Name: WAQAR RIASAT ALI Section: E Roll num: 2023F - BSE -221

LAB NO 4

MULTIPLE ROWS, VIEWS AND STORED PROCEDURES

Objective:

To learn and implement group functions
To learn and implement 'GROUP BY' and 'HAVING' clause.
To learn and implement views
To learn and implement predefined and user-defined stored procedures with input parameters

LAB TASKS

1. Create a table named Students' GPAs with the following schema. (Student id, batch, semester #, GPA)
   Now Display the average

Input 01:

```
7  create table Students_GPA(Student_id int primary key, batch int , semester varchar(25) , gpa double );
8  insert into Students_GPA(Student_id , batch,semester,gpa) values
9  (1, 2021, '1st', 3.45),
10 (2, 2021, '2nd', 3.67),
11 (3, 2022, '3rd', 3.22),
12 (5, 2022, '4th', 2.95),
13 (6, 2023, '5th', 3.80),
14 (7, 2023, '6th', 3.60),
15 (8, 2024, '7th', 2.75),
16 (9, 2024, '8th', 3.10),
17 (10, 2025, '8th', 3.90);
18
19 select batch,
20 round(avg(gpa),2)       -- rounds off the average GPA for each batch to 2 decimal places.
21 from Students_GPA
22 Group by batch
23 order BY
24 Batch DESC;
```

Output 01:

batch	round(avg(gpa),2)
2025	3.9
2024	2.92
2023	3.7
2022	3.08
2021	3.56

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2. Create a view which displays those student ids whose average GPAs are greater than or equal to 3.

Input 02:

```
32 •  create view avg_gpa as
33    select batch,round(avg(gpa),2) as Avergae_GPA
34    from Students_GPA
35    group by batch
36    having avg(gpa>=3.0);
37    select * from avg_gpa;
```

Output 02:

	batch	Avergae_GPA
▶	2021	3.56
	2022	3.08
	2023	3.7
	2024	2.92
	2025	3.9

3. Create a procedure to display the maximum, minimum and average GPA of each student

Input 03:

```
create procedure max_and_min_GPA()
SELECT MAX(GPA) AS Maximum_GPA, MIN(GPA) AS Minimum_GPA
from Students_GPA;

call  max_and_min_GPA()
```

Output 03:

	Maximum_GPA	Minimum_GPA
▶	3.9	2.75

4. Consider the following schema: Sailors (sid(PK), sname, rating, age) Boats (bid(PK), bname, color) Reserves (sid (FK), bid(FK), day(date)). Create a view that calculates the average age of sailors for each rating level.

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Input 04:

```
73  create table Sailors (sid int primary key, sname varchar(25), rating varchar(25), age int);
74  insert into Sailors (sid, sname, rating, age) values
75  (101, 'WAQAR RIASAT ALI' , '9.9%' , 20 ),
76  (230, 'ANEEQ SHAMS MACHERA' , '8.9%' , 27 ),
77  (216, 'HUSSAIN MACHERA' , '7.9%' , 26 ),
78  (219, 'QASIM MACHERA' , '6.9%' , 25 ),
79  (250, 'SAQIB MACHERA' , '5.9%' , 24 ),
80  (376, 'HASSAN MACHERA' , '4.9%' , 23 ),
81  (220, 'ADEEL MACHERA' , '3.9%' , 22 );
82
83  create table Boats(B_id int primary key, bname varchar(25), color varchar(25));
84  insert into Boats (B_id , bname, color) values
85  (101, 'Surfing Boat', 'Blue'),
86  (230, 'Fishing Boat', 'Red'),
87  (216, 'Speed Boat', 'White'),
88  (219, 'Sail Boat', 'Green'),
89  (250, 'Rescue Boat', 'Yellow'),
90  (376, 'Rowing Boat', 'Brown'),
91  (220, 'Luxury Yacht', 'Black');
92
93  create table Reserves(sid INT, B_id INT ,day date , foreign key (sid) references Sailors(sid), foreign key (B_id)
94  references Boats(B_id)  );
95  INSERT INTO Reserves (sid, B_id, day) VALUES
96  (101, 101, '2025-04-18'),
97  (230, 101, '2025-04-19') ,
98  (101, 250,  '2025-04-1'),
99  (101, 219,  '2025-04-1'),
99  (101, 219,  '2025-04-1'),
100 (250, 230, '2025-04-13');
101
102 CREATE VIEW calc_avg AS
103 SELECT rating, ROUND(AVG(age), 2) AS avg_age
104 from Sailors
105 group by  rating;
106
107 select * from calc_avg;
```

Output 04:

	rating	avg_age
▶	9.9%	20.00
	7.9%	26.00
	6.9%	25.00
	3.9%	22.00
	8.9%	27.00
	5.9%	24.00
	4.9%	23.00

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5. Create a view that shows the sailor names and the days they made reservations for sailboats (boats with the color 'Blue').

Input 05:

```
115 •  create view show_sailors as
116    select
117    Sailors.sname, Sailors.age, Reserves.day , Boats.color
118    from Sailors
119    join
120    Reserves on
121    Reserves.sid = Sailors.sid
122    join
123    Boats on  -- join ke bd batana lazmi h konsa table join kr rhe.
124    Boats.B_id = Reserves.B_id
125    where Boats.color ='Blue';
126
127 •  select * from show_sailors;
```

Output 05:

	sname	age	day	color
▶	WAQAR RIASAT ALI	20	2025-04-18	Blue
	ANEEQ SHAMS MACHERA	27	2025-04-19	Blue

6. Create a procedure for task#6 where the boat color will be passed as a parameter

Input 06:

```
134 •  create procedure boat_color( in color varchar(20))
135     select s.sname, b.bname, b.color,r.day
136     From
137     Sailors s
138
139     join Reserves r on
140     r.sid = s.sid
141
142     join Boats b on
143     b.B_id = r.B_id
144
145     where b.color = color;
146 •  call boat_color('Blue');
```

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Output 06:

	sname	bname	color	day
▶	WAQAR RIASAT ALI	Surfing Boat	Blue	2025-04-18
	ANEEQ SHAMS MACHERA	Surfing Boat	Blue	2025-04-19

7. Create a table Projects with the following schema. (P_id, Pro_name, Dep_id). Now write a query to show which projects have been assigned to the 'HR' department. Wrap the above query in the procedure. Also pass the department name as parameter.

Input 07:

```
153 •  create table Projects(P_id int Primary key , Pro_name varchar(25), Dep_id int);
154 •  INSERT INTO Projects (P_id, Pro_name, Dep_id) VALUES
155    (1, 'GFS', 101 ),
156    (2, 'ARY LAGUNA', 102 ),
157    (3, 'BAHRIA TOWN KARACHI', 103),
158    (5, 'DHA ISLAMABAD', 104),
159    (6, 'HABIB METRO', 105),
160    (7, 'KDA LEASE', 106),
161    (8, 'SCHEME33', 107),
162    (9, 'NAYA NAZIMABAD',109 ),
163    (10, 'ASF CITY', 110);
164
165 •  select * from Projects;
166
167 •  create table department (
168        Assigned_department varchar(25),
169        P_id int,
170        foreign key(P_id) references Projects(P_id));
```

```sql
insert into department (Assigned_department, P_id) values
('Finance department', 1),
('Sales department', 2),
('HR department', 3),
(null, 5),
('Marketing department', 6),
('Legal department', 7),
(null, 9);

create procedure get_projects_by_department(IN dept_name VARCHAR(25))
select
    p.Pro_name,d.Assigned_department
from
Projects p
join
department d ON p.P_id = d.P_id
where
d.Assigned_department = dept_name;

call get_projects_by_department('HR department');
```

Output 07:

Pro_name	Assigned_department
BAHRIA TOWN KARACHI	HR department

8. Answer the following questions:

- **What have you learned from the lab task?**

I learned about the procedures and views how they help us in making our work easier

- **What was the most challenging task and how did you overcome that challenge?**

The most challenging thing which I faced was to implement the concept of joins(learned in lab3) and the syntax issues regarding the view and the procedure but the implementation of joins and the foreign key is still challenging to me.