

3BCA3 DATABASE MANAGEMENT SYSTEM

DATABASE :-

A database is a collection of related information, stored so that it is available to many users for different purpose.

Database systems are designed to manage large bodies of information. Management of data involves both defining structures for storage of information and providing mechanisms for the manipulation of information.

FILE :-

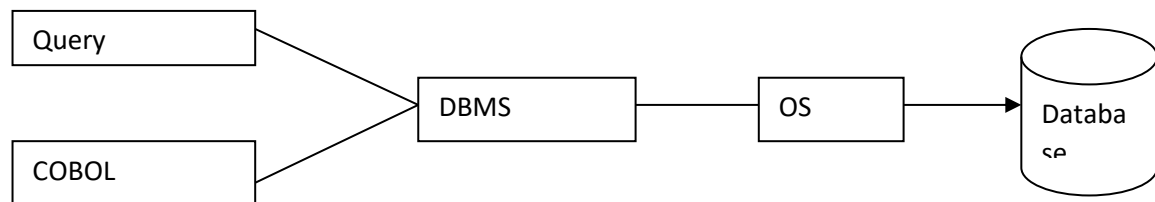
A file is a collection of logical information.

A computer file contain information arranged in an electronic format.

Database can handle business inventory, accounting and filing to prepare and summarize reports. There can be database which store newspaper, articles, magazines and conics.

There is a well-defined market for specific information for highly selected group or user and at most all subject.

for example:- MEDLINE is a well-known database services providing medical information for doctors. Similarly, WESTLAW is a computer west information services which retrieve the requirement of lawyers.



Database are widely used in :-

1. BANKING :- for customer information related A/c, loan and banking transaction.
2. AIRLINES:- Reservation and scheduled information.
3. UNIVERSITY :- For student information course material, registration and grade.
4. Credit card and transaction.
5. Telecommunication.

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DATABASE MANAGEMENT SYSTEM (DBMS):-

DBMS is a combination of hardware & software that can be used to setup, monitor (guide) a database and can manage the updating and retrieval of data that has been stored in it.

2nd DEFINITION:-

A DBMS acts as the interface between data stored on the disk and its users. In that sense, it Create a boundary between data and its user.

Most

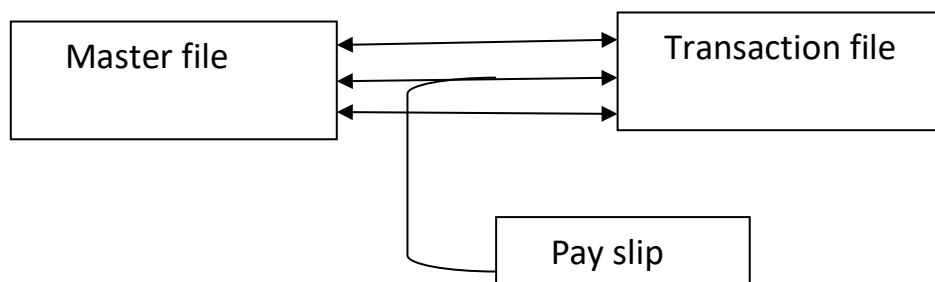
DBMS has the following facilities:

1. Creating a file, addition of data, deletion of data, modification of data, creation, addition and deletion of entire file.
2. Retrieving data collectively and selectively.
3. The data can be stored or indexed at the user direction.
4. Mathematical function can be performed and the data stored in the database manipulated with these function to perform the desired calculation.
5. To maintain data integrity and database use.

The DBMS interprets and process user request to retrieve information from a database. The DBMS response to a query by invoking the appropriate subprogram is up ways perform its special function to interpret the query or to locate the desired data in the database and present in the desired order.

TRADITIONAL FILE ORIENTED APPROACH:-

The traditional file oriented approach to information process, has for each application. A separate master file and its own setup personal file.



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Data can be classified into two types:-

master and transaction.

Master :- master data does not change with time. Some examples are employee number and employee name. days work and allowance are transaction data which can change from time to time.

Although such file based approach which came into being the first commercial application of computer did provide an increased efficiency in the data processing compared to earlier manual people. Record based system as the demand for efficiency and speed increase the computer based simple file oriented approach to information processing started suffering from the following significant disadvantages.

1. Data Redundancy :-

the same piece of information may be stored in two or more file as for example:- the particulars of an individual who may be a customer or an employee , may be stored in two or more file. If we want to change information such as all files.

2. Program/Data dependency :-

In the traditional file oriented approach if a data field is to be added to a master file on such program that access the master file would have to change to allow for this new field which would have been added to the master record.

3. Lock of Flexibility :-

In view of the storage coupling between the program and the data most retrieval possibility would be limited to well anticipated and pre-determined request for data. The system would normally be capable of producing schedule, records and queries which it has been rough program to create.

FILE MANAGEMENT SYSTEM (FMS):-

In earlier approach program depend on user and user depend on the program. So, to create a lot of problem handled the system and large organization often had many end user. End user had a varieties of task.

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As for example:-one manager could request for a report of employee who join after a certain data. Another could need information about a specific department. The third could ask about employee in a particular department in a particular grade and so on. A complex query would means interaction with more than one file in a single program. Thus even a simple request could take a few hours of programming efforts. This was frustrating although it was better than a manual system.

The other problem in using file was the tight locking of the programs and file. As for example:- if someone in the personal department decide to add a field called blood group to the employee file, then all program interacting with the employee file would need a change to accommodate this new field. This was externally changing since writing a new program is time consuming process and changing existing one is even more so change to a file based system where approach with a lot of reason.

In this situation related this problem arise in the following form:-

1. Extra efforts to enter duplicate data
2. Additional storage requirements
3. Different values for the same data item also called data inconsistency.

DATA ITEM:-

The term data item is the word for what has been traditionally called the field in the data processing and smallest unit of data that has meaning to its users although the data item may be treated as molecule of database that data items are group together to form aggregates describe which various name.

ENTITY :-

All such item about which relevant information is stored in the database are called entities.

ATTRIBUTES :-

The quantities of the entity which we stored as information are called attributes. An attributes may be expressed as a number or text. It may be scan picture, a sound sequence in meaning picture which is now possible in sound. Visual multimedia database.

An attributes is a name, column of a relation.

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LOGICAL AND PHYSICAL DATA:-

One of the key features of database approach is to bring about a distinction between logical and physical structure of data.

The term logical structure refers to the programmer see it and the physical structure refers to the data are actually recorded on the storage medium even in the earlier stage of records stored on tape the length of the internal record tape requires that many logical records be group in to one. Physical record to several storage palces on the disk.

It was the S/w which separated them when used in an application program and combined them again before writing back on disk.

SCHEMA AND SUB-SCHEMA:-

Schema is a logical database description and it is a design as a chart of the type of data that are used, its guies the name of entity and attribute and specific relationship between them.

It is a frame work in to which the value of the data item can be bit like an information display system. Such as arrival and departure time at airport and railway station. The schema will remained the same through the value display in the system will be change from time to time.

The term schema is used to mean our all chart of all the data item type and record type stored in a database. The term schema refers to the same few but for the data item type and record type which are used in particular information or by a particular user.

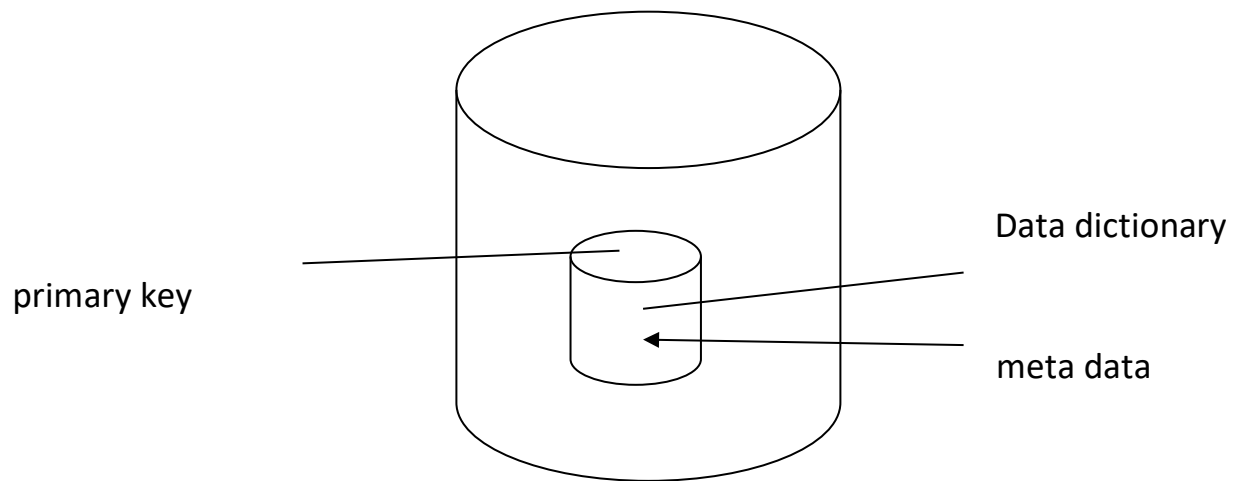
Therefore many different sub-schema can be derive from one schema.

A SIMPLE ANALYSES TO DIFFERENTIATE BETWEEN SCHEMA AND SUB-SCHEMA:-

Sub-schema may be that of the schema represented a roadmap of delhi city, major historical site, educational institute, railway station, airport etc.

A schema could be similar may be display one route. Each from the railway station or the airport to the Indian prastit university (IPU) at gudgawa laxmi nagar.

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DATA DICTIONARY :-

It hold detail information about the different structures and the data type. The details of the logical structure that are mapped into the different structure details of relationship details of all user privilege and access right performance of resource way details.

The information describing the data in the database i.e.- meta-data or the data about the data.

DBMS management system data dictionary is one of the fundamental component of the system. For example:- the authorization control module use the data dictionary to check whether a user has the necessary authorization to carry out the requested operation to perform this check the data dictionary has to :-

1. The name of user authorize to use DBMS.
2. The name of data item in the database.
3. The data item that each user can access and the type of access allowed. As for example:- insert, update, delete etc.

An another example an integrity check module uses the data dictionary to check that request operation satisfied all necessary integrity and constraints. So perform this check the data dictionary has to store.

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- a. The name of data item in the database.
- b. The type and size of the data item.
- c. The constraints on each data item.

Syntax:-

Delete * from student ;

Delete roll from student (where roll=1);

1. PROCEDURE DML:-

A language that allow the user to tell the system exactly how to manipulate the data with the procedure DML, the user or more normally the programmer specify what data is needed and how to obtain it. This means that the user must express, all the data operation that are to be used by calling procedural to obtain information required.

Typically such as procedural DML retrieve a record process and based on the result obtained by this processing and retrieve on other record.

2. NON-PROCEDURAL DML:-

It requires a user to specify what database needs without specifying how to get it.

A language that allow the user to state that what data is needed whether than how it is to be retrieve.

Non-procedural data manipulation language allow the required data to be specified in a single retrieval and update statement. With non-procedural data manipulation language translate a DML statement in to a procedure that manipulates the required set of record.

It can contain different type of command such as insert into, update, delete from, select request. The database manager then place a call to the file manager to perform the requests.

3. FILE MANAGER:-

The file manager manipulates the under-line storage file and manage the allocation of storage space on the disk. It established and maintained

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the list of storage structures and indexed defined in the internal schema. If # file are used in call on the hashing function to generate record address. However, the file manager does not directly manager the physical input and output of data rather process the request on to the appropriate access method which either read from or write data into the system buffer.

4. DML PREPROCESSOR :-

This module convert a DML statement embedded in an application program into standard function cal in host language. The DML preprocessor must interpret with query preprocessor to generate the appropriate code.

5. DDL COMPILER :-

The DDL compiler connects DDL statement into a set of table containing meta- data. These tables are stored in the data dictionary which control information is stored in data file header.

```
Insert in to student
(name, roll, address)
value (BK, 1, Pakri)
```

DDL :- It can contain different type of commands and sql keywords as a like create, alter, drop, truncate.

DCL:- with the help of DCL, we can project our data in the database and safely stored in the database. With the help of DCL, we can associate different type of permission as a like we can access the data and grant the permission on the data. It contain different type of command grant, revoke, commit, roll back.

COMPONENT OF DBMS:-

Programmers

Application program

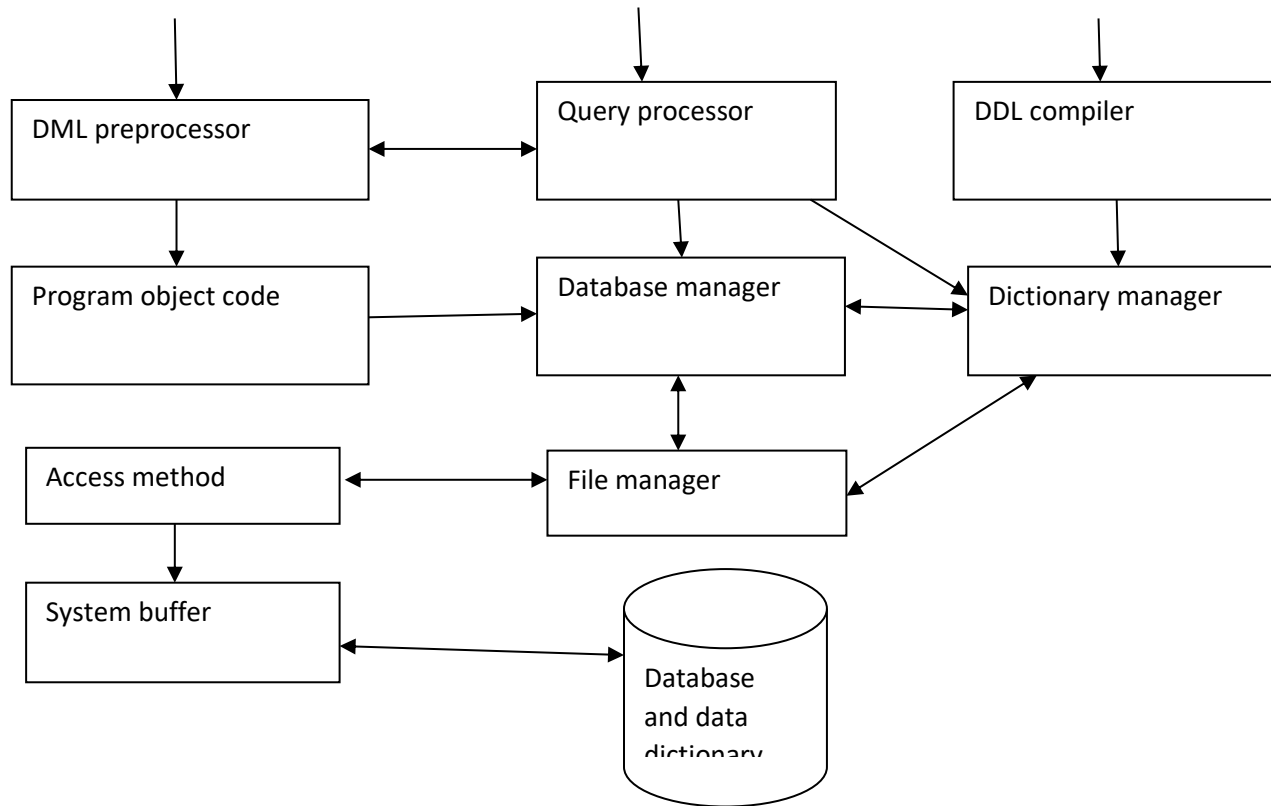
Users

Query

DBA

Database schema

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The major component of DBMS are explained. A DBMS is a complex s/w system that is used to manage, store and meta-data used to describe the data. It is highly complex and sophisticated complex piece of s/w that aim to provide the service. It is not possible to generalize the component structure of DBMS. They are very from system to system.

A DBMS is partitioned in to several s/w components module each of which is assigned a specific operation.

1. QUERY PROCESSOR:-

This is a major component of DBMS that transfer queries in to a series of low-level instructions directed to the database manager.

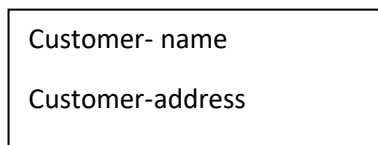
A query processor is a processor which interact with query. DDL interpreter DML processor and query evaluation engine. DML compiler translate DML statement in query language consisting of low- level instructions that query evaluation engine is understood.

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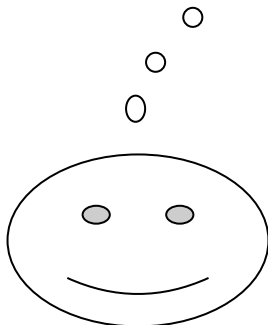
2. DATABASE MANAGER:-

The database manager interface with user submitted application program and queries. The database manager accepts queries and examine the external and conceptual schema to determine what conceptual record are required to satisfy the

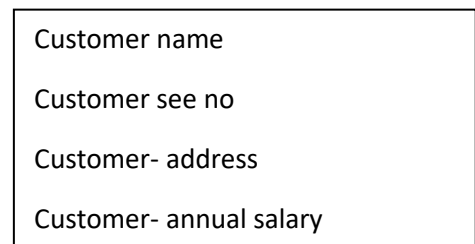
THREE VIEWS OF DATA:-



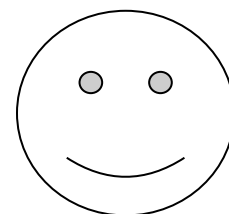
Logical record-1



User -1



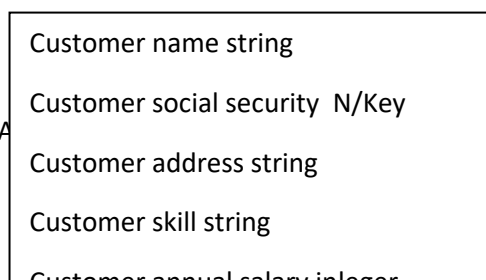
Logical record-2



User-2

Conceptual view ->

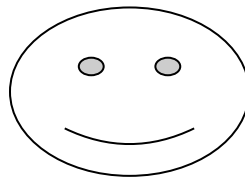
By:- Abhay Kumar Mishra, A



Application , Maharaja College,Ara

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Conceptual record



Name: string length 25 offset
Soc sec no:- 9 dec offset 25 unique
Department : string length-6 offset
Address: string length 51 offset 10
Skill:- string length 20 offset offset 91
Salary :- 9,2 dec offset 111



Internal record

LOGICAL VIEW:- The view at each of these label is describe a schema the word schema is used in database literate if structure preplanning map. External or user label is the highest label of data abstraction, where only those person of database of the concern with a user or application program are included.

Is a external view is described by schema is called external schema.

The external schema

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consist of the logical record on the relationship in the internal view, the object include entity, attribute and relationship.

CONCEPTUAL OR GLOBAL LABEL:- At the label of database abstraction on entity and relationship among them are in to one conceptual view represent the entire database. The conceptual view is defined by the conceptual schema. It describe all the record and relation included in the conceptual view.

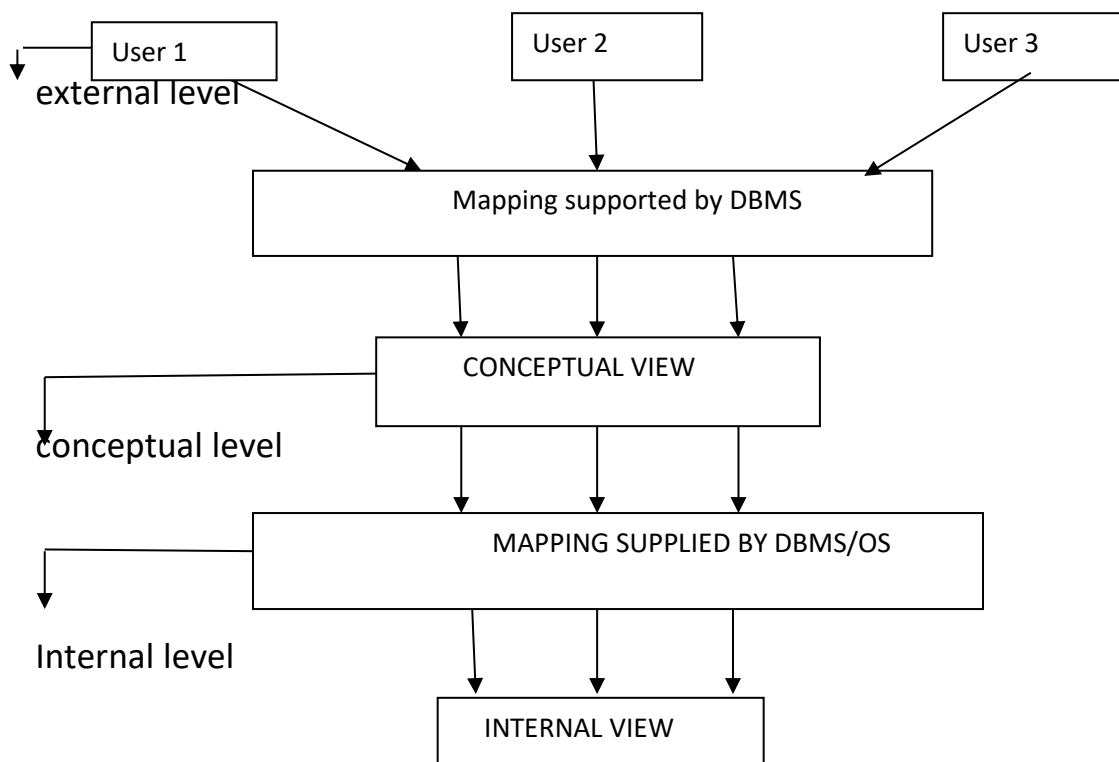
There is only one conceptual schema for database. This schema also contains method of driving object in the conceptual view from the object in the external view.

INTERNAL LABEL/ PHYSICAL SCHEMA:-

This is view as the lowest of abstraction closet to the physical stored, method is it indicate how to data will be stored and describe the data structure and access method to be used by the database.

The internal view is represented by internal schema which contains the difference of represented data fields and access and use:-

MAPPING BETWEEN DIFFERENT LABEL:-



By:- Abhay Kumar Mishra, Academic Head Department of Computer Application , Maharaja College,Ara

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Mapping are required in a database system with three different view a mapping between the external and conceptual level guide the correspond among the record and the relationship external and conceptual level.

Similarly,

there is a mapping from conceptual record to an internal record is a record of the internal level. It stored the record on a physical device. The internal record may be split of in to two or more physical record.

The physical database is the data that is stored on secondary storage device. It is made up records with certain data structure and organized in file. Concatically there us a additional mapping from the internal record to one or more stored record on secondary storage device and mapping associate between conceptual and internal view, which create the interface between conceptual level and internal level in the term of mapping supplied DBMS and O.S and also mapping create between external and conceptual level with the help of mapping by DBMS.

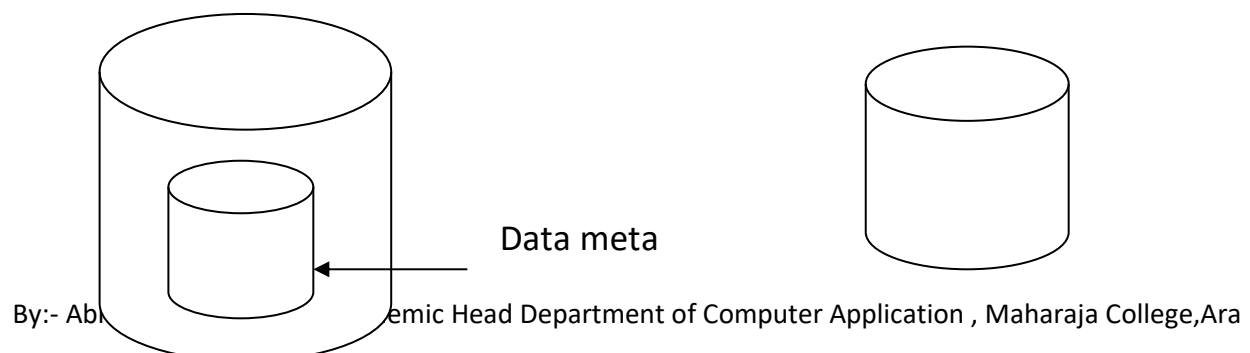
It is a three level architecture for a DBMS. Most commercial database are based on a three level architecture model called the ASCII SPARC model (American national standard institute/standard planning and requirements committee model) .

VIEW OF DATA:-

DDL(Data Definition Language)

DML (Data Manipulation Language)

DCL (Data Control Language)



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(own database create)

1. DDL:-

Create table student

Name char(20)

Roll no. (10)

Course number (10,2);

Student

Name	Roll no.	Course free

(create database)

DATA LANGUAGE:-

Database language is a language which provides some do different type of task with the help of this language. We can perform in creation, deletion, updation and modification of table and existing data in the database.

It is three type

1. DDL

2. DML

3. DCL

1. DDL:- It specify a conceptual schema by a set of definition expressed by special language is called DDL. It contains some details and how to implement this schema used store the data in physical device.

The following statement in :- SQL

To define the student table

Create table student

Name char (20)

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Roll no. (10)

Course free number (10,2);

Execution of the above statement create the student table.

2. DML:- The retrieve of information stored in database.

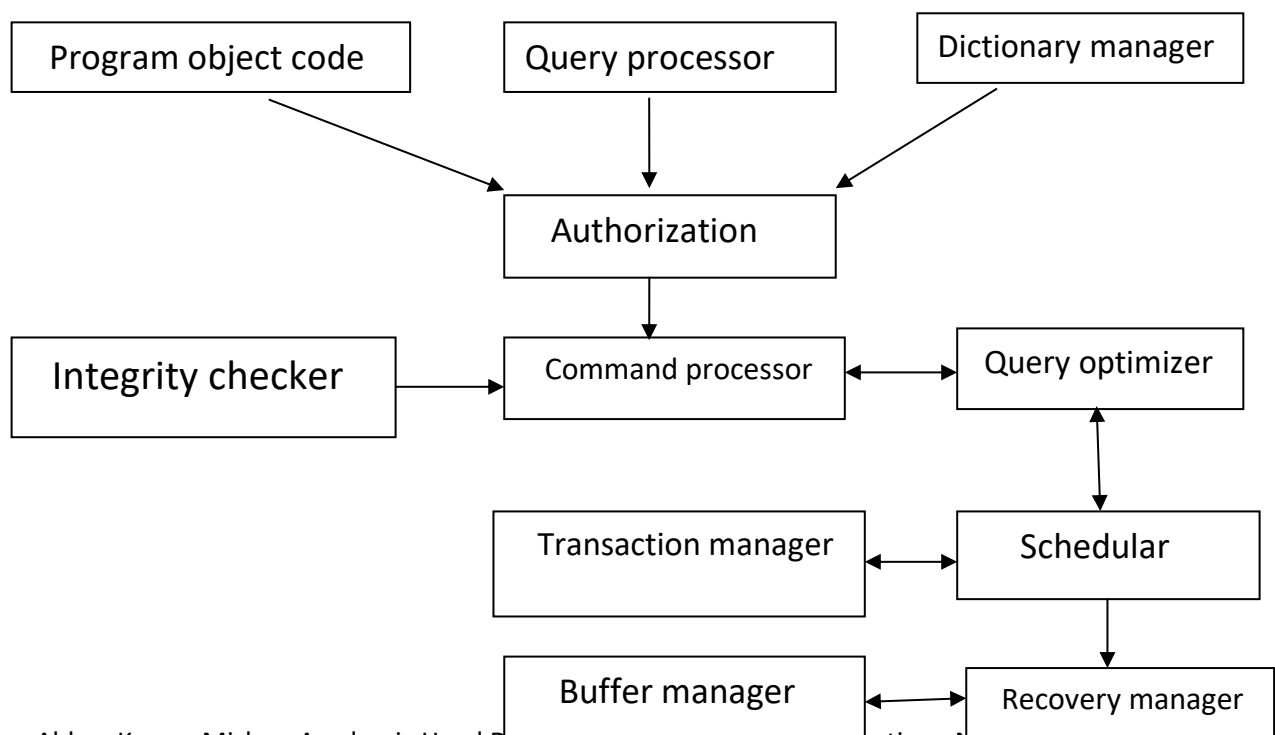
Student

Name	Roll	Course
Abhishek pandey	10	Bca
Arun singh	12	Ca
Rohit raj	43	Dca
Rahul sinha	18	Pg

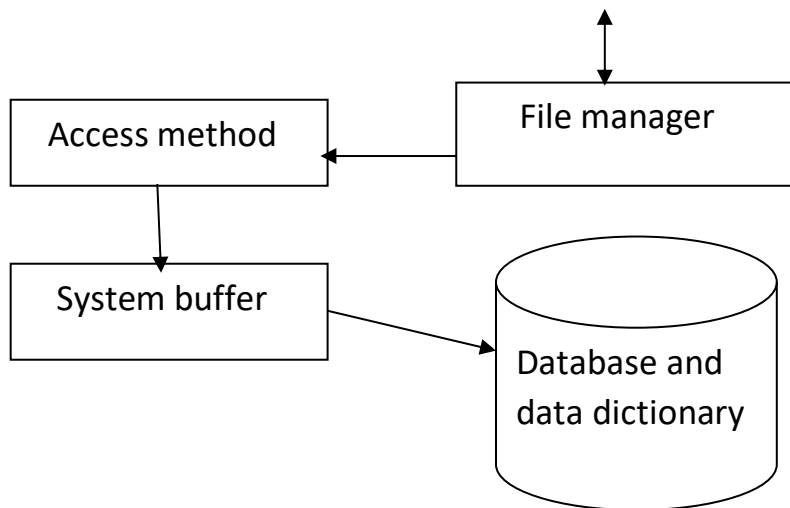
- The insertion of new information from the database
- The deletion of information in the database of existing data in the database.

DICTIONARY MANAGER :-

The dictionary manager access to and maintain the data dictionary. The data dictionary is accessed by most DBMS components.



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The major software components for the database manager are given below:-

1. AUTHORIZATION CONTROL:-

This module check that the user had necessary authorization to carry out the required operation.

2. COMMAND PROCESSOR:-

Once the system has check that the user had the authority to carry out the operation, control is passed to the command processor.

3. INTEGRITY CHECKER:-

Integrity checker operation manager the database and check the requested operation. it satisfies all necessary integrity constraints such as key constraints.

4. QUERY OPTIMIZER:-

These module determines an optimizer method for the query execution.

5. TRANSACTION MANAGER :-

This module perform the require processing of operation, it receives from scheduler.

6. SCHEDULAR:-

This module is responsible for ensuring the concurrent operation(co-operation) on the database process without conflicting with one another. It control the relative order in which transaction operation are executed.

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7. RECOVERY MANAGER:-

These module ensure that the database remains in a consistent state.

8. BUFFER MANAGER:-

This module is responsible for the transfer of data between main memory and secondary storage such as disk and tape.

The recovery manager and the buffer manager are sometime refers collectively as the data manager.

DBA(Database Administrator) :-

The DBA can be a single person or group of person who makes the strategy and provide the technical support for implementing different decision. The DBA responsible for the overall control of the system ay technical level. We can now describe some of the task of the DBA in little more details.

This function of DBA includes the following:-

1. DEFINE THE CONCEPTUAL SCHEMA:-

It is the DBA job to decide exactly what information to be helped in the database. The DBA identifies the entity and the information to be recorded about these entity. This process is usually referred to as logical database design. Once the DBA decides the content of database at an abstract level, he creates the corresponding conceptual schema.

2. DEFINING THE INTERNAL SCHEMA:-

The DBA must also decide how the data is to be represented in the database. This process is usually refer to as physical database design. Having done the physical design, the DBA must then create the corresponding the storage structure. In addition to it, the DBA must also define the associated conceptual or internal mapping.

3. LICE SING WITH USER :-

The DBA lice sing with user to ensure that the data they need is available and write the necessary external schema. In

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addition, the DBA must also define the associated external or conceptual schema.

4. GRANTING OF AUTHORIZATION :-

For data accessing, granting of different type of authorization(read, write, etc) allow the DBA to required which is part of the database so, that various users can access.

5. INTIGRITY CONSTRAINT:-

The value stored in the database must satisfied certain consistency constant.

ADVANTAGE OF DBMS:-

Database provides storage facilities and is responsible for the concurrent of database as a like DBA is a centralized manager as it control over the data and focuses on centralize control. We can change the data record or any type of modification can perform, with the help of DBA.

THE IMPORTANT ADVANTAGES OF DBMS IS GIVEN BELLOW:-

1. REDUCE REDUNDANCY:-

The database administrator avoid unnecessary duplication of database and reduce the unnecessary data in to disk storage. It also eliminate extra processing of unnecessary data.

2. SHARE DATA :-

DBMS provides the facility -> sharing of data any number of application program or user.

3. INTIGRITY :-

DBMS provides the facility of integrity. With the help of integrity we can check, the validation , data integrity mains that the data contained in the database is both accurate and consistent. when the value is entered, we can check the validation specify range the correct format. As for ex:- the value of fee of any student may be of range(4000>= to 10000) .

4. SECURITY:-

For any organization, data is very important and

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authorized person must not be accessed of confidential data. DBA how has the ultimate responsibility for data in DBMS can ensure that proper accessed procedure are followed including proper authentication schema for a accessing the DBMS additional check before authentication for accessing sensitive data.

5. CONFLICT RESOLUTION:-

Since the database and under the control of DBA, DBA should resolve the conflicting requirement of various user and application. The DBA select the best file structure and access method to get optional performance for the response critical application, while permitting less critical application, continue to use the database with a relatively slower responsible.

6. DATA INDEPENDENCE :-

Physical data independence and logical data independence is usually considered from two points of view.

Physical data independence allow changing in the physical storage device or organization of the file to be without requiring change in the conceptual view or any of the external view where the logical data independence employees that application program need not be changed if field are added to an existing record and do the related with other task.

DISADVANTAGE OF DBMS:-

1. It is the complex system.
2. It is expensive in the sense of additional (hardware).
3. Database professional hard to any company or organization. Then performance average.
4. Since there is centralization of data a signal point of failure will result in total data loss/higher impact of failure.
5. Back up and recovery operation are complex and cannot easily done by non professional.

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RELATIONSHIP:-

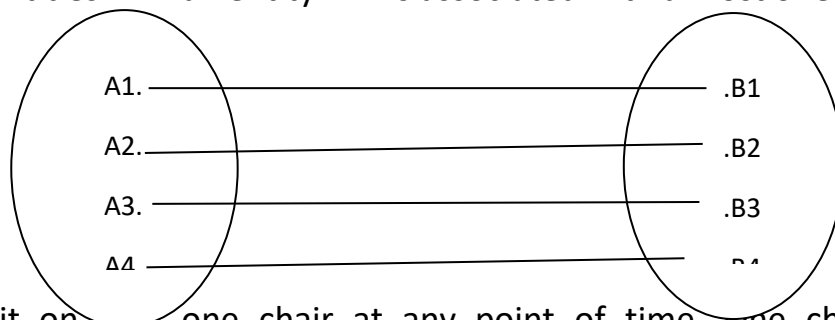
Relationship is a natural association that exist between one or more entities. We can associate or display the relation between teacher and student, course and student.

CARDINALITY OF A RELATIONSHIP:-

Cardinality of relationship defines the type of relationship between two participating entities.

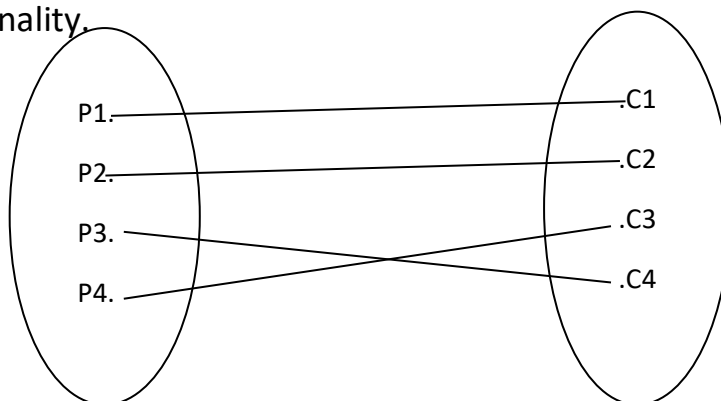
1. ONE- TO- ONE RELATIONSHIP :-

An entities in A is associated with almost one entities in B. an entity in B is associated with almost one entities in A.



One person can sit on only one chair at any point of time. One chair can accommodate only one person in a given point of time. This relationship has one to one cardinality.

As for example :- one person (p1,p2,p3,p4) can sit on only chair at any point of time and also one chair (c1,c2,c3,c4) can accommodate a maximum of one person at any given time. In this relationship both the participating entities have one to one cardinality.

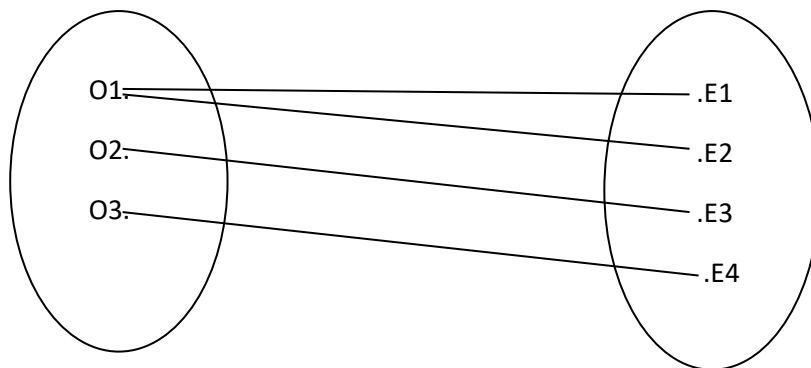


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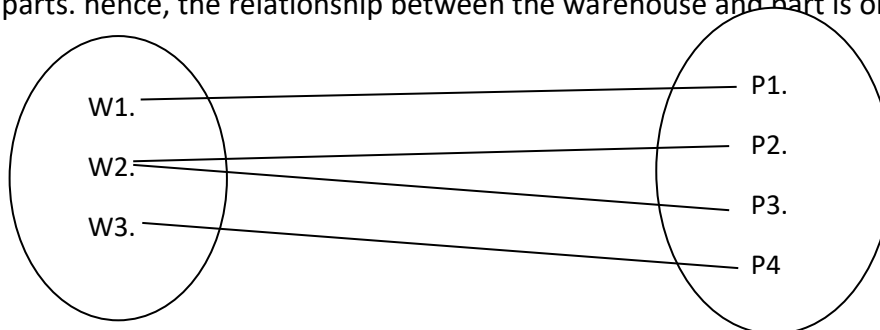
2. ONE- TO- MANY REALTIOSHIP:-

one Instant of entities is related to multiply instance of another entities is called one to many relationship.

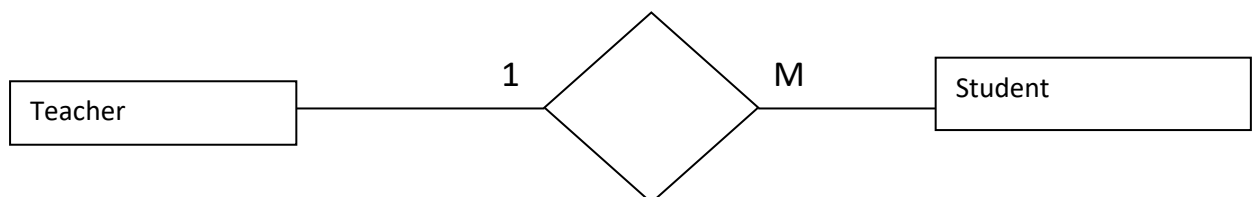
As for example:- one organization(o1,o2,o3) can have many employees but one employees(e1,e2,e3,e4) can work only one for an organization.



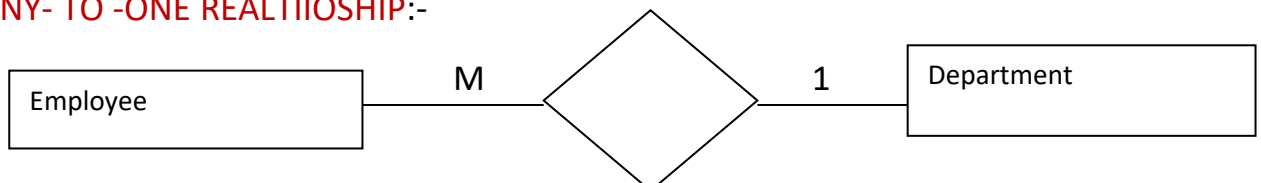
Warehouse(w1,w2,w3) can be used to stored many parts but one parts (p1,p2,p3,...) can be stored only in one warehouse. In this example:- one instance warehouse accommodate many parts. hence, the relationship between the warehouse and part is one to many.



Or,



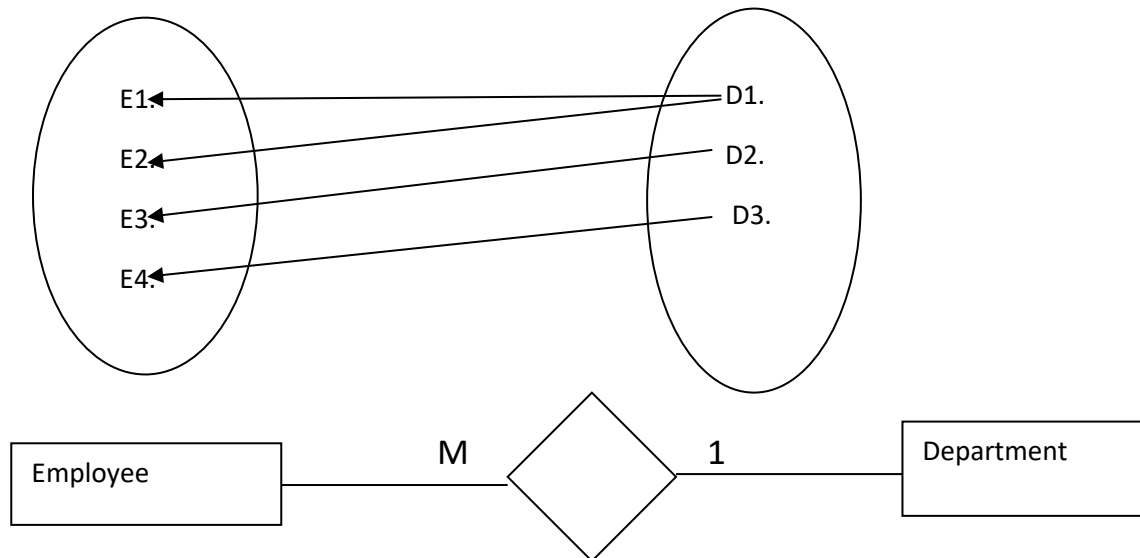
3. MANY- TO -ONE REALTIOSHIP:-



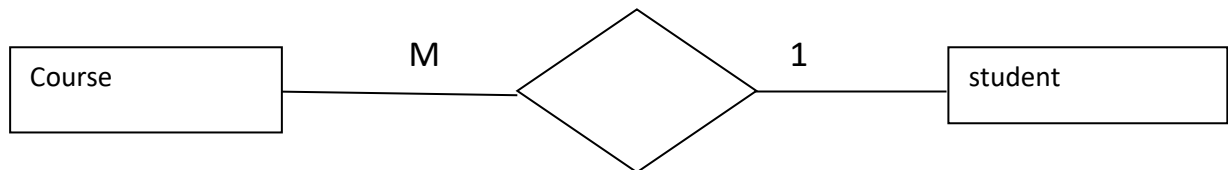
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This relationship reverse of one to many relationship.

Example:- many employee (e1,e2,e3) can work for only one department but one department (d1,d2,d3) can have many employee. Relationship between employee and department is many to one.

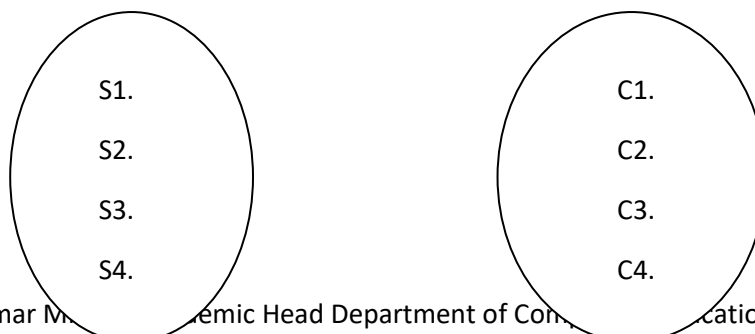


4. MANY- TO- MANY RELATIONSHIP:-



In this many to many relationship, multiple instant of one entities are related to multiple instant to another entities. As for example:-

One student (S1,S2,S3,S4) is enrolled for many course (C1,C2,C3,C4) and one course is enrolled by many student.



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KEY:-

Key is a single attribute which contained information.

PRIMARY KEY:-

A unique entities identifier is refer to as a primary key.

Example:- roll no. is student table.

The primary key uniquely identify each record in a table and most never contain some repeated information or record.

During the creation of the table, the database designer select one of the candidates key among the several key available to uniquely identify row in the customer detail table.

The candidates key so selected is called primary key.

Roll	Name	Fee
0001	Abhishek	4000
0002	Arun	3500
0003	Rohit	3500
0004	Rahul	4000
0005	Ranjan	5000

SUPER KEY:-

If we add additional attributes to a primary key the resulting combination still uniquely identify an instance of entity set. Such type of key are called super key.

A super key for an entities set is a set of one or more attributer with combine value which uniquely identify the entities in the entities set.

Any super set of candidate key is a super key as for example:- consider the following set comparison of attributes from the customer detail table.

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Emp. id	Emp. Last name	Emp. Mid name	Emp. First name	Emp. Email	Department	Grade	Manager id
234	Singh	Kumar	Bijendra	brijendra@gamil.com	Comp	1	Null
355	Singh	Kumar	Suraj	Surajprasad@gamil.com	Finance	1	Null
368	Mishra	Kumar	Abhay	abhaykumar@gamil.com	HR	1	Null
2345	Singh	Kumar	Shyam	shyamkumar@gamil.com	HR	1	Null

1 and 2 is called super key.

CONDIDATE KEY :-

A candidates key is an attribute or a set of attribute that uniquely identify a record.

These attribute or combination of attribute are called candidate key. In such among, the candidate key is selected to be a primary key. The remaining candidate key are called alternate key.

NOTE:- there is a only one primary key in a table but in one table associated multiple candidate key.

SECONDARY KEY:-

A secondary key is an attribute or combination of attribute that may not be a candidate key but that classified the entities set on a particular characteristics.

COMPOSITE KEY:-

In many cases as we design a database we will have a table that uses more than one column as part of primary key. These are called composite key.

When a record can not be uniquely identified by a single field, in such case a composite key is used.

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A composite key is a group of field that are combined together to uniquely identified a record.

FOREIGN KEY:-

EMPLOYEE

Id	Name	Amount
1001	B.K.Singh	2,000
1002	A.K. Mishra	2500
1003	Suraj singh	2,500
1004	Nizam ashraf	3,000
1005	Rakesh roushan	4,000

DEPARTMENT

Depart-id	Dept-name	Id
102	Bca	1001
103	Phy	1002
104	Chem.	1003
1005	Math	1001
1000	Phy	1002

A foreign key is a set of attribute, the value of which are required to match the value of candidate key in the same or another table. the foreign key attributes can have duplicate or null value.

The problem of ensuring that the database does not goes in to any invalid foreign key value is there for known as referential integrity problem.

The constraint that value of a given foreign key must match the value of corresponding candidate key is known as referential constraint.

The relation that contain the foreign key is the referential relation (also called the child table) and the relation that

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contain the corresponding candidate key is the reference relation (also called the parent table).

INVALID FOREIGN KEY VALUE :-

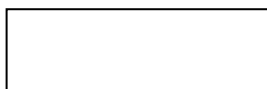
A value of 1116 in the id attributes of department table is invalid because a value of 1116 is not present in the id of the employee table.

ENTITY-RELATIONSHIP DIAGRAM :-

Entity-relationship diagram (or E-R Diagram) was first defined in 1976 by peter chen. Since the Charles bachman and james martine have added some small refinement to the basic E-R diagram due to its simplicity and ease of use this technique attracted considerable attention during 1990in both industries and research community.

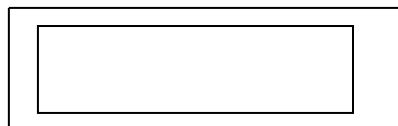
- i. It is a logical tool.
- ii. It is used by database design to use the database.
- iii. We can show all entities and relationship among entity using E-R model.
- iv. We can also define the mapping constraints among entities.
- v. We can use the E-R diagram for E-R modeling.

RECTANGULAR BOX:-



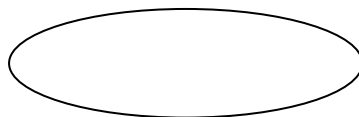
Which represent entity set.

DOUBLE RECTANGULAR SHAPE:-



Which represent weak entity set.

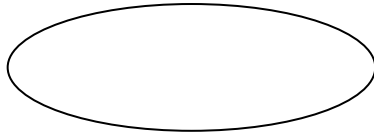
OVAL/ ELLIPSIS:-



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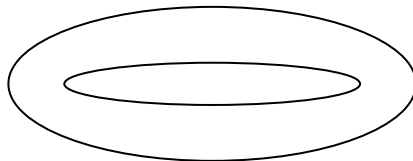
Which represents attributes.

DERIVED ATTRIBUTES:-



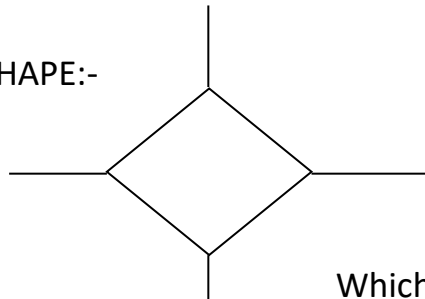
Which represents derived attribute.

DOUBLE ELLIPSIS:-



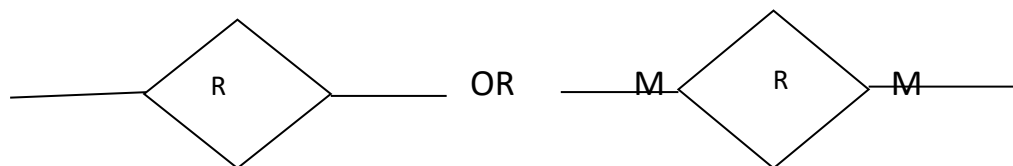
Which represents multi value attribute.

DIAMOND SHAPE:-

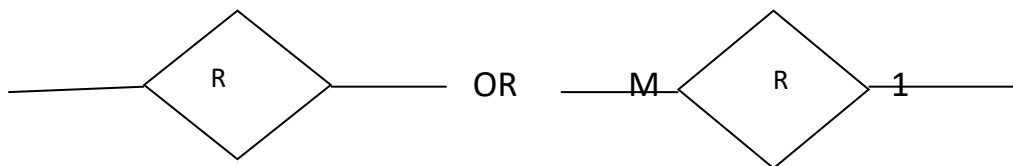


Which represents relationship.

Relationship diagram show how two entities share information in the database.

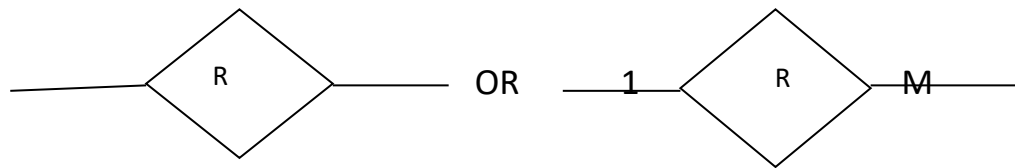


Which represent many to many relationship.

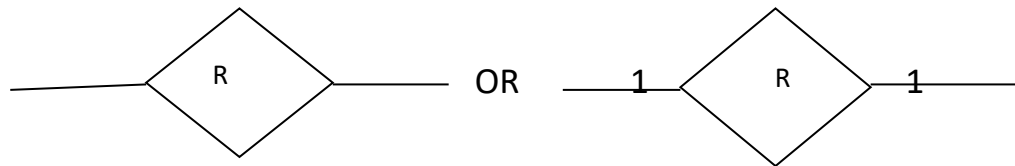


Which represent many to one relationship.

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Which represent one to many relationship.



Which represent one to one relationship.

STEP IN E-R MODELLING:-

MODEL:- A representation or scaled down structure of an object. Usually the following six steps are followed to generate E-R model

STEP 1:-

IDENTIFY THE ENTITY :- Look for general abstraction in requirement specification document which are business interest to business user.

STEP 2:-

FIND RELATIONSHIP :- Identify the natural relationship and their cardinalities between the entities.

STEP 3:-

IDENTIFY THE KEY ATTRIBUTE FOR EVERY ENTITY:-

identify the attributes or set of attributes which can identical instance of entity uniquely.

STEP 4:-

IDENTIFY OTHER RELEVANT ATTRIBUTE:-

identify other attribute which are interest to business user and want to store the information in data base.

STEP 5:-

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COMPLETE E-R DIAGRAM :-

complete E-R diagram with all attributes including primary key.

STEP 6:-

PREVIEW YOUR RESULT WITH YOUR BUSINESS USER:

Look at the list of attributes associated with each entities to visualize if any thin has been omitted.

CASE STUDY 1:-

PROBLEM STATEMENT:-

apply thye above methodlogy to model university database application.

- ❖ An university has many department.
- ❖ Each department has multiple instructor. One among them is the head of the department.
- ❖ An instructor belongs only one department.
- ❖ Each department offers multiple courses. Each of which is taught by a single instructor.
- ❖ Student may in roll for many courses offered by different department.

SOLUTION:-

STEP 1:-

Generally the entities will have multiple instance a given business scenario(moto).

As per this guide line, we can identify the following entities.

- i. Department
- ii. Course
- iii. Instructor
- iv. Student.

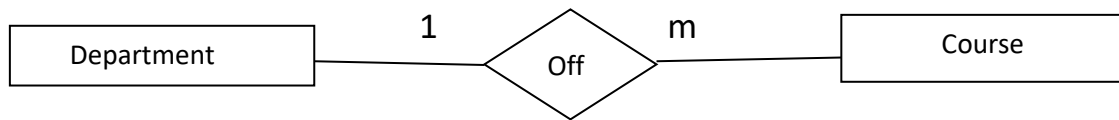
Head of department is not an entity. It is a relationship between instructor and department.

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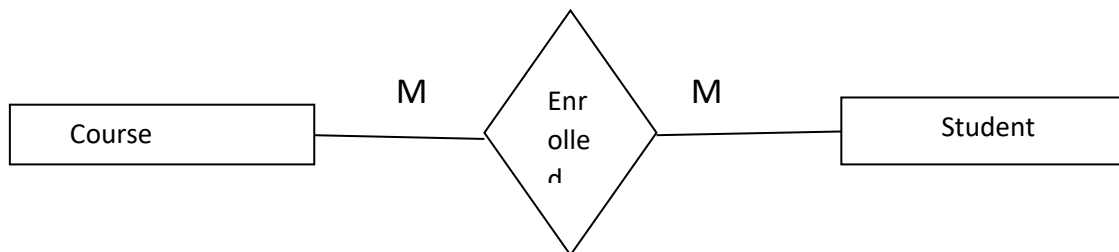
STEP 2:-

FIND THE RELATIONSHIP:-

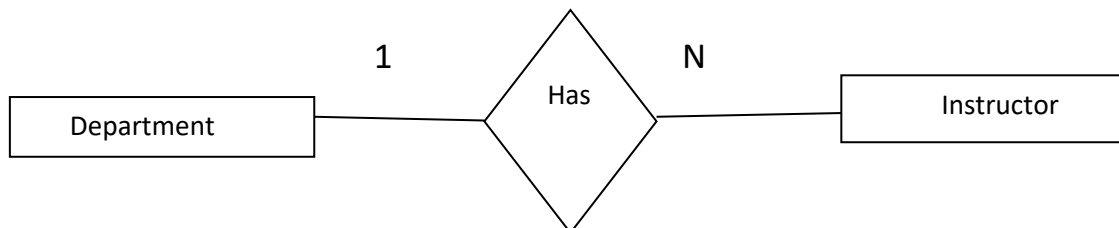
We can write the following relationship.



The department offers multiple courses and each course belongs to only one department. Hence, cardinality between department and course is one to many.

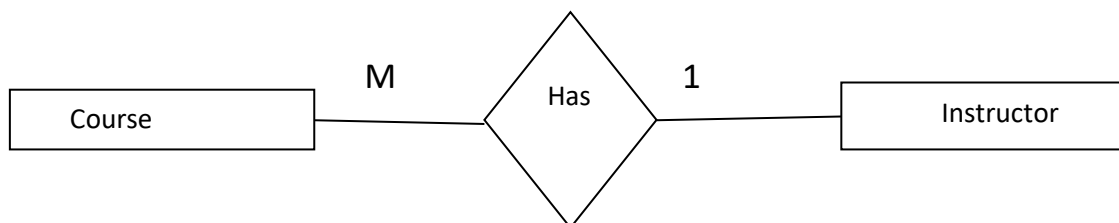


One course is enrolled by multiple student and one student enrolls for multiple courses. Hence, the relationship is many to many.



One to many relationship.

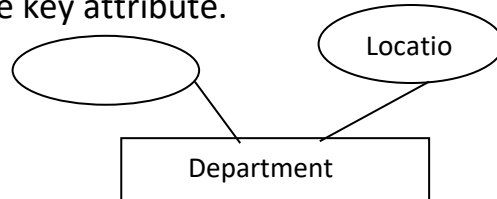
one department has multiple instructor and one instructor belongs to one and only one department. Hence, the relationship is one to many.



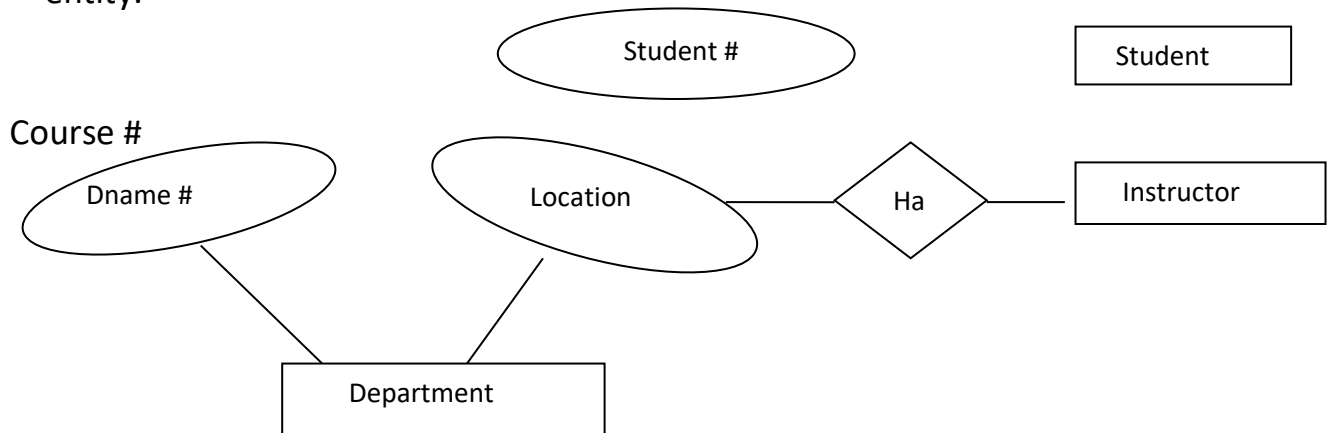
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One course is teach by only one instructor but one instructor teaches many courses. Hence, the relationship between course and instructor is many to one.

Step 3:- Identify the key attribute.



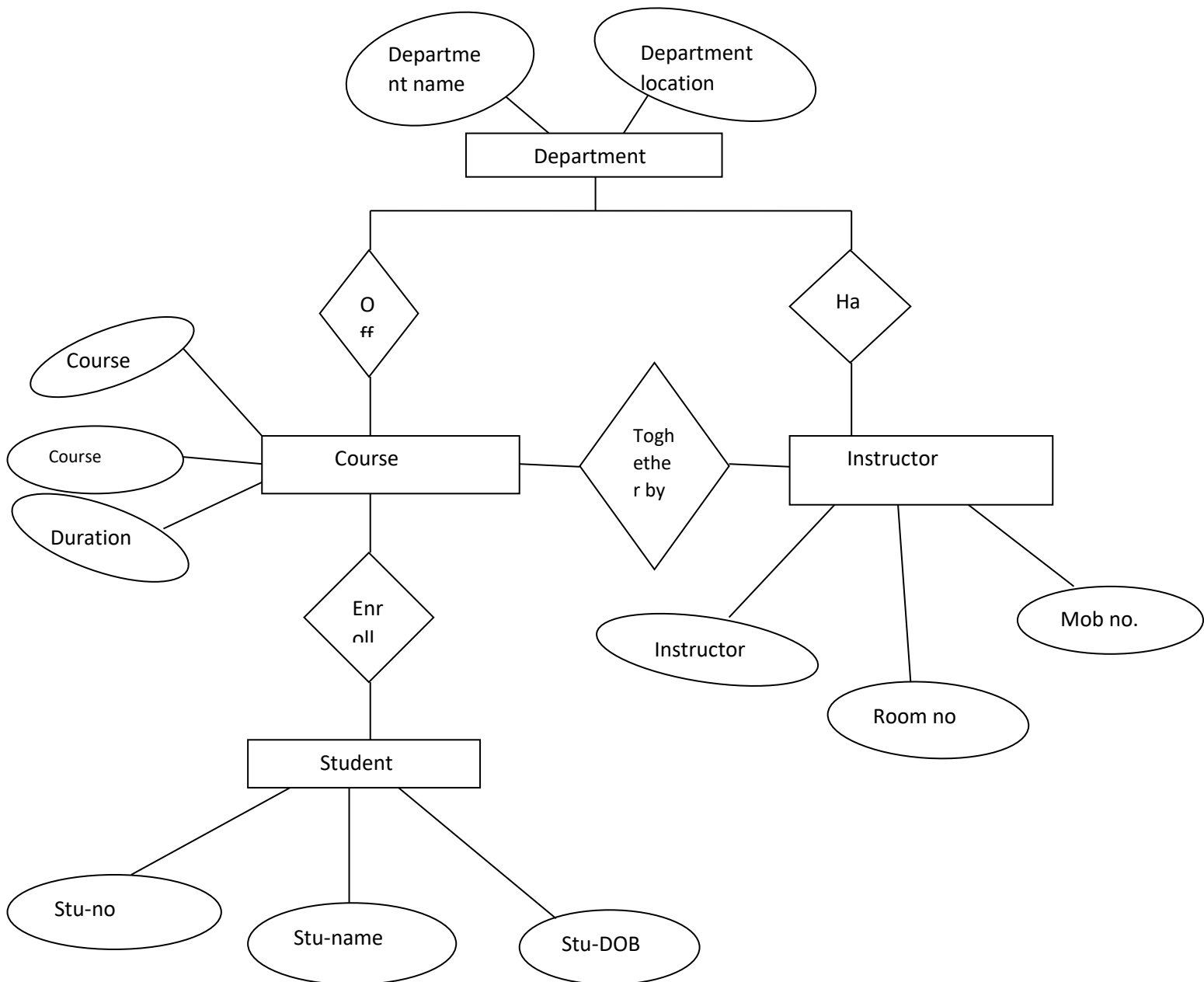
- i. D name(department name):- which identify the department uniquely will be the key attribute for department entity.
- ii. Student #(student number):- student number is the key attributes for the student entity.
- iii. Iname(instructor name):- is the key attribute for instructor entity.
- iv. course #(course number):- or course code is the key attribute for course entity.



Step 4:- identify other relevant attributes.

- i. (department , name ,location) department.
- ii. (course no., course name, duration) course.
- iii. (insname , room no., mob) instructor
- iv. (student no.,student name, DOB) student

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Case study 2:- problem statement

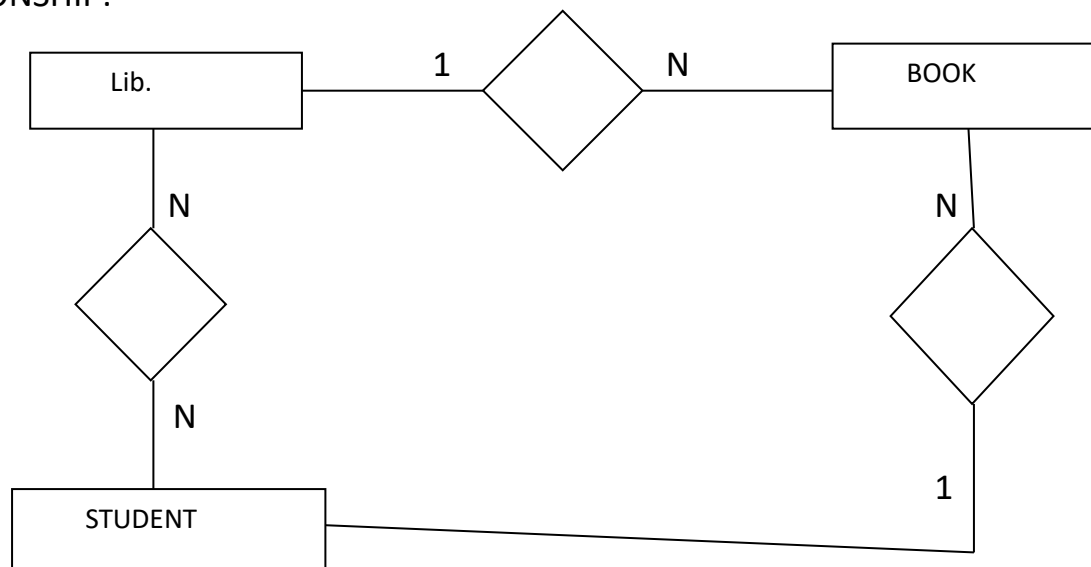
Consider a university library scenario for developing the E-R model.

Assume in a university-

- ❖ There are multiple library and each library has multiple student number.
- ❖ Student can become member to multiple library by paying appropriate member ship fee.
- ❖ Each library has its own set of books with in the librarythes books are identify by a unique number.
- ❖ Student can borrow multiple books from subscribed library.
- ❖ Student can order books using enter library loan.
- ❖ This can be useful in a student business to borrow books from a library where they are not a member.

The students order the books through a library where they are a member.

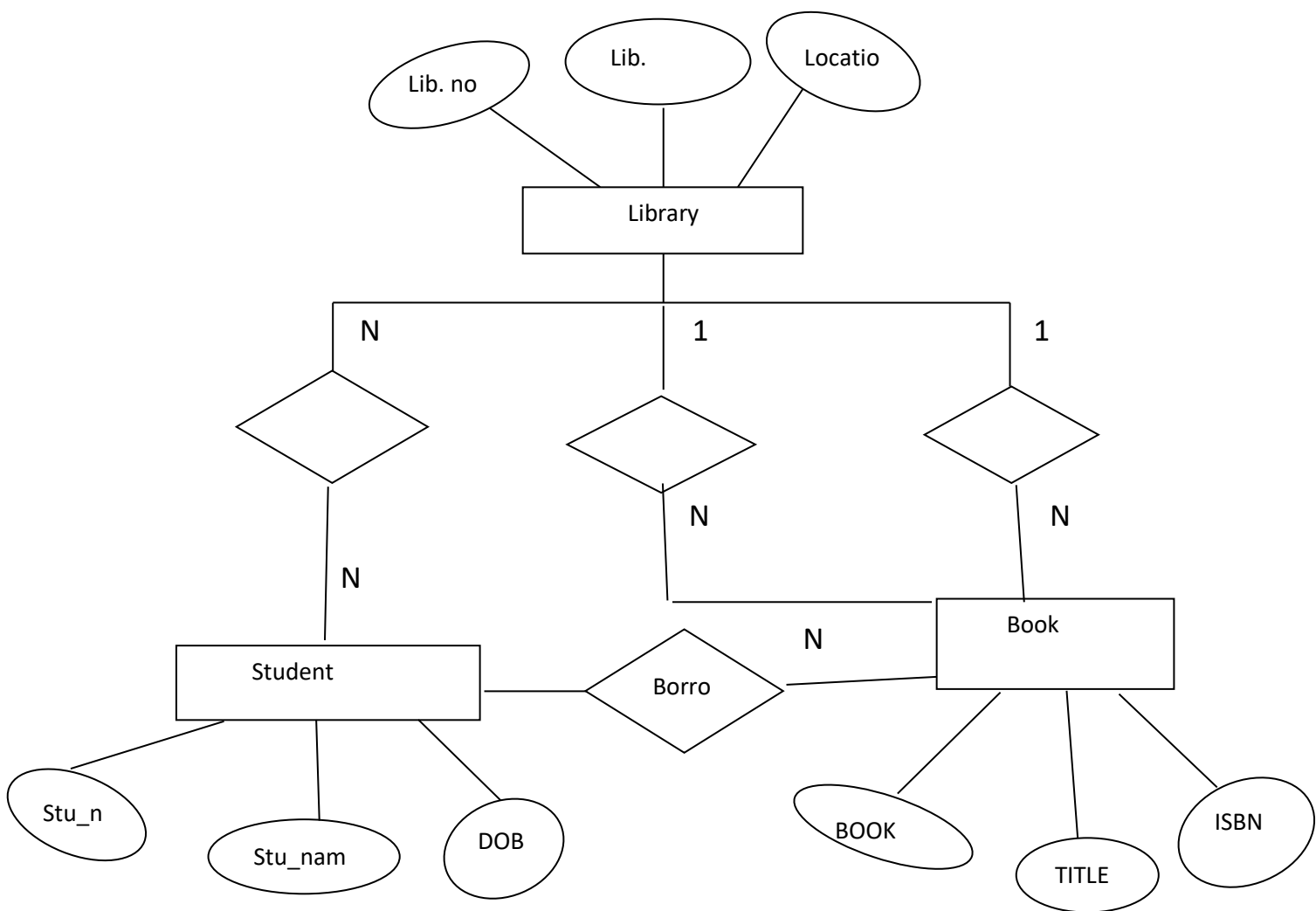
RELATIONSHIP:-



Attributes name :-

- i. (library no, libname, location) library (table name)
- ii. (student no, student name, DOB) student
- iii. (book no, tittle, ISBN) Book.

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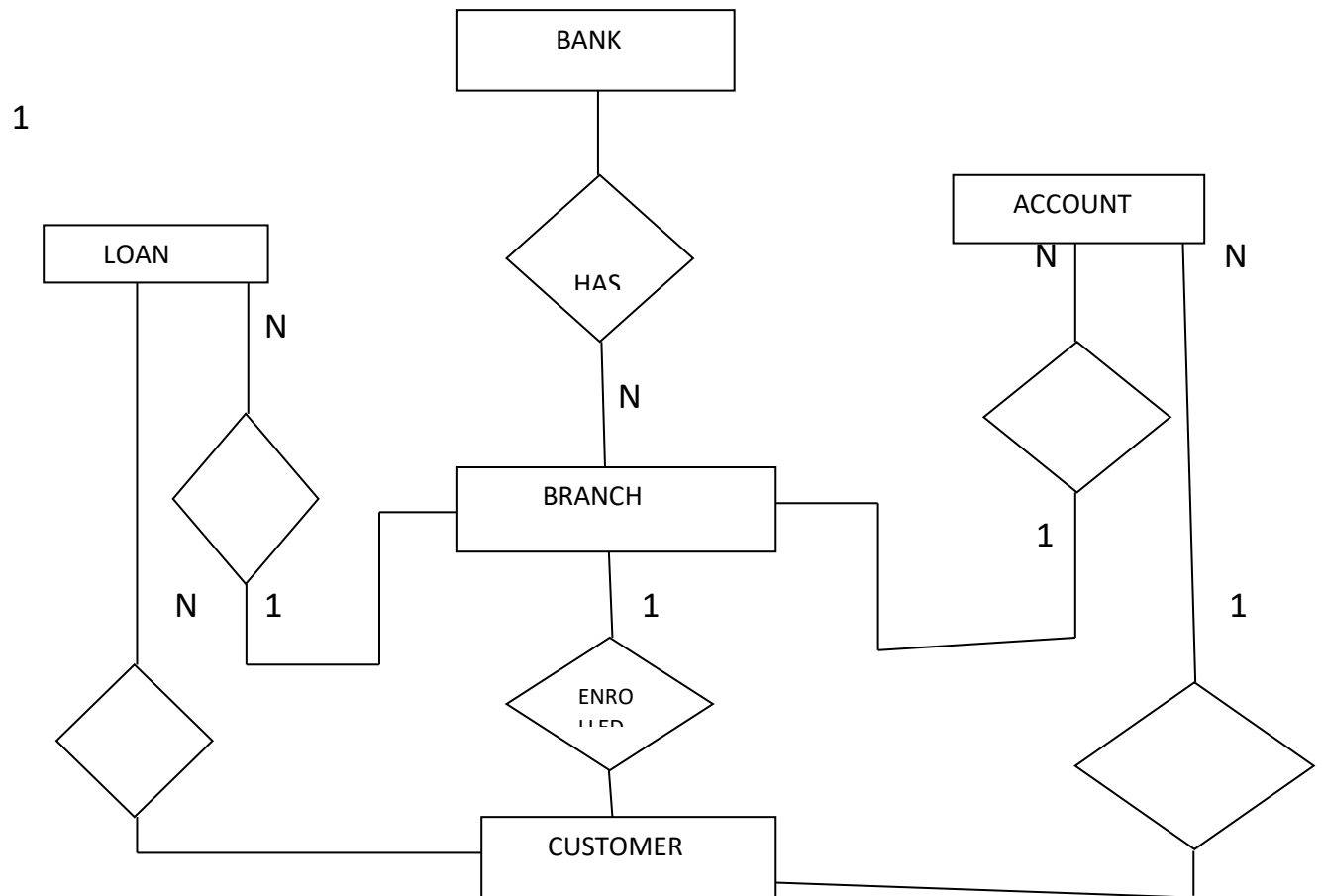


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Case study 3:- problem statement

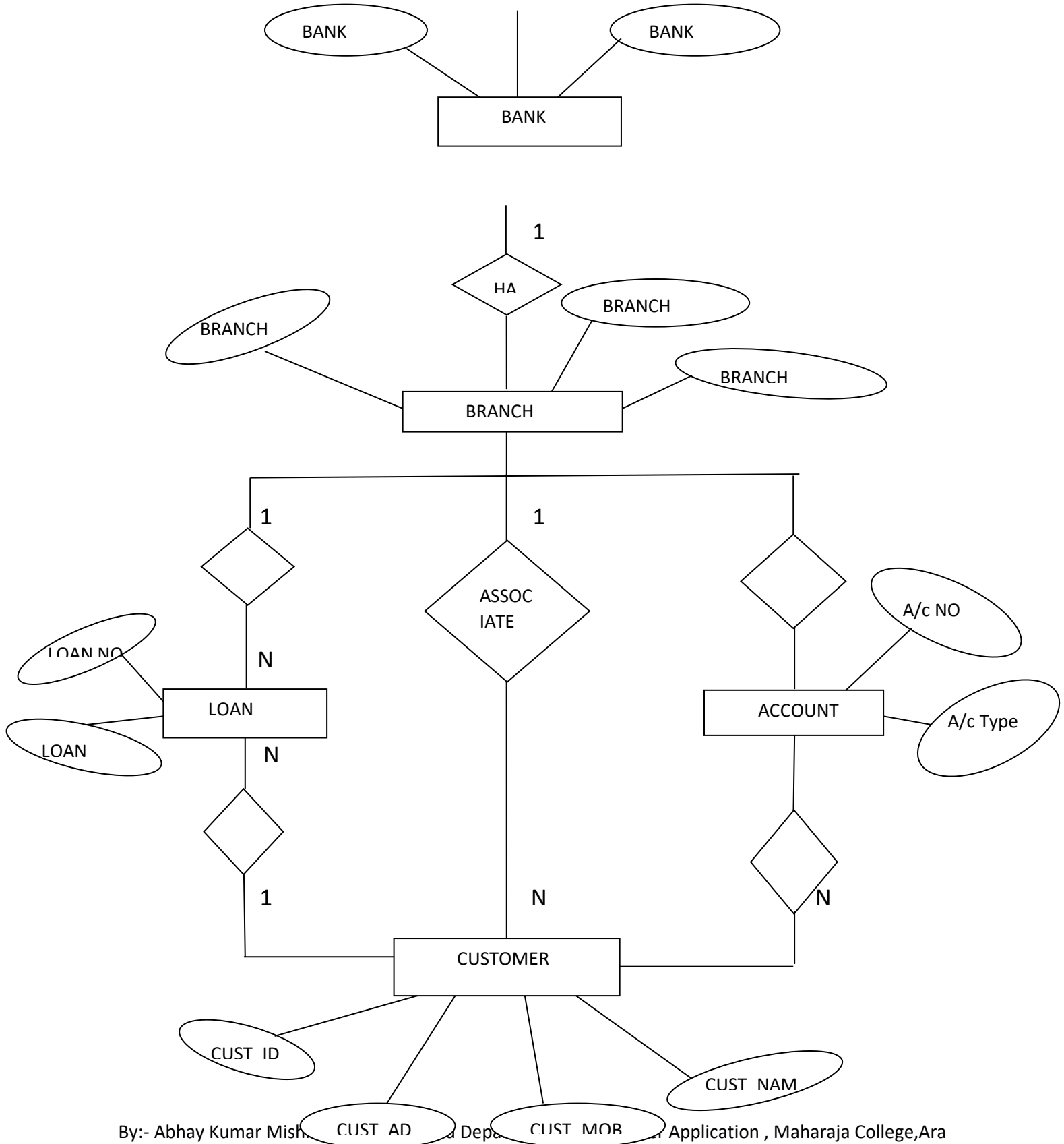
consider a banking business scenario for developing the E-R diagram. Assume in a city.

- ❖ There are multiple bank and each bank has many branches.
- ❖ Each branch has multiple customer.
- ❖ Customer has various type of accounts.
- ❖ Some customer also have taken different type of loan from these bank branches.
- ❖ One customer can have multiple a/c and loans.



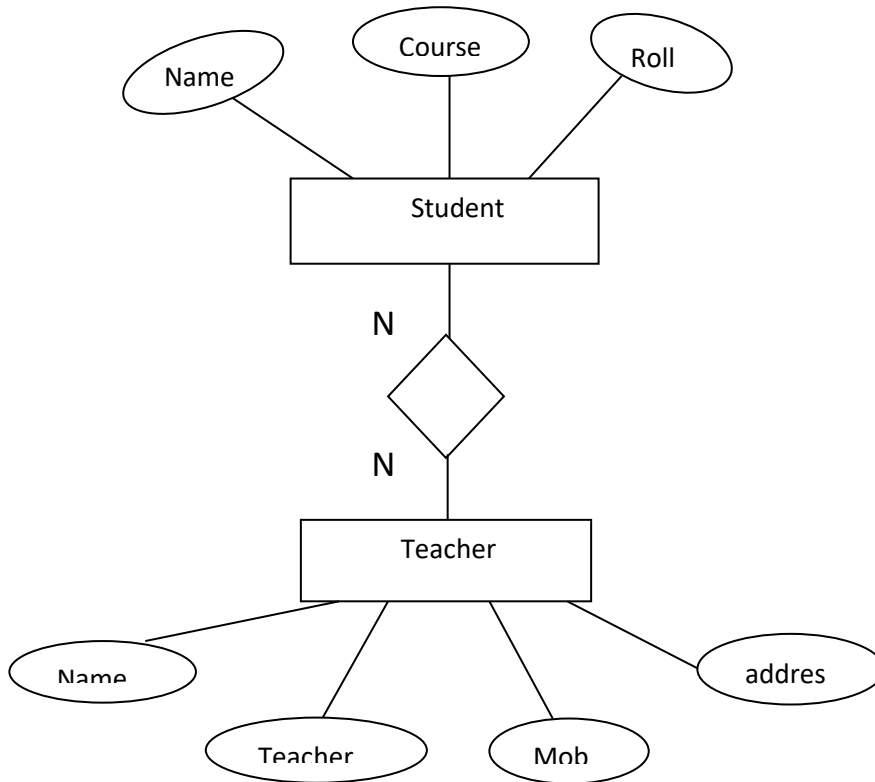
- (bank code, bank name, location address) bank
- (Loan no., loantype) loan
- (branchno, branchname, branchaddress) branch
- (cust id, custname, A/c, custadd, mob) customer.
- (A/c no, A/c type)

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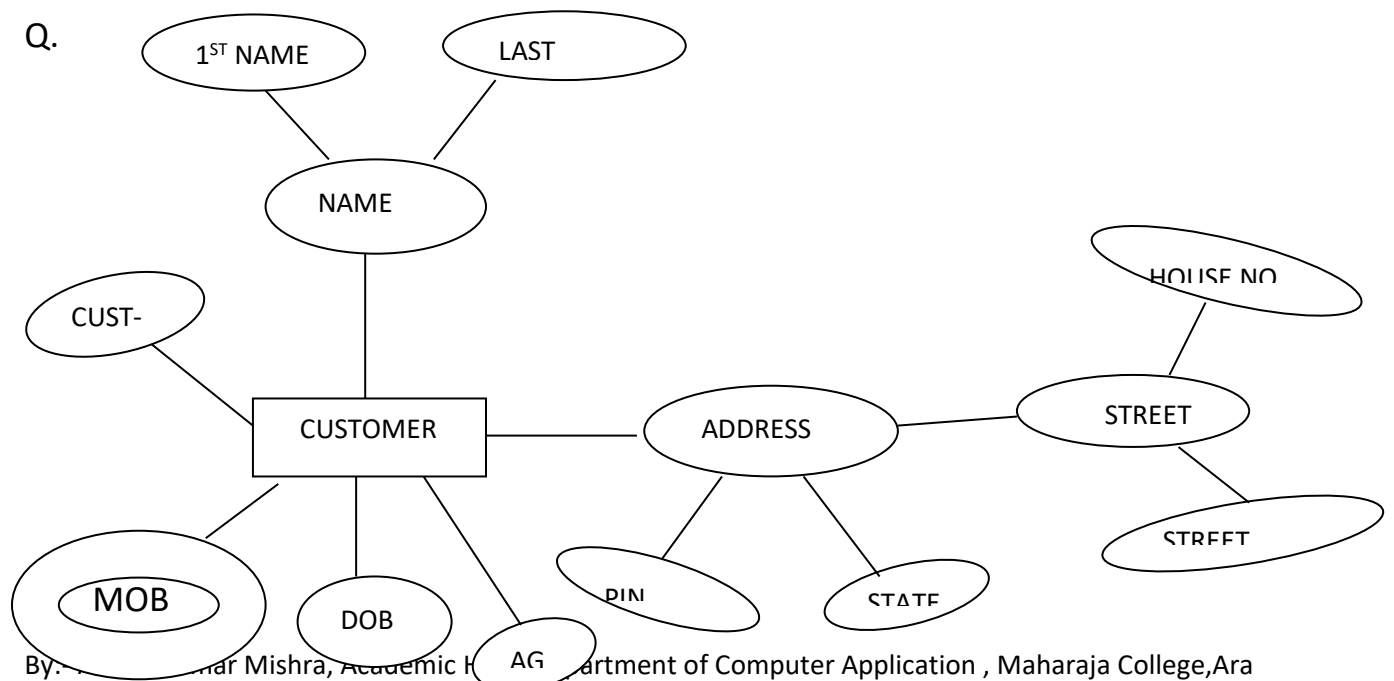


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Q. Draw an E-R diagram between a student and a teacher .



Q.



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DATA MODEL:-

A data model is a mechanism that provides abstraction for database application. Data modeling is used for representing entity of interests and their relationship. It allow the conceptualization of the association between entities and their attributes.

A data model is a conceptual tool to describe data, data relationship data semantics and consistency constraints.

There are basically three types of data models:-

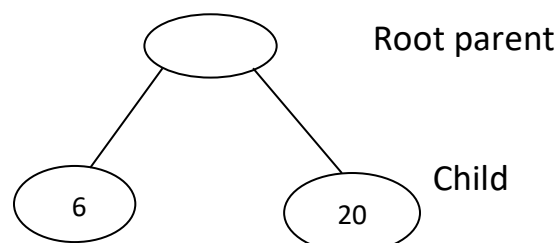
1. Hierarchical data model
2. Network data model
3. Relational data model

1. Hierarchical data model:-

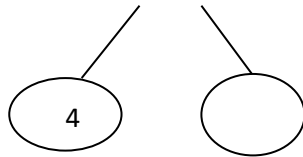
The hierarchical data model organized data in tree structure. There is a hierarchical of parent and child data segment. This structure implies that a record can have repeating information generally in the child segment. Data is represented by a collection of record (record type). A record type is the equivalent of a table in the relational model and with the individual record being the equivalent of row .To create links between these record type the hierarchical model is used parent-child relationship.

In a hierarchical database, the parent child relationship is one-to-many. This restrict a child segment to having only one parent segment.

Hierarchical database model were popular from the later 1960 (with the introduction of IBM information business management system) and IMS information management system was introduced in 1970.



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ADVANTAGE OF HIERARCHICAL DATA MODEL:-

- i. It is stored in hierarchical order in the data.
- ii. The way of implementing records relationship is symbol. So it is simple state forward.

DISADVANTAGE OF HIERARCHICAL DATA MODEL:-

- i. All relationship can't create in the real world as a like many to many relationship.
- ii. Insertion, deletion is very complex.

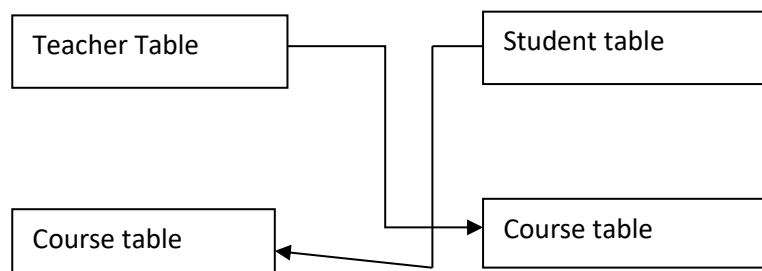
NETWORK DATA MODEL:-

The network model permitted the modeling of many to many relationship in the data. In 1971, CODASYL (Conference on data system language) formally define the network model.

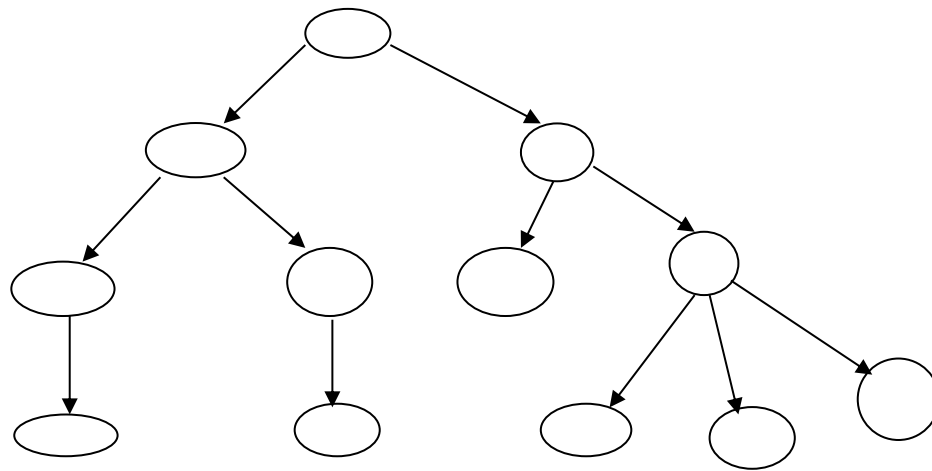
Data in the network model is represented by a collection of records and the relationship among the data are represented by links (pointer). The records in the database are organized as collection of graph.

Network model is a model which contain more than owner. It has created all relationship as a like one to one, one to many, many to many and many to one.

Structure of logical record type and member record type can have multiple owner in the network model.



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ADVANTAGE OF NETWORK DATA MODEL:-

- i. It is useful because it create relation many to many relationship.
- ii. Very easy for searching of any record because it has multiple access path to a data element.

DISADVANTAGE OF NETWORK DATA MODEL:-

All record contain the data with the help of pointer so it is very complex.

RELATIONAL DATA MODEL:-

The relational data model uses a collection of tables (relation) each of which is assign a unique name to represent both data and the relationship among those data. Each table has multiple columns, and each column has a unique name i.e:- associated relationship row of relations are referred to tuples of the relation. It means row indicates the tuples and column indicates attributes. Each attributes of a relation has distinct name.

Cust-id	Loan no.	Amount
0001	2011	4,00,000
002	2012	5,00,000
003	2013	3,00,000
004	2014	5,00,000
005	2015	2,00,000
006	2015	1,00,000

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No of attributes/column/field

Degree of relations

STRUCTURE TERMINOLOGY:-

Formal Relation Term	Information Equivalent
Relation	Table
Tuple	row/record
Cardinality of relation	no .of row or records
Attribute	column/field
Degree of relation	no. of columns/fields
Primary key	unique identifier

ABSTRACTION:-

Abstraction is the simplification mechanism used to hide super class details of a set of object. It allow one to concentrate on the properties that are of the interest to the application such as car is abstraction of personal transportation vehicles which doesn't related details about model, year, color.

There are three main abstraction mechanism used to model in format.

1. Generalization
2. Specialization
3. Aggregation

1. GENERALIZATION:-

Generalization is the abstracting process of viewing set of object as single general class by concentrating on the properties that are of interest to the application.

As for example:- student is a generalization of a graduate or undergraduate, whole time or part time student.

Super class is known as a generalization class. The process of generalization is a bottom to top approach which results in identification

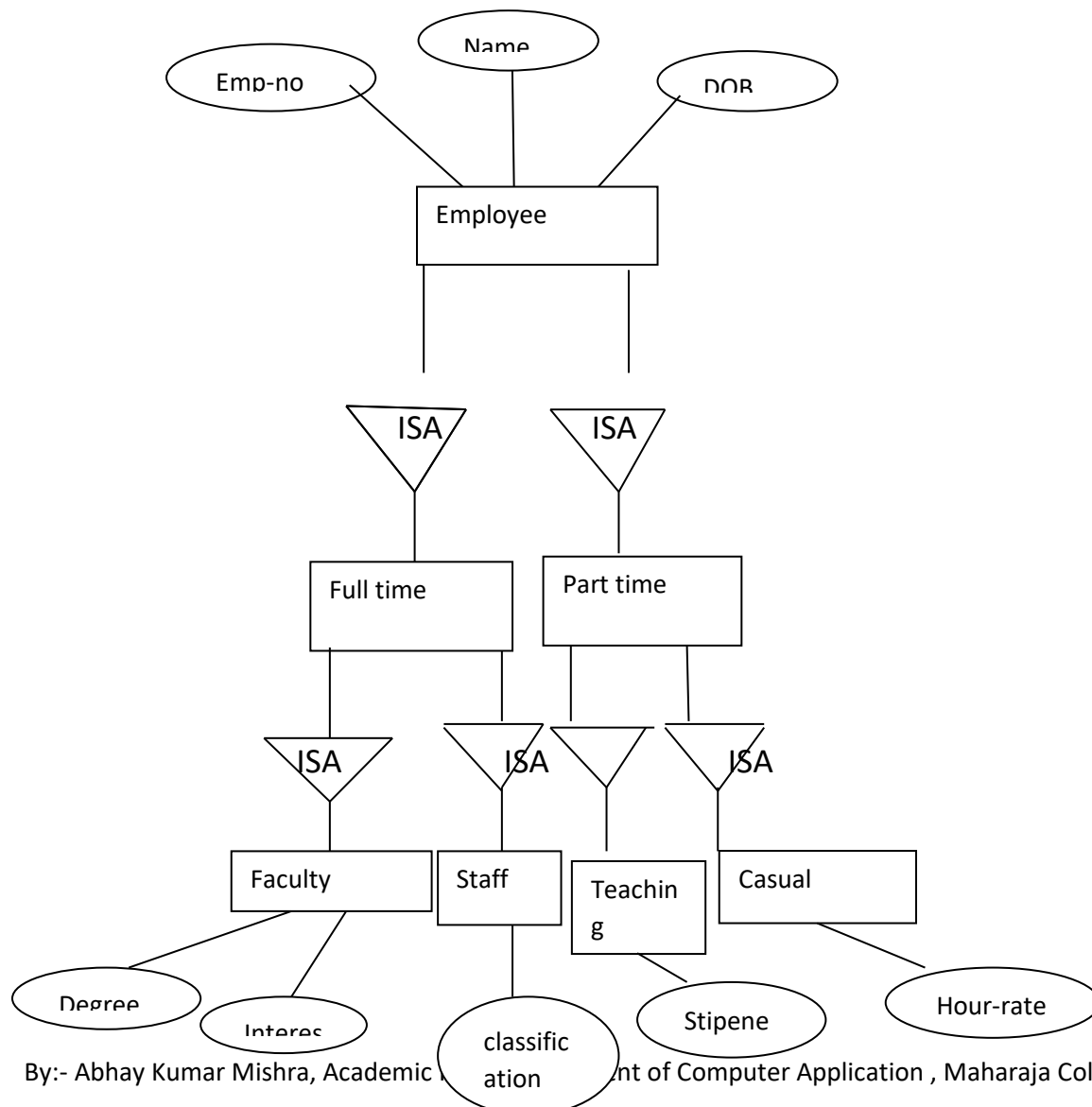
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of a generalized super class from the original subclass. The process of generalization can be view as the reverse of the specialization process.

2. SPECIALIZATION:-

Specialization is the abstracting process if introducing new characteristics to an existing class of object to create one or new class of object. It is lower level of abstraction. This involve taking a higher level entity and using additional characteristics which generate lower level entity. The lower level entity also inherit the characteristics of higher level entity.

Super type class is known as specialization class. As for example- furniture is referred to generalization class where as table, chair, bench etc. is specialization class.



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It is a top down approach to define a set of super classes. Their related subclasses. Their set of super class is defined on the basis of some characteristics of the entity in the super class.

3.AGGREGATION:-

Aggregation is the process of compiling information and object there by abstracting a higher level object. In this manner, the entity is divided by aggregation. The characteristics name, address, social security no.

another form of aggregation is abstracting a relationship between object and viewing the relationship as an object. As for example-enrollment relationship between entities student and course could be view as entity registration.

CONCEPT OF RELATIONAL MODEL:-

The relational model was developed by easier frank 'ted' codd of the IBM in 1972. The basic concept in the relational is that of relation view as a table which has following properties.

- i. It is column homogeneous. In other word in any given of the table all item are of the same kind.
- ii. Each item is a simple number or a character string table must be in first NF(1NF) (first normal form).
- iii. Ordering of row with in a table is immaterial.
- iv. All row of table are assigned distinct name and the ordering of these column is immaterial.
- v. All row of table are distinct.

CODD'S 12 RULE:-

Edger frank 'ted' codd (23rd Aug 1923-18 April 2003). Edger frank 'ted' codd was a british computer scientist who while working for IBM, invented the relationship model for database management. The theoretical basis for relational database.

Codd's 12 rules are a set of 12 rules purposed by Edger frank 'ted' codd (E.F.T Codd).

A pioneer of relational model for database design to define what is required from DBMS in order for it to be consider relation that is RDBMS. There are 12 rules which are given below.

1. THE INFORMATION RULE:-

In relational database model, all information should be always in the form of a table. Data dictionary should be also in the form of a table.

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2. THE ROLE OF GURANTED ACCESS:-

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

3. THE SYSTEMATIC TREATMENT OF NULL VALUE :-

It's fundamental to the DBMS that null values are supported in the representation of missing and inapplicable information. These supports for NULL values must be consistent through the DBMS and independent of data type.

Null value of numeric data must have only one blank.

As for example:- we make define four possible values for a column.

M:-Male

F:-Female

X:-No data available

Y:-Not

Application

4. THE DATABASE DESCRIPTION RULE:-

A description of database is contained and maintained using the same logical structure used to define the data. Allow user with appropriate authority to query such information in the same way and using some language as they would any other data in the database. It contains information in tabular form and view that can be examined using SQL (Structure Query Language).

5. THE COMPREHENSIVE SUBLANGUAGE RULE:-

With the help of this rule guide or support some language and check some rule. It can be expressed as character, string conforming to some well-defined syntax i.e. comprehensive support as a like data definition, view definition, integrity constraint, authorization, data manipulation, transaction boundary.

RDBMS must be completely manage-able through its own structure in SQL.

6. THE VIEW UPDATING RULE:-

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

7. HIGH LEVEL, UPDATE, INSERT AND DELETE:-

An RDBMS must be more than one data retrieve in the relational data set. It must also be possible to insert, update, delete data item from the relational set.

We can say that according to this rule user can easily insert the value of field, delete the

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constraint and update. Operating system should be supported for any retrieval set rather than just for a single row or column in a single table.

8. PHYSICAL DATA INDEPENDENCE RULE:-

Change mode to physical storage representation or access method don't required change to be in application program used to manipulate in the table.

9. LOGICAL DATA INDEPENDENCE RULE:-

Application program must be independent of change mode to the base table. It should not be affected by change mode to be the base table change mode to table should not required and change to be made application program operation on the table.

This rule always many type of database change o be made dynamically without user aware of them.

10. THE DISTRIBUTION RULE:-

An RDBMS must have distribution dependency. It is one of the most attractive aspect of RDBMS database system built on the relational framework are also well suited for today client-server database degine.

11. NON SUB- VERSION RULE:-

If an RDBMS support a lower level language that permits for row at a time processing then this language must not be able to bypass any integrity rule or constraint rule the relational language.

12. INTEGRITY RULE:-

Integrity constraint specific to a particular relation database. Database must be defined in data sublanguage. These integrity constraint must be storable in the catalog and not in use of application program.

The relational model includes two general integrity rule.

a. INTEGRITY RULE 1(Entity integrity):-

it is concerned with ht eprimary key value. It is defined as in the mode of creation table. If the attribute A of relation R is a primary key attribute A of R then A can't accept NULL value.

```
Create table R
(A number (20) primary key)
B char (20)
```

b. INTEGRITY RULE 2(Referential integrity):-

it is concerned with foreign key. It is defined as

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follow:- with attribute of a relation having domain name that are te primary key of another location (table).

Create table K

(A number (20) references A(R),

C char (20));

SQL (Structure Query Language):-

SQL is used to retrieve data from the database. The DBMS process the sql request retrieve the requested data from the database and return it. This process of requesting data from the database and receiving back the result is called a database query and hence the name of structure query language.

IBM develop the original version of sql at san josh laboratory. Now the Almaden research centre IBM implemented the language sequel which part of the system project in the early 1970. The sequel language was changed the name of sql. Sql has early related as the standard relational database language. In 1986, the ANSI-SPARC model and the international organization for standard published and sql standard called sql86. ANSI published an extended the next version of the standard sql was sql92 and most recent version is sql99. Then after oracle company provide this type of task. So recently software is oracle 8i, oracle 9.0, oracle 9i, oracle 10g and oracle 11g etc.

ADVANTAGE OF SQL:-

- i. It is simple to use several command for data processing activities.
- ii. We can use sql commands for the creation, deletion and modification structure.
- iii. Defining relationship between two or more table.
- iv. Inserting data into the table.
- v. Deleting data from the table.
- vi. Controlling a database.

TYPE OF SQL LANGUAGE OR STATEMENT:-

- i. DDL(Data Definition Language)
- ii. DML(Data Manipulation Language)
- iii. DCL(Data Control Language)

1. DDL (Data Definition Language):-

In SQL, ddl commands are used to create, alter, drop, add the column name, modify the column name, describe the table etc.

For creating a table:-

By:- Abhay Kumar Mishra, Academic Head Department of Computer Application , Maharaja College,Ara

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Syntax:- create table <table name>

```
(<column name>, <data type>,<size>,<column name>)  
<data type><size>;
```

Example :- create table naveen

```
(acct-id varchar2(20), name varchar1(20), address varchar2(30), pin code number  
(6));
```

DATA TYPE :-

CHARACTER (char):-

this data type is used to store character string value of fixed length. The data type can hold maximum number of character 255.

Varchar and varchar2:-

This data type is used to store variable length alphanumeric data. This data type can hold maximum character is 2000 and oracle 9i can hold upto 4000. It is called non-paied.

NUMBER(p,s):-

The precision (P) determine the total number of digita possible which indicate left side of decimal point and scale (S) determine total number of digit possible to right side of decimal point. The maximum length is 38 digit.

Syntax :- number (4,3)

DATE :-

this data type is used to represent date and time . the standard format is DD-MM-YYYY and time stored in 24 hour.

LONG:-

this data type is used to store variable name character string contained upto 2GB.

Create table from a table:-

Syntax :- create table <target table>

```
(<column name>, <column name>, <column name>)
```

```
As select <column name >,<column name >,<column name >, from <source  
table name >,
```

```
Create table Praveen
```

```
(acct-id, name ,address, pin code)
```

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As select acct-id, name, address, pin code from tanya;

MODIFY THE STRUCTURE OF TABLE:-

1. Adding a new column

Syntax:- alter table <table name>

Add (<new column name > <data type> (<size>),.....);

Example :- alter table naveen

Add(mob number (10));

Add(mob number(10), city varchar2(20));

2. Dropping a column from a table :-

Syntax:- alter table <table name>

Drop column (<column name>);

Example :- alter table naveen

Drop column city;

3. modifying /changing the data type of a column:-

Syntax:- alter table<table name >

Modify (<column name > <new data type >(<size >));

Example:- alter table student

Modify (mob varchar2(10));

RESTRICTION ON ALTER COMMAND:-

Using altered table, the following task can't be performed:-

- Change the name of table
- Change the name of column.
- Decrease the size of column if table data exist.

Alter table student

Add primary key (Roll);

Alter table student

Drop primary key (Roll);

Renaming table:-

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Syntax :-

rename <old table name> to <new table name>;

Example :- rename naveen to Praveen.

Destroying table:-

Syntax - drop table <table name>;

Example:- drop table Praveen;

Describing table:-

Syntax:- describe <table name >;

Or

Desc <table name >

Example :- describe naveen ;

Or

Desc naveen;

CONSTRAINT:-

NOT NULL CONSTRAINT:-

“Not NULL ” constraint defined at the column level.

Syntax:- <column name > <data type > (<size>) not NULL;

Example:- create table Praveen

(roll noi number (10)) not NULL;

Name varchar2(20),address varchar2(30));

“Not NULL” constraint defines at the table level

Syntax- <column name > <data type > (<size >) not NULL;

Example:- create table Praveen

(roll no number(10), name varchar2(20), address varchare2(30) not NULL
(roll no));

UNIQUE CONSTRAINT :-

SYNTAX - <Column name > <data type > (<size >) unique

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“unique constraint ” define at column level

Example:- create table student

```
(roll varchar2(20), name varchar2(20) unique , address varchar2(30));
```

“unique constraint ” define at table level

Example:- create table student

```
(roll varchar2(20), name varchar2(30), address varchar2(30) unique (name));
```

PRIMARY KEY CONSTRAINT:-

Syntax - <column name > <data type > (<size >) primary key

“primary key constraint ”define at column level

```
(client-no varchar2(40)primary key, product-rate number (10), quantity varchar2(30));
```

“primary key constraint ” defined at table level

Example- create table sales-order

```
(Client-no varchar2(40), product-rate number(10),quantity varchar2(30) primary key (client-no , product-rate ));
```

FOREIGN KEY CONSTRAINT :-

“Foreign key constraint ” define at the column level

Example:- create table sales-order-details

```
(det-order-no varchar2((20) references sales-order <order no> product-no varchar2(30), product-rate varchar2(30));
```

Create table sales-order

```
(order-no varchar2(20) primary key, product-rate varchar2(30));
```

CHECK CONSTRAINT :-

“Check constraint ” defined at the column level

Syntax :- <column name > <data type > (<size >) check (<logical expression>)

Example:- create table praveen

```
(client-no varchar2(6) check (client-no like 'p'), name varchar2(20) check (name =upper(name) ), addresss varchar2(30), city varchar2(10) check(city in ('Ara', 'Patna', 'Ranchi', 'Delhi' )) Pin code number(6));
```

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“check constraint ” define at the table level

Syntax:- check logical expression

Example:- create table Praveen

(client-no varchar2(6), name varchar2(20), address varchar2(30), city varchar2(10), pin code number (6), check(client-no like 'P') check(name= upper (name)), check (city in ('Ara', 'Patna', 'Ranchi', 'Delhi')));

DEFAULT VALUE CONCEPT:-

Syntax:- <column name > <data type > (<size >) default (<value>);

Example:- create table BK

(roll varchar2(10), name varchar2(30) default 'praveen', address varchar2(30), pin code number(6) default 802301);

Truncate

Syntax:- truncate table <table name >

Example :- truncate table student;

ii. **DML(Data Manipulation Language):-**

the next sql command is DML command that are given below:-

insert, select, edit,update etc.... sql provide the following basic data manipulation statement.

Inserting data in to table:-

Insert in to <table name >

<column name1 > to <column name >

Values (<expression1> to <expression n >);

Example:- insert into student

(roll, name address)

Values(001, 'Aman', 'Ara ')

2nd method – insert in to student

Values (& Roll, '&name ', '&address');

Roll- 03

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Name –Joy

Address – Ara

One row created

/ :- to fill the data again , we have to press forward slash(/).

By default NULL value :-

Insert in to student

Value (002, 'BK');

SELECT :-

To see the whole data inserted in to table.

Syntax:- select * from <table name >;

Example:- select * from student;

FILTERING THE TABLE DATA:-

The way of filtering table data will be :-

- i. Selected column and all row.
- ii. Selected row and all column;
- iii. Selected column and selected row;

1. Selected column and all row:-

the retrieval of specific column from a table.

Syntax:- select <column name1> <column name2 > from <table name >.

Example:- select roll, name from student.

2. Selected row and all column:-

Syntax :- select * from <table name > where <condition >;

Example:- select * from student where name = 'Kamlesh';

3. Selected column and selected row:-

Syntax :- select <column name1>, <column name2> from <table name > where <condition >;

Example:- select roll, name ,address from student where name ='praveen';

ELIMINATING DUPLICATE ROW WHEN USING A SELECTED STATEMENT :-

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A table could hold duplicate row in such case top view any unique row.

Syntax:- select DISTINCT <column name1>, <column name2> from <table name >;

Example:- select DISTINCT name , pin code from student;

SORTING DATA IN A TABLE:-

Syntax :- select * from <table name > order by <column name1 >, <column name2 > <[sort order]>;

Example:- select * from student order by name;

In descending order

Select * from student order by name desc;

Inserting a data in to a table from another table:-

Syntax:- insert in to <target table name > select <column name1> ,<column name 2> from <source table name >;

Example:- insert in to student1 select roll , name , address from student;

LOGICAL OPERATOR:-

i. The AND Operator:-

Example :- select product-no, profit, price from product-master where profit >=10 AND profit <=20;

ii. OR operator :-

example:- select produce- no, profit, price, address, pin code from product- master where pin code=802301 or pin code =802312;

iii. NOT Operator :-

example:- select product-no, profit ,price, address, pin code from product-master where address NOT in ('Ara', 'Patna', 'Ranchi');

2nd example :-

Select product-no, profit , price, address, pin code from product-master where NOT (address='Ara' OR address= 'Ranchi');

RANGE SEARCHING :-

Select profit, price from product-master where profit between 10 AND 20;

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Select * from client-master where name like Na%;

Select * from client-master where name like = 'M'%; AMAN(second letter necessary in capital but first letter any).

Renaming column using with expression list:-

Syntax:- select <column name> <alias name > from <table name>;

Example:- select Roll * 10 Roll1, name , price * 20 new price from product-master.

DELETE:-

Remove of all rows

Syntax:- delete from <table name >;

Example :- delete from student;

Deletion of a specified row:-

Syntax:- delete from <table name> where <conditions>;

Example:- delete from student where roll=0001 ;

With grant option :-

The 'with grant option ' allow the guarantee to enter grant object privilege to other user.

For creating a user:-

If we want to create a user in sl then use the create user command and identified by. Then after creation of user we can use connect command insert in user login.

Syntax:- create user <user name> identified by <password>;

Example:- create user Naveen identified by *****.

CONNECT:-

If you want to connect from database then perform the following syntax.

Syntax:- grant connect, resource to <username>

Example:- Grant connect, resource to Naveen;

Connect (enter)

Username: naveen

Password: *****

To associate all privilege:-

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Syntax:- Grant all on <table name > to <username>;

Example:- Grant all on Praveen to naveen

For specific privilege:-

Grant select on Praveen to Rajnigandha;

It authorized for select.

Another example:- Grant select, insert on Praveen to Rajnigandha;

It grant for select as well as insert.

REVOKE:-

It is used to cancel database privilege from user, syntax is given below-

Syntax:- revoke <object privilege > on object name from <username >;

Example:- revoke all on supplier-master from rajnigandha;

Another example for specific:-

Revoke select, insert on supplier-master from Rajnigandha;

Updating the concept of a table:-

Updating all row

Syntax:- update <table name> set <column name> =<expression >

Example:- update student set address= 'Ara';

Updating a record conditionally

Syntax:- update <table name> set <column name> =<expression > where <condition>;

Example:- update student set name = ' Mr. Naveen ' where pinb code =802301;

iii. DCL(Data Control Langugae):-

DCL is a definition of security mechanism or schema for protecting data from unauthorized access.

The DCL consist of feature that a user is permitted to perform a particular action. It contain commands as a like grant and revoke.

Oracle provide extensively security features in order to safe guard information stored in its table from unauthorized watching and damage depending on a user status and responsibility appropriate write on oracle resource can be assigned to the user by DBA.

The resource on the server are called privilege.

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Granting Privilege Using Grant Statement:-

The grant statement provides various types of access to database object such as table, view and so on.

Syntax:- Grant <object privilege > on <object name > to <user name >[with grant option];

OBJECT PRIVILEGE:-

Each privilege that is granted authorized the guarantee to perform some operation on the object. A user can grant all privilege or grant only specific object privilege as a like alter, delete, delete, update, insert.

RELATIONAL ALGEBRA:-

Relational algebra is a procedural query language. It is a collection of operation which manipulate the relation between one or two and produce a new relation as their result. The fundamental operation in the relational algebra are select, project, union, set difference, Cartesian product and rename. It can be divided in to two basic operation.

- I. Set- oriented approach
- II. Relation-oriented approach.

1. set-oriented approach:-

it contain some operation as a like union, intersection, set difference, Cartesian product perform.

Union operation:-

P

Emp-no	Emp-name
101	Aditya
102	Abhishek
103	Aman
104	Rajesh
105	Vinay

Q

Emp-no	Emp-name
101	Aditya
102	Abhishek
106	Sahil
107	Manish

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104	Rajesh
108	Naveen

R=P U Q

Emp-no	Emp-name
101	Aditya
102	Abhishek
103	Aman
104	Rajesh
105	Vinay
106	Sahil
107	Manish
108	Naveen

Two relation have union capability if they have same value and one to one corresponding of the value have the attributes with corresponding attributes defined over the same domain. The resultant of domain operation is denoted by the symbol U.

Example:- In the above example, we have taken two relation P and Q and computed its result in R. the relation P and Q represent employee working on software working package.

Intersection operation:-

P

Emp-no	Emp-name
101	Aditya
102	Abhishek
103	Aman
104	Rajesh
105	Vinay

Q

Emp-no	Emp-name
101	Aditya
102	Abhishek
106	Sahil
107	Manish
104	Rajesh

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108	Naveen
-----	--------

R=P Q

Emp-no	Emp-name
101	Aditya
102	Abhishek
104	Rajesh

The intersection operation select the common tuples from the two relation. The resultant operation P Q is set of all employee working on both package.

Difference operation:-

P

Emp-no	Emp-name
101	Aditya
102	Abhishek
103	Aman
104	Rajesh
105	Vinay

Q

Emp-no	Emp-name
101	Aditya
102	Abhishek
106	Sahil
107	Manish
104	Rajesh
108	Naveen

P-Q

Emp-no	Emp-name
103	Aman
105	Vinay

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The difference operation remove common from the first relation. The result of $P-Q$ gives employee working only on package.

Cartesian product

P

Emp-no	Emp-name
101	Aditya
102	Abhishek
103	Aman
104	Rajesh
105	Vinay

C

S
C1
C2

Emp-no	Emp-name	S
101	Aditya	C1
102	Abhishek	C1
103	Aman	C1
104	Rajesh	C1
105	Vinay	C1
101	Aditya	C2
102	Abhishek	C2
103	Aman	C2
104	Rajesh	C2
105	Vinay	C2

The standard Cartesian or simple Cartesian of two relation is the concatenation of tuple belonging to the relation. A new resultant relation schema is created of all possible creation of tuples.

2. Relation oriented approach :-

this approach perform the operation such as selection (σ), projection (π), join(\Join) and division (\div).

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Projection and selection are unary operation and join and division are binary operation.

Selection operation (σ):-

The selection operation select a tuples that satisfy a given predication. We use the lowercase letter sigma(σ) symbol to denote select operation. the predicate appears as subscript to sigma. The argument relation is in parenthesis after the sigma to select those tuples of loan relation where the bank is union bank.

Loan

Loan-no	Bank-name	Amount
L-11	SBI bank	9,000
L-14	Allahabad bank	1,15,000
L-15	Union bank	15,000
L-16	Central bank	13,000
L-17	HDFC	10,000
L-93	ICICI BANK	20,000

Using DML command:-

```
select * from loan where bank-name = union –bank
```

Using σ operation:-

```
(bank-name=union bank)loan
```

Q. find all tuples in which amount is more than 12,000 repees.

Using DML command (select)

```
Select * from loan where amount > 12,000
```

Using σ operation :-

```
Amount > 12,000(loan)
```

Q. if we want to find the tuples pertaining to know off more than 12,000 repees made by union bank.

Using DML select command:-

```
Select * from loan where bank-name= 'union bank' AND amount > 12,000;
```

Using σ operation :-

```
Amount > 12,000
```

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Projection operation (π):-

the projection operation is a unary operation that returns its argument relation with certain attributes. Since relation is a set are eliminated projection elimination. It is denoted by upper case greek letter π . we list attributes that wish to appear in the result as subscript to π . the argument relation follow a parenthesis we write the query list of loan number (loan-no) and the amount of loan.

As for example:-

Q. find distinct loan-no and amount from the table loan.

Using DML select (command)

Select DISTINCT loan-no, amount from loan

Using π operation:-

π Loan-no, amount (loan)

Loan-no	Amount
L-11	9,000
L-14	1,15,000
L-15	15,000
L-16	13,000
L-17	10,000
L-93	20,000

Join operation:-

when we required to retrieve data from more than one table, then we use join statement in sql statement.

The natural join operation is binary operation that allow us to combine a certain selection Cartesian product in to one operation. it is denoted by the symbol \bowtie or \Join .

The natural join operation from Cartesian product of its two argument perform a selection forcing equal attributes that appear in both relation schema and finally remove duplicate attributes.

Although the definition natural join is complicated. The operation is easy to apply. We were now ready for a formal definition of the natural join.

Consider two relation employee and salary. The natural join of employee and salary denoted by employee \bowtie salary.

It is of different type:-

- I. Cross join

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- II. Equi join
- III. Non-equi join
- IV. Self join
- V. Outer join
- VI. Natural join.

1. cross join :-

It gives the cross product of the row of the join table. Display the name and address of the employee using employee and address table.

```
Select emp-name, emp-address from employee(loan)
```

```
Cross join address;
```

Using union keyword

```
Select name, address from employee union name, address from address.
```

2. EQUI JOIN:-

when we retrieve records from more than one table using equal operation is known as equi join . in this, the table must have primary and foreign key of the table. As for example:-

Display the name address of all employee from employee and address table

```
Select emp-name ,emp-address from employee e, address a where e.id=a-id (= symbol of equi join)
```

3. NON-EQUI JOIN :-

When we required to retrieve the records from more than one table using any operation except equal operation in join condition is known as non-equi join. As for example:-

display the name and address of all employee where id(employee id) is greater than that of address's id.

```
Soln:- select emp-name,a.address from employee e, address a where e.id > a.id
```

Without creating object

```
Select name, address from employee ,address where employee. Id > address.id.
```

4. SELF JOIN :-

When a table is join by itself known as self join. In this case, two columns of the table have the primary key and a foreign key. As for example:-

display the name of employee and his manager from table employee.

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Soln:- select emp-name, m-name from employee e employee m where e.id= m.id

5. NATURAL JOIN:-

When the table of the join operation having the same name and the data type of the column then use a natural join. Example:-

Select name, location from employee natural join department .

Here, employee and department are table.

RELATIONAL CALCULUS:-

Relational calculus is query system where the query are expressed as variable and formula on these variable. Relational calculus means calculating with relation base on predicate calculus. The letter is formal language used by logical symbol and logical argument as a like P AND Q, P OR Q, P NOT P NOT Q.

Relational calculus is of different types:-

1. Tuples relational calculus

2. Domain relational calculus

1. Tuples relational calculus:-

$\{ x/f(x) \} \{ x: f(x) \}$

X such that f(x) tuples relational calculus is a non-procedural language. The query is relational calculus expressed as a like x such that f(x) where f is formula environment and x represent a set of tuples variable.

In this language, we can use comparing relation as a like =, !=, <, >, <=, >=.

Q find record of all employee whose salary is greater than 5000rupees.

Using select command of DML

Select * form emp where salary> 5000

Using tuples relational calculus

{t/emp(t) and t.salary > 5000}

Q. find employee name, data of birth, designation of employee where salary is greater than 7000 rupees.

{t. emp-name, t.DOB, t. designation/emp(t) and t.salary > 7000}

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2. Domain Relational Calculus:-

the second form of relational calculus called domain relational calculus.

Domain used variable that are text and value form and attributes domain rather than value for entity tuples. The domain relational calculus is expressed in the domain relational calculus is in given form.

$$\{ \langle x_1, x_2, x_3, \dots, x_n \rangle \mid p \langle x_1, x_2, x_3, \dots, x_n \rangle \}$$

where $x_1, x_2, x_3, \dots, x_n$ represents domain variable and P represents a formula composed of atom. It was the case in the tuples relational calculus.

$x_1, x_2, x_3, \dots, x_n$ belongs to R where R is a relation on N attributes. $x_1, x_2, x_3, \dots, x_n$ are domain variable and P is a formula in x.

Q. find the loan-no, bank-name and amount from loan over 12000 rupees.

$$\{ \langle L, b, a \rangle \mid \langle L, b, a \rangle \wedge a > 12000 \} \subseteq L \subseteq L, b, a$$

Note:- \vee OR

\wedge NOT

QBE(Query By Example):-

Query by example is the name of both data manipulation language and early database system that include this language. The QBE database system was developed at IBM T.J. Watson Research Centre in the early 1970 with the help of MMZ100f. The QBE data manipulation language was later used in IBM's QUERY management facility (QMF). Many database system for personal computer support variants of QBE language. It has two distinct features:-

1. Unlike most query language and programming language QBE has two dimensional system. Queries look like system table. A query is a one-dimensional language such as sql can be written in one line. Two dimensional language require two dimension for its expression.

2. QBE queries are expressed by example instead of a given procedure for obtaining the desired answer. The user gives an example of what's the data is required. The system generalize this example to compute the answer to the query.

In QMF, QBE queries are translated in to equivalent SQL queries. Relational database management system such as Dbase IV, INGRES and Oracle have some form of example based query example. It is based on domain calculus and two dimensional system both horizontally or vertically. The query are written in dimension of table.

Queries are formed by INGRES and example of possible answer on skeleton table.

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The SQL doesn't have column heading. The first column is used for relation name.

skeleton is displayed by pressing function key to get a list of relation. We enter 'P' for print command on the first column of column heading.

To get a list of relation, we enter 'P' for print command in first column in the column heading.

P						

Duty-allocation P				

Duty-allocation P	Posting -no.	Emp-no	Shift	Day
	P.P1	P.E1	P.S1	P.D1

The fact of all details are required is indicated by P under the relation .

{<P1, E1,S1, D1 >/ P<P1, E1, S1, D1> ^ E1=2 5 5 } {<P1,E1,S1, D1 >/ <P1,E1,S1,D1 > Duty-allocation }

{<<P1,E1,S1,D1>/ P<P1,E1,S1,D1 ^ E1=2 5 5 } {<P1,E1,S1,D1 >/ <P1,E1,S1,D1 > P }

INGRES (Interactive Graphics and Retrieval System):-

INGRES system is a relational database system developed at university of California at Berkeley. This project run almost concurrently with the system R project at IBM at San Jos Research Centre.

QUERY LANGUAGE:-

The data manipulation language for INGRES based on relational tuples calculus. Unlike SQL, it doesn't support relational language, algebraic operation such as intersection, union or minus. QUEL doesn't support nested query.

By:- Abhay Kumar Mishra, Academic Head Department of Computer Application , Maharaja College,Ara

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The original version of INGRES is used extensively run under UNIX system as well as work station based on the microprocessor. It is commercial product.

For table creation :-

Syntax:- create <relation name > (attributes)

Example:- create duty-allocation (posting no = l, emp-no=i, shift= l, day=i)

Create student (roll=l, name= l, address= i)

RANGE:-

Range is used to create or define variable.

Syntax:- range of <tuple variables > is <relation name >

Range of D is Duty-allocation

Range of S is student

Note:- l is given for identification

RQUBE:- relational query by example.

ANOMALIES IN A DATABASE:-

If we want to retrieve , update, insert and delete the information in designing table then their situation create the problem in front of us as a like retrieve, update, delete of incorrect data or record is called anomalies in a database.

There are different types of anomalies:-

1. Redundancy:-

In the sense of database system information to be stored only once. It means reduce the redundancy. Ythe same piece of information stored in several times in the database. Then leads to the waste of storage space and increase the total size of data stored.

2. Updata Anomalies:-

If we want to update only one data then we see multiple copies are updates. We can change the phone number of 'Naveen' then must be changed in different place. The consisting in all tuples pertaining (relates) to the student.

3. Insertion Anomalies:-

if we want to insert data in some specific field or related with specific information then we can see multiple copies are inserted and not change in specific record or information.

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4. Deletion Anomalies:-

if we want to delete the data only one place but we can see all data are delete related with them.

FUNCTIONAL DEPENDENCY:-

It is sub sequence of the enter relationship among attributes of an entity represented by a relation. An attribute 'y' can called functional dependent on 'x' indicating by $X \rightarrow Y$

We can say that attribute X is identifying attributes

Y. example:-

X {1,2,3,4,5} x is independent of y

Y {0,6,9,8,7}

Functional dependency play an important rule in differentiating between good database design there is no fullproof algorithm module of identifying dependency.

Let x and y be two attribute and relation. Given the value of x. if there is only one value of y corresponding to it, then u is said to be functionally dependent on x. this is indicated by the notation. $X \rightarrow Y$.

HOW TO CHECK THE FUNCTIONAL DEPENDENCY:-

If we have to check the functional dependency of y on x($x \rightarrow y$) then we will change x with the value of y. if the value of x doesn't repeat then we will say that y is functionally depended on x and if the value of x repeat, then the value should also be repeated.

Closure of functional dependency:-

it is denoted by F^+ even a set of functional dependency (F) if we can inference new functional dependency is based on the set F, then it is called as closure of functional dependency and denoted by F^+ . as for example:-

$F = \{ b \rightarrow c \}$

$C \rightarrow b$

$c \rightarrow a$

$F^+ = b \rightarrow a$

Rules of functional dependency:-

1. Transitive:- $x \rightarrow y$

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$$y \rightarrow z$$

$$\Leftrightarrow X \rightarrow z \text{ (z denoted x)}$$

2. Additivity :- $x \rightarrow y$

$$x \rightarrow z$$

$$\Leftrightarrow X \rightarrow y+z$$

Full functional dependency:-

when all non-key attributes depend on the key attributes it is called full functional dependency.

Roll	Name	Address	Age	Course
------	------	---------	-----	--------

Above example, non-key attributes (Name, Address, Age, Course) depends on the key attributes (Roll).

$x \rightarrow y$ is a full functional dependency because deletion from any attributes from x could result in to the cancellation of dependency. In other words, any attribute belongs to other attributes. So it is called full functional dependency.

Partial dependency:-

Roll	Course	Name	Address	Age	Date of joining
------	--------	------	---------	-----	-----------------

A functional dependency $x \rightarrow y$ is a partial dependency when some non-key attributes depend on key attributes and remaining non-key attributes depend on key attributes and so one or more non-key attributes. In other words, all non-key attributes not depend on key attributes there is a partial dependency of non-key attributes either on the key attributes and the non-key attributes.

In the above figure, non-key attributes name, address and age depend on Roll and non-key attributes date of joining depend on Roll and course attributes.

If all the non-key attributes are not depended upon key attributes, they are known as partial dependency.

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Transitive Dependency:-

if x, y, and z be the attributes of R and if $x \rightarrow y$ and $y \rightarrow z$ that means $x \rightarrow z$ so z is transitive dependency.

$R = \{x, y, z\}$

when non-key attributes depend on other non-key attributes, it is called transitive dependency.

In general case of transitive dependency. A, B, C are three columns in a table. If C is related to B

And, if B is related to A

Then, C is directly related to A.

NORMALIZATION:-

Normalization process of database design which is used to eliminate (avoid, remove, truncate) or minimize the data redundancy and make the database constraint. It also allows to perform basic operations such as insert, delete and update are easier.

Normalization is the process in which eliminates and simplifies the relationship in a record. Normalization transmits a collection of data in a record structured by another record designed which is easier and more manageable.

The goal of relational database design is to generate a set of relation schemes that allow us to store information without any redundant data (repeated data). It also allows us to retrieve information easily and more effectively.

NEED FOR NORMALISATION:-

Normalization reduces the redundancy. Redundancy is the same piece of information occurring in a field. It can create a platform with storage, retrieval and updation of data. Redundancy creates

1. Inconsistency:-

errors are more likely to occur when facts are repeated.

2. Anomalies:-

Insertion, modification and deletion of data may cause inconsistency. With the help of normalization we can eliminate.

PROPERTIES OF NORMALIZATION:-

Ideal relation after normalization should have the following properties so that the problem mentioned in the normalized form.

- I. No data value should be duplicated in different rows unnecessarily.
- II. A value must be specified and required for every attribute in a row.

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- III. Each relation should be self contained in other word if a row from a relation is deleted, important information should not be accidentally lost.
- IV. When a row is added to a relation, other relation in a database should not be affected.
- V. A value of an attribute in a tuple may be changed independent of other tuples in the relation and other relation.

FIRST NORMAL FORM(1NF):-

A database can be called to be in 1NF, if the data is atomic and there is no repeating group.

Converting a relation to first normal form is the first essential step of normalization. The successive higher normal form known as 2NF,3NF,BCNF,4NF and 5NF.

Each form is an improvement over the earlier form. In other word, 2NF is an improvement on 1NF ,3NF is an improvement on 2NF and so on.

The higher normalization step are based on three-independent concepts.

- I. Dependence among attribute in a relation.
- II. Identification of an attributes or set of attributes is a key of relation.
- III. Multi value dependency will be attributes.

SECOND NORMAL FORM(2NF):-

A database can be called as 2NF if all the non-key attributes are fully functionally dependent on key attribute in the case of composite key. Attribute their should not be any partial dependency and the data should be already in 2NF.

2NF is a relation that is (i.e:) in 1NF and every non-primary key is fully functionally depend on the primary key.

THIRD NORMAL FORM(3NF):-

A relation can be called as to be in 3NF if no non-key attributes functionally depend on any other non-key attributes and the database should be already in 2NF, then we eliminate transitive dependency in 3NF.

3NF normalization will be necessary where all attributes in a relation tuples are not functionally depend only on the key attributes if two non-key attributes are functionally depend then there will be unnecessary duplication of data.

BCNF(Boyce Codd Normal Form):-

BCNF proposed a simple normal form of 3NF but it is much more straight than 3NF (every relation in BCNF is also in 3NF) . however a relation in 3NF , is not necessary in BCNF.

A table is in BCNF If only a determinate in the table are candidate key.

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DETERMINANTS:-

If $A \rightarrow B$ then A is called determinant of B and B is functionally depended on A.

Assume that a relation has more than one possible key as a like candidate key, contain common attribute, if an attribute of a candidate key depends on the other key attributes.

Example:-

Roll	Name	Address	Pid	P name	Mks	Grade
001	Ram	Patna	P01	IT	60	C
001	Ram	Patna	P02	BS	62	C1
001	Ram	Patna	P03	C	75	A
002	Mohan	Ranchi	P02	BS	69	B
002	Mohan	Ranchi	P03	C	80	S
002	Mohan	Ranchi	P04	CO	75	A
003	Sohan	Delhi	P01	IT	45	F
003	Sohan	Delhi	P03	C	54	D
003	Sohan	Delhi	P04	CO	60	C

Checking 1NF:- Roll, Name, Address from a repeating group. We can break the table in two table.

Table 1

Roll	Name	Address
001	Ram	Patna
002	Mohan	Ranchi
003	Sohan	Delhi

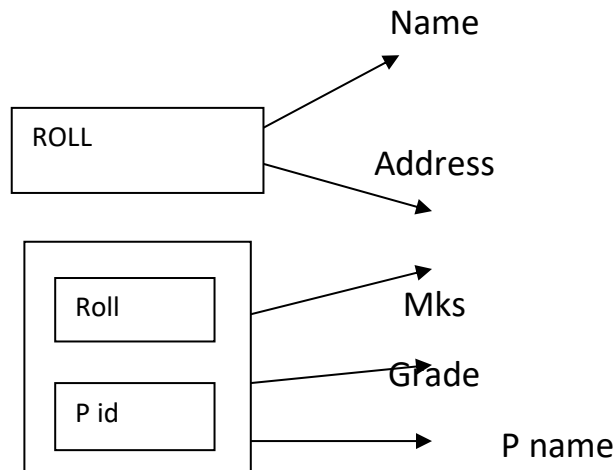
Table 2:-

Roll	P id	P name	Mks	Grade
001	P01	IT	60	C
001	P02	BS	62	C1
001	P03	C	75	A
002	P02	BS	69	B
002	P03	C	80	S
002	P04	CO	75	A
003	P01	IT	45	F
003	P03	C	54	D

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003	P04	CO	60	C
-----	-----	----	----	---

Now the above two table are in 2NF. Now checking 2NF.



The first table will remain as it is. The second table can be broken down into two tables.

Roll	Name	Address
001	Ram	Patna
002	Mohan	Ranchi
003	Sohan	Delhi

Table 2

P id	P name
P01	IT
P02	BS
P03	C
P04	CO

Table3

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Roll	P id	Mks	Grade
001	P01	60	C
001	P02	62	C1
001	P03	75	A
002	P02	69	B
002	P03	80	S
002	P04	75	A
003	P01	45	F
003	P03	54	D
003	P04	60	C

Now the above all three table are in 3NF.

Checking 3NF:-

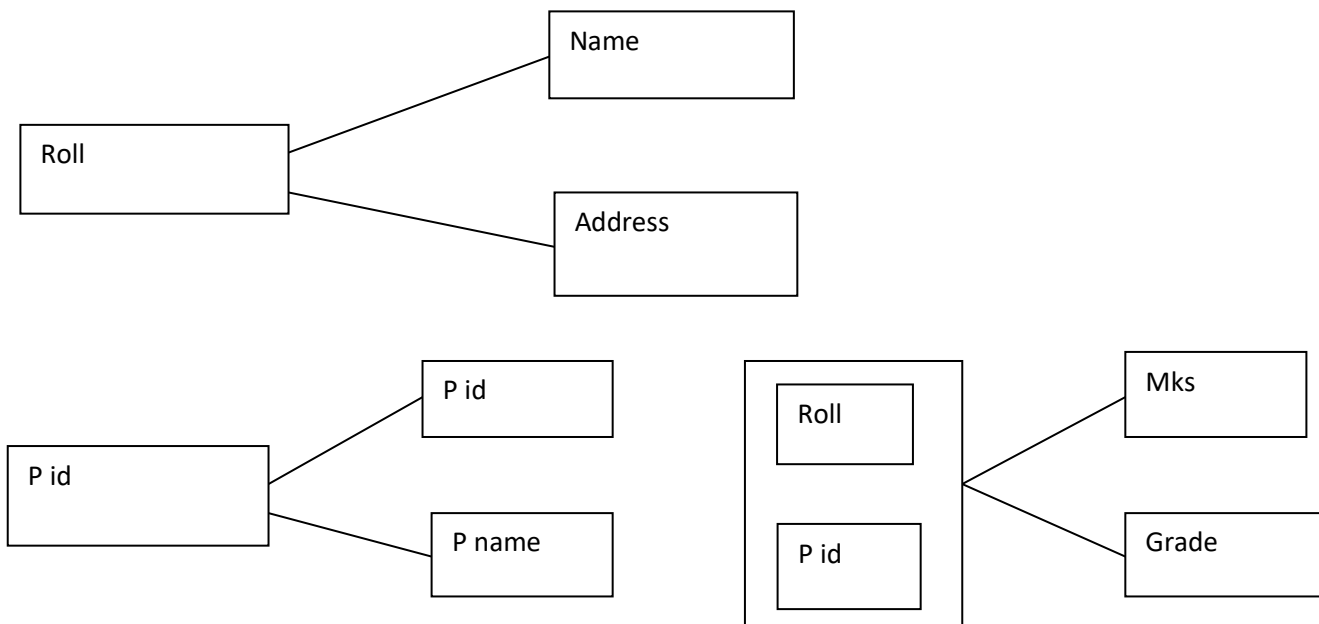


Table 1

Roll	Name	Address
001	Ram	Patna
002	Mohan	Ranchi
003	Sohan	Delhi

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Table 2

P id	P name
P01	IT
P02	BS
P03	C
P04	CO

TABLE 3

MKS	Grade
60	C
62	C1
75	A
69	B
80	S
75	A
45	F
54	D
60	C

Table 4

Roll	P id	Mks
001	P01	60
001	P02	62
001	P03	75
002	P02	69
002	P03	80
002	P04	75
003	P01	45
003	P03	54
003	P04	60

Q. change the table 3NF in to BCNF:-

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Roll	Name	Department	Year	Hostel-name
115	R. shyam	Physics	1	Ragni
142	Ranjan	Chemistry	1	Ragni
156	Chandan	Math	2	Shiwani
181	Raman	Botany	2	Shiwani
182	Anuradha	Geology	3	Chandrabali

Soln:-

Table 1

Year	Hostal-name
1	Ragni
2	Shiwani
3	Chandabali

Table 2

Roll	Name	Department	Year
115	R.shyam	Physics	1
142	Ranjan	Chemistry	1
156	Chandan	Math	2
181	Raman	Botany	2
182	Anuradha	Geology	3

Now, the above tables are in BCNF.

Q. change the table 3NF in to BCNF.

P- code	Department	HOD	Time
P1	Physics	J.L. Singh	50
P1	Math	Ashok Singh	50
P2	Chemistry	Binod Singh	25
P2	Physics	J.L. Singh	75
P3	Math	Ashok Singh	100

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Soln:-

Table1

Department	HOD
Physics	J.L. Singh
Math	Ashok Singh
Chemistry	Binod Singh

Table 2:-

P-code	Department	Time
P1	Physics	50
P1	Math	50
P2	Chemistry	25
P2	Physics	75
P3	Math	100

Q. change the table BCNF to 4NF.

Client-no	Interview date	Interview time	Staff-no	Room -no
CR-76	13-MAY-95	10:30	G5	G101
CR-56	13-MAY-95	12:30	G5	G101
CR-74	13-MAY-96	12:00	G37	G102
CR-56	13-MAY-96	10:30	G37	G102

Soln:- table 1

Staff- no	Room-no	Interview Date
G5	G101	13-MAY-95
G37	G102	13-MAY-96

Table 2:

Client- no	Interview	Staff-no
CR-76	13-MAY-95	G5

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CR-56	13-MAY-95	G5
CR-74	13-MAY-96	G37
CR-56	13-MAY-96	G37

DATABASE SECURITY:-

The protection of the database against threats using both technical and administrative controls is called database security.

Security consideration do not only apply to the database that is the data itself.

We

consider database security in relation to the following situation.

- I. Threats and fraud
- II. Loss of confidential
- III. Loss of privacy
- IV. Loss of integrity
- V. Loss of availability

THREATS:-

A threats may be represented by a person, action, circumstances, account likely to bring harm to an organization. The harm may be tangible or intangible such as loss of hardware, software or data.

Authorization:-

The granting of right or privilege which involve a subject to login access to a system or object.

Authorization control can be built in to the software and permission not only on the system or object a specified user can have excess to and also what the user may be done with it. It may assign to user a several form of authorization on part of the database.

As for example:- read authorization, insert authorization, update and delete authorization.

AUTHENTICATION:-

Authentication refers to the task of verifying the identification of a person's software connected to a database. The simplest form of authentication consists of a security password which must be presented when a connection is open to a database. Password where authentication is used widely by operating system as well as database. The DBMS is an associated application program reside on computer system manage by operating system. There fore, it is gain in order to across the DBMS and access the first has to be gained to the computer system by using the operating system.

The system administrator is usually responsible for permitting the user to have access a computer system by creating individual user account. each

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user is given a unique identifier which the operating system used to determine who they are associated with. Each identifier is a password selected by the user and known to operating system verified or authenticate claim by user.

ENCRYPTION TECHNIQUE:-

The encoding of data by a special algorithm that renders the data unreadable by any program without decryption key.

There are a vast number of technique for the encryption of the data. Simple encryption technique may not provide strong security. Since it may be easy for an authorized user to break the code. As an example, a weak encryption technique so consideration.

MOHAN

PRKDQ

It can break the code unauthorized user in easy way (so the threats attack to access it) encryption also protect data transmitting over communication line. A good encryption technique has the following properties:-

- I. An encryption key to be used to encrypt the data (plain text).
- II. A decryption key to be used to decrypt the cyper text.
- III. A decryption algorithm that we key transform the cyper text block in to plain text.

One approach the data encryption standard issued in 1977 does both substitution of character and rearrangement of their order. On the basis of an encryption key for this scheme to work, the authorized user must be provides with the encryption key via a secure mechanism.

PUBLIC KEY ENCRYPTION:-

Public key encryption is an alternative scheme that avoids some of the problem with the help of protocol (on the phase with the destination). It is based on two keys

1. Public key
2. Private key

the encryption algorithm may also be public so that anyone WISYWING (what you see is what you get) to send a user message can use the user's publicly non key in conjunction with the algorithm to encrypt with only the owner of private key can cyper the message .

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AUDIT TRIAL:-

A database login that is used mainly for security purpose is called an audit trial. A database system keeps track of all operation that a user perform during a login session.

One of the person of an audit is to check many secured database application required. In audit trial be maintained an audit trial log off all check insert, delete, update to the base along with information such as user perform the change and when the change was performed. The audit trial add security in several ways:-

- I. Ensuring accuracy of input data.
- II. Ensuring accuracy of data securing.
- III. Prevention and deletion of error during program execution.
- IV. Properly testing and documented program.
- V. Development and maintenance.
- VI. Avoiding an unauthorized program attention.
- VII. Granting and monitory to access data.

DATABASE INTEGRITY:-

Database integrity is prevention of data correctly and implies the process of keeping the database from the accidental deletion or alternation. When many user entered the data item in to a database because very important data are inserted, update, deleted and different type of constraint keep always maintain database integrity. Data integrity is closely associated with security or database security and properly safeguard is a system both sets control the reliability and validity of the data internally on the authorized user used in correct way.

Types of integrity:-

- I. Entity integrity
- II. Referential integrity
- III. Domain integrity

iii.> Domain integrity:-

a domain is set of all allowable value for one or more attribute, a domain define a pool of related value . if a DBMS does not support the concept of domain then specific data type such as character, integer are used to define each attribute of database. When we apply to check condition the domain for the attribute of any entity as a like age of employee table. We must contain 18 to 27. The attribute can't hold specified in domain.

Create table employee

(name varchar2(20), salary number (20,4), age number (5));

Check constraint check in (age between is 18 to 27);

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Here, check constraint is optional.

Database recovery:-

The database recovery is the process of restoring the database to a correct state following a failure. The failure may be reserved of a system crash due to hardware and software error. It may be media failure such as head crash. It may be an application software. Here, such as logical error in the program that is accessing the database. Whatever the cause of failure, the DBMS must be able to recover from the failure and restore the database to a consistent state.

RECOVERY FACILITY:-

A DBMS should provide the following facility to access with recovery concept.

- I. A backup mechanism which makes periodic backup copy of the database.
- II. Login facility which keeps trait of the current state of transaction and database change.
- III. A check point facility which enables update to the database which are in progress to be made permanent.
- IV. A recover manager which allow the system to restore the database to a consistent state a failure.

BACKUP MECHANISM:-

The DBMS should provide a mechanism to allow backup copy of the database and the lock file to be made at regular interval without necessary having to first stop the system. the backup copy of the database can be used in event that the database has been damage or destroy.

Typically, the backup is stored in offline storage such as magnetic tape, optical disk, magnetic media etc.

RECOVERY TECHNIQUE:-

The particular recovery procedure to be used is depend on the extend of damage that has occurred to the database we consider two cases:-

1. if the database has been extensively damage but has become consistent. For example:- a disk head crash has occurred and destroyed the database then it is necessary to restore the last backup copy of the database and reply the update operation of committed transaction using the lock file.
2. If the database has not been physically damage but has become inconsistent as for example= when detect the copy of other storage device and use the backup copy of database, it can restore the database to a consistent state using the before and after image held in the lock file.

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TRIGGER:-

A trigger is a statement that the system executes automatically as a side effect of a modification to the database. To design a trigger mechanism we must meet two requirements.

- i. Specific when a trigger is to be executed. This is broken up into an event that causes the trigger to be checked and a condition that must be satisfied for trigger execution to proceed.
- ii. Specify the action to be taken when executed.

The above methods of triggers are referred to as the event condition actions model for triggers. The database stores triggers just as if they were regular data so that they are accessible to all database operations.

NEED FOR TRIGGER:-

Triggers are useful mechanisms for altering humans or for starting certain tasks automatically when certain conditions are met / generate.

DATABASE TRIGGER:-

Oracle engine allows the user to define procedures that are implicitly executed (i.e. - executed by the Oracle engine itself).

When an insert, update or delete is issued against a table from SQL, these procedures are called database triggers.

USE OF DATABASE TRIGGER:-

Since Oracle engine supports database triggers, it provides a highly customizable database management system. Some of the uses to which the database triggers can be used to customize management information by the Oracle engine are as follows:-

1. A trigger can permit DML statements against a table only if they are issued during regular business hours or on predetermined weekdays.
4. A trigger can also be used to keep an audit trail of a table along with the operation performed and the time in which the operation was performed.
5. It can be used to prevent invalid transactions.
6. Enforce complex security authorization.

Types of triggers:-

1. Row trigger
2. Statement trigger
3. Before trigger
4. After trigger
5. Combination trigger
6. Before statement trigger

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7. Before row trigger
8. After statement trigger
9. After row trigger.

KNOWLEDGE:-

Knowledge can be defined as the body of fact and principles accumulated (gather) by human kinds or fact or state of knowing. Knowledge is having a familiarity with language concept, procedures, rules. Idea, abstraction, fact and associated couple with an ability to use these modeling different aspect of work.

The meaning of knowledge is clearly related to the meaning of intelligence. In computer, knowledge is also stored as symbolic structure but in the form of collection of magnetic sports and voltage stage.

Knowledge may be declarative or procedural. Procedural knowledge is compiled knowledge related to the performance of some task.

As for example:- the step used to solve an algebraic equation are expressed as procedural knowledge.

Declarative knowledge:-

on the other hand is passive knowledge expressed as statement of fact about the word. Personal data in a database is typical of declarative knowledge . such data are explicit piece of independent knowledge.

Heuristic knowledge:-

it is a special type of knowledge used by humans to solve the complex problem. Heuristic are the knowledge useful made good judgement or strategy or rules of thumb used to simplify the solution of problem. It6 is much experience.

As for example:- in locative a fault in a television set, a physician treating a patient use knowledge and data. The data is patients records including patient history measurement of vital science.

Knowledge based system:-

knowledge based system get their power from expert knowledge that has been code in to fact rules heuristic and procedure. The knowledge is stored in knowledge based separated from the control and inferencing component. this makes it possible to add new knowledge or refined existing knowledge without recompiling the control an inferencing program . this greatly simplify the construction and maintenance of knowledge based system.

In the knowledge lies the power, this was the message learn a researches at Stanford university during thr late 1960 and early 1970.

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Knowledge Based Management System:-

A knowledge based management system is as a computer system used to manage and manipulate facilities include a reasoning facilities usually include aspect of one or more in the form of reasoning.

Reasoning is of different type:-

1. Deductive Reasoning:-

deductive reasoning implies that a new fact can be inferred from a given set of facts or knowledge using different rules of inference.

2. Inductive Reasoning:-

it is used to prove something by first proving a base fact having proved these we can prove a generalized fact.

3. Adductive Reasoning :-

it is used in generating a hypothesis to explain observation.

Object Oriented Database Management System:-

1. Object:- object is a variable of class. It is also called an instance of a class. All public member (variable or function) is a class access through object from outside the class.

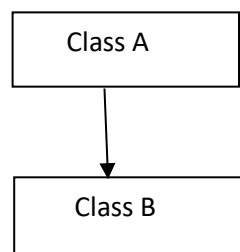
2. Class :- class is a collection of similar variable and function. It is a derived data type. It is a template for object.

3. Inheritance :- in object oriented programming system, new classes can be developed based on existing classes. The member of existing classes can be inherited to the new classes, if it is made child class of the existing class. The new child class is also called derived class or subclass. The parent class is also called base class or super class. This helps in reduce ability of code. New version of the software can be made using the feature of existing version private t inherited the child class.

Different forms of inheritance:-

i.> single level inheritance:-

```
class A
{
}
class B: public A
{
}
```



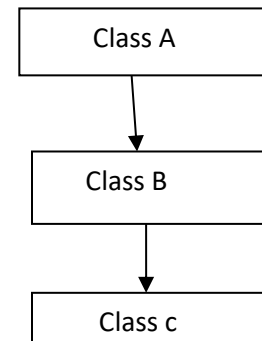
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ii.> Multilevel inheritance:-

```
class A
{
}

class B : public A
{
}

class C: public B
{
}
```



iii.> Hybrid inheritance:- it contain more than one parent.

iv.> Abstraction:- Abstraction refers to the act of representing essential feature without including the back ground details or explanation. Class uses the concept of abstraction and are defined as a list of abstract attributes such as size, height and cost and function to operate on these attributes. They encapsulate all the essential properties of the object that are to be created.

v.> Encapsulation:- The properties of being a self contained unit is called encapsulation. The idea that encapsulate unit can be used without knowing how its work is called data hiding.

OBJECT ORIENTED DATABASE:-

Object Oriented Database are dependent on the object on programming paradigm. It enable us to create classes, organized object, structure and inheritance a hierarchy and called method of other classes. It also provia the facility associated with standard database system.

However, object oriented database system have not replace your relational database management system in commercial business application.

Following are the two different form appear for designing object oriented database:-

1. Design to store, retrieve and manager objects create of program, written in some object oriented language. Such as C++, JAVA etc.
2. Design to provide object oriented facility to user of non-object oriented programming language.

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That means, the user will create class, object, inheritance, library function So on. The database system store and manages these objects and classes.

DISTRIBUTED DATABASE:-

Some organization uses distributed database system rather than a centralized database system. In the centralized database system, data reside in one single location, where as in a distributed database system, the data resides in several locations. Distributed database system communicate and exchange data among one and another using lease line, telephone line and other medium (communication).

The computer don't share memory or its related time.

Each computer in distributed system participated in the execution of transaction. These computer is also known as nodes or site.

Advantage of distributed database system :-

1. SHARABLE DATA(data sharing) :- since data is distributed on multiple computer, user operate one computer to another computer for different purposes.
2. Distributed control:- Unlike centralized database system where a single database administrator control the database, in a distributed system, responsibility of control is divided among local administrator for each computer.
3. Reavailability and availability :- In a distributed system the data is distributed among multiple computer. Failure of any one computer does not cause shut down of the entire database system.
4. Faster query processing:- Query involving data at several sites can be split in to sub queries. These sub queries can be executed in parallel by several sites such as parallel computation allowed faster processing.

Disadvantage of distributed database system :-

1. Increase cost:- it is more difficult to develop software package, to implement distributed database. So cost is also increase to develop .
2. More error prompt:- Distributed database system operate in parallel. It is very difficult to ensure the correctness of data.
3. Increase overhead:- Maintaining physical link between the sites and exchanging message among the computer is an additional overhead associated with the distributed system.