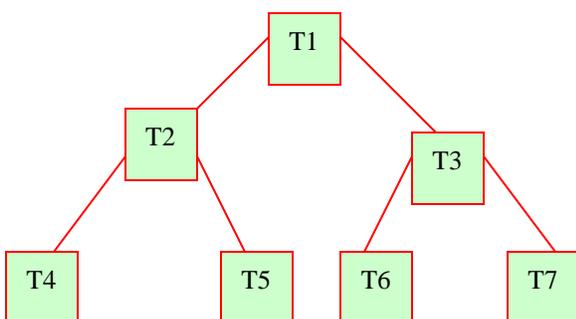
Fully connected network



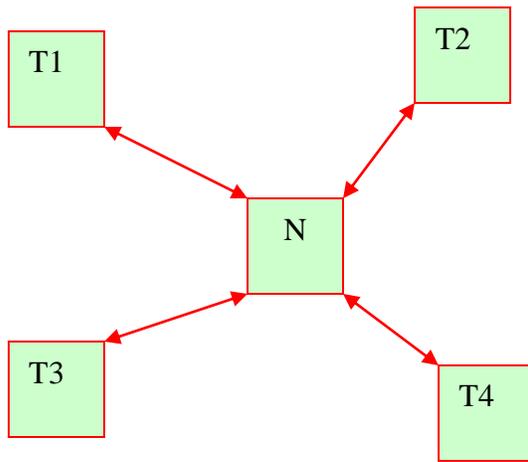
Partially connected network:-



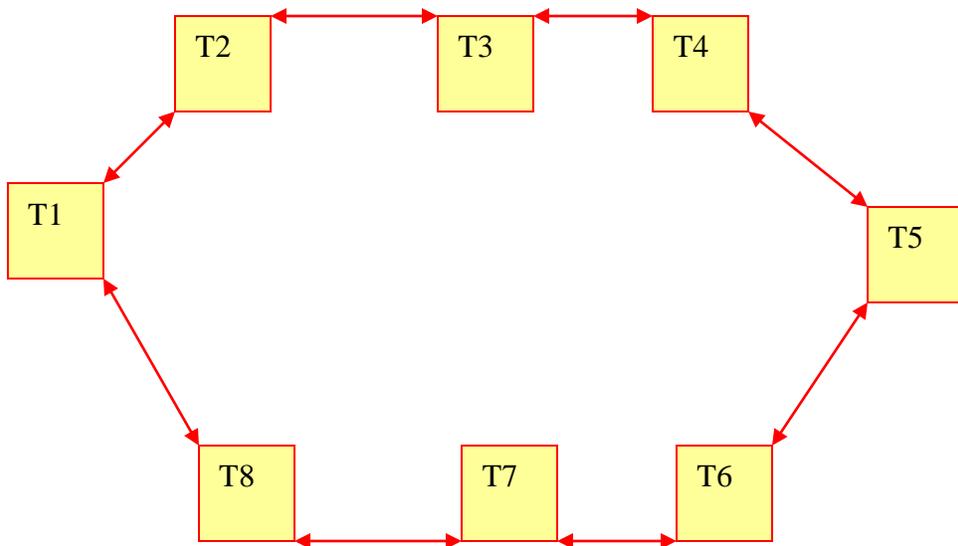
Tree structure network:-



STAR network:-



RING network:-



DESIGN OF DISTRIBUTED DATABASES:-

There are several issues that are specific to distributed databases.

- ❖ Replication
- ❖ Fragmentation
- ❖ Replication & Fragmentation

Replication:-

The system maintain several copies of the relations (Table). Each replica is stored in a different site. Replication is to store only one copy of relation.

Advantage of Replication:-

- ❖ Availability.
- ❖ Increase parallelism.
- ❖ Increase overhead on update.

Fragmentation:-

The relation is partitioned into several fragments. Each fragment stored in a different site.

Replication & Fragmentation:-

It is combination of the above both two technique.

Fragmentation:-

Let r is relation divided into a number of fragments $r_1, r_2, r_3, r_4 \dots r_n$. It is divided into two parts.

- ❖ Horizontal Fragmentation (σ)
- ❖ Vertical fragmentation (Π)

Vertical Fragmentation (Π)

$$\bigcup_{i=1}^n r_i = r$$

EMP(R)

Enrollment	Sname	Fname	Cname	Address
101	Mayank	Ajay	BCA	Lanka Vns
102	Priyanka	Vijay	MCA	Sigara Vns
103	Amazad	Asalam	BCA	Akhari VNS

$R_1 = \Pi_{\text{Enrollment, Fname, Address}} \text{EMP(R)}$

Enrollment	Fname	Address
101	Ajay	Lanka Vns
102	Vijay	Sigara Vns
103	Asalam	Akhari VNS

$R_2 = \Pi_{\text{Enrollment, Sname, Cname}} \text{EMP(R)}$

Enrollment	Sname	Cname
101	Mayank	BCA
102	Priyanka	MCA
103	Amazad	BCA

$$\bigcup_{i=1}^2 R_i = R$$

Horizontal fragmentation (σ):-

$r_i = \sigma_{r_i}(r)$

$r = r_1 \bowtie r_2 \bowtie r_3 \bowtie r_4 \dots r_n$

EMP

Enrollment	Sname	Fname	Cname	Address
101	Mayank	Ajay	BCA	Lanka Vns
102	Priyanka	Vijay	MCA	Sigara Vns
103	Amazad	Asalam	BCA	Akhari VNS
104	Rahamat	Ashalam	MCA	Kandawa VNS

R1 = $\sigma_{Cname='BCA'}(EMP)$

R2 = $\sigma_{Cname='MCA'}(EMP)$

R1 = $\sigma_{Cname='BCA'}(EMP)$

Enrollment	Sname	Fname	Cname	Address
101	Mayank	Ajay	BCA	Lanka Vns
103	Amazad	Asalam	BCA	Akhari VNS

R2 = $\sigma_{Cname='MCA'}(EMP)$

Enrollment	Sname	Fname	Cname	Address
102	Priyanka	Vijay	MCA	Sigara Vns
104	Rahamat	Ashalam	MCA	Kandawa VNS

EMP = R1 \bowtie R2

OODBD:-Object Oriented Database design:-

Object oriented database design which must be support following three properties.

- ❖ Polymorphism(P)
- ❖ Inheritance(I)
- ❖ Encapsulation(E)

Polymorphism:-

A single function may perform various types of tasks depending upon arguments.

Example:-

draw (line) 

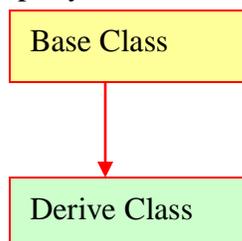
draw (Circle) 

draw (Rectangle) 

draw(oval) 

Inheritance:-

It means **reusability**. That is property of **base class(Father Class)** is going to access by its **derive class(Children Class)**. Whose property is going access is called as **base class(Father Class)** and in which the property is access is called as a **derive class(Children Class)**.



Encapsulation:-

It is an abstraction process of **binding** and **hiding** properties.

Concepts of Class & Objects:-

Class:-

It is combination of **data member (Attributes)** and **member functions (Behaviors)**. It has no **physical existence**.

Example:-

Class person
Class Animal
Class Vehicle
Class Vegatable
Class Students
Class Teachers
Class Leader
Class Country
Class Temple
Class Furniture
Etc.

Object:-

It is an **instance** of class is called object.

Example:-

Ravi is an object of **class person**.

Monkey is an object of **class animal**.

Format of class Declaration:-

```
class <class_Name>
{
Private :
    Data_members;
    Member_functions;
public:
    Data_members;
    Member_functions;
protected:
    Data_members;
    Member_functions;
};
```

Where :-

Private, public and protected are called **visibility mode**.

Feature of OODBs:-

- ❖ Reusability.
- ❖ Polymorphism.
- ❖ Encapsulation.
- ❖ Generacity.
- ❖ Data abstraction.
- ❖ Distributed database perform.
- ❖ Robust.
- ❖ High security.
- ❖ Portable.
- ❖ High performance.

Introduction of SQL:-

Data types:-

char(size)	It can hold 255 characters.	Field size fixed.
varchar(size)	It can hold 2000 characters.	Field size may be variable.
varchar2(size)	It can hold 2000 & More characters	Field size may be variable.
number (m,n)	m, Size of numbers before decimal. n ,Size of numbers after decimal.	
date	dd-mm-yy Size 8 characters	
long	it is used to store variable length character strings containing upto 2 GB	
raw/long raw	It is used to store binary data such as digitized picture or image.	

Creation of user account in Oracle:-

Types of Uesr and password:-

Username/Password

- ❖ Internal/oracle The Strongest user. For startup/Shutdown Database
- ❖ System/Manager Less power than Internal. For creating user accounts and database.
- ❖ Scott/Tiger Ordinary User. For working purpose like
 - Creation table
 - Deletion table
 - Query performing
 - Sorting
 - Indexing
 - Sequencing
 - Updation
 - Programming etc.

How to connect and start database:-

Step1:- Open SvrMgr Prompt (svrmgr>)

Step2:- Type **connect/Internal** and press Enter Button.

Step3:- Type **Startup** and Press Enter Button.

How to close database:-

Step1:- Type **Shutdown** and Press Enter Button.

How to connect (System/ manager):-

```
SQL>create user <user_Name> identified by <password>;↵
```

```
SQL>grant connect, resource to <user_Name>;↵
```

How to connect User:-

```
SQL>Connect <user_name>/Password;↵
```

How to Delete User Account:-

```
SQL>Connect System/manager;↵
```

```
SQL>Drop user <user_name>;↵
```



How to connect Scott Tiger:-

```
SQL>Connect Scott/Tiger;↵
```

How to Exit From User:-

```
SQL>Exit;↵
```

Example For creation user account

```
SQL>create user icsm identified by uprtou;↵
```

```
SQL>grant connect, resource to icsm;↵
```

```
SQL> Connect icsm/uprtou;↵
```

Example For Removing user account

```
SQL>Drop user icsm;↵
```

Syntax For creation of Table:-

```
SQL>Create table <table_name>(COL1 <datatype1>(size1) [Constraints], COL2 <datatype2>(size2) [Constraints], COL3 <datatype3> (size3) [Constraints]...);↵
```

Example For creation Table:-

```
SQL>Create table emp(Empno number(10) primary key,Ename varchar2(15) not null,Job char(10),sal number(9,2), deptno number(10));↵
```

Syntax for Insert Record Into Table:-

```
SQL>Insert into <table_Name>[(COL1,Col2...)] values(&Arg_COL1, (&Arg_COL2,...));↵
```

Example For Insert Record Into Table:-

```
SQL>Insert into emp values (&eno, '&name', '&Job', &sal, &Dept);↵
```

Example For Insert Record Into Specific Column:-

```
SQL>Insert into EMP (Empno, Ename) values (&eno, '&name');↵
```

Example For Displaying whole records:-

```
SQL>Select * from emp;↵
```

Example For Describing Table Structure:-

```
SQL>desc emp;↵
```

Example For Describing specific fields from Table :-

```
SQL>Select empno, ename, job, sal from emp;↵
```

Example For Describing specific fields from Table using Criteria :-

```
SQL>Select empno, ename, job, sal from emp where sal>=10000;↵
```

How to Apply Validation/Constraint Rules on Attributes:-

Apply Of Primary key:-

<Name_of Column> Primary Key

Example:- Empno number(12) primary key

How to Make Composite key:-

Primary Key (<Name_of Column1>, <Name_of Column2>...)

Example:- primary key(eno,ssn)

eno	ssn	
101	001	Valid
101	001	Not Valid
101	002	Valid
102	002	Valid
101	002	Not Valid

How to Make Reference Key:-

<data_Type> <column_name2> references <Master_Table>(<column_name1>);

Example:-

T1(code1, Ename) → →code1 Primary Key:-

SQL>create table T1(code1 number(10) primary key,Ename varchar2(15));

T2(code2,Fname) → →Code2 Reference key:-

SQL>create table T2(code2 number(10) references T1(code1),Fname varchar2(15));

Example of Making Composite Key:-

SQL>create table t2(code1 number(10),ssn number(12),ename varchar(15),fname char(18),primary key(code1,ssn));

How to Make Unique Key:-

...<Name_of Column1> unique,...

SQL> create table t3(eno number(10) primary key,ename varchar(15),UID number(10) unique,fname varchar(15));

How to Make Not Null Key:-

...<Name_of Column1> not null,...

SQL> create table t3(eno number (10) primary key,ename varchar(15) not null,UID number(10) unique,fname varchar(15));

How to Make Cheque Constraints Key:-

...cheque(<column_name> in (<Criteria_expression>))...

SQL>create table t1(eno number(10) primary key,ename varchar(15) not null,city varchar(15) check (city in('ald','kan','luck','vns')),job varchar(15));

How to Make default Key:-

...default <column_name> (value)...

SQL>create table t1(eno number(10) primary key,ename varchar(15) not null,city

varchar(15) check (city in('ald','kan')),job varchar(15),sal number(10) default(7000)); ←

Alter Command:-

This command is used for editing column value, adding new column, removing existing column in a table object.

a:- Alter Table <table_Name> **add**(<new_col1> <data_type>(size1), <new_col2> <data_type>(size2), <new_col3> <data_type>(size3),...)

b:- Alter Table <table_Name> **drop** column <column_name>;

c:- Alter Table <table_Name> **modify**(<new_col1> <data_type>(mod_size1), <new_col2> <data_type>(mod_size2),...)

Example of a:-

```
SQL>alter table t1 add(sal number(10));
```

Example of b:-

```
SQL> alter table t1 drop column job;
```

Example of c:-

```
SQL>alter table t1 modify (eno number (14));
```

Update command:-

This command is used for updating data values, insert value after adding new column.

```
update <table_name> set=<Column_Value1>,<Column_Value2>...  
where <criteria_On_Column>;
```

Example :-

```
update t1 set sal=&sal where eno=&no;
```

Delete command:-

This command is used for deleting record.

```
delete from <table_Name> where <criteria_Column>;
```

```
SQL>delete from emp;
```

```
SQL>delete from emp where empno>=110;
```

```
SQL>delete from emp where job="Steno" OR job="Clerk";
```

```
SQL>delete from emp where empno=&no;
```

Creation of table Using Existing table:-

Create table <table_Name> as select <col1>,<col2>,... from <table_name> where <criteria_expression>;

Example:-

create table emp1 as select empno, ename,job from emp where empno>=105;

Commit/Save-

It is used for saving records.

Example:-

SQL>commit;

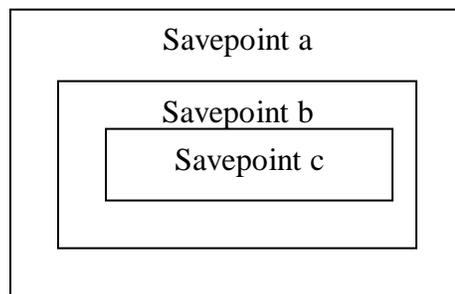
Rollback-

It is used for recall previous records after performing DML transactions.

SQL>Rollback;

Savepoint-

It is working area for performing transaction purpose.



SQL>Rollback to savepoint a;(it means rollback all a, b and c)

SQL>Rollback to savepoint b;(it means rollback both b and c)

SQL>Rollback to savepoint c;(it means rollback only c)

Syntax for creation of savepoint Area:-

SQL>savepoint a;

SQL>savepoint b;

SQL>savepoint c;

Example:-

SQL>rollback to savepoint c;

SQL>rollback to savepoint a;

Performing Query On EMP:-

EMP (Empno, ename, job, Sal, Deptno, mgr, comm, hiredate)

Syntax:-

Select <col1>, <col2>, <col3>... from <table_Name>

Where <Criteria_Expression> group by

<Aggregate_Column_name>

Order by <Column_name> asc|desc;

Operators used in Sql query:-

☞ Relational operators(>,<,>=,<=,<>)

☞ Arithmetical Operators(+,-,*,/)

☞ Predicate (and, or, not, like, not like, between, not between, in, not in, any, all, not all).

Aggregate Functions Used in Sql Query:-

sum ()

max ()

min ()

count ()

avg ()

Order Types:-

❖ Ascending Order.(A-Z)

❖ Descending Order.(Z-A)

Wild cards:-

1:- % For all Characters.

2:- _ (Underscore)For any one characters.

Consider a table:-

EMP(empno,ename,job,sal,deptno,mgr,hiredate,comm)

1:-To display all records from employee table;

```
SQL>select * from emp;
```

2:-To display employe no,name, job and sal from employee table;

```
SQL>select empno, ename, job, sal from emp;
```

3:-To display employe records from employee table who is found salary more than 1500 ;

```
SQL>select empno, ename, job, sal from emp where sal>=1500;
```

4:-To display employe records from employee table who is found sal between 1000 and 2500 ;

```
SQL>select empno, ename, job, sal from emp where sal between 1000 and 2500;
```

5:-To display employe records from employee table whose job is clerk,salesman,president

```
SQL>select empno, ename, job, sal from emp where job  
in('CLERK','SALESMAN','PRESIDENT');
```

6:-To display employe records from employee table whose job is not clerk, salesman, president

```
SQL>select empno, ename, job, sal from emp where job  
not in('CLERK','SALESMAN','PRESIDENT');
```

7:-To display employe records from employee table whose name begin with 'F';

SQL>select empno, ename, job, sal from emp where ename like 'F%';

8:-To display employe records from employee table whose name not begin with 'F';

SQL>select empno, ename, job, sal from emp where ename not like 'F%';

9:-To display employe records from employee table whose name begin with 'F' or 'J';

SQL>select empno, ename, job, sal from emp where ename like 'F%' or ename like 'J%';

10:-To display employe records from employee table ascending order by name.

SQL>select empno, ename, job, sal from emp order by ename asc;

11:-To display employe records from employee table descending order by name.

SQL>select empno, ename, job, sal from emp order by ename desc;

12:-To display total salary, average salary and maximum salary in each department.

SQL>select sum(sal) Total_sal,avg(sal) Average,max(sal) Maximum ,deptno from emp group by deptno;

13:-To display total salary, average salary and maximum salary in department 20.

SQL>select sum(sal) Total_sal,avg(sal) Average,max(sal) Maximum ,deptno from emp group by deptno having deptno=20;

14:-To display total records, Minimum salary in department 20.

SQL>select count(*) Total_Record, min(sal) Minimum ,deptno from emp group by deptno having deptno=20;

15:-To display employee records whose name begin with any character,second character must be 'A' and remaining are any characters.

SQL>select empno, ename, job, sal from emp where ename like '_A%' ;

Example Based on Nested Sql Query:-

Syntax:-

Select <col1>, <col2>, <col3>... from <table_Name>

Where <col_any>=(select <col_any> from <table_Name>

Where <col_any>=(select <col_any> from <table_Name>

Where <col_any>=(select <col_any> from <table_Name>

...));

16:- To display employee records whose job is same as job of 'JAMES'.

SQL>select empno, ename, job, sal from emp where job= (select job from emp where ename='JAMES');

17:- To display employee records who is found highest salary.

```
SQL>select empno, ename, job, sal from emp where sal= (select max(sal) from emp);
```

18:- To display employee records who is found lowest salary.

```
SQL>select empno, ename, job, sal from emp where sal= (select min(sal) from emp);
```

19:- To display employee records who is found highest salary or lowest salary.

```
SQL>select empno, ename, job, sal from emp where sal= (select max(sal) from emp)
or sal= (select min(sal) from emp);
```

20:- To display employee records who is found second highest salary .

```
SQL>select empno, ename, job, sal from emp where sal=(select max(sal) from emp where
sal<(select max(sal) from emp));
```

21:- To display employee records who is found second lowest salary .

```
SQL>select empno, ename, job, sal from emp where sal=(select min(sal) from emp where
sal>(select min(sal) from emp));
```

22:- To display employee records who is found second highest salary or second lowest salary .

```
SQL>select empno, ename, job, sal from emp where sal=(select max(sal) from emp where
sal<(select max(sal) from emp)) or sal=(select min(sal) from emp where sal>(select
min(sal) from emp));
```

Example Based on Join Query:-

Join:-

To access the data from more than one table simultaneously, In this situation we join the table.

Types of Join:-

- ✓ Equi Join
- ✓ Non Equi Join
- ✓ Self Join
- ✓ Outer join
 - Left outer join (+)=.....
 - Right Outer join =..... (+)....

Equi Join:-

Joining two or more table by using a condition.

Example:-

EMP (Empno, ename, job, Sal, Deptno, mgr, comm, hiredate)

DEPT(Deptno,LOC,Dname)

23:- To display employee records with there department name.

```
SQL>select emp.empno,emp.ename, emp.job, dept.dname,dept.loc from emp,dept
where emp.deptno=dept.deptno;
```

Non Equi Join:-

Joining two or more table without using any join condition.

24:- SQL>select emp.empno,emp.ename, emp.job, dept.dname,dept.loc from emp, dept;

Self Join

Joining a tables with itself by using a join condition.

25:- To display employee name with his/her boss name.

```
SQL>select e.ename Employee,m.ename Manager from emp e,emp m
where e.mgr=m.empno;
```

Outer Join:-

Joining two tables with a join condition having symbols

.... (+)=.....(Left) or =..... (+).... (Right)

Example of Left Outer Join

26:- To display employee records which must have department.

```
SQL>select emp.ename employee,dept.dname Department from emp,dept
where emp.deptno(+)=dept.deptno;
```

27:- To display employee records which not necessarily having department.

```
SQL>select emp.ename employee, dept.dname Department from emp,dept
where emp.deptno=dept.deptno (+);
```

Example Based on Union, Intersect and minus

28:- **Union:-**

```
SQL>select empno,ename from emp
union
select empno,ename from emp1;
```

29:-**Intersect:-**

```
SQL>select empno,ename from emp
intersect
select empno,ename from emp1;
```

30:-**minus:-**

```
SQL>select empno,ename from emp
minus
select empno,ename from emp1;
```

View:- Most Important

It is an object which maps one or more tables known as virtual tables, also called views.

Uses of Views:-

- ✓ For the data security.
- ✓ To reduce redundancy.
- ✓ To make query easy.
- ✓ To allow data independence.
- ✓ To prevent different views of same data.

Types of Views:-

- ✓ Simple View
- ✓ Composite View/Complex View

Simple View:-

The view based on a single table contains no function or group of data and it can perform DML statement.

Syntax:-

```
Create view <view_name> as
Select <column1>, < column 2>, < column 3>... from <table_Name>
Where <Criteria_Expression>
Order by <Column_name> asc|desc;
```

Composite View:-

It is based on multiple tables can contains functions and group by clause but does not always allow DML statement.

Syntax:-

```
Create view <view_name> as
Select < column1>, < column2>, < column3>... from <table_Name>
Where <Criteria_Expression>
<Aggregate_Column_name>
Order by <Column_name> asc|desc;
```

Restriction for complex view:-

- ✓ This can not remove a row if the view contains an aggregate function group by clause and distinct keyword.
- ✓ It can not modify a row if it contains aggregate function group by clause distinct key word and column defined by the expression.
- ✓ It cannot add data if it contains aggregate function group by clause, distinct key word, column defined by the expression and if there are not null column in the base table are not included in the view.

Example Simple View:-

```
SQL>create view view1 as select empno, ename, job,sal from emp where sal>=1000;
```

Insertion through view in master/Base table:-

```
SQL>insert into view1 values(&no,'&name','&job',&sal);
```

Example Composite View:-

- 1:- SQL>create view view2 as select emp.empno,emp.ename, emp.job, dept.dname,dept.loc from emp,dept where emp.deptno=dept.deptno;
- 2:- SQL>create view view3 as select sum(sal) Total_sal,avg(sal) Average,max(sal) Maximum ,deptno from emp group by deptno;

Index:- Most Important

An index is an object based on column or columns of the table which having an ordered list of the contents of columns.

Uses of index:-

- ✓ Increase the performance of database.
- ✓ Faster searching of records.

Types of Index:-

- ✓ Simple index based on **single column**.
- ✓ Composite index based on **multiple column**.

Syntax of Simple Index:-

```
SQL>create index <index_Name> on <Table_Name>(<column_name>);
```

Example Simple Index:-

```
SQL>create index emp_index on emp(empno);  
SQL>select empno, ename, job, sal from emp where empno>=110;
```

Syntax of Composite Index:-

```
SQL>create index <index_Name> on  
<Table_Name>(<column_name1>,<column_name2>...);
```

Example Composite Index:-

```
SQL>create index emp_index on emp(empno,deptno);  
SQL>select empno, ename, job, sal, deptno from emp where empno>=110 and deptno  
in(10,20);
```

How to drop Index:-

```
SQL>Drop index <index_name>;
```

How to Display Date of System:-

```
SQL>select sysdate from dual;
```

Note:-Dual is a dummy table consist of single column

How to Perform calculation:-

SQL>Select 2*3+5*7 Result1,6/7+8/3 Result2 from dual;

To display employee records increasing 20% of salary of each employee.

SQL>select empno, ename, sal, sal*1.2 increase_salary from emp;

Block diagram of P/L SQL Programming:-

(Procedure Language Structure Query Language):-

It is used to execute multiple SQL statement and control inside process of data.

Parts of P/L SQL:-

- ✓ Declaration Section.
- ✓ Execution Section.
- ✓ Exception Handling (Optional).

Declaration Section:-

In the declaration section we declare the values, constant and initialize the variables.

Execution Section:-

This section is also known as body of P/L SQL which exist in between begin & end.

In this section we pass the sql statements.

Exception Handling:-

In this section we declare the exception to handle the errors executed by the body of the program.

Syntax:-

```
declare <variable> <data_type>;
begin
....
....
....
[ Exception ]
end;
```

Example:- 1 (Addition Of two Numbers)

```
declare
var1 number(5):=&a;
var2 number(5):=&b;
var3 number(5);
begin
dbms_output.put_line('Enter First Number='||var1);
dbms_output.put_line('Enter Second Number='||var2);
var3:=var1 +var2;
dbms_output.put_line('Sum of Two Numbers='||var3);
end;
```

Sql>Set serveroutput on;

Sql>/

Example:- 2 (Product and Division of two Numbers)

```

declare
var1 number(5,1):=&a;
var2 number(5,1):=&b;
var3 number(5,1);
var4 number(5,1);
begin
  dbms_output.put_line('Enter First Number='||var1);
  dbms_output.put_line('Enter Second Number='||var2);
  var3:=var1 /var2;
  dbms_output.put_line('Division Of Two Numbers='||var3);
  var4:=var1 *var2;
  dbms_output.put_line('Product Of Two Numbers='||var4);
end;

```

Example:- 3 (Area of circle and Sphere)

```

declare
r number(5,1):=&r1;
pi number (5,1):=3.14;
area_circle number(5,1);
area_sphr number(5,1);
begin
  dbms_output.put_line('Enter radius='||r);
  area_circle:=pi*r*r;
  dbms_output.put_line('Area of Circle='||area_circle);
  area_sphr:=4/3.0*pi*r*r*r;
  dbms_output.put_line('Area of Sphere='||area_sphr);
end;

```

Example:- 4 (Area of Triangle)

```

declare
side1 number(5,1):=&a;
side2 number(5,1):=&b;
side3 number(5,1):=&c;
s number(5,2);
Area_Triangle long(9,5);
dbms_output.put_line('Enter First side of triangle=' || side1);
dbms_output.put_line('Enter Second side of Triangle=' ||side2);
dbms_output.put_line('Enter Third side of Triangle=' ||side3);
s:=( side1+ side2+ side3)/2;
Area_Triangle:=sqrt(s*( s- side1)*( s- side2)*( s- side3));
dbms_output.put_line('Area of Triangle=' || Area_Triangle);
end;

```

Example:- 5 (Leap Year)

```

declare
year number(5,1):=&y;
begin
  dbms_output.put_line('Enter year='|| year);
  if mod(year,4)=0 then
    dbms_output.put_line('Leap year');

```

```
end if;
if mod(year,4)!=0 then
dbms_output.put_line('Not Leap year');
end if;
end;
```

Example:- 6 (Odd/Even)

```
declare
n number(5,1):=&n1;
begin
dbms_output.put_line('Enter number='|| n);
if mod(n,2)=0 then
dbms_output.put_line('Even Number');
else
dbms_output.put_line('Odd Number ');
end if;
end;
```

Example:- 7 (Example based on database)

%type For One Value
%rowtype For one tuples

```
declare
var1 emp%rowtype;
var2 emp%rowtype;
begin
select * into var1 from emp where empno=7369;
dbms_output.put_line(var1.empno||' '||var1.ename||' '||var1.sal);
end;
```

Example:- 8 (Example based on database)

```
declare
no emp.empno%type;
name emp.ename%type;
begin
select empno,ename into no,name from emp where empno=7369;
dbms_output.put_line(no||' '||name);
end;
```

if-then-else-statement

```
if<condition> then
    <Action>
else
    <Action_false>
end if;
```

Example:- 9

```
declare
year number(5,1):=&y;
```

```
begin
dbms_output.put_line('Enter year='|| year);
if mod(year,4)=0 then
dbms_output.put_line('Leap year');
else
dbms_output.put_line('Not Leap year');
end if;
end;
```

Nested if-else Statement:-

```
if<condition> then
    <Action>
elseif<condition> then
    <Action>
else
    <Action>
End if;
```

Example: - 10 (Grading System)

```
declare
h number(6):=&h1;
e number(6):=&e1;
m number(6):=&m1;
p number(6):=&p1;
c number(6):=&c1;
tot number(6);
per number(6,2);
begin
dbms_output.put_line('Enter Marks Obtained in Hindi='||h);
dbms_output.put_line('Enter Marks Obtained in English='||e);
dbms_output.put_line('Enter Marks Obtained in Maths='||m);
dbms_output.put_line('Enter Marks Obtained in Physics='||p);
dbms_output.put_line('Enter Marks Obtained in Chemistry='||c);
tot:=(h+e+m+p+c);
per:=tot/5.0;
if(per>=75) then
dbms_output.put_line('A Grade'|| '||Tot='||tot||' ||Per='||per);
elseif(per>=60 and per<75) then
dbms_output.put_line('B Grade'|| '||Tot='||tot||' ||Per='||per);
elseif(per>=45 and per<60) then
dbms_output.put_line('C Grade'|| '||Tot='||tot||' ||Per='||per);
elseif(per>=33 and per<45) then
dbms_output.put_line('D Grade'|| '||Tot='||tot||' ||Per='||per);
else
dbms_output.put_line('E Grade'|| '||Tot='||tot||' ||Per='||per);
end if;
```

end;

Example:- 11(Largest of any Three Numbers)

declare

a number(6):=&a1;

b number(6):=&b1;

c number(6):=&c1;

begin

dbms_output.put_line('Enter a='||a);

dbms_output.put_line('Enter b='||b);

dbms_output.put_line('Enter c='||c);

if(a>b and b>c or a>b and c>b) then

dbms_output.put_line('A is the Largest Number');

elsif(b>c and c>a or b>c and a>c) then

dbms_output.put_line('B is the Largest Number');

else

dbms_output.put_line('C is the Largest Number');

end if;

end;

Example:- 12 (Series of natural Numbers)

While<condition>

Loop

<action>

End Loop;

declare

i number(5):=1;

n number(8):=&n;

begin

dbms_output.put_line('Enter Number='||n);

while(i<=n)

loop

dbms_output.put_line(i);

i:=i+1;

end loop;

end;

Example:- 13 (Series of Fibonacci Numbers)

declare

i number(5):=1;

a number(5):=0;

b number(5):=1;

s number(5):=0;

n number(8):=&n;

begin

dbms_output.put_line('Enter Number='||n);

while(i<=n)

```
loop
  dbms_output.put_line(s);
a:=b;
b:=s;
s:=a+b;
i:=i+1;
end loop;
end;
```

Example:- 14 (Finding Factorial Of Any Numbers)

```
declare
i number(5):=1;
fact number(5):=1;
n number(8):=&n;
begin
  dbms_output.put_line('Enter Number='||n);
  while(i<=n)
  loop
    fact:=fact*i;
    i:=i+1;
  end loop;
  dbms_output.put_line('factorial of number='|| n ||'='||fact);
end;
```

Syntax:-

```
for <variable> in <begin>..<end>
loop
  <action>
end loop;
```

Example:- 15 (Series of natural numbers)

```
declare
i number(5);
n number(8):=&n;
begin
  dbms_output.put_line('Enter Number='||n);
  for i in 1..n
  loop
    dbms_output.put_line(i);
  end loop;
end;
```

Define Cursor in Oracle:-

Cursor is used to access the result set present in the memory. This result set contains the records returned on execution of a query.

There are two types of cursor:

1. Explicit (user defined cursor).
2. Implicit (predefined cursor). OR

Oracle engine uses private working area to process queries. This work area is called as cursor. The data that is stored in the cursor is called as Active Data Set.

Implicit cursors (predefined cursor): - The oracle engine implicitly opens a cursor on the server to process each SQL statement. Implicit cursors are managed by the Oracle engine itself.

Explicit Cursors (user defined cursor): - Explicit Cursors are the cursors created by the user inside a PL/SQL block. The declare section of a PL/SQL block and used within its executable Section.

What is trigger:-

Oracle allows you to define procedures that are implicitly executed when an INSERT, UPDATE, or DELETE statement is issued against the associated table. These procedures are called database triggers.

Types of Triggers:-

- 1:- Built in Triggers/System Defined Triggers.
- 2:-User Defined Triggers.
 2. 1 Before insert.
 2. 2 After insert.
 2. 3 Before update.
 2. 4 After update.
 2. 5 Before delete.
 2. 6 After delete.

Syntax of trigger:-

```
CREATE [OR REPLACE] TRIGGER <trigger_name>
BEFORE|AFTER { INSERT|DELETE|UPDATE } ON <table_name>
[REFERENCING [NEW AS <new_row_name>] [OLD AS <old_row_name>]]
[FOR EACH ROW [WHEN (<trigger_condition>)]]
<trigger_body>
```

4GL:- (Fourth Generation Language):-

It is also known as **Very high level language**. Following basic types of language tools fall into this category.

- ✓ Query Language.
- ✓ Report Generator.
- ✓ Application Generators.
- ✓ Decision Support System & Financial Planning.
- ✓ Some Microcomputer application S/w.

Example:-

- ✓ Oracle
- ✓ Sql Server
- ✓ Foxpro
- ✓ LINC

Emp (empno, ename, job, sal, deptno, address).

1:- To display all employee records.

Select * from emp;

2:- To display empno, ename and job only.

Select empno, ename, job from emp;

3:- To display employee records who is found salary more than 10000.

Select empno, ename, job, Sal from emp where sal >= 10000;

5GL:- (Fifth Generation Language):-

It is also known as HAL(Human Accessible Language) based language.

This language make to smarter.

Example:- LOTUS-1-2-3

How to Solve 4 GL to Help solving problem

- ✓ They are much easier to learn use.
- ✓ They provide more power full feature.
- ✓ They provide convenient feedback on systematic mistakes.
- ✓ It is much faster than 3GL.

Impact of 4 Gl:-

It deserve management attention such as

- ✓ Productivity and s/w development.
- ✓ Restructuring of the system development process.
- ✓ Empasis on DSS and End User Computing.

Relational calculus:-

It is a query system where in queries are expressed as variables and formulas on these variables. Such formula describe the properties of the required result relation without specifying the method of evaluating it. It is based on predicate calculus.

Example:-

Ram is a good Student.	$P(x)$
Raheem Is a good Student	$Q(y)$
Ram & Raheem both are good Student.	$P(x) \wedge Q(y)$
Ram & Raheem both are bad Student.	$\neg [P(x) \wedge Q(y)]$

Tuple calculus:-

Queries in tuple calculus are expressed by tuple calculus expression. A tuple calculus expression is of the form

$$\{X \mid F(X)\}$$

Where F is formula, involving X and x represent a set of tuples variables.

Tuple calculus formulas are built from atoms. An atom is either of the forms given below.

A1:- $x \in R$ Where r is relation and x is tuple variable.

A2:- $x \theta y$ or $x \theta c$

Where θ is comparison operators ($>$, $>=$, $<$, $<=$, \neq , $=$)

Locking Scheme:-

A lock is a variable associated with each such data item manipulating the value of a lock is called Locking. The value of a lock variable is used in the locking scheme to control the concurrent access and manipulation of access data item. Locking is done by **lock manager**.

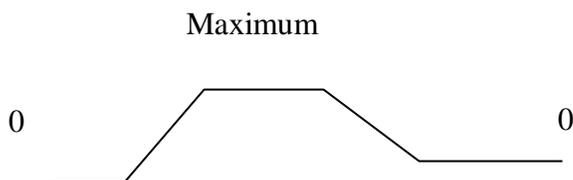
There are two types of Locks.

- ❖ Exclusive Lock (Write lock or update lock).
- ❖ Shared Lock (Read Lock).

Two Phase Locking:-

It has two phases.

- ❖ **Growing Phases** (The number of locks from 0 to Maximum for transaction)
- ❖ **Contracting Phases** (The number of locks held decreases from Maximum to Zero)



Database Transaction:-

A transaction is a program unit whose execution may change the contents of a database. If the database was in consistent state before a transaction, then on the completion of the execution of the program unit corresponding to the transaction, the database will be consistent

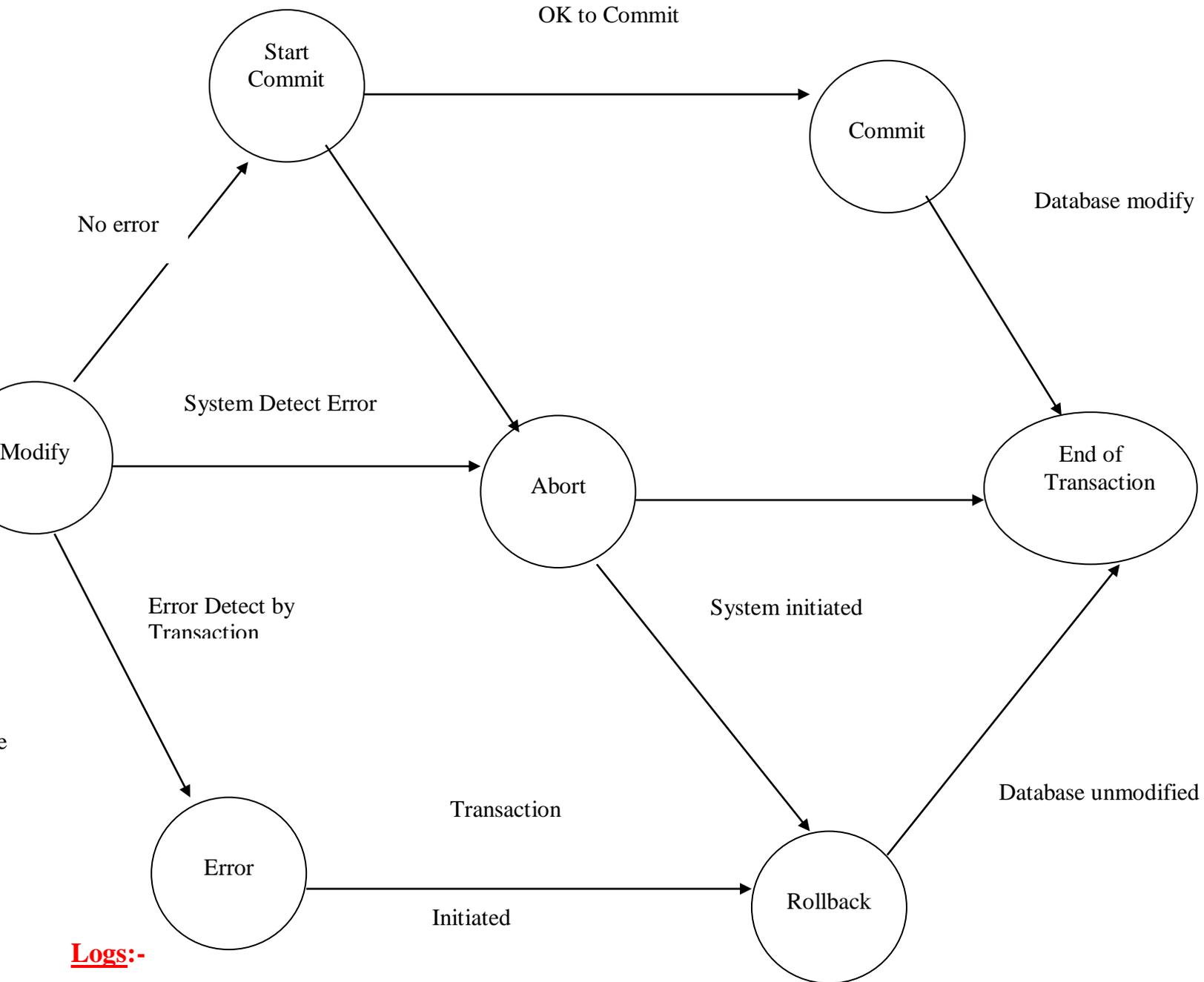
state. This requires that the transaction be considered atomic. It is executed either successfully or in case of errors.

A transaction can end in three possible ways.

- ❖ Successful termination.
- ❖ Suicidal Termination (**Rollback Operation**).
- ❖ Murderous termination (**Aborted for one reason or many reasons**).

Property of Transaction:-

- ❖ **Atomicity** (It will run to completion as an indivisible unit)
- ❖ **Consistency** (The database was in consistent state before the start of transaction, then on termination of a transaction the database will also be in a consistent state).
- ❖ **Isolation** (Actions performed by a transaction will be isolated or hidden from outside the transaction until the transaction termination).
- ❖ **Durability** (A transaction ensures that the commit action of a transaction) on its terminations, will be reflected in the database.



Logs:-

It is usually written to stable storage, contains the redundant data required to recover from volatile storage failures and also errors discovered by the transaction or database system. It record following in formations:-

- ❖ A start of transaction marker.
- ❖ The transaction identifier.
- ❖ The record identifier.
- ❖ The operations performed on the records (insert, delete, modify).
- ❖ The previous value of modified data.
- ❖ Updated value of modify record.
- ❖ Commit transaction marker.

Types of Logs:-

❖ Current Log

- It contains log information (including checkpoint) required for recovery from system failures involving loss of volatile information.

❖ Archival log

- It is used for failures involving loss of nonvolatile informations. The log contains information on all transactions made on the database from the copy of archival copy. It is written in chronological order.

Checkpoints:-

A scheme called checkpoint is used to limit the volume of the information that has to be handled and processed in event of system failure involving the loss of volatile information.

It consist of following:-

- ❖ A start of checkpoint record giving the identification
- ❖ All log information from the buffers in the volatile storage is copied to the log on stable storage.
- ❖ All database updates from the buffers in the volatile storage are propagated to the physical database.
- ❖ An end of check point record is written and the address of the checkpoint record is saved on the file accessible to the recovery routine on startup after a system crash.

Note:-Checkpoint signal generated by system timer. There are many types of checkpoint signals.

- ❖ Transaction Consistent Checkpoint Signal.
- ❖ Action consistent checkpoint signal.
- ❖ Transaction oriented checkpoint signal.

Statistical database:-

A statistical database contains confidential information about individuals (or organizations), which is used to answer statistical queries concerning totals, averages, numbers with certain characteristics.

Phases of designing database:-

Phase 1 **Definition of problem.**

It includes estimates of costs (operational and setup), risks analysis.

Phase 2 **Analysis of existing system and procedures.**

It includes feasibility study of the proposed solution.

Phase 3 **Preliminary Design.**

This design is evaluated against the initial requirements. The cycle of steps consisting of the definition of the problem, procedure analysis and preliminary design is repeated until a satisfactory design is obtained.

Phase 4 **Computing system decision.**

This decision may be based on the existing environment. If the database is to be implemented on an existing computer system, The choice is limited to that for the DBMS.

Phase 5 **Final design.**

In this phase, we design E-R model of database.

Phase 6 **Implementation And Testing.**

It consists of writing and compiling the code for the conceptual and external schemes in the DDL of DBMS.

Phase 7 **Operation and Tuning (Improve performance).**

This phase includes, the design is ready for day-to-day operation.

Question:-

QUESTION:-1 What do you understand about database?How manage by DBMS?

QUESTION:-2 What are different types of database model? Explain with suitable examples and diagram.

QUESTION:-3 What is E-R diagram? Explain with suitable examples and diagram.

QUESTION:-4 Explain about following elements with examples and diagram

- ❖ Abstraction.
- ❖ Generalization.
- ❖ Specialization.
- ❖ Aggregation.

QUESTION:-5 What are three types of different data views of data and level of DBMS ?

QUESTION:-6 What are different types of database anomalies? How it will optimize of minimize.?

Or

What are different types of normalization Technique

QUESTION:-7 What are twelve rules for RDBMS give by EF codd? Explain with suitable example?

QUESTION:-8 What is integrity rules? Explain with suitable example

QUESTION:-9 What are different types of constraints/Validation rules? Explain with examples.

QUESTION:-10 What are different types of files organizations.?

QUESTION:-11 What is distributed database system? Describe about different types of fragmentation technique

QUESTION:-12 What is schema and subschema? Explain with suitable examples.

QUESTION:-13 Explain about Object Oriented database Design technique?

QUESTION:-14 Write functions of DDL, DML, DCL and TCL with suitable examples?

QUESTION:-15 What are different types of relational algebra functions?

QUESTION:-16 What is the role of Views and Index in database system?

QUESTION:-17 What is join? Explain different types of join technique with suitable examples?

QUESTION:-18 Write short notes of followings?

- ❖ DBTG Set
- ❖ 4GL and 5GL
- ❖ ISAM
- ❖ VSAM
- ❖ Inverted file organization
- ❖ Integrity rules
- ❖ Coral Rings
- ❖ Functional dependency
- ❖ Decomposition of relations

- ❖ Cardinality/Arity(Degree)
- ❖ Schema
- ❖ E-R models
- ❖ BCNF
- ❖ Hash functions

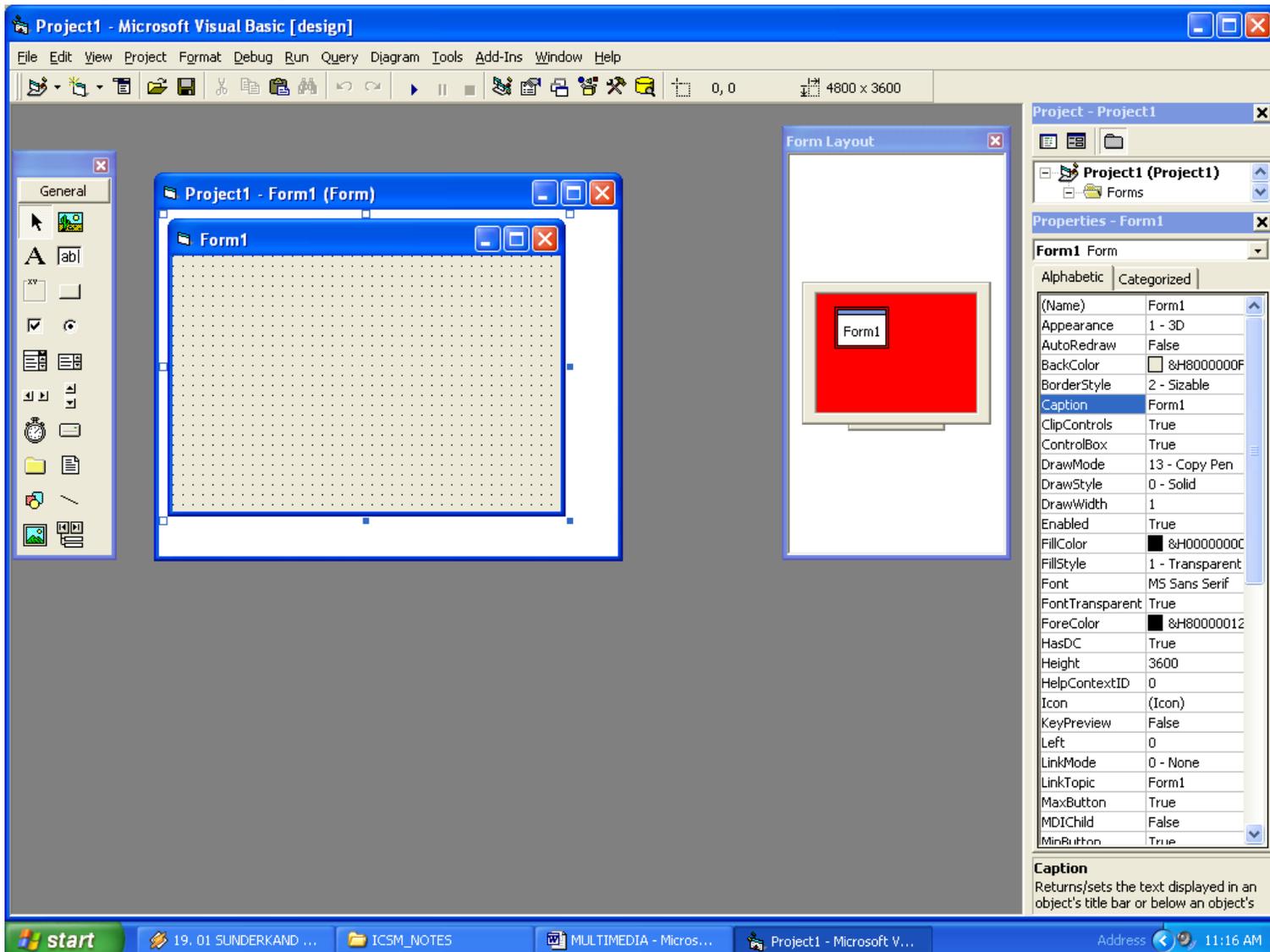
QUESTION:-19 What are different types of users in DBMS?

QUESTION:-20 Prepare complete query technique in SQL?

BCA 10(Windows Programming)

Visual Basic(VB)

It is object based programming language. Which facilitates RAD(Rapid Application development) based programming.The following structure of windows is used in VB programming.It is known as IDE(Integrated Development Environment)



An integrated development environment (IDE) is a programming environment that has been packaged as an application program, typically consisting of a code editor, a compiler, a debugger, and a graphical user interface (GUI) builder.

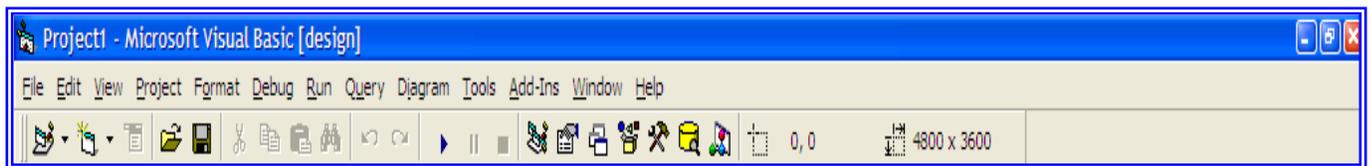
Or

An integrated development environment (IDE) is a programming environment that has been packaged as an application program, typically consisting of a code editor, a compiler, a debugger, and a graphical user interface (GUI) builder. The IDE may be a standalone application or may be included as part of one or more existing and compatible applications.

VB has the following windows:-

Menu / Toolbar :-

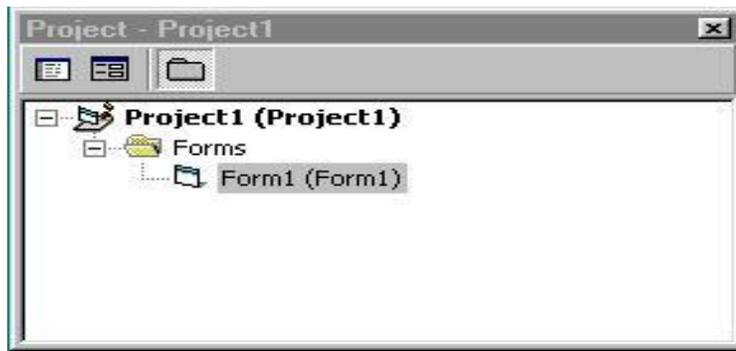
This is the only element of the IDE which is always visible. You use it to select which other IDE elements to view and to add forms or controls to your project. There are many other features which we will discuss later.



Toolbox :-



The toolbox is simply a library of controls which you can place on your application. Once you have placed all the controls you need onto your applications forms, you can hide the toolbox to make room for working in the other elements of the IDE.

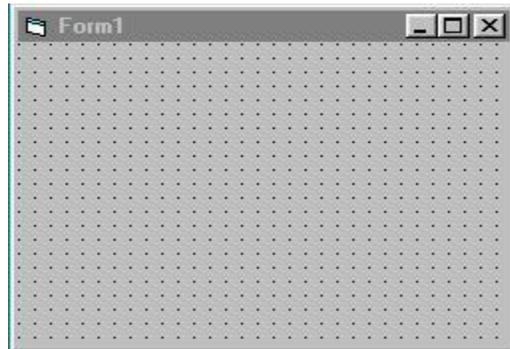


Project Window:-

This is simply a list of all the forms which make up your VB project. There are several kinds of forms which we will talk about later.

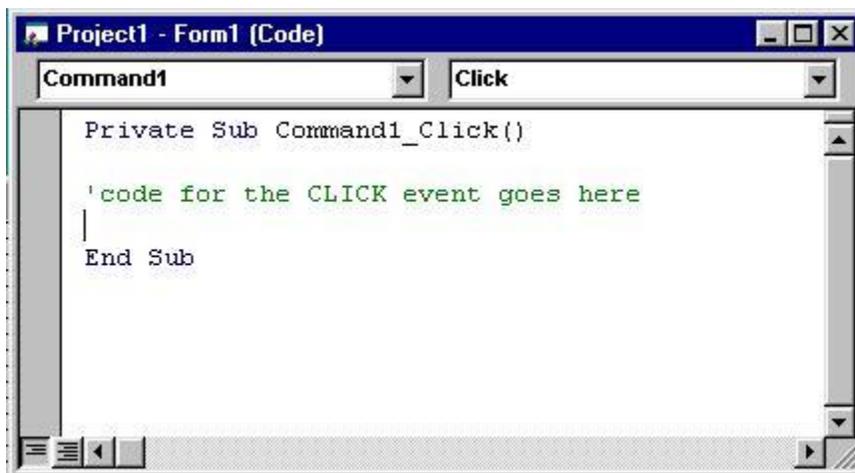
Forms :-

We add these to our VB application as they are needed. They are the windows which hold the various controls (buttons, text boxes, etc.) which make up our application.

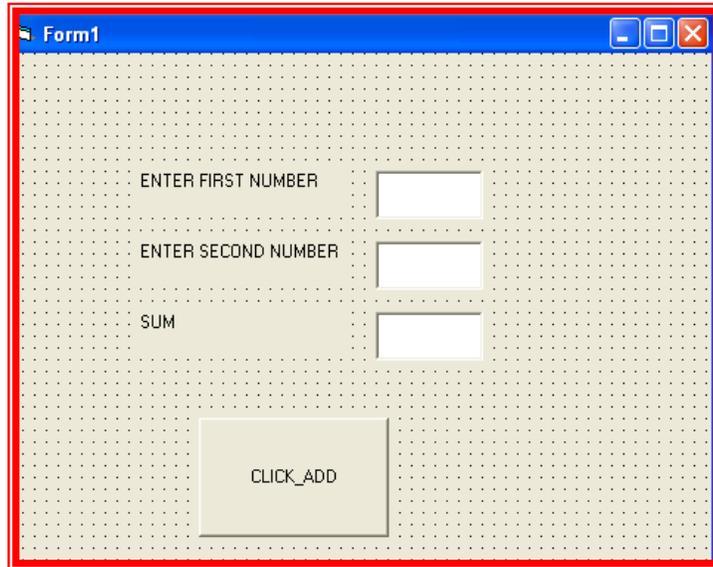


Code Window: -

Like its name implies, this is where you type in the code that VB executes. Notice that the heading of the window indicates with which event the code is associated.



How we write program in IDE Environment



Example:-1

```
Private Sub CLICKADD_Click()
```

```
Dim a, b, c As Integer
```

```
a = Val(Text1.Text)
```

```
b = Val(Text2.Text)
```

```
c = a + b
```

```
Text3.Text = c
```

```
End Sub
```

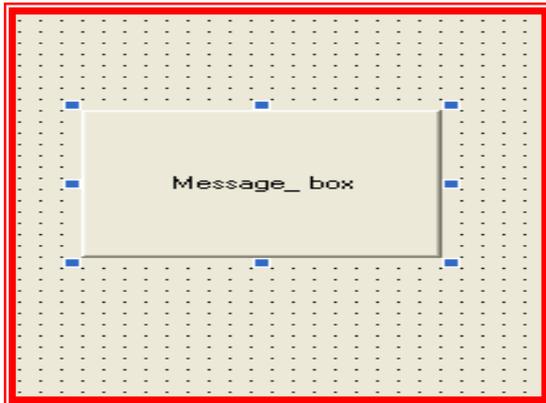
Working with MsgBox:-

It is used for displaying message on screen.

Syntax:-

```
msgbox (prompt,as vbmsgboxresult)
```

Example:-2



```
Private Sub Command1_Click()
```

```
    MsgBox ("Welcome How Are You")
```

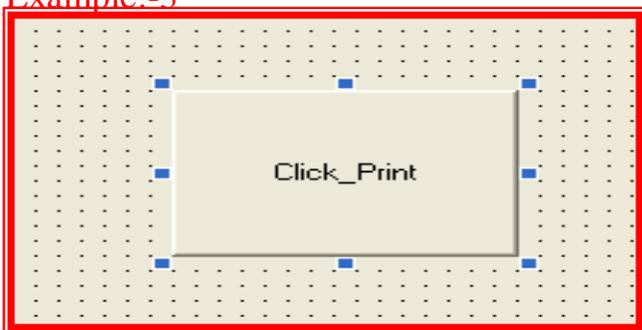
```
    MsgBox ("Varanasi is A holly City")
```

```
    MsgBox ("India is the second Largest country in population")
```

```
End Sub
```

Working with Print Command (?):-

Example:-3



```
Private Sub Command2_Click()
```

```
Print "Calculated result of 2 * 4 * 5 + 6 * 5=", 2 * 4 * 5 + 6 * 5
```

```
Print "Welcome"
```

```
Print "Sum of 6 and 7=", 6 + 7
```

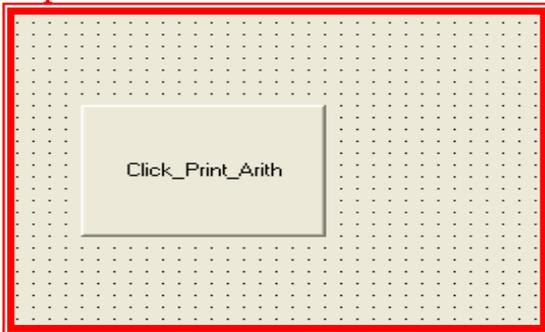
```
Print "Square of 6=", 6*6
```

```
End Sub
```

Visual basic Arithmetic Operators:-

❖ +	Addition	$3+4=7$
❖ -	Subtraction	$9-4=5$
❖ *	Product	$9*5=45$
❖ /	Real Division	$9/5=1.8$
❖ \	Integer Division	$13\backslash 5=2$
❖ ^	Exponentiation	$3^2=9$
❖ Mod	Remainder/Modulo	$19 \text{ mod } 8=3$

Example:-4



```
Private Sub Command2_Click()  
    Print "Sum of 5+8=", 5 + 8  
    Print "Product of 5*8=", 5 * 8  
    Print "Division of 5/8=", 5 / 8  
    Print "Integer Division of 8\5=", 8 \ 5  
    Print "Exponent of 5^2=", 5 ^ 2  
    Print "Modulo of 13 mod 7=", 13 Mod 7  
End Sub
```

Visual basic Logical Operators:-

-  And
-  Or
-  not

Relational Operator:-

-  > Greater than.
-  < Less Than.
-  >= Greater than or Equal.
-  <= Less Than or Equal.
-  < > Not Equal.

Visual basic Variable Types/Data Types:-

❖ Integer	2 Bytes	-32768 to 32767.
❖ Long integer	4 Bytes	-2147483648 to 2147483647.
❖ Single	4 bytes	-3402823E38 To -1.401298 E-45 for negative values.
❖ Double	8 Bytes	-79769313486232 E308 to -4.94065645841247E-324 For Negative values. 4.94065645841247 E-324 to 1.79769313486232 E 308 for Positive values.
❖ Currency	8 Bytes	-922337203685477.5808 to 922337203685477.5807

- ❖ String 10 bytes String length 0 to 65400 characters.
- ❖ Variable 16 Bytes for numeric 22 bytes +string length for character
Any of the above.

Operator for Data Types:-

- % Integer
- & long
- ! Single
- # Double
- @ Currency
- \$ String

Description of toolbox:-

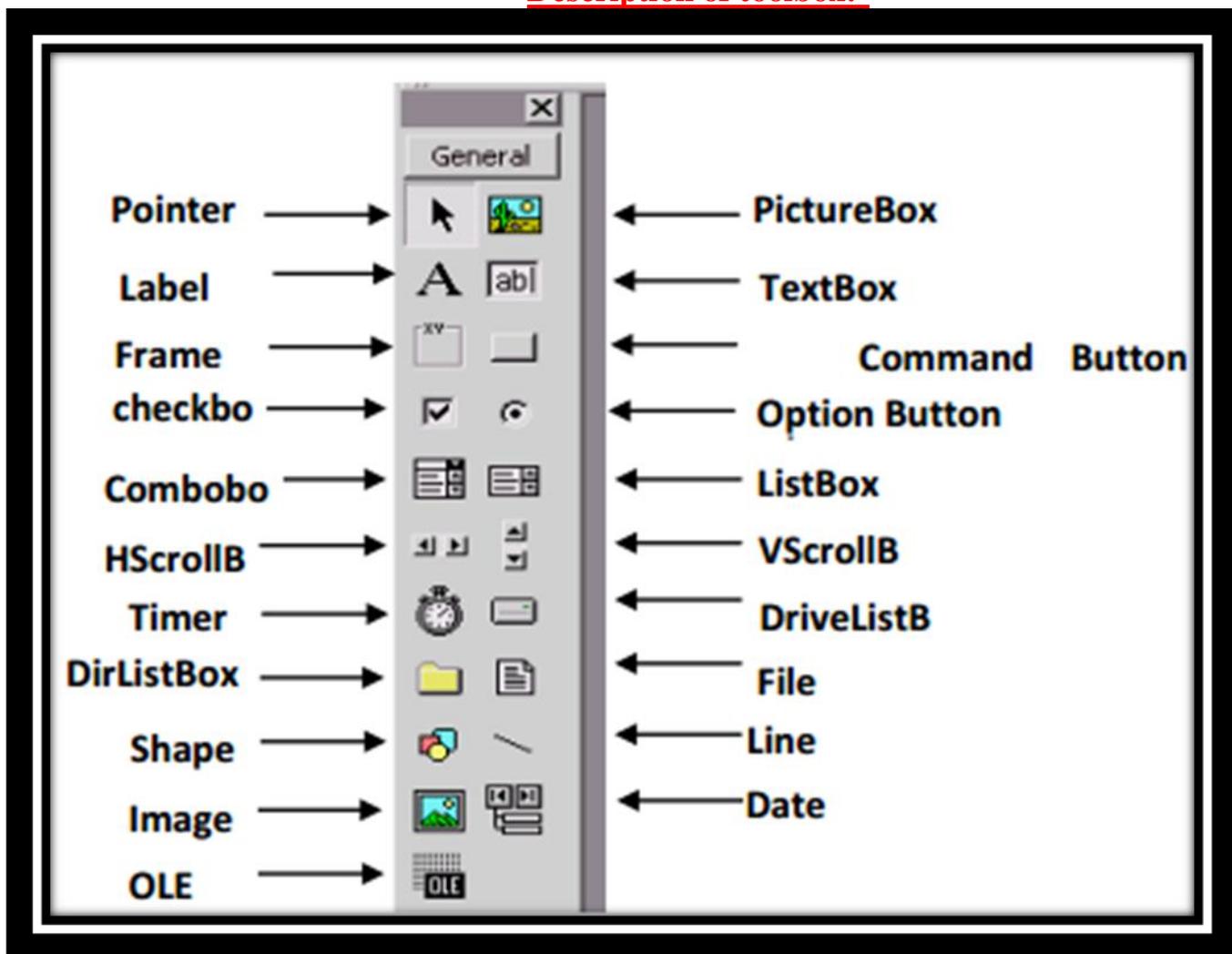


Table (1): Toolbox controls summary.

Control	Description
Pointer	Used to interact with controls on the form(resize them, move them, etc.). The pointer is not a control
PictureBox	A control that display images or print the result.
Label	A control that displays uneditable text to the user.
TextBox	A control for accepting user input. Textbox can also display text.
Frame	A control for grouping other controls.
CommandButton	A control that represents a button. The user presses or clicks to initiate an action.
CheckBox	A control that provides the user with a toggle choice (checked or unchecked)
OptionButton	Option buttons are used in groups where only one at a time can be true.
ListBox	A control that provides a list of items.
ComboBox	A control that provides a short list of items.
HscrollBar	A horizontal scrollbar.
VscrollBar	A vertical scrollbar.
Shape	A control for drawing circles, rectangles, squares or ellipse
Line	A control for drawing line.
DrivelistBox	A control accessing the system disk drivers.
DirlistBox	A control accessing directories on a system
Filelistbox	A control accessing file in a directory
Image	A control for displaying images. The images control does not provide as many capabilities as a picturebox.
OLE	A control for interacting with other window applications.
Timer	A control that performs a task at programmer specified intervals. A timer is not visible to the user.

Text Box

A text Box control, sometimes called an edit field or edit control, displays information entered at design time, entered by the user, or assigned to the control in code at run time.

Button

Use a Command Button control to begin, interrupt, or end a process. When chosen, a Command Button appears pushed in and so is sometimes called a push button.

List Box

A List Box control displays a list of items from which the user can select one or more. If the number of items exceeds the number that can be displayed, a scroll bar is automatically added to the List Box control.

Label:-

A Label control is a graphical control you can use to display text that a user can't change directly.

Combo Box:-

A Combo Box control combines the features of a text box and a list box. This control allows the user to select an item either by typing text into the combo box, or by selecting it from the list.

Timer:-

A Timer control can execute code at regular intervals by causing a Timer event to occur. The Timer control, invisible to the user, is useful for background processing.

Picture Box:-

The primary use for the Picture Box control is to display a picture to the user. The actual picture that is displayed is determined by the picture property. The picture property contains the file name (and optional path) for the picture file that you wish to display.

DATA Grid Control:-

The DATAGrid control displays and operates on tabular data. It allows complete flexibility to sort, merge, and format tables containing strings and pictures. When bound to a Data control, MSFlexGrid displays read-only data.

Date and Time Picker Control:-

A Date and Time Picker (DTP) Control provides a simple and intuitive interface through which to exchange date and time information with a user. For example, with a DTP control you can ask the user to enter a data and then retrieve his or her selection with ease.

Option Button /Radio Button:-

An Option Button control displays an option that can be turned on or off.

Image Control:-

Use the Image control to display a graphic. An Image control can display a graphic from an icon, bitmap or metafile, as well as enhanced metafile, JPEG, or GIF files.

Check Box Control:-

A Check Box indicates whether a particular condition is on or off. We use check boxes in an application to give users true/false or yes/no options. Because check boxes work independently of each other, a user can select any number of check boxes at the same time.

Example 5:-

Enter first Number:-	<input type="text" value="45"/>
Enter Second Number:-	<input type="text" value="57.8"/>
Result	<input type="text" value="0.7785467"/>

ADD	SUB	MUL	DIV
-----	-----	-----	-----

Public a, b, d1, d2, d3, d4 As Double

Private Sub Command1_Click()

a = Val(Text1.Text)

b = Val(Text2.Text)

d1 = a + b

Text3.Text = d1

End Sub

Private Sub Command2_Click()

d2 = a - b

Text3.Text = d2

End Sub

Private Sub Command3_Click()

d3 = a * b

Text3.Text = d3

End Sub

Private Sub Command4_Click()

d4 = a / b

Text3.Text = d4

End Sub

Control Structure/Control Statement:-

VB provides facilities for controlling the order of execution of the statements, which is referred to as flow control statements/control statements.

There are following categories of flow control statements.

- ❖ Decision Control Statement.
- ❖ Looping Control Statement.

Decision Control Statement:-

```
if<criteria/Condition> then
    Statement_blocks
end if
Exit_Statement_block
```

Example 6:-

The screenshot shows a VBA form with a light beige background. In the top-left corner, there is a label "Enter year". To its right is a text box containing the number "2013". Below these elements, centered on the form, is a button with a dotted border and the text "Check_Year".

```
Private Sub Command1_Click()  
Dim y As Integer  
y = Val(Text1.Text)  
If (y Mod 4 = 0) Then  
MsgBox ("LEAP YEAR")  
End If  
If (y Mod 4 <> 0) Then  
MsgBox ("NOT LEAP YEAR")  
End If  
End Sub
```

if-else-end if control statement

```
if<criteria> then  
    statement_blocks_True  
else  
    statement_blocks_False  
end if
```

Example 7:-

The screenshot shows a VBA form with a light beige background and a dotted grid pattern. In the top-left corner, there is a label "Enter NUMBER". To its right is an empty text box. Below these elements, centered on the form, is a button with a dotted border and the text "CHECK_NUMBER".

```
Public N As Integer
Private Sub Checknumber_Click()
N = Val(Text1.Text)
If (N Mod 2 = 0) Then
MsgBox ("EVEN NUMBER") &N
Else
MsgBox ("ODD NUMBER") &N
End If
End Sub
```

Nested if-then-elif-endif

```
if<criteria1> then
    statement_blocks_True1
else
    if<criteria2>
        statement_blocks_true2
    else
        if<criteria3>
            statement_blocks_true3
        else
            ...
            ...
            ...
        end if
    end if
end if
```

Example 8:-

MARKS SHEET	
ENTER HINDI MARKS	<input type="text" value="55"/>
ENTER ENGLISH MARKS	<input type="text" value="46"/>
ENTER MATHS MARKS	<input type="text" value="77"/>
ENTER PHYSICS MARKS	<input type="text" value="66"/>
ENTER CHEMISTRY MARKS	<input type="text" value="55"/>
TOTAL MARKS	<input type="text" value="299"/>
PERCENTAGE MARKS	<input type="text" value="59.8"/>

Public h, e, m, p, c, tot, per As Double

```

Private Sub CLICK_MARKSHEET()
h = Val(Text1.Text)
e = Val(Text2.Text)
m = Val(Text3.Text)
p = Val(Text4.Text)
c = Val(Text5.Text)
tot = h + e + m + p + c
per = tot/ 5
Text6.Text = tot
Text7.Text = per
If (per >= 75 And per <= 100) Then
MsgBox ("A Grade") &("Total marks=") & tot &("Percentage=") & per
Else
If (per >= 60 And per < 75) Then
MsgBox ("B Grade") &("Total marks=") & tot &("Percentage=") & per
Else
If (per >= 45 And per < 60) Then
MsgBox ("C Grade") &("Total marks=") & tot &("Percentage=") & per
Else
If (per >= 35 And per < 45) Then
MsgBox ("D Grade") &("Total marks=") & tot &("Percentage=") & per
Else
MsgBox ("E Grade") &("Total marks=") & tot &("Percentage=") & per
End If
End If
End If
End If
End Sub

```

Example 9:-

The screenshot shows a VBA form with a light beige background and a red border. It contains three text boxes for input, each with a label to its left: 'FIRST NUMBER' (containing '6633'), 'SECOND NUMBER' (containing '554'), and 'THIRD NUMBER' (containing '112'). Below these text boxes is a button with a dotted border and the text 'CHECK_LARGEST'.

```

Private Sub Command1_Click()
Dim A, B, C As Integer
A = Val(Text1.Text)
B = Val(Text2.Text)
C = Val(Text3.Text)

```

```

If (A > B And B > C Or A > C And C > B) Then
MsgBox "A IS LARGEST" & Now
Else
If (B > C And C > A Or B > A And A > C) Then
MsgBox "B IS LARGEST" & Now
Else
MsgBox "C IS LARGEST" & Now
End If
End If
End Sub

```

Select-----end select control statement

It is used for designing and solving choice based problem.

Syntax:-

```

Select case (<Expression>)
    case <value1>
        Statement Blocks1
    case <value2>
        Statement Blocks2
    case <value3>
        Statement Blocks3
    ...
    ...
    ...
case else
    Statement Blocks_False
End select

```

Example:-10

The image shows a graphical user interface for a choice-based problem. At the top, there is a green title bar with the text "CHOICE BASED PROBLEM". Below the title bar, there are four input fields, each with a label to its left: "ENTER YOUR CHOICE", "ENTER FIRST NUMBER", "ENTER SECOND NUMBER", and "RESULT". Each label is in a dark teal box. To the right of each label is a white text box with a grey border. Below these four input fields is a single button with the text "CLICK_CHOICE_RESULT". The entire interface is set against a light grey dotted background and is enclosed in a red border.

```

Private Sub Command1_Click()
Dim N As Integer
Dim A, B, C1, C2, C3, C4 As Double

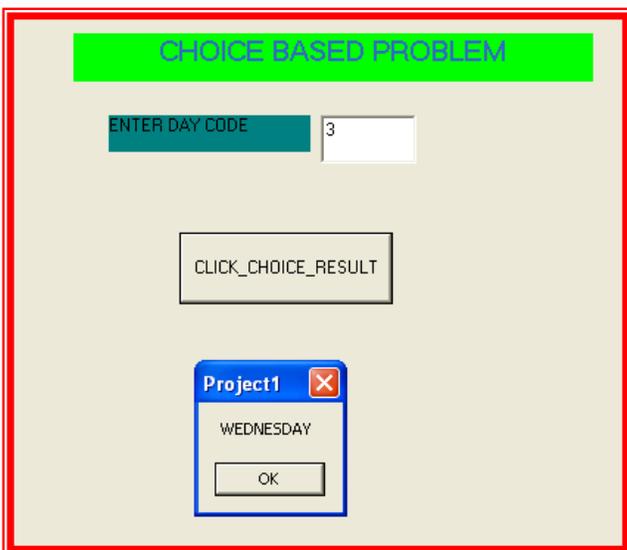
```

```

N = Val(Text1.Text)
A = Val(Text2.Text)
B = Val(Text3.Text)
Select Case (N)
Case 1
C1 = A + B
Text4.Text = C1
Case 2
C2 = A - B
Text4.Text = C2
Case 3
C3 = A * B
Text4.Text = C3
Case 4
C4 = A / B
Text4.Text = C4
Case Else
MsgBox "Enter correct choice"
End Select
End Sub

```

Example:-11(DAY CODE CONVERSION)



```

Private Sub Command1_Click()
Dim N As Integer
N = Val(Text1.Text)
Select Case (N)
Case 0
MsgBox "SUNDAY"

```

```

Case 1
  MsgBox "MONDAY"
Case 2
  MsgBox "TUESDAY"
Case 3
  MsgBox "WEDNESDAY"
Case 4
  MsgBox "THURSDAY"
Case 5
  MsgBox "FRIDAY"
Case 6
  MsgBox "SATURDAY"
Case Else
  MsgBox "ENTER CORRECT DAY CODE"
End Select
End Sub

```

The screenshot shows a form titled "CHOICE BASED PROBLEM" with a blue header bar. Below the header, there are two columns of options: "1: QUADRATIC EQUATION" (highlighted in pink) and "2: CHECK YEAR" (highlighted in orange). The form contains several input fields with green labels: "ENTER CHOICE", "ENTER COEFFICIENT OF X^2", "ENTER COEFFICIENT OF X", "ENTER CONSTANT", "ENTER ANY YEAR", "FIRST ROOT", and "SECOND ROOT". At the bottom center, there is a button labeled "PRESS_OK".

```

Public CH, YEAR As Integer
Public A, B, C, D, X1, X2 As Double
Private Sub Command1_Click()
CH = Val(Text1.Text)
A = Val(Text2.Text)
B = Val(Text3.Text)
C = Val(Text4.Text)

```

```

YEAR = Val(Text5.Text)
Select Case CH
Case 1
D = B ^ 2 - 4 * A * C
If (D = 0) Then
X1 = -B / 2 * A

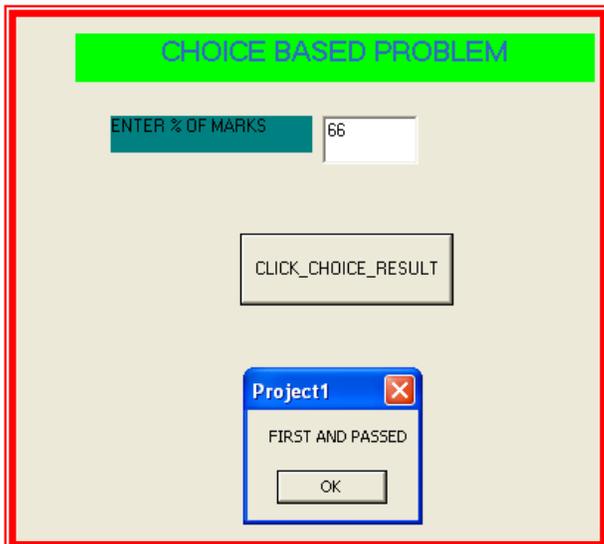
```

```

X2 = B / 2 * A
Text6.Text = X1
Text7.Text = X2
Else
If (D > 0) Then
MsgBox ("REAL AND UNEQUAL ROOTS")
X1 = -B + Sqr(D) / 2 * A
X2 = -B - Sqr(D) / 2 * A
Text6.Text = X1
Text7.Text = X2
Else
MsgBox ("ROOTS ARE IMAGINARY")
End If
End If
Case 2
If (YEAR Mod 4 = 0) Then
MsgBox ("LEAP YEAR")
Else
MsgBox ("NOT LEAP YEAR")
End If
Case Else
MsgBox ("WRONG INPUT CHOICE")
End Select
End Sub

```

Example:-12(RERESULT STATUS)



```

Private Sub Command1_Click()
Dim N As Integer
N = Val(Text1.Text)
Select Case (N)
Case Is <= 33
MsgBox "FAILED & POOR"
Case 34 To 45

```

```
MsgBox "THIRD AND PASSED"  
Case 46 To 59  
MsgBox "SECOND AND PASSED"  
Case 60 To 75  
MsgBox "FIRST AND PASSED"  
Case 76 To 100  
MsgBox "EXCELLENT AND PASSED"  
Case Else  
MsgBox "ENTER CORRECT DAY CODE"  
End Select  
End Sub
```

LOOP/ITERATION/REPITITION:-

It allows the execution of some set of statements repeatedly till either for a known number of times or till certain conditions are met. There are following five types of looping statements.

Types of Looping Control:-

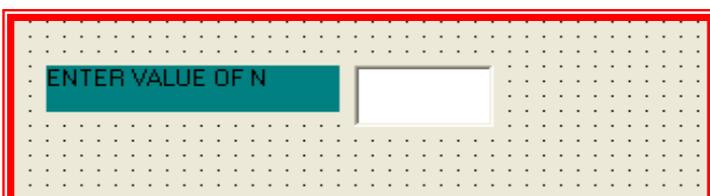
- ❖ **DO WHILE LOOP**
- ❖ **DO LOOP**
- ❖ **DO UNTIL**
- ❖ **DO LOOP UNTIL**
- ❖ **FOR NEXT**

DO WHILE LOOP

It executes looping body when condition is true. And exit from loop when condition is false.

```
DO WHILE <CONDITION>  
    STATEMENT_BLOCKS_TRUE  
LOOP  
EXIT_STATEMENT_BLOCKS_FALSE
```

Example:-13(SERIES OF NATURAL NUMBERS)



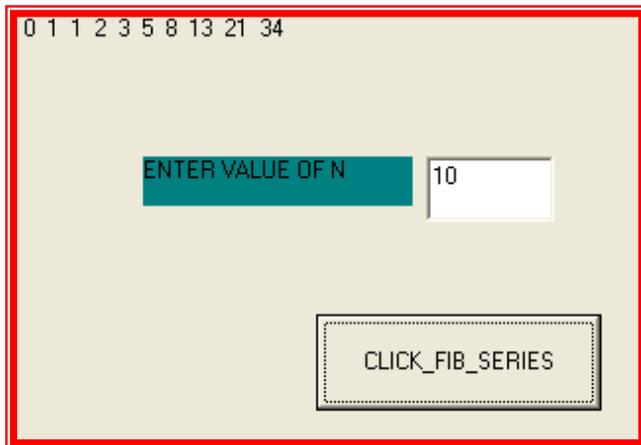
The image shows a VBA UserForm with a red border and a light gray background with a dotted pattern. On the left side, there is a teal-colored label with the text "ENTER VALUE OF N" in white. To the right of the label is a white rectangular input box with a thin gray border.

```

Private Sub Command1_Click()
Dim N, I As Integer
I = 1
N = Val(Text1.Text)
Do While I <= N
Print I;
I = I + 1
Loop
End Sub

```

Example:-14(SERIES OF FIBONACCIE)



```

Private Sub Command1_Click()
Dim N, I, A, B, S As Integer
I = 1
A = 0
B = 1
S = 0
N = Val(Text1.Text)
Do While I <= N
Print S;
A = B
B = S
S = A + B
I = I + 1
Loop
End Sub

```

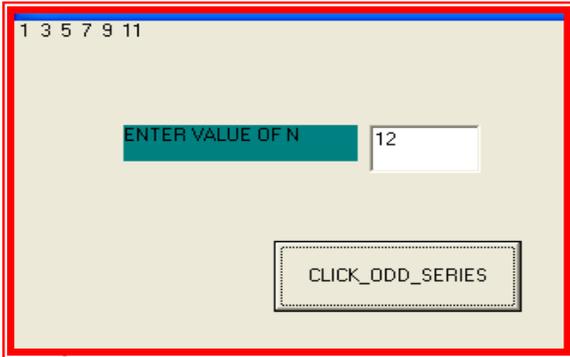
DO LOOP

It executes the statement first and then tests condition after each execution.

Syntax:-

```
do
    Statements;
loop while<criteria>
```

Example:-15(SERIES OF ODD NUMBER)



```
Print I;
I = I + 2
Loop While I <= N
End Sub
```

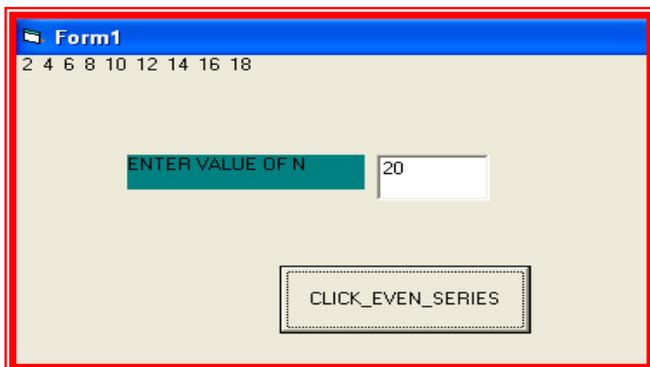
DO ...UNTIL

It executes the statement when condition is false and exit when condition is true.

SYNTAX:-

```
DO UNTIL <CONDITION>
    STATEMENT
LOOP
```

Example:-16(SERIES OF EVEN NUMBERS)



```
Private Sub Command1_Click()
Dim N, I As Integer
I = 2
N = Val(Text1.Text)
Do Until I >= N
Print I;
I = I + 2
Loop
Print "THANK YOU";
End Sub
```

DO LOOP UNTIL <CRITERIA>

It executes the statement first and then checks criteria and performs further execution.

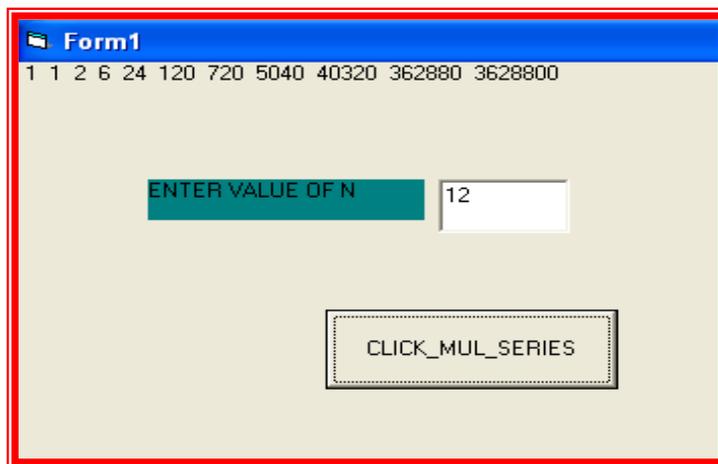
OR

This loop has a condition at the end and the statements are repeated until the condition is met. Since the check is at the end the statements are at least executed once.

Syntax:-

```
do
    statement_blocks;
    updations;
loop until <criteria>
```

Example:-17(SERIES OF CORRESPONDIND PRODUCT NUMBERS)



```
Private Sub Command1_Click()
Dim N, I As Integer
I = 1
M = 1
N = Val(Text1.Text)
Do
Print M;
M = M * I
I = I + 1
Loop Until I >= N
End Sub
```

FOR NEXT LOOP:-

Repeats a group of statements a specified number of times.

Syntax :-

```
For counter [As datatype] = start To end [Step ]
    [ statements ]
[ Continue For ]
[ statements ]
```

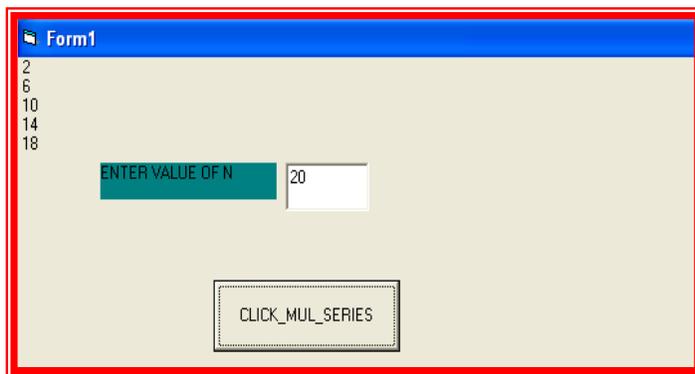
```
[ Exit For ]  
[ statements ]  
Next [ counter ]
```

Or

Syntax :-

```
for <variable>=<Start_Value> to <End_Value> Step [ Incrementation/Decrementation]  
    Statement_blocks_True  
Next <variable>  
    Statement_blocks_False
```

Example:-18 Series of following numbers



```
Private Sub Command1_Click()  
Dim N, I As Integer  
N = Val(Text1.Text)  
For I = 2 To N Step 4  
Print I  
Next I  
End Sub
```

WAP to display following pattern:-

```
*  
**  
***  
****  
*****
```

```
Private Sub Command1_Click()  
Dim I, N, J As Integer  
N = Val(Text1.Text)  
For I = 1 To N Step 1  
For J = 1 To I  
Print " * ";  
Next J  
Print  
Next I  
End Sub
```

Programming Based On Database:-

Working with DrivelistBox,DirListBox and FileListBox Control:-

DrivelistBox Control:-

It is drop down list box that will display the list of drives on my computer.It gets all information from operating system and allows the user to select a drive of his choice.

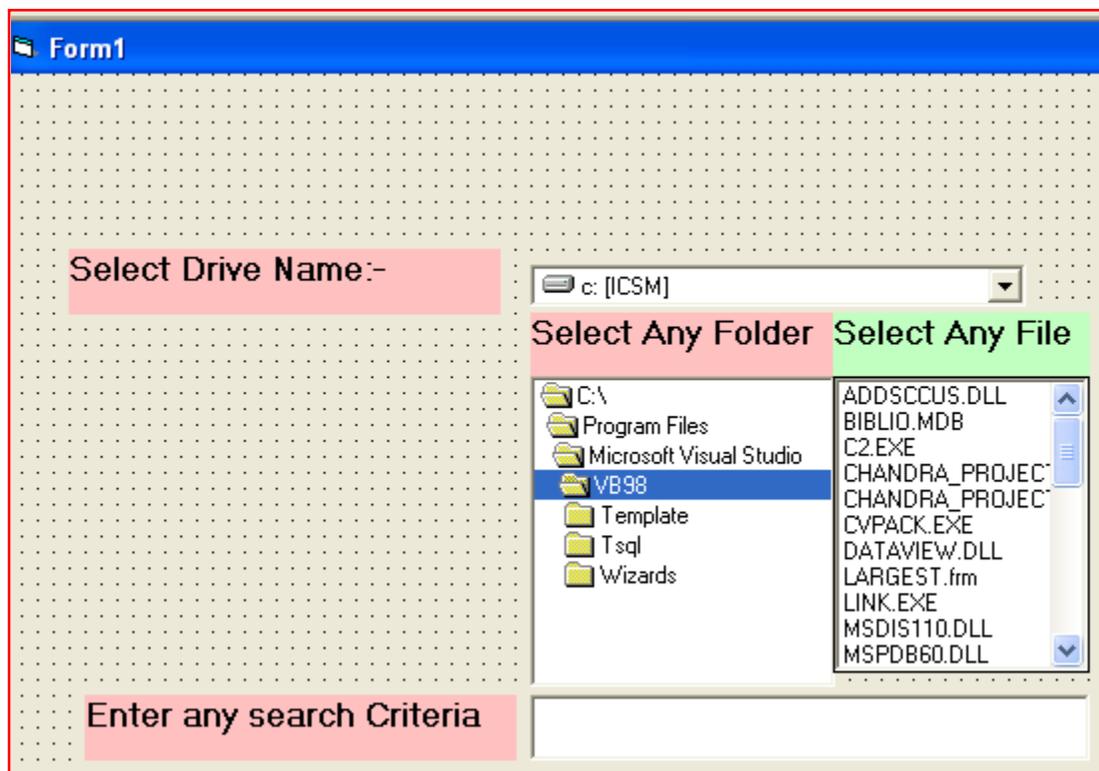
DirListBox Control:-

A drop down list box that displays a hierarchical list of directories in the current drives.

FileListBox Control:-

It displays all files in the current directory or folder.Allows users to set up search criteria for files.

Example:-



```
Private Sub Dir1_Change()  
File1.Path = Dir1.Path  
End Sub
```

```
Private Sub Drive1_Change()  
Dir1.Path = Drive1.Drive  
End Sub
```

```
Private Sub Text1_Change()  
File1.Pattern = Text1.Text  
End Sub
```

```
Private Sub File1_Click()  
f = Dir1.Path & "/" & File1.FileName  
Picture1.Picture = LoadPicture(f)  
End Sub
```

```
Private Sub Form_Load()  
File1.Pattern = "*.*"  
End Sub
```

Database Connectivity with VB:-

- ❖ Through Data. (MS ACCESS AND ORACLE)
- ❖ Through ADOCD. (MS ACCESS AND ORACLE)

Through Data.

Step 1:-Creation of Table

Click Add Ins Menu → Visual data Manager → File → New → Ms Access → Version 7.0 mdb → Save In Drive c: with Name EMP → Press Right Button On Property And Click Create Table → Write name of Table and Click Add Field Button → Type Name of various fields and select data type (Say Field Empno, Ename, Job, Sal) → Press Build The Table → Press Right Button And Click Open → Click Add → Enter Various records → Close Database Windows

Step 2:-Form Design

The screenshot shows a Visual Basic form window titled "Form1" with a blue title bar. The form's background is a light gray grid. At the top center, the text "EMPLOYEE RECORDS DATABASE" is displayed in red. Below this, there are four text boxes arranged vertically, each with a label to its left: "EMPNO", "EMPLOYEE NAME", "EMPLOYEE JOB", and "SALARY". To the right of the "SALARY" text box is a data grid control with a "Data1" label and four navigation arrows (back, forward, first, last). At the bottom of the form, there is a horizontal row of six buttons: "ADD", "DELETE", "NEXT", "PREV", "FIRST", and "LAST".

Step 3:-Connection Steps

Select Data1 → Select Database name from property Windows → Select And Open Table name(Say Emp) → Click Recordsource and Select Emp table from property windows → Select Empno Text box → After Then Select data Source (Data1) from property windows → Select Data field And Choose Empno from property Windows → similarly we will again do these works for Employee Name, Job and Salary

Step 4:-Codes for Buttons

```
Private Sub Add_Click()  
Data1.Recordset.AddNew  
End Sub  
Private Sub Delete_Click()  
Data1.Recordset.Delete  
End Sub  
Private Sub Next_Click()  
Data1.Recordset.MoveNext  
End Sub  
Private Sub First_Click()  
Data1.Recordset.MoveFirst  
End Sub  
Private Sub Prev_Click()  
Data1.Recordset.MovePrevious  
End Sub  
Private Sub Last_Click()  
Data1.Recordset.MoveLast  
End Sub
```

Connection Through Adodc(MS ACCESS):-

Step 1:-Creation of Table

Click Add Ins Menu → Visual data Manager → File → New → Ms Access → Version 7.0 mdb → Save In Drive c: with Name EMP → Press Right Button On Property And Click Create Table → Write name of Table and Click Add Field Button → Type Name of various fields and select data type(Say Field Empno,ENAME,Job,SAL) → Press Build The Table → Press Right Button And Click Open → Click Add → Enter Various records → Close Database Windows

Step 2 :- (Adding ADODC)

Project → Components → Microsoft ADO Data Control 6.0 (OLEDB) → Apply → Close

Step 3:-

Drag and Drop Adodc components on form.

Step 4 :- Connection Steps:-

Select Record source from Property Windows → Type select * from emp → Apply → OK →
 → Click Connection String from property windows → Use data Link and Select Table by
 Browse → Use ODBC → Select MS Access → Click Use Connection → Click Build → Click Use
 Connection → Select table from Build → Click Select → Select table name And Press
 Ok → Press Ok → Click test Connection → Press Ok → Press Apply and Click OK.

Step 5:-Connection of Textbox with Table Fields(EMP)

Data source → Adodc1 → Data Field → Select Empno, Ename, Job, and Sal step by step.

Step 6:-Codes for Buttons

```
Private Sub Add_Click()
```

```
Adodc1.Recordset.AddNew
```

```
End Sub
```

```
Private Sub Delete_Click()
```

```
Adodc1.Recordset.Delete
```

```
End Sub
```

```
Private Sub Next_Click()
```

```
Adodc1.Recordset.MoveNext
```

End Sub

Private Sub First_Click()

Adodc1.Recordset.MovePrevious

End Sub

Private Sub Prev_Click()

Adodc1.Recordset.MoveFirst

End Sub

Private Sub Last_Click()

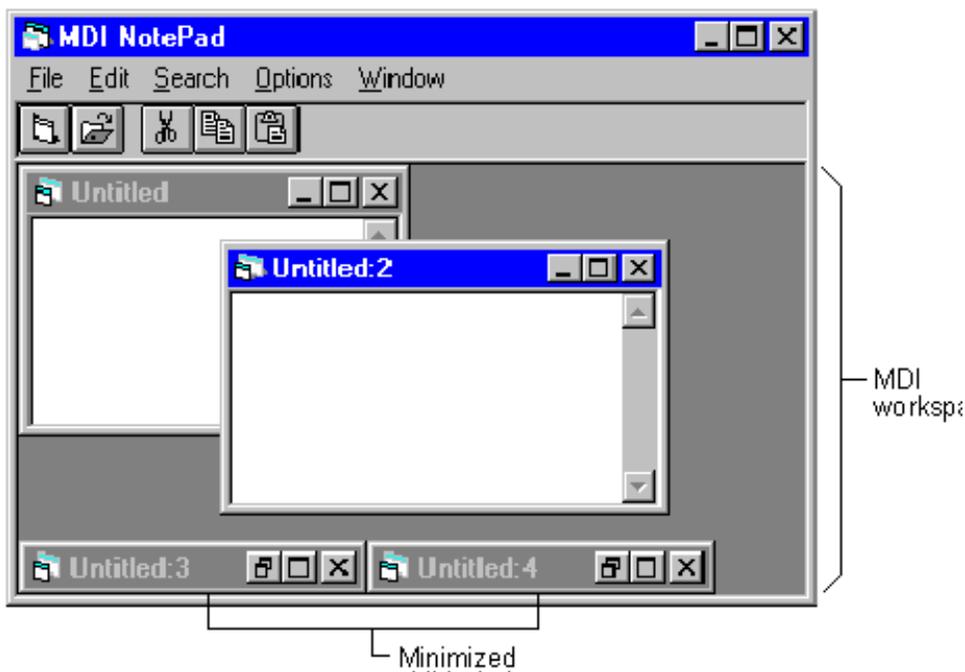
Adodc1.Recordset.MoveLast

End Sub

What is MDI:- Multiple-Document Interface (MDI) Applications

The multiple-document interface (MDI) allows you to create an application that maintains multiple forms within a single container form. Applications such as Microsoft Excel and Microsoft Word for Windows have multiple-document interfaces.

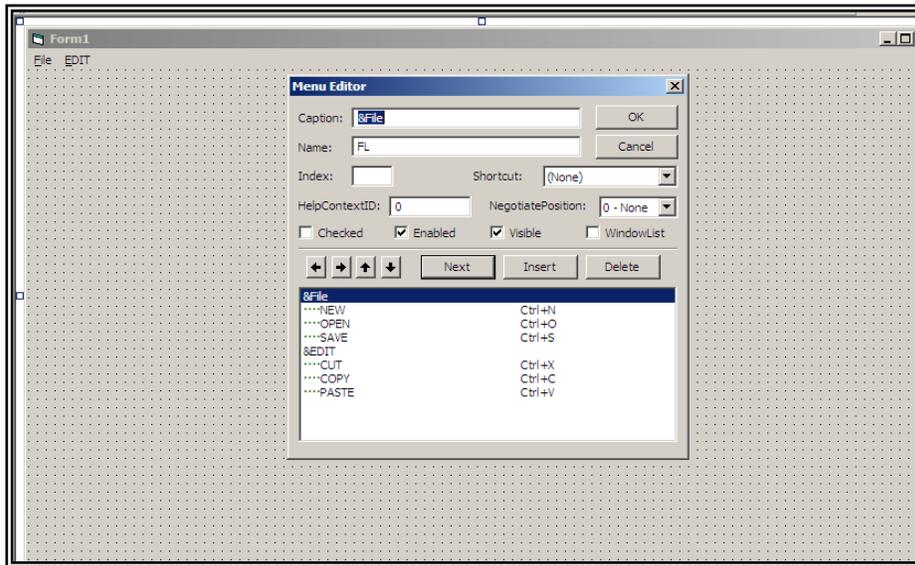
An MDI application allows the user to display multiple documents at the same time, with each document displayed in its own window. Documents or child windows are contained in a parent window, which provides a workspace for all the child windows in the application. For A child form is an ordinary form that has its MDI Child property set to True. Your application can include many MDI child forms of similar or different types.



CREATING MENUS IN VISUAL BASIC (MDI :-Multiple Document Interface)

STEP1:-

Tools → Menu Editor (Ctrl+E) →



STEP2:-

After designing Menu → Press Ok Button



Connection Through Adodc(ORACLE):

STEP1:-

Project → Components → Microsoft ADO Data Control 6.0 (OLEDB) → Apply → Close

STEP2:-

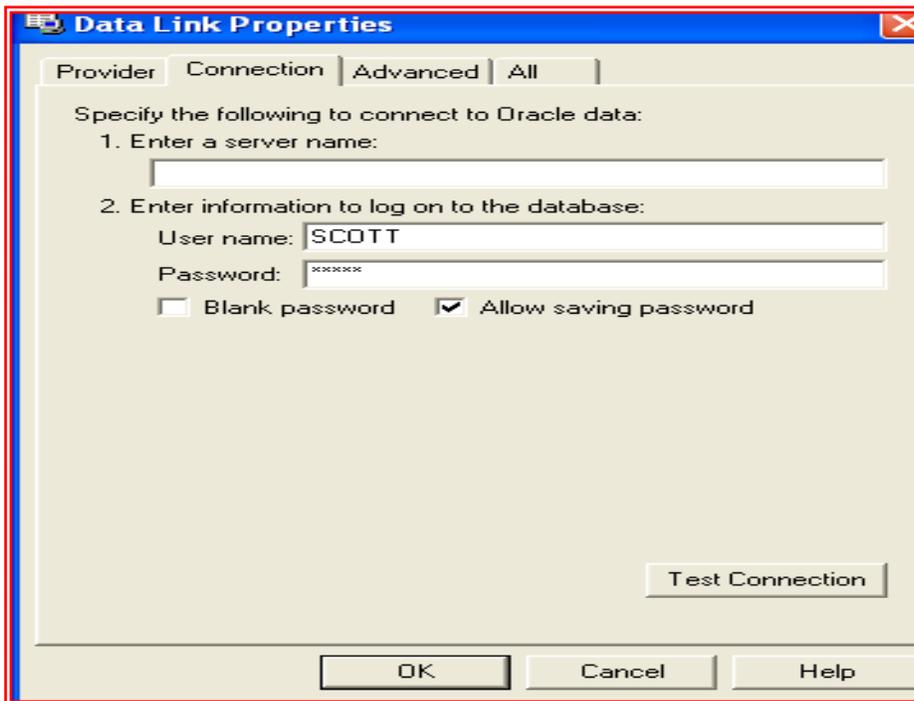
Drag and Drop Adodc components on form.



STEP3 Connection Steps:-

Select Record source from Property Windows → Type select * from emp → Apply → OK

→ Click Connection String from property windows → Use Connection String → Click Build →
→ Type User name And Password in Data Link Property (Scott/Tiger) → Click Check box of
allowing saving password → Click Test Connection → Click OK → Click Apply → Click OK



STEP4:-Adding Fields In Text Box

Select Text Box (EmpNo) → Click Data Source (Select ADODC1) → Select Data Field (Empno) →
Similarly for other text boxes.

STEP5:-Coding

```
Private Sub Add_Click()
```

```
Adodc1.Recordset.AddNew
```

End Sub

Private Sub Delete_Click()

Adodc1.Recordset.Delete

End Sub

Private Sub Next_Click()

Adodc1.Recordset.MoveNext

End Sub

Private Sub Prev_Click()

Adodc1.Recordset.MoveFirst

End Sub

File Handling:-

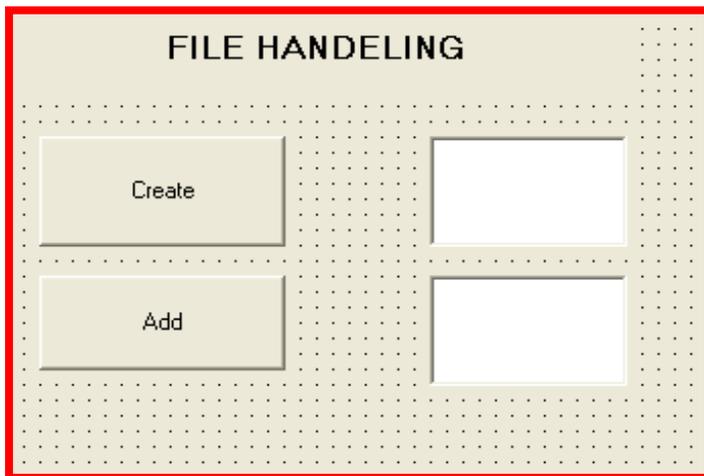
Example 1:- Creation of file and adding Textual information

Step1:-

Add:-Project→Reference→"Microsoft Scripting Runtime"

Step2:-

Form Design



Step3:-

Code on Click of Commands (Create and Add)

```
Dim fstream As New Scripting.FileSystemObject
```

```
Dim ts1 As TextStream
```

```
Private Sub Add_Click()
```

```
    ts1.Write Text2.Text & vbCrLf
```

```
End Sub
```

```
Private Sub Create_Click()
```

```
    Set ts1 = fstream.OpenTextFile(Text1.Text, ForWriting, True)
```

```
End Sub
```

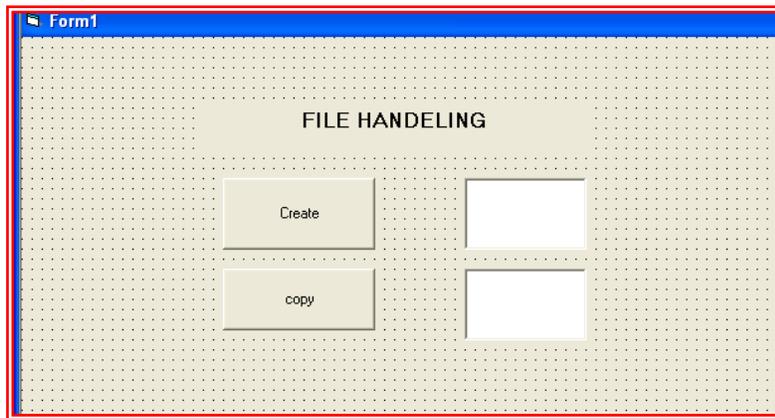
Example 2:- Creation of file and Copying Textual information

Step1:-

Add:-Project→Reference→”Microsoft Scripting Runtime”

Step2:-

Form Design



Step3:-

Code

```
Dim fstream As New Scripting.FileSystemObject
Dim ts1 As TextStream
Dim ts As TextStream
Private Sub copy_Click()
    Set ts = fstream.OpenTextFile(Text1.Text, ForReading, True)
    Set ts1 = fstream.OpenTextFile(Text1.Text, ForWriting, True)
    While Not ts.AtEndOfStream
        ts1.Write ts.ReadLine & vbCrLf
    Wend
End Sub
Private Sub Create_Click()
    Set ts1 = fstream.OpenTextFile(Text1.Text, ForWriting, True)
End Sub
```

Functions:-

Visual basic provides some **built in functions** that help the programmers to write efficient programmes.

Built In Functions in VB:-

❖ String Functions.

- Str It convert number to string values.
- Lcase\$ It convert text string into lowercase.
- Ucase\$ It Convert into uppercase letters.
- Rtrim\$ It removes unnecessary spaces from right.
- Ltrim\$ It removes unnecessary spaces from left.
- Len It calculate number of characters into string.

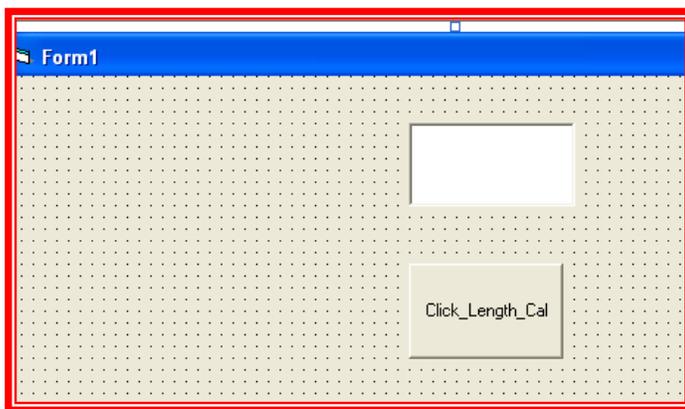
❖ Financial Functions

- DDB It return depreciation of an assets.
- FV It returns future value of an investment based on periodic constant payments and a constant interest rates.
- PMT It calculates premium based on periodic, constant payments and constant interest rate.
- PV It returns the present value based on periodic, constant payments to be paid in the future and a constant interest rate.

❖ Numeric Functions

- Val It convert character string to number.
- CLng It convert number into long.
- Ceur It convert number to currency.
- CDbl It convert number to double.
- CSgn It convert number to single.

Example:-1 Calculation of length of text string



```
Private Sub Command1_Click()  
Dim str As String  
Dim m As Integer  
str = Text1.Text  
m = Len(str)  
Print "length of string=", m  
End Sub
```

Example:-2 Conversion of upper to Lower and Vice Versa



```

Public str As String
Private Sub Command1_Click()
str = Text1.Text
MsgBox UCCase(str)
End Sub
Private Sub Command2_Click()
MsgBox LCCase(str)
End Sub

```

Example:-3 Based on PMT function

Code:-

```

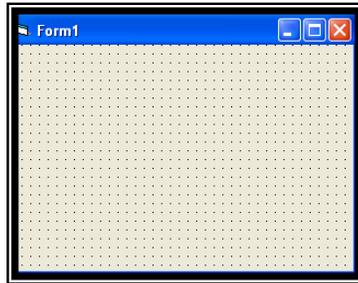
Dim p, n, r, prem, futur As Double
Private Sub Click_FV_Click()
futur = FV(r / 100, n, prem)
Text5.Text = futur
End Sub
Private Sub Click_PMT_Click()
p = Val(Text1.Text)
r = Val(Text2.Text)
n = Val(Text3.Text)
prem = Pmt(r / 100, n, p)
Text4.Text = prem
End Sub

```

What Is Form,Form Properties and Form Event:-

Form:-

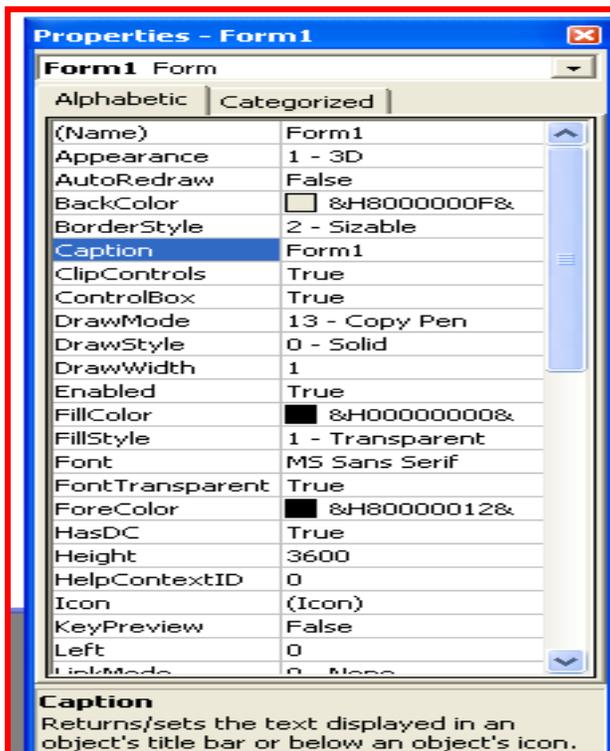
A form is nothing but a box that contains control objects. It is a window or dialog box that one creates with VB.



Form Properties:-

It means the characteristics or the variables that describe behavioural characteristics of an object it contains components or attributes such as color, font, caption or name.

Press F4 Button for Open property Window



Form Events:-

An event is an action like a press key or click of the mouse button etc.Each event has a particular action to be performed.

Syntax:-

Sub Name

Statements;

End Sub

Example:-



Private Sub Command2_Click ()

Msgbox (“Welcome In IDE Environment”)

End Sub

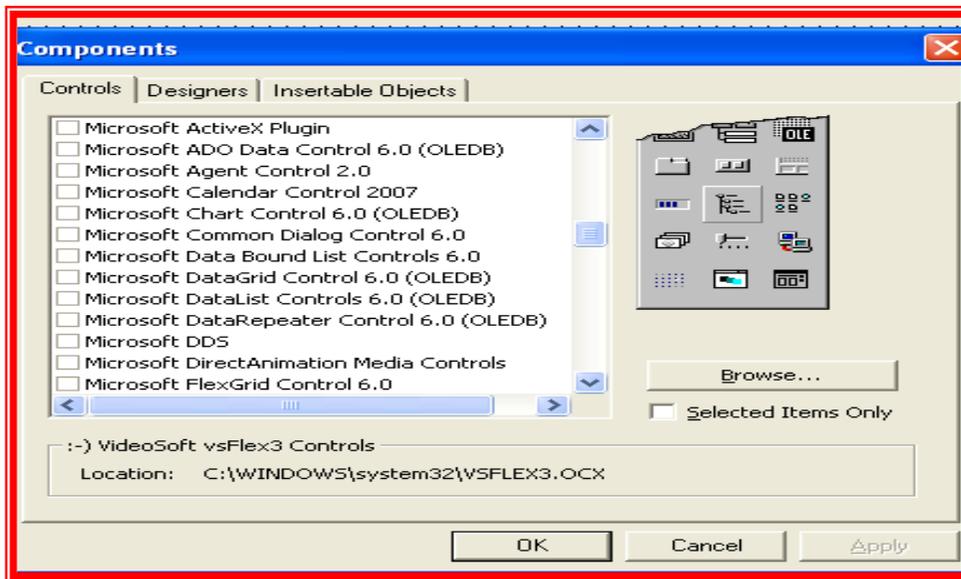
Event Name:-

- ❖ Click
- ❖ Dbclick
- ❖ DragDrop
- ❖ DragOver
- ❖ KeyPress
- ❖ Load
- ❖ MouseMove
- ❖ Unload
- ❖ KeyDown

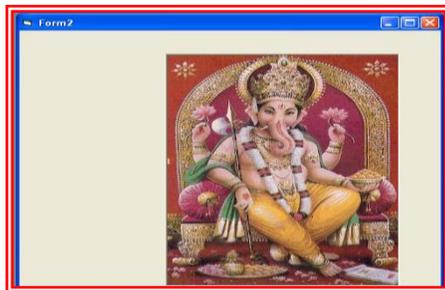
What is control:-

It is a special type of object that one draws on form to enable user interaction with an application, all objects that appear inside a form are called controls. Any controls must have a name and includes some properties.

- ❖ Image control
 - ❖ Label Control
 - ❖ Textbox control
 - ❖ Command control
 - ❖ Line Control
 - ❖ Shape Control
 - ❖ Horizontal control
 - ❖ Vertical control
 - ❖ Rich Textbox Control
- etc



Example:-



- Step1:-Take a form
 Step2:-Drag & drop Image Control
 Step3:-Insert Image from image source

Custom Control:-

It is a program that someone has written which can be included in the visual basic program. There are two types of custom controls

- ❖ VBX (Visual basic Extension)
- ❖ OCX(OLE custom Extension Controls)

How to Load Custom Control:-

Press Ctrl+T

Example:-

- Microsoft Calendar Control
- Microsoft Chart Control
- Microsoft ADO Data Control (OLEDB)
- Microsoft Data Control. etc.

Write Complete Step for handling database using ADO DC

Step 1:-Creation of Table

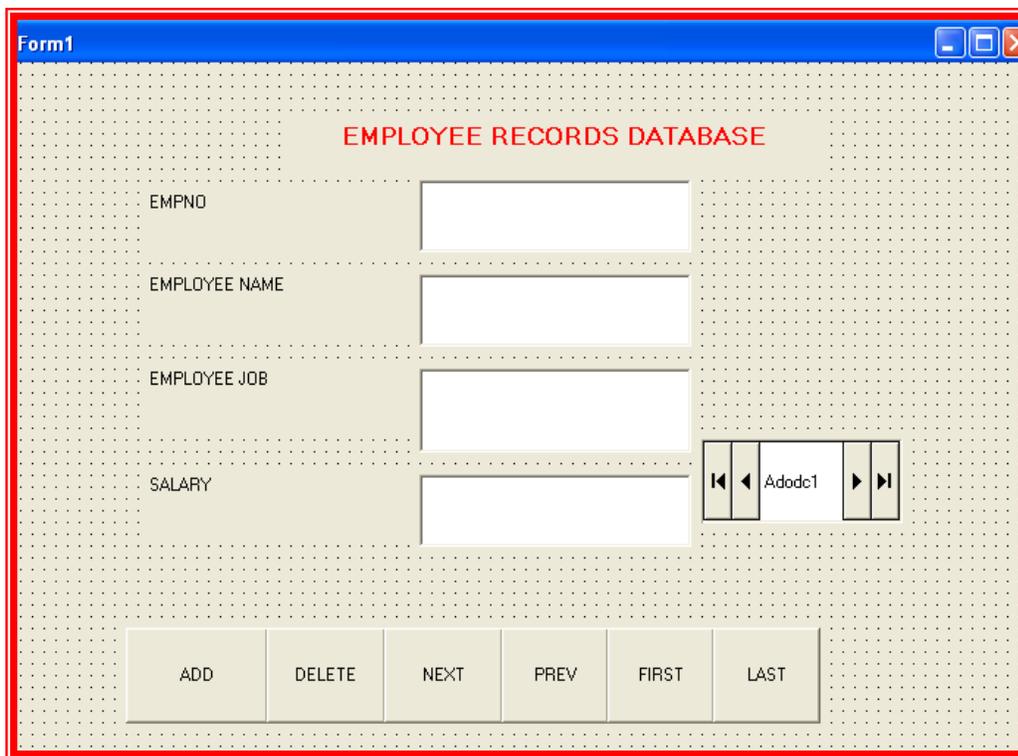
Click Add Ins Menu → Visual data Manager → File → New → Ms Access → Version 7.0 mdb → Save In Drive c: with Name EMP → Press Right Button On Property And Click Create Table → Write name of Table and Click Add Field Button → Type Name of various fields and select data type(Say Field Empno,ENAME,Job,SAL) → Press Build The Table → Press Right Button And Click Open → Click Add → Enter Various records → Close Database Windows

Step 2 :- (Adding ADODC)

Project → Components → Microsoft ADO Data Control 6.0 (OLEDB) → Apply → Close

Step 3 :-

Drag and Drop Adodc components on form.



Step 4 :- Connection Steps:-

Select Record source from Property Windows → Type select * from emp → Apply → OK →
→ Click Connection String from property windows → Use data Link and Select Table by
Browse → Use ODBC → Select MS Access → Click Use Connection → Click Build → Click Use
Connection → Select table from Build → Click Select → Select table name And Press
Ok → Press Ok → Click test Connection → Press Ok → Press Apply and Click OK

Step 5:-Connection of Textbox with Table Fields(EMP)

Data source → Adodc1 → Data Field → Select Empno, Ename, Job, and Sal step by step.

Step 6:-Codes for Buttons

```
Private Sub Add_Click()
```

```
Adodc1.Recordset.AddNew
```

```
End Sub
```

```
Private Sub Delete_Click()
```

```
Adodc1.Recordset.Delete
```

```
End Sub
```

```
Private Sub Next_Click()
```

```
Adodc1.Recordset.MoveNext
```

```
End Sub
```

```
Private Sub First_Click()
```

```
Adodc1.Recordset.MovePrevious
```

```
End Sub
```

```
Private Sub Prev_Click()
```

```
Adodc1.Recordset.MoveFirst
```

```
End Sub
```

```
Private Sub Last_Click()
```

```
Adodc1.Recordset.MoveLast
```

```
End Sub
```

Functions and Procedures:-

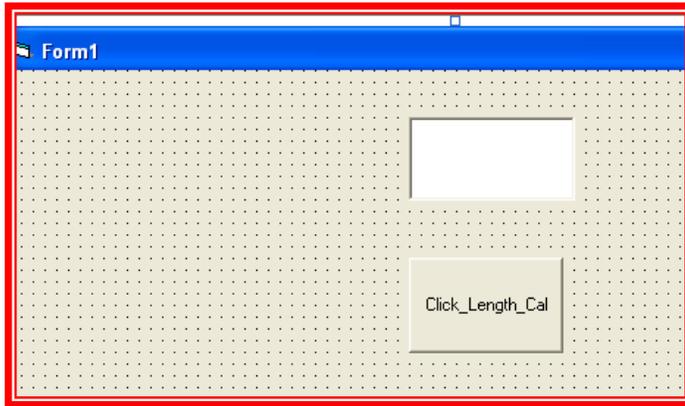
Functions:-

It is a set of statements that perform a specific task within a program and return either a number or a string value. VB has a number of functions. A function must have a name and may or may not consist of arguments. Function arguments enclosed within parenthesis. There are two categories of functions.

❖ Built In Functions

- pmt()
- fv()
- pv()
- Len()
- Ucase()
- Lcase()
- etc.

Example:- Calculation of length of text string



```
Private Sub Command1_Click()  
Dim str As String  
Dim m As Integer  
str = Text1.Text  
m = Len(str)  
Print "length of string=", m  
End Sub
```

❖ User defined Functions.

```
[Private | Public] [Static] Function <function_name>([arguments])  
Statement_Blocks  
End Function
```

Example:-

```
Private Function Add(ByVal x As Integer, ByVal y As Integer) As Integer
```

```
    Add = x + y
```

```
End Function
```

```
Private Function pro(ByVal x1 As Integer, ByVal y1 As Integer) As Integer
```

```
    pro = x1 * y1
```

```
End Function
```

```
Private Sub Form_Load()
```

```
    Dim a, b, c1, c2 As Integer
```

```
    a = 32
```

```
    b = 64
```

```
    c1 = Add(a, b)
```

```
    c2 = pro(a, b)
```

```
    MsgBox c1
```

```
    MsgBox c2
```

```
End Sub
```

Procedures:-

It is a sequence of code statements that performs a specific task within a program but return no explicit value. it executed as an unit. A procedure begin with a sub statement and end with an End Sub statement. It performs actions but do not return any values. Function perform actions and return values.

Syntax:-

```
[Private | Public] [Static] sub <Procedure_name>([arguments])
```

```
Statement_Blocks
```

```
End Sub
```

Example:-1

```
Sub TestSub()
```

```
    MsgBox "I am First Procedure"
```

```
End Sub
```

```
Private Sub Form_Load()
```

```
    MsgBox "I am executed By form Loading before Procedure calling"
```

```
    TestSub
```

```
    MsgBox "I am executed By form Loading after Procedure calling"
```

```
End Sub
```

Example:-2

```
Private Sub Command1_Click()
```

```
    Dim N, I As Integer
```

```
    I = 1
```

```
    N = Val(Text1.Text)
```

```
    Do While I <= N
```

```
        Print I;
```

```
        I = I + 1
```

```
    Loop
```

```
End Sub
```

What Is Data Control:-

Data control functions performed by using Data and Adodc components.

Which is defined below.

Database Connectivity with VB:-

- ❖ Through Data. (MS ACCESS)
- ❖ Through ADO DC. (MS ACCESS AND ORACLE)

Through Data.

Step 1:-Creation of Table

Click Add Ins Menu → Visual data Manager → File → New → Ms Access → Version 7.0 mdb → Save In Drive c: with Name EMP → Press Right Button On Property And Click Create Table → Write name of Table and Click Add Field Button → Type Name of various fields and select data type (Say Field Empno, Ename, Job, Sal) → Press Build The Table → Press Right Button And Click Open → Click Add → Enter Various records → Close Database Windows

Step 2:-Form Design

Step 3:-Connection Steps

Select Data1 → Select Database name from property Windows → Select and Open Table name (Say Emp) → Click Recordsource and Select Emp table from property windows → Select Empno Text box → After Then Select data Source (Data1) from property windows → Select Data field And Choose Empno from property Windows → similarly we will again do these works for Employee Name, Job and Salary

Step 4:-Codes for Buttons

```
Private Sub Add_Click()
Data1.Recordset.AddNew
End Sub
Private Sub Delete_Click()
Data1.Recordset.Delete
End Sub
Private Sub Next_Click()
Data1.Recordset.MoveNext
End Sub
```

```
Private Sub First_Click()  
Data1.Recordset.MovePrevious  
End Sub  
Private Sub Prev_Click()  
Data1.Recordset.MoveFirst  
End Sub  
Private Sub Last_Click()  
Data1.Recordset.MoveLast  
End Sub
```

Through Adodc(MS ACCESS):-

Step 1:-Creation of Table

Click Add Ins Menu → Visual data Manager → File → New → Ms Access → Version 7.0 mdb → Save In Drive c: with Name EMP → Press Right Button On Property And Click Create Table → Write name of Table and Click Add Field Button → Type Name of various fields and select data type(Say Field Empno,ENAME,Job,SAL) → Press Build The Table → Press Right Button And Click Open → Click Add → Enter Various records → Close Database Windows

Step 2 :- (Adding ADODC)

Project → Components → Microsoft ADO Data Control 6.0 (OLEDB) → Apply → Close

Step 3 :-

Drag and Drop Adodc components on form.

The screenshot shows a Microsoft Access form window titled "Form1". The form has a title bar with standard Windows window controls. The main area of the form is titled "EMPLOYEE RECORDS DATABASE" in red text. Below the title, there are four text boxes arranged vertically, each with a label to its left: "EMPNO", "EMPLOYEE NAME", "EMPLOYEE JOB", and "SALARY". To the right of the "SALARY" text box is an ADODC control labeled "Adodc1" with navigation arrows (back, forward, first, last). At the bottom of the form, there are six buttons arranged horizontally: "ADD", "DELETE", "NEXT", "PREV", "FIRST", and "LAST".

Step 4 :- Connection Steps:-

Select Record source from Property Windows → Type select * from emp → Apply → OK →
→ Click Connection String from property windows → Use data Link and Select Table by
Browse → Use ODBC → Select MS Access → Click Use Connection → Click Build → Click Use
Connection → Select table from Build → Click Select → Select table name And Press
Ok → Press Ok → Click test Connection → Press Ok → Press Apply and Click OK

Step 5:-Connection of Textbox with Table Fields(EMP)

Data source → Adodc1 → Data Field → Select Empno, Ename, Job, and Sal step by step.

Step 6:-Codes for Buttons

```
Private Sub Add_Click()
```

```
Adodc1.Recordset.AddNew
```

```
End Sub
```

```
Private Sub Delete_Click()
```

```
Adodc1.Recordset.Delete
```

```
End Sub
```

```
Private Sub Next_Click()
```

```
Adodc1.Recordset.MoveNext
```

```
End Sub
```

```
Private Sub First_Click()
```

```
Adodc1.Recordset.MovePrevious
```

```
End Sub
```

```
Private Sub Prev_Click()
```

```
Adodc1.Recordset.MoveFirst
```

```
End Sub
```

```
Private Sub Last_Click()
```

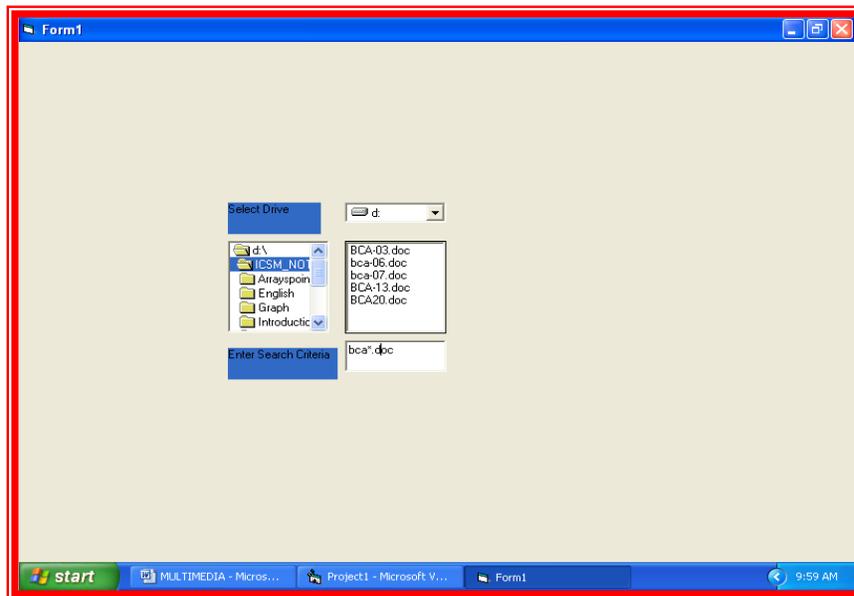
```
Adodc1.Recordset.MoveLast
```

```
End Sub
```

Working With DriveListBox, DirListBox and FileListBox

Question:-

Write a program to displays all files in the current directory or folder. Allows users to setup search criteria for files.



Code:-

```
Private Sub Dir1_Change()  
File1.Path = Dir1.Path  
End Sub
```

```
Private Sub Drive1_Change()  
Dir1.Path = Drive1.Drive  
End Sub
```

```
Private Sub Text1_Change()  
File1.Pattern = Text1.Text  
End Sub
```

Visual basic Built In Function Related To files and Folders:-

ChDrive	Changed the current logged drive
ChDir	Changes The default directory
MkDir	Creates a new Directory
Rmdir	Deletes a directory
Name	Renames a file
Kill	Deletes a file
FileCopy	Copies Source files to destination
FileDateTime	Return date and time when the file was modified
GetAttr	Returns the attribute of a file as an Integer Value
SetAttr	Sets the attributes of a file.

Syntax of ChDrive:-

ChDrive drive

Syntax of ChDir:-

ChDir path

Syntax of Mkdir:-

Mkdir path

Syntax of Rmdir:-

Rmdir path

Syntax of kill:-

kill pathname

Common Dialog Control:-

It provides standardization in the interface for all windows compliant applications, VB has the commonDialog Control. It let us display the following dialog boxes.

-  Open a file
-  Save a file
-  Set a Color
-  Set a Font
-  Print a Document

Method of Common Dialog Box:-

- ShowOpen
- ShowSave
- ShowColor
- ShowFont
- ShowPrinter
- ShowHelp

Example:-

WAP to display File Open dialog Box and changing color dialog box.

Step1:-

Project→Component→Microsoft Common Dialog Control 6.0

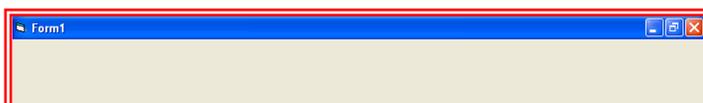
Step2:-

Drag the Microsoft Common Dialog Control 6.0 on form

Step3:-Drag and Drop text Box on Form

Step4:-make two Button say **Open** and **Color**

Step5:-Write code on Open and Color



Code:-

```
Private Sub Command1_Click()  
CommonDialog1.ShowOpen  
End Sub
```

```
Private Sub Command2_Click()  
CommonDialog1.ShowColor  
Text1.ForeColor = CommonDialog1.Color  
End Sub
```

Code Changes for Displaying a File Open Dialog Box

The following code demonstrates displaying a File Open dialog box, initialized to the Program Files directory.

```
CommonDialog1.InitDir = "C:\Program Files"  
CommonDialog1.ShowOpen  
  
OpenFileDialog1.InitialDirectory = "C:\Program Files"  
OpenFileDialog1.ShowDialog()
```

Code changes for Displaying a File Save Dialog Box

```
' Visual Basic 6.0  
' Uses a CommonDialog control.  
CommonDialog1.InitDir = App.Path  
CommonDialog1.ShowSave  
  
' Visual Basic  
' Uses a SaveFileDialog component.  
SaveFileDialog1.InitialDirectory = My.Application.Info.DirectoryPath  
SaveFileDialog1.ShowDialog()
```

Code changes for Displaying a Print Dialog Box

```
' Visual Basic 6.0  
' Uses a CommonDialog control.  
CommonDialog1.FileName = App.Path & "MyFile.txt"  
CommonDialog1.ShowPrinter
```

' Visual Basic

' Uses PrintDocument and PrintDialog components.

```
PrintDocument1.DocumentName = My.Application.Info.DirectoryPath _
```

```
& "MyFile.txt"
```

```
PrintDialog1.Document = PrintDocument1
```

```
PrintDialog1.ShowDialog()
```

Working with RichText Control:-

It provide the necessary interface to the user. We are able to create a small application that would allow the user to create a new file or open an existing file, add text to it, save the changes and print the content of the file as well. We could also change the font size, font color of the text etc. By This control we create own word processor.

Step1:- Add Microsoft Rich text Box Control6.0

Step2:- Select the control tab in the component box

Step3:- Double click on the Microsoft rich textbox control item from the list of component

Step4:- close the component box

Step5:- draw the following controls on the form

Far calling Font dialog Box:-

```
Commdialog1.showFont
```

```
Richtextbox1.selFontname = Commdialog1.FontName
```

Far calling Color dialog Box:-

```
Commdialog1.showColor
```

```
Richtextbox1.selcolor = Commdialog1. color
```

ActiveX:-

It provides facility to import data from one application to another application. And also facilitates following features.

Or

ActiveX controls are COM components or objects you can insert into a Web page or other application to reuse packaged functionality someone else has programmed.

 To be able to make changes in the imported data.

 To be place different types of data or object in one document.

 It facilitates DDE(Dynamic data Exchange).

 It also allowed one application to send commands to another applications.

Conclusion:-

This technology inbuilt in VB was not very successful and gave way to newer technology. Next came OLE (Object Linking and Embedding).

Under This technology, one document could display an object from different applications.

OLE:-

It is a way of **attachment** of word file in the form of **linked object** or **embedded object**. In case linked object original file must be change or affected and in the case of embedded object, original file does not change or affect. A word document that accepts or requests an object is called as **client** or **container**. The application that provides an object is called the **server**.

In other words OLE provide a mechanism by which a container application can execute commands in the server application .It allows to container application export or transfer data from the objects to another application.

Note:-

ActiveX is a OLE of type of some extension.Some properties of ActiveX controls are:-

 Properties:-Like BackColour, Font, Resize, Paint, etc.

 Events:-Click, MouseMove, Keypress etc.

 Methods:-The code associated with the control

Connection:-

There are following three types of connectivity of database with VB application.

 DAO Data access Object

 ADO ActiveX data Object

 RDO Remote data Object

Step:-1 First we include Reference:-Microsoft ActiveX data Object 2.1 Library

Procedures & functions in Visual Basic:-

We use procedures and functions to create modular programs. Visual Basic statements are grouped in a block enclosed by Sub, Function and matching End statements. The difference between the two is that functions return values, procedures do not.

A procedure and function is a piece of code in a larger program. They perform a specific task. The advantages of using procedures and functions are:

- Reducing duplication of code
- Decomposing complex problems into simpler pieces
- Improving clarity of the code
- Reuse of code
- Information hiding

Procedures

A procedure is a block of Visual Basic statements inside Sub, End Sub statements. Procedures do not return values.

```
Option Strict On
```

```
Module Example
```

```
    Sub Main()
```

```

        SimpleProcedure()

    End Sub

    Sub SimpleProcedure()
        Console.WriteLine("Simple procedure")
    End Sub

End Module

```

This example shows basic usage of procedures. In our program, we have two procedures. The `Main()` procedure and the user defined `SimpleProcedure()`. As we already know, the `Main()` procedure is the entry point of a Visual Basic program.

SimpleProcedure()

Each procedure has a name. Inside the `Main()` procedure, we *call* our user defined `SimpleProcedure()` procedure.

Sub SimpleProcedure()

```

    Console.WriteLine("Simple procedure")

```

End Sub

Procedures are defined outside the `Main()` procedure. Procedure name follows the `Sub` statement. When we call a procedure inside the Visual Basic program, the control is given to that procedure. Statements inside the block of the procedure are executed.

Procedures can take optional parameters.

```

Option Strict On

Module Example

    Sub Main()

        Dim x As Integer = 55
        Dim y As Integer = 32

        Addition(x, y)

    End Sub

    Sub Addition(ByVal k As Integer, ByVal l As Integer)
        Console.WriteLine(k+l)
    End Sub

End Module

```

In the above example, we pass some values to the `Addition()` procedure.

```

Addition(x, y)

```

Here we call the `Addition()` procedure and pass two parameters to it. These parameters are two Integer values.

```
Sub Addition(ByVal k As Integer, ByVal l As Integer)
    Console.WriteLine(k+l)
End Sub
```

We define a *procedure signature*. A procedure signature is a way of describing the parameters and parameter types with which a legal call to the function can be made. It contains the name of the procedure, its parameters and their type, and in case of functions also the return value.

The `ByVal` keyword specifies how we pass the values to the procedure. In our case, the procedure obtains two numerical values, 55 and 32. These numbers are added and the result is printed to the console.

Functions

A function is a block of Visual Basic statements inside `Function`, `End Function` statements. Functions return values.

There are two basic types of functions. Built-in functions and user defined ones. The built-in functions are part of the Visual Basic language. There are various mathematical, string or conversion functions.

```
Option Strict On

Module Example

    Sub Main()

        Console.WriteLine(Math.Abs(-23))
        Console.WriteLine(Math.Round(34.56))
        Console.WriteLine("ZetCode has {0} characters", _
            Len("ZetCode"))

    End Sub

End Module
```

In the preceding example, we use two math functions and one string function. Built-in functions help programmers do some common tasks.

In the following example, we have a user defined function.

```
Option Strict On

Module Example

    Dim x As Integer = 55
    Dim y As Integer = 32

    Dim result As Integer

    Sub Main()

        result = Addition(x, y)
        Console.WriteLine(Addition(x, y))

    End Sub

End Module
```

```

Function Addition(ByVal k As Integer, _
                 ByVal l As Integer) As Integer
    Return k+l
End Function

End Module

```

Two values are passed to the function. We add these two values and return the result to the Main()function.

```
result = Addition(x, y)
```

Addition function is called. The function returns a result and this result is assigned to the result variable.

```

Function Addition(ByVal k As Integer, _
                 ByVal l As Integer) As Integer
    Return k+l
End Function

```

This is the Addition function signature and its body. It also includes a return data type, for the returned value. In our case is is an Integer. Values are returned to the caller with the Returnkeyword.

Recursion

RECURSIVE FUNCTIONS

A recursive process is a process that calls itself. A recursive function is a function that calls itself (with different arguments).-

Recursion is a powerful problem-solving tool. It can break a complex problem into simpler ones. It is available in many modern languages such as VB.

```

Function Factorial(n)
Dim i As Integer
Factorial = 1
For i = 1 To n
    Factorial = Factorial * i
Next i
End Function

```

Program:-

```

Public N, N1, I As Integer
Private Sub FACT_Click()
N = Val(Text1.Text)
Factorial (N)
End Sub
Function Factorial(N1)
Factorial = 1
For I = 1 To N1
    Factorial = Factorial * I

```

Print I, "=", Factorial

Next I

End Function

What is Array:-

A two dimensional array is a table of items that make up of rows and columns. The format for a one dimensional array is Array Name(x), the format for a two dimensional array is Array Name(x,y) and a three dimensional array is Array Name(x,y,z) . Normally it is sufficient to use one dimensional and two dimensional arrays.

Example of One dimensional Array

Student Name	Name(1)	Name(2)	Name(3)	Name(4)
--------------	---------	---------	---------	---------

Example of Two Dimensional Array

Name(1,1)	Name(1,2)	Name(1,3)	Name(1,4)
Name(2,1)	Name(2,2)	Name(2,3)	Name(2,4)
Name(3,1)	Name(3,2)	Name(3,3)	Name(3,4)

Declaring Arrays

In general format to declare a one dimensional array is as follow:

Dim array_Name (subscript variable) as data_Type

Examples:-

Dim CusName(10) as String

Dim Count (100 to 500) as Integer

Program:-1

```
Dim studentName(10) As String
Dim num As Integer
Private Sub addName()
For num = 1 To 10
studentName(num) = InputBox("Enter the student name", "Enter Name", "", 1500, 4500)
If studentName(num) <> "" Then
Form1.Print studentName(num)
Else
End
End If
Next
End Sub
```

Program:-2

```
Dim studentName(10) As String
Dim num As Integer
```

```

Private Sub addName( )
For num = 1 To 10
studentName(num) = InputBox("Enter the student name")
List1.AddItem studentName(num)
Next
End Sub
Private Sub Start_Click()
addName
End Sub

```

Program:-3

```

Private Sub cmdAdd_Click()
Dim i, j, r1, c2 As Integer
Dim a(), b(), c() As Integer
r1 = Val(InputBox("Enter rows"))
c1 = Val(InputBox("Enter columns"))
ReDim a(r1, c1)
Text1.Text = "First Matrix is :" & vbNewLine
For i = 1 To r1
For j = 1 To c1
a(i, j) = Val(InputBox("Enter Elements"))
Text1.Text = Text1.Text & a(i, j) & " "
Next
Text1.Text = Text1.Text & vbNewLine
Next
ReDim b(r1, c1)
Text1.Text = Text1.Text & "Second Matrix is :" & vbNewLine
For i = 1 To r1
For j = 1 To c1
b(i, j) = Val(InputBox("Enter Elements"))
Text1.Text = Text1.Text & b(i, j) & " "
Next
Text1.Text = Text1.Text & vbNewLine
Next

ReDim c(r1, c1)
Text1.Text = Text1.Text & "Addition of Two Matrix is :" & vbNewLine
For i = 1 To r1
For j = 1 To c1
c(i, j) = a(i, j) + b(i, j)
Text1.Text = Text1.Text & c(i, j) & " "
Next
Text1.Text = Text1.Text & vbNewLine
Next
End Sub

Private Sub cmdClear_Click()
Text1.Text = ""
End Sub

Private Sub cmdExit_Click()
Unload Me
End Sub

```

Question:-WAP to display a series of prime numbers.

```
Public p, n, i As Integer
Private Sub Prime_Series_Click()
p = 1
Print "Prime; Numbers; are:"
For n = 1 To 100
For i = 2 To n - 1
If n Mod i = 0 Then
p = 0
Exit For
Else
p = 1
End If

Next
If p = 1 Then
Print n;
End If

Next
End Sub
```