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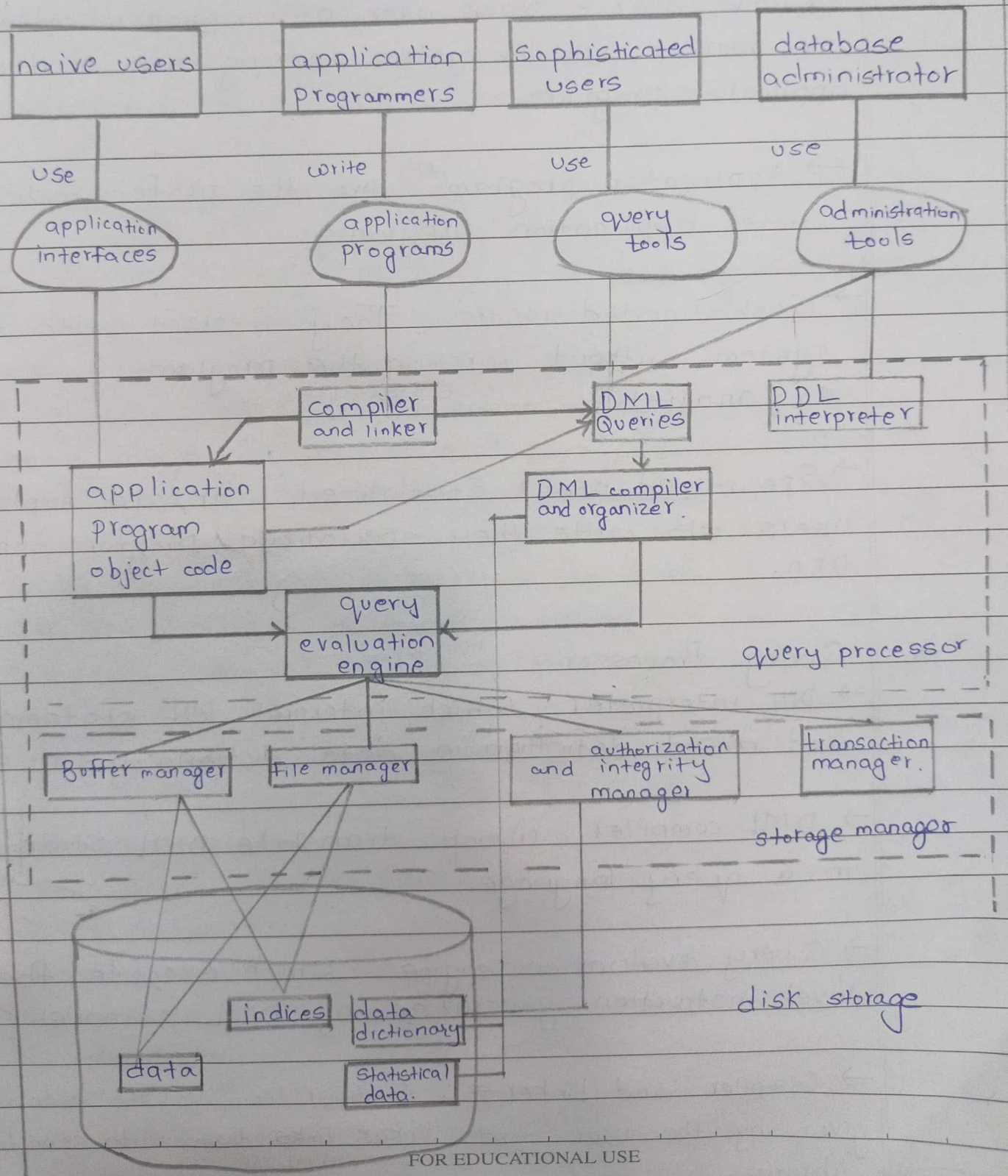
DBMS Assignment

Q.1 Draw and explain DBMS system architecture in detail.

Ans



* Database users:
Various user use the database system.
→ Naive user :- Naive user are unsophisticated users who interact with the system invoking one of the application program.

→ Application programmers: Are the professionals who write application programs.

→ Sophisticated users : They interact with the system without writing the program.
eg: analyst

→ Specialized user : Specialized user are sophisticated users who write their specialized program application like DBA.

* Query Processor.
→ DDL interpreter : which interpret DDL statements and record definition in data dictionary.

→ DML compiler : which translate DML statement in a query language.

→ Query evaluation engine : which execute the low-level instruction generated by DML compiler.

→ Compiler and Linker : Compiler compiles the instructions given by the user and linker links them with standard library.

Application program object code: Application program is viewed after execution of the source code. But when source code gets execute first it gets convert into object code which is understandable by the computer system.

* Storage Manager

→ Authorization & integrity Manager: which tests for the satisfaction of integrity constraints & checks the authority of user to access data

→ Transaction manager: which ensure that the database remain in a consistent state despite system failures & that concurrent transaction proceed without conflicting.

→ File manager: which manages the allocation of space on disk storage & the data structure used to represent information stored on disk.

→ Buffer Manager: which is responsible for fetching data from disk storage into main memory & deciding what data to cache in main memory

* Disk storage.

→ Data Files :- The actual database is stored in the data files.

→ Data dictionary - It is used to store metadata. The metadata is the data about the structure of the database.

→ Indices: which provides fast access to data item which holds the particular values.

→ Statistical Data: which store statistical information about the data in the database.

Q.2 Discuss different types of database users.

→ Database users are catagorized based up on their interaction with the database. There are seven types of DB users in DBMS.

1) Database Administrator (DBA)

DBA is a person / team who defines the schema and also controls the 3 levels of database. The DBA will then create a new account id and password for the user if he/she need to access the database. DBA is also responsible for providing security in DB and allows only authorized user to access / modify the DB.

2) Naive Users: Naive users are the unsophisticated who don't have any DBMS knowledge but they frequently use the database applications in their daily life to get the desired results. For eg, Railways ticket booking users are naive users.

3) System Analyst: System Analyst is a user who analyzes the requirements of parametric end use They check whether all the requirements of end users are satisfied.

4. Sophisticated Users: Sophisticated user can be engineers, scientists, business analyst, who are familiar with the database. They can develop their own DB apps according to their requirement.

5. Database Designers: DB Designers are the users who design the structure of database which includes tables, indexes, views, triggers, stored procedures and constraints which are usually enforced before the database is created or populated with data. It is the responsibility of DB designers to ~~crea~~ understand the requirement of each user group and then design the structure.

6. Application Programmers - Also referred as system analysts are the back-end programmers who writes the code for the application programs.

7. Casual Users: Casual users are the users who occassionally use / access the DB. ~~buch~~ but each time when they access the DB, they require new info.

3) Explain Different features of EER model.

→ Enhanced entity-relationship diagrams are advanced database diagrams very similar to regular ER diagrams which represents requirements and complexities of complex databases. It is a diagrammatic technique for displaying the sub class and

super class, specialization and generalization, Aggregation etc.

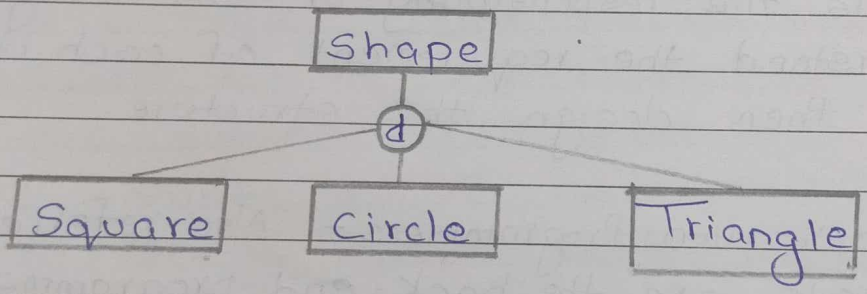
→ Subclass/ Superclass

① An entity type may have additional meaningful subgroupings of its entities that need to be represented explicitly because of their significance to the DB application.

② The subgroupings are called the sub-class of the entity.

③ The entity itself is called the superclass.

Eg



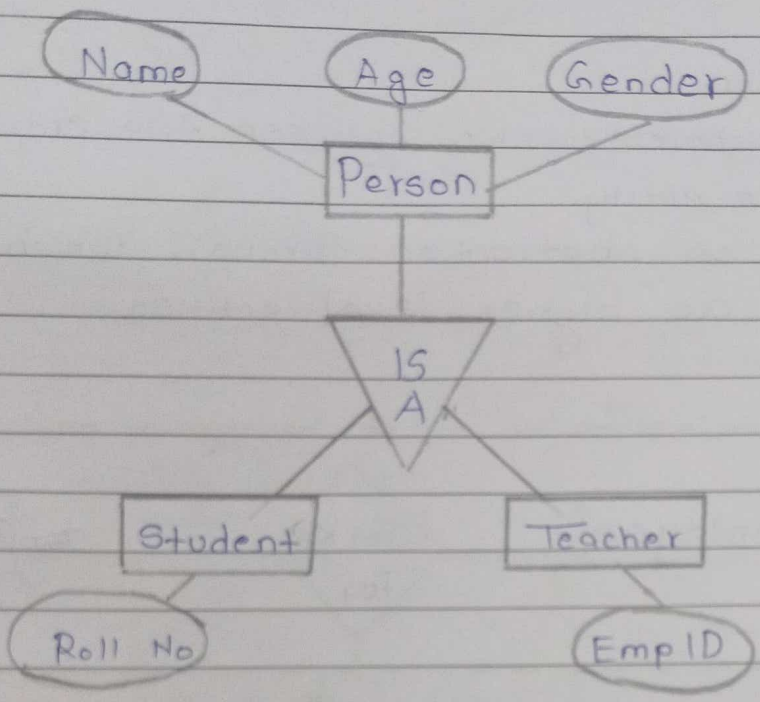
In the above eg. Shape is superclass and square, circle and thangle ~~is~~ are subclasses.

→ Specialization.

① The process of classifying an entity into more specialized entity.

② It ~~is~~ converts the high level entity into low level entity by adding additional attribute or special attribute.

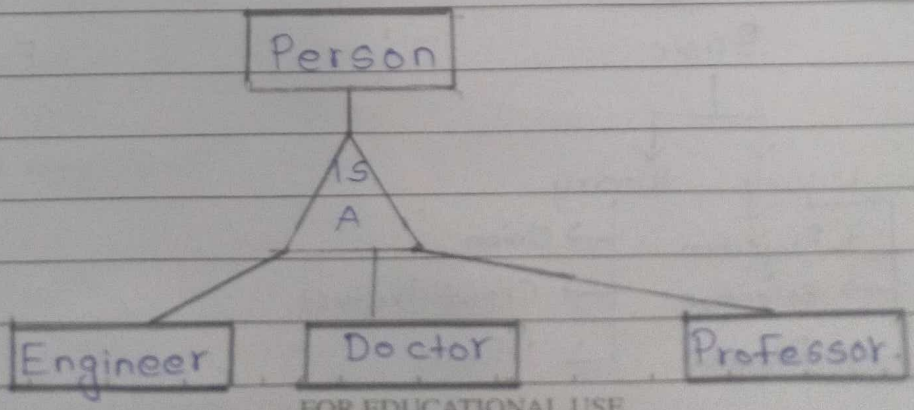
Eg.



Here entity Person is classified to more specialized student and teacher entity.

→ Generalization.

① It is reverse of specialization.
② It is a bottom up approach.
③ Common attribute of more than one entity form a new entity.
④ Lower level attribute unite and produce higher level attribute.

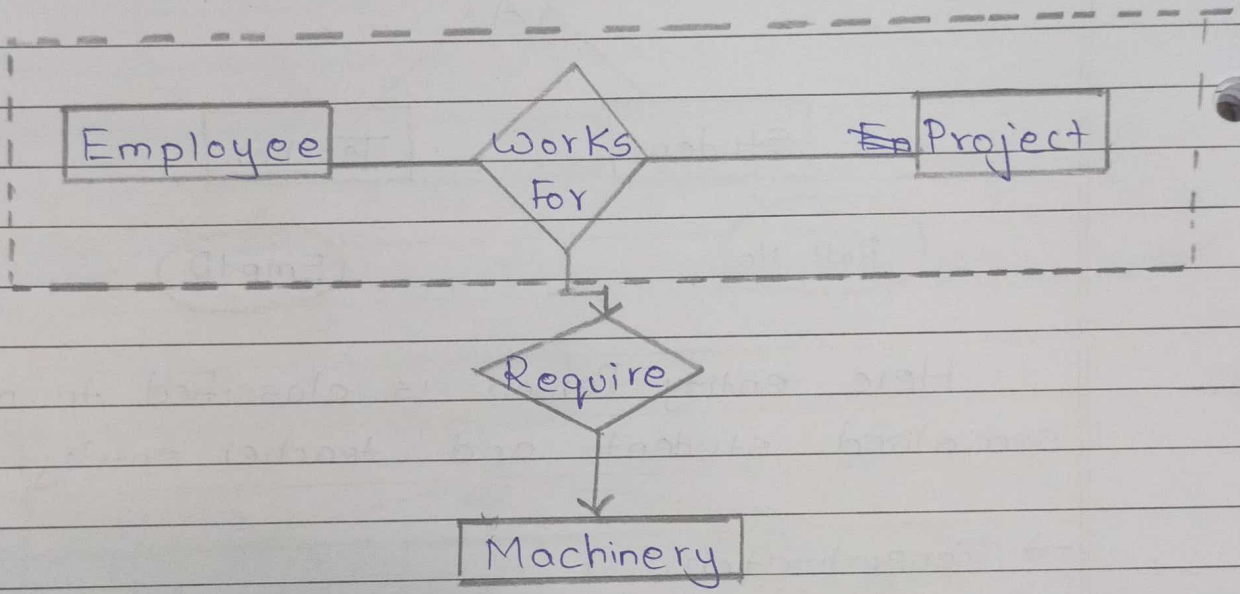


→ Aggregation

① It is an relationship between two entity treated as a single entity.

② It is an abstraction through which relationship is treated as higher level entities.

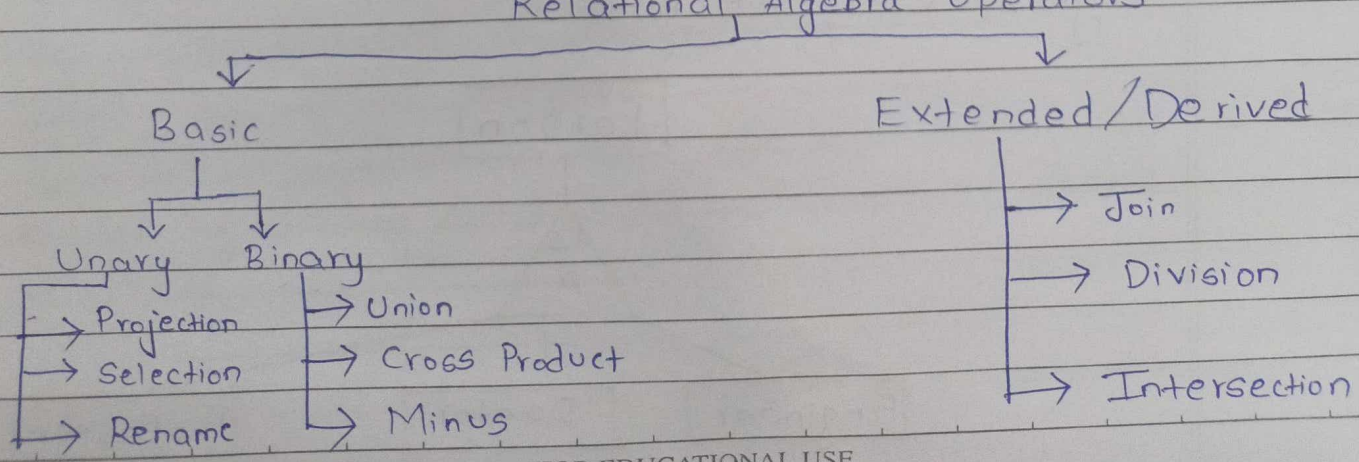
Fg:



Here employee and project is treated as a single entity.

Q.4 Explain different relational algebra operatoks.

Ans.



1) Projection (Π)

→ Projection is used to project required column data from a relation.

→ (Π) symbol is used to choose attributes from a relation.

Eg: Student

Name	Age	Mark
Joe	19	70
John	18	80
Jack	15	90

Π Name, Mark (Student)

Result :

Name	Mark
Joe	70
John	80
Jack	90

Syntax: Π <attribute list> (relation)

2) Selection (σ)

→ The SELECT operator is σ (sigma) symbol. It is used as an expression to choose tuples that meet the selection condition.

Syntax : σ <selection condition> (R)

Eg: List all staff with a salary greater than 10,000

→ σ salary > 10000 (staff)

Result :

EmpId	Emp_Name	Salary
1	Mihir	25000
4	Raj	30000

3) Rename (P)

Rename is a unary operation used for renaming attributes (column) of a relation.

Syntax: P newName / oldname (Relation)

Eg : P EmployeeName/ Name (Employee).

Name col will be renamed to EmployeeName.

4) Union (U)

Union operation in relational algebra is same as union operation in set theory, only constraint is for union of two relation both relation must have same set of Attributes.

Syntax: Relation1 U Relation2

Eg

Course_1

C_id	C_name
11	C
21	C++
31	Java

Course_2

C_id	C_name
12	Python
21	C++

Course1 U Course_2

Cid	C_name
11	C
12	Python
21	C++
31	Java

5) Cross Product

→ ① 'X' symbol is used for cross product.

→ ② It is same as cartesian product.

student

Sid	Name
1	Mihir
2	Raj

Course

Cid	CName
1	C++
2	Java

Eg:

Student X Course

Result

Sid	Name	Cid	CName
1	Mihir	1	C++
1	Mihir	2	Java
2	Raj	1	C++
2	Raj	2	Java

6) Join - Used to join two relations. Denoted by

There are three types of joins.

1) Natural Join
2) Outer Join
   a) Left Outer Join
   b) Right Outer Join
   c) Full Outer Join.

~~3) Full Outer join~~

3) Equi join.

Employee

Emp_code	Emp_name
101	Stephan
102	Jack

Salary

Emp_code	Salary
101	50000
102	30000

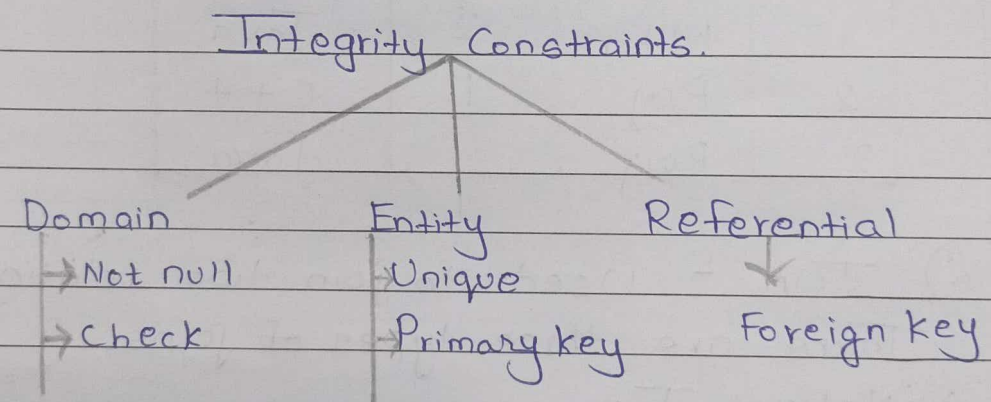
(Employee ⋈ Salary)

~~Employee~~ Result:

Emp_code	Emp_name	Salary
101	Stephan	50000
102	Jack	30000

Q.5 Write Different integrity constraints in SQL.

Ans



1) NOT NULL - NOT NULL constraint is used to avoid the absence of values in a row for a particular column.

2) CHECK - A check constraint defines a condition that each row must satisfy.

3) Unique - It is used to prevent duplication of values within the rows of a specific column.

4) Primary key - Primary key constraints are used to identify the records uniquely. The primary key is combination of two constraints unique and not null.

5) Foreign key: A foreign key is a field in one table that refers to the primary key in another table.

Q.6) Explain different aggregate functions in SQL.

Ans. SQL aggregate function is used to perform the calculations on multiple rows of a single column of a table. It returns a single value.

1) Count (column_name)
Count the number of values in a column.
eg: select count (name) from Emp;

Also count (*) is used to count the total number of rows.

2) Min (column_name)
It returns the lowest value from a column.
eg: SELECT MIN (~~column~~ Salary) FROM Emp;

3) MAX (column_name)
It returns the highest value from a column.
eg: SELECT MAX(salary) FROM Emp;

4) SUM (column_name)
It is used to calculate sum of values of column.
Eg: SELECT SUM(SALARY) FROM Emp;

5) AVG (column) - It is used to ~~fin~~ calculate average of values in column.
Eg: SELECT AVG (salary) FROM Emp;