RELATIONAL ALGEBRA

kuch commands SQL se hum database maise apna hissa nikal lete hain joh humai required hota hai.

is midnhere between SQL Query and conceptual model.

SQL → structured query language
tuples → rows, records

Operations:-

① Selection $S_c(R)$

c → condition
R → table
S → selection notation

Returns all records which satisfy a condition

Observation
. Schema (list of columns)
· Ak table hoga jis per hum selection ka operation laga sakde, (aik time per aik table)
· her row ko check kr sakta

② Projection π

π column 2 (output میں . col ہ رہی ہو گی
remove ہ values duplicate اور اگر یہ display کرے گا

③ Cartesian product
Each tuple in R1 and each tuple in R_2
$R_1 \times R_2$ ⇒ Notation.
→ jab multiple records ko join kr k
hum result dikhayen.

UNION

column, rows, attributes same honce

fields

chije phr he union liya jata.

S1

sid	sname	age	rating
22	dusl		
31			
58			

S2

sid	sname	age	rating
28			
37			
44			
58			

(S1 U S2)

sid	sname	age	rating
22			
28			
31			
44			
58			

INTERSECTION

(S1 ∩ S2)

sid	sname	age	rating
31			
58			

Difference

S1 - S2

22		

S2 - S1

44		
28		

$$\pi_{sname, rating} \left(\sigma_{rating > 8} (S2) \right);$$

$$\left(\sigma_{rating > 8} (S2) \right)) \Rightarrow \begin{matrix} 9 \\ 10 \end{matrix}$$

JI

yuppy	9
rusty	10

S2

sid	sname	rating	age
28	yuppy	9	35.0
31	lubber	8	55.0
44	guppy	5	35.0
58	rusty	10	35.0
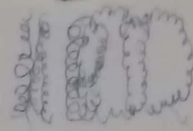
SQL   Structured Query language

database se communicate krne k liye language haii

Types of SQL

① DDL   => Data Definition Language { Column }
② DML   => Data Manipulation Language   { Row }
③ TCL   =>

① DDL

database create kr k table banate, table k name likhte, table create kiya, table delete kiya, attribute / table ko change krna.

② DML

joh database bana hua tha us per kuch apply krna, how to manipulate, order, display (with some condition) the data

③ TCL

kon sa user kis DB k part ko access kr sakte, checks lagate

① DDL

3 commands
- Create
- Alter   { attribute ka name change }
- Drop   { delete }

Constraints hum DDL mai set krte kyu k is mai hum table create krte.
Not Null, Primary key.

• Query for Create Table — table name

Create Table dept   attribute

key word   (deptno   numeric,   }*
                  dname   varchar (14) }
           );

• Dropping a Table (Delete dept)

Drop Table dept ;

• Default option   // setting the default value

Create Table Std (sid int **Default 2**);   system date

- - - - hiredate Date   **Default Sysdate** ;

now () => It displays current time

What are DDL constraints?

① not null   { when field is mandatory }
② unique   { no duplicates }
③ check   { when some condition is apply } $age \leq 18$
④ primary key
⑤ foreign key

When to create constraints? / Ways

• create table command   => column level
• table level   { table create kine
             { ⑤ define ر. یا ﻝ

Column level.

Create table X (

name varchar (20) NOTNULL);

Table level

Constraint NOT NULL (name);

(

Constraint emp-salary CHECK (Salary > 0);

=> Foreign key match ko Table level
می آتی کرتی بیسی کا (تارہ) آر column می می، کمی .

Composite Primary Key;

Primary key (RegNO, Course No);

Foreign Key

REFERENCES department (dep-id);
emp k table dept-id as a freign huy act
h sahi, dept-id hum nai department k
table se uthayi haii

Table level

CONSTRAINT emp-dp (id)
REFERENCES

:Alter Command

add a new column, delete a column.
rename

- ADD
- Modify   { attribute ko change } changes
- Drop

① Add
ALTER TABLE dept
ADD (job_id   varchar (9));

② Modify
ALTER TABLE dept
MODIFY (last name   varchar (10));
Modify (last_name   as: lname) ;   => lname
③ Drop   old   new
alter table dept
Drop id;

RENAME   => It is used for changing the table name
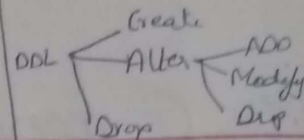
Dropping Constraint
Alter Table dept
Drop constraint emp name;

→ Data Manipulation language

DML - Select Statement

Row per apply kuto
(Row filtering) => Select.

Select k sath hum attribute names likhte
Select k sath * lag gaya toh sarah ajaye
gaa

Select {attributes}   ← attribute
From   tablename   ← table name
Where   GPA > 3.0 ;   ← condition

Where   name = 'Me';

not equal   < >   ← use symbol for ≠

• Between ‾‾ and ⇢ for range   random
• IN (set) ⇢ for selective values ↙ {2, 3, 4, 7,}
• like ⇢ pattern match kre   {for strings}
• is null ⇢ yahan koi null value hai

① Range
    where salary between 20000 and 50000
② In / Random / Selected
    where GPA IN (2, 3, 3.6)
③ where f_name LIKE ('s');
                    LIKE ('% @ gmail.com');
④ No record
    where marks IS@NULL};

NOT hogee →

→AND→ hogee →phr OR hoga.

→ Brackets (سب سے پہلے)

Imp.

Rule of
presidence.

Mehak Zafar

SP22, BCS, 019

BCS-5C

Data Base Assignment 3

- -

① Find a list of all the CD title?

$$\Pi_{title} \ (CD).$$

② Find a list of the titles of tracks that are more than 300 seconds long.

$$\Pi_{Title} \ (\sigma_{time > 300}^{(Track)})$$

③ Find a list of the names of those artists who have a track on the CD with the title "Compilation"?

$$\Pi_{Name} \ (Artist \ \bowtie \ \sigma_{title = "Compilation"} \ ^{(CD)}).$$

where

σ = Selection
Π = Projection
$\bowtie$ = join

DML — CRUD operations

CRUD => Create, Read/Retrieve, Update, Delete

add => insert
new
row

① INSERT INTO tablename (id, name)
    Values { 1, 'm'};

②② Null value/Blank
① Insert Into tablename (id)   //name
    Values {1};   ز, ا جسوت اس
                                   6 attribute

② Insert Into tablename
    Values (1, NULL);

Special value
  Sysdate

Insert Into tablename (Date)
Value (SysDate);

Copying rows from another table

    Insert Into   X   // Y wala table
        Select * From Y ;   copy hojayega X
                          mai

jidhr se copy kr rahe toh attribute same
hone chaiye, data type, no of attributes same

SUBQuery → Query within a query.

Copying specific columns data from other table

→ Insert Into emp (id, name, Salary)
→ Select emp_id, emp_name, sal
→ From employees;

Copying specific rows from another table

Insert Into Table (id, name, department)
Select id, name, dept
From employees
where dept = 'CS';

Changing/Modifying Data in a table

① Update   ⇒ row ka data change kuch ga.

① Specific record
Update emp
Set dept-id = 70
where empid = 113;

sel
عمر کی (id) کی
در قم کی تلاش
کری

② All record
Update emp
Set id = 40;

③ 2 chrzon ke base par set kino
Set dept-id = 70
where empid = 113 && name = 'XYZ';

Delete

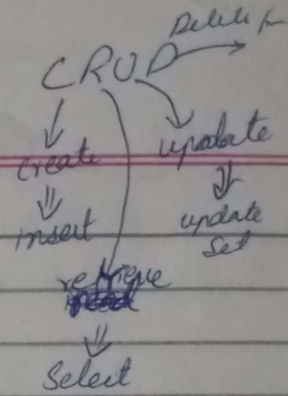① Specific rows

Delete from table name
where depid = 1 ;

② All rows
Delete from table name ;

CRUD
Delete
create update
insert update
Set
retrieve
read
Select

SQL - Group Functions

group function are aggregate functions
aug, maghera, mini, max, count

=> multiple records per at a time operations
lagayen gaii

=> **always SELECT** statement

Select Avg(salary)& from employees where jobid = ' 1 ';	Select Avg(salary), Max(salary), = ;

name => Max => alphabet   => Z

Select Count(*)
From employees
where id = '1';

Count => count non null values
O is not Null.

Distinct => duplicate ho 1 dafah he
count krch.

student → different departments
↳ make different groups.

Group by
=> jis attribute he base per hum grouping kina chah valo.

```
Select dep.id AVG (salary)
   from employees
Group by dep-id;
```

Grouping by more than 1 column

```
select   AVG (salary)
from     employees
groups by id, name;
```

Having
Group function h ooppen conditition lagance toh where nah lagance, hauing lagance hai.

Display dep.d and max Salar

dep-id;

```
Select Max (Salary)
From employees
hauing Max (Salary) > 10.000
groupby dep-id;
```

|| Payroll.

output

id	Payroll

= //

Order by Sum (Salary); => display max sequence ayaye

Nested Group Function

Select   (Max (Avg (salary)));