Database Management Systems Laboratory
Assignment 2

University Festival Management System

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1 Relational Schema

Table	Attribute	Data Type	Constraints	Foreign Key (From)
Role	RID	VARCHAR(10)	PRIMARY KEY NOT NULL UNIQUE	-
	Rname	VARCHAR(50)	NOT NULL	-
	Description	VARCHAR(255)	-	-
Event	EID	VARCHAR(10)	PRIMARY KEY NOT NULL UNIQUE	-
	Date	DATE	NOT NULL	-
	Ename	VARCHAR(100)	NOT NULL	-
	Type	VARCHAR(50)	NOT NULL	-
College	Name	VARCHAR(100)	PRIMARY KEY NOT NULL UNIQUE	-
	Location	VARCHAR(50)	NOT NULL	-
Student	Name	VARCHAR(50)	NOT NULL	-
	Roll	CHAR(9)	PRIMARY KEY NOT NULL UNIQUE	-
	Dept	VARCHAR(50)	NOT NULL	-
	RoleID	VARCHAR(10)	-	**Role**(RID)
Volunteer	Roll	CHAR(9)	NOT NULL	**Student**(Roll)
	EventID	VARCHAR(10)	NOT NULL	**Event**(EID)
			PRIMARY KEY = (Roll, EventID)	
Participant	PID	BIGSERIAL	PRIMARY KEY NOT NULL UNIQUE	-
	Name	VARCHAR(50)	NOT NULL	-
	College_Name	VARCHAR(100)	NOT NULL	**College**(Name)
	EventID	VARCHAR(10)	NOT NULL	**Event**(EID)
Manages	Roll	CHAR(9)	NOT NULL	**Student**(Roll)
	EventID	VARCHAR(10)	NOT NULL	**Event**(EID)
			PRIMARY KEY = (Roll, EventID)	

Table 1: Relational Schema for the Given Information

2 Initial Records

2.1 Role Table

rid	rname	description
SEC001	Secretary	A student, as secretary, coordinates event logistics, communicates with participants, and ensures smooth execution by overseeing administrative details and schedules.
SEC003	Sub_Secretary	A sub-secretary assists the main secretary, handling specific tasks, communication, and logistics to support the seamless management of an event.
TR001	Treasurer	Manages financial aspects and budgeting for events.
PRO001	Public Relations Officer	Handles communication and publicity for events.
LC001	Logistics Coordinator	Organizes and manages logistical aspects of events.
TC001	Technical Coordinator	Manages technical setup and requirements for events.
LC002	Operations Coordinator	Manages overall operational aspects and ensures smooth execution of events.

2.2 Event Table

eid	date	ename	type
ME001	2024-01-25	Megaevent	Special
DJ001	2024-01-28	DJ Night	Entertainment
ME003	2024-02-01	Super Event	Special
CN001	2024-03-15	Cultural Night	Cultural
SG001	2024-03-20	Sports Gala	Sports
TE001	2024-03-25	Tech Expo	Technical
FS001	2024-04-01	Fashion Show	Cultural
LF001	2024-04-10	Literary Fest	Literary

2.3 College Table

name	location
IITB	Mumbai
IITD	Delhi
IITK	Kanpur
IITM	Madras
IITKGP	Kharagpur
IITR	Roorkee
Jadavpur University	Kolkata
Calcutta University	Kolkata
National Medical College	Kolkata
Presidency University	Kolkata

2.4 Student Table

name	roll	dept	roleid
Abhishek Kumar	20CS10064	CSE	SEC001
Bhaskar Kumar	20CS10065	CSE	SEC003
Bratin Ghosh	20CS10063	CSE	TR001
Somya Gupta	21ME10034	ME	SEC001
Dhruv Lal	21ME10035	ME	SEC001
Tanya Mondal	21CE10036	CE	SEC001
Rajesh Prasad	21EE10036	EE	SEC001
Eshaan Gupta	19ME10036	ME	PRO001
Rahul Sharma	22CS10036	CSE	LC002
Vishal Agarwal	22CS30021	CSE	PRO001
Sakshi Dubey	20CS10066	CSE	SEC003
Amit Patel	21EE10037	EE	SEC001
Rahul Singh	22CS10038	CSE	SEC003
Neha Sharma	19ME10039	ME	SEC003
Pooja Mishra	22CS30040	CSE	SEC001
Catholine Marie	20CS10067	CSE	LC002

2.5 Volunteer Table

roll	eventid
20CS10064	ME001
20CS10065	ME001
20CS10063	ME001
22CS10036	ME003
22CS30021	SG001
21ME10034	CN001
21ME10035	FS001
20CS10066	DJ001
21EE10037	ME003
22CS10038	CN001
19ME10039	SG001
22CS30040	TE001
20CS10067	ME001

2.6 Participant Table

pid	name	college_name	eventid
1	Faisal Khan	IITB	ME001
2	Rajesh Prasad	IITB	ME001
3	Sophie Martin	IITB	DJ001
4	Lucas Dubois	IITB	ME003
5	Eva Rousseau	IITB	CN001
6	Antoine Bernard	IITB	SG001
7	Isabelle Leroux	IITB	TE001
8	Claude Laurent	IITB	FS001
9	Amélie Dubois	IITB	LF001
10	Rahul Sharma	IITB	ME001
11	Manish Das	IITD	ME001
12	Nitish Kumar	IITD	ME001
13	Chirag Paswan	IITK	ME001
14	Gaurav Lal	Jadavpur University	ME001
15	Amrita Dubey	Calcutta University	ME001
16	Monika Roy	National Medical College	ME001
17	Antoine Martin	IITD	DJ001
18	Camille Dubois	IITK	ME003
19	Elise Rousseau	IITM	CN001
20	Lucas Lambert	IITKGP	SG001
21	Isabelle Lefevre	IITR	TE001
22	Maximilian Becker	Jadavpur University	FS001
23	Hannah Müller	Calcutta University	LF001
24	Lukas Schmidt	National Medical College	CN001
25	Sophie Wagner	Presidency University	TE001
26	Felix Weber	IITR	DJ001
27	Ivan Ivanov	IITM	SG001
28	Anastasia Sokolova	IITB	LF001
29	Dmitri Petrov	IITK	FS001
30	Ekaterina Ivanova	IITKGP	ME003
31	Natalia Volkova	IITD	CN001

2.7 Manages Table

roll	eventid
20CS10064	ME001
20CS10065	ME001
20CS10063	ME001
21ME10034	ME001
21ME10035	ME003
21CE10036	CN001
21EE10036	SG001
19ME10036	DJ001
22CS10036	TE001
22CS30021	LF001
20CS10066	DJ001
21EE10037	ME003
22CS10038	CN001
19ME10039	SG001
22CS30040	TE001
20CS10067	TE001

3 Queries

3.1 Roll number and name of all the students who are managing the “Megaevent”

3.1.1 Relational Algebra Query

$$\Pi_{\text{student.roll,student.name}}(\sigma_{\text{event.ename='Megaevent'}}(\text{student} \bowtie_{\text{student.roll=manages.roll}} \text{event} \bowtie_{\text{manages.eventid=event.eid}} \text{event}))$$

3.1.2 SQL Query

```sql
SELECT
    student.roll,
    student.name
FROM
    student
    JOIN manages ON student.roll = manages.roll
    JOIN event ON manages.eventid = event.eid
WHERE
    event.ename = 'Megaevent';
```

3.1.3 Output

roll	name
20CS10064	Abhishek Kumar
20CS10065	Bhaskar Kumar
20CS10063	Bratin Ghosh
21ME10034	Somya Gupta

3.2 Roll number and name of all the students who are managing “Megaevent” as a “Secretary”

3.2.1 Relational Algebra Query

$$\text{secretary\_student} \leftarrow \Pi_{\text{name, roll}}(\sigma_{\text{role.rname='Secretary'}}(\text{student} \bowtie_{\text{student.roleid=role.rid}} \text{role}))$$

$$\Pi_{\text{roll, name}}(\sigma_{\text{ename='Megaevent'}}(\text{secretary\_student} \bowtie_{\text{secretary\_student.roll=manages.roll}} \text{manages} \bowtie_{\text{manages..eventid=event.eid}} \text{event}))$$

3.2.2 SQL Query

```sql
SELECT
    secretary_student.roll,
    secretary_student.name
FROM
    (
        SELECT
            name,
            roll
        FROM
            student
            JOIN role ON student.roleid = role.rid
        WHERE
            role.rname = 'Secretary'
    ) AS secretary_student
    JOIN manages ON secretary_student.roll = manages.roll
    JOIN event ON manages.eventid = event.eid
WHERE
    ename = 'Megaevent';
```

3.2.3 Output

roll	name
20CS10064	Abhishek Kumar
21ME10034	Somya Gupta

3.3 Name of all the participants from the college "IITB" in "Megaevent"

3.3.1 Relational Algebra Query

$$\text{participant\_IITB} \leftarrow \Pi_{\text{participant.name, eventid}}(\sigma_{\text{college.name='IITB'}}(\text{participant} \bowtie_{\text{participant.college\_name=college.name}} \text{college}))$$
$$\Pi_{\text{name}}(\sigma_{\text{ename='Megaevent'}}(\text{participant\_IITB} \bowtie_{\text{participant\_IITB.eventid=event.eid}} \text{event}))$$

3.3.2 SQL Query

```sql
SELECT
    name
FROM
    (
        SELECT
            participant.name,
            eventid
        FROM
            participant
            JOIN college ON participant.college_name = college.name
        WHERE
            college.name = 'IITB'
    ) AS participant_IITB
    JOIN event ON participant_IITB.eventid = event.eid
WHERE
    ename = 'Megaevent';
```

name
Faisal Khan
Rajesh Prasad
Rahul Sharma

3.3.3 Output

3.4 Name of all the colleges who have at least one participant in "Megaevent"

3.4.1 Relational Algebra Query

$\Pi_{\text{college\_name}}(\sigma_{\text{ename='Megaevent'}}(\text{participant} \bowtie_{\text{participant.eventid=event.eid}} \text{event}))$

3.4.2 SQL Query

```sql
SELECT
    DISTINCT college_name
FROM
    participant
    JOIN event ON participant.eventid = event.eid
WHERE
    event.ename = 'Megaevent';
```

3.4.3 Output

college_name
Calcutta University
IITB
IITD
IITK
Jadavpur University
National Medical College

3.5 Name of all the events which are managed by a "Secretary"

3.5.1 Relational Algebra Query

$\text{event\_secretary} \leftarrow \Pi_{\text{roll}}(\sigma_{\text{role.rname='Secretary'}}(\text{student} \bowtie_{\text{student.roleid=role.rid}} \text{role}))$
$\Pi_{\text{ename}}(\text{event\_secretary} \bowtie_{\text{event\_secretary.roll=manages.roll}} \text{manages} \bowtie_{\text{manages.eventid=event.eid}} \text{event})$

3.5.2 SQL Query

```sql
SELECT
    DISTINCT ename
FROM
    (
        SELECT
            roll
        FROM
            student
            JOIN role ON student.roleid = role.rid
        WHERE
            role.rname = 'Secretary'
    ) AS event_secretary
    JOIN manages ON event_secretary.roll = manages.roll
    JOIN event ON manages.eventid = event.eid;

```

3.5.3 Output

ename
Megaevent
Super Event
Cultural Night
Sports Gala
Tech Expo

3.6 Name of all the "CSE" department student volunteers of "Megaevent"

3.6.1 Relational Algebra Query

$$\text{mega\_student} \leftarrow \Pi_{\text{roll}}(\sigma_{\text{event.ename='Megaevent'}}(\text{volunteer} \bowtie_{\text{volunteer.eventid=event.eid}} \text{event}))$$
$$\Pi_{\text{name}}(\sigma_{\text{student.dept='CSE'}}(\text{student} \bowtie_{\text{student.roll=mega\_student.roll}} \text{mega\_student}))$$

3.6.2 SQL Query

```sql
SELECT
    name
FROM
    student
    JOIN (
        SELECT
            roll
        FROM
            volunteer
            JOIN event ON volunteer.eventid = event.eid
        WHERE
            event.ename = 'Megaevent'
    ) AS mega_student ON student.roll = mega_student.roll
WHERE
    student.dept = 'CSE';
```

3.6.3 Output

name
Abhishek Kumar
Bhaskar Kumar
Bratin Ghosh
Catholine Marie

3.7 Name of all the events which have at least one volunteer from "CSE"

3.7.1 Relational Algebra Query

$$\text{student\_volunteer} \leftarrow \Pi_{\text{roll,ename}}(\text{volunteer} \bowtie_{\text{volunteer.eventid=event.eid}} \text{event})$$
$$\Pi_{\text{ename}}(\sigma_{\text{student.dept='CSE'}}(\text{student} \bowtie_{\text{student.roll=student\_volunteer.roll}} \text{student\_volunteer}))$$

3.7.2 SQL Query

```sql
SELECT
    DISTINCT ename
FROM
    student
```

```
    JOIN (
        SELECT
            roll,
            ename
        FROM
            volunteer
            JOIN event ON volunteer.eventid = event.eid
    ) AS student_volunteer ON student.roll = student_volunteer.roll
WHERE
    student.dept = 'CSE';
```

3.7.3 Output

ename
Cultural Night
DJ Night
Megaevent
Sports Gala
Super Event
Tech Expo

3.8 Name of the college with the largest number of participants in "Megaevent"

3.8.1 Relational Algebra Query

$$\text{participant\_count} \leftarrow {}_{\text{participant.college\_name}}\mathcal{G}_{\text{count(PID) as p\_count}}(\sigma_{\text{event.ename='Megaevent'}}(\text{participant} \bowtie_{\text{participant.eventid=event.eid}} \text{event}))$$
$$\Pi_{\text{college\_name}}(\text{participant\_count}) - \Pi_{\text{A.college\_name}}(\rho_{\text{A}}(\text{participant\_count}) \bowtie_{\text{A.p\_count < B.p\_count}} \rho_{\text{B}}(\text{participant\_count}))$$

3.8.2 SQL Query

```
SELECT
    college_name
FROM
    (
        SELECT
            participant.college_name,
            COUNT(*) AS participant_count
        FROM
            participant
            JOIN event ON participant.eventid = event.eid
        WHERE
            event.ename = 'Megaevent'
        GROUP BY
            participant.college_name
        ORDER BY
            participant_count DESC
        LIMIT
            1
    ) AS mega_college_count;
```

3.8.3 Output

college_name
IITB

3.9 Name of the college with the largest number of participants in any event

3.9.1 Relational Algebra Query

$$\text{participant\_count} \leftarrow_{\text{participant.college\_name}} \mathcal{G}_{\text{count(PID) as p\_count}}(\text{participant} \bowtie_{\text{participant.eventid=event.eid}} \text{event})$$
$$\Pi_{\text{college\_name}}(\text{participant\_count}) - \Pi_{\text{A.college\_name}}(\rho_{\text{A}}(\text{participant\_count}) \bowtie_{\text{A.p\_count < B.p\_count}} \rho_{\text{B}}(\text{participant\_count}))$$

3.9.2 SQL Query

```sql
SELECT
    college_name
FROM
    (
        SELECT
            participant.college_name,
            COUNT(*) AS participant_count
        FROM
            participant
            JOIN event ON participant.eventid = event.eid
        GROUP BY
            participant.college_name
        ORDER BY
            participant_count DESC
        LIMIT
            1
    ) AS mega_college_count;
```

3.9.3 Output

college_name
IITB

3.10 Name of the department with the largest number of volunteers in all the events which have at least one participant from "IITB"

3.10.1 Relational Algebra Query

$$\text{IITB\_event} \leftarrow \Pi_{\text{eid}}(\sigma_{\text{participant.college\_name='IITB'}}(\text{participant} \bowtie_{\text{participant.eventid=event.eid}} \text{event}))$$
$$\text{volunteer\_IITB} \leftarrow \Pi_{\text{roll}}(\text{IITB\_event} \bowtie_{\text{IITB\_event.eid=volunteer.eventid}} \text{volunteer})$$
$$\text{student\_count} \leftarrow_{\text{volunteer\_IITB.dept}} \mathcal{G}_{\text{count(Roll) as r\_count}}(\text{volunteer\_IITB} \bowtie_{\text{volunteer\_IITB.roll=student.roll}} \text{student})$$
$$\Pi_{\text{dept}}(\text{student\_count}) - \Pi_{\text{A.dept}}(\rho_{\text{A}}(\text{student\_count}) \bowtie_{\text{A.r\_count < B.r\_count}} \rho_{\text{B}}(\text{student\_count}))$$

3.10.2 SQL Query

```sql
SELECT
    dept
FROM
    (
        SELECT
            dept,
            COUNT(*) AS student_count
        FROM
            (
                SELECT
                    roll
                FROM
```

```sql
                    (
                        SELECT
                            DISTINCT eid
                        FROM
                            participant
                            JOIN event ON participant.eventid = event.eid
                        WHERE
                            participant.college_name = 'IITB'
                    ) AS IITB_event
                    JOIN volunteer ON IITB_event.eid = volunteer.eventid
            ) AS volunteer_IITB
            JOIN student ON volunteer_IITB.roll = student.roll
        GROUP BY
            dept
        ORDER BY
            student_count DESC
        LIMIT
            1
    ) AS mega_dept_count;
```

3.10.3 Output

dept
CSE