



Daffodil
International
University

Daffodil International University

Daffodil Smart City (DSC), Savar, Dhaka

Department of Computing and Information System

Semester Project on

DATABASE MANAGEMENT SYSTEM [CIS - 222]

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I am grateful to Daffodil International University for providing me with an environment that has helped me develop my knowledge and skills.

Lastly, I would like to dedicate this project to those who are differently abled and have a thirst for knowledge. Their determination and resilience are a true inspiration to us all.

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Theory Part

Task – 1

Q1. Explaining why they choose the DIU student database over others.

Answer:

The DIU student database was chosen over other options because:

- 1. Relevance to Academic Needs:** It helps manage **student records, faculty supervision, and course enrolments**, which is crucial for an academic institution.
- 2. Structured & Relational Data:** Unlike other databases like the blood donation or hotel management system, a **student database follows a structured relational model**, making it an ideal choice for learning **ER modelling and SQL queries**.
- 3. Scalability & Real-World Applications:** The database can be extended to **track attendance, results, and research work**, making it useful for future enhancements.

Q2. Explaining the issues that might Mr. Fahim encountered when resolving the Relational Model.

Answer:

Mr. Fahim may have faced the following challenges:

1. **Normalization Issues:** Ensuring **no redundancy** and **data integrity** while structuring tables.
2. **Primary & Foreign Key Conflicts:** Establishing **relationships between tables** without violating **referential integrity**.
3. **Handling Many-to-Many Relationships:** For example, students registering for multiple courses requires an **intermediate (junction) table**.
4. **Complex Query Optimization:** Queries involving **JOINS and subqueries** need proper indexing for **efficiency**.

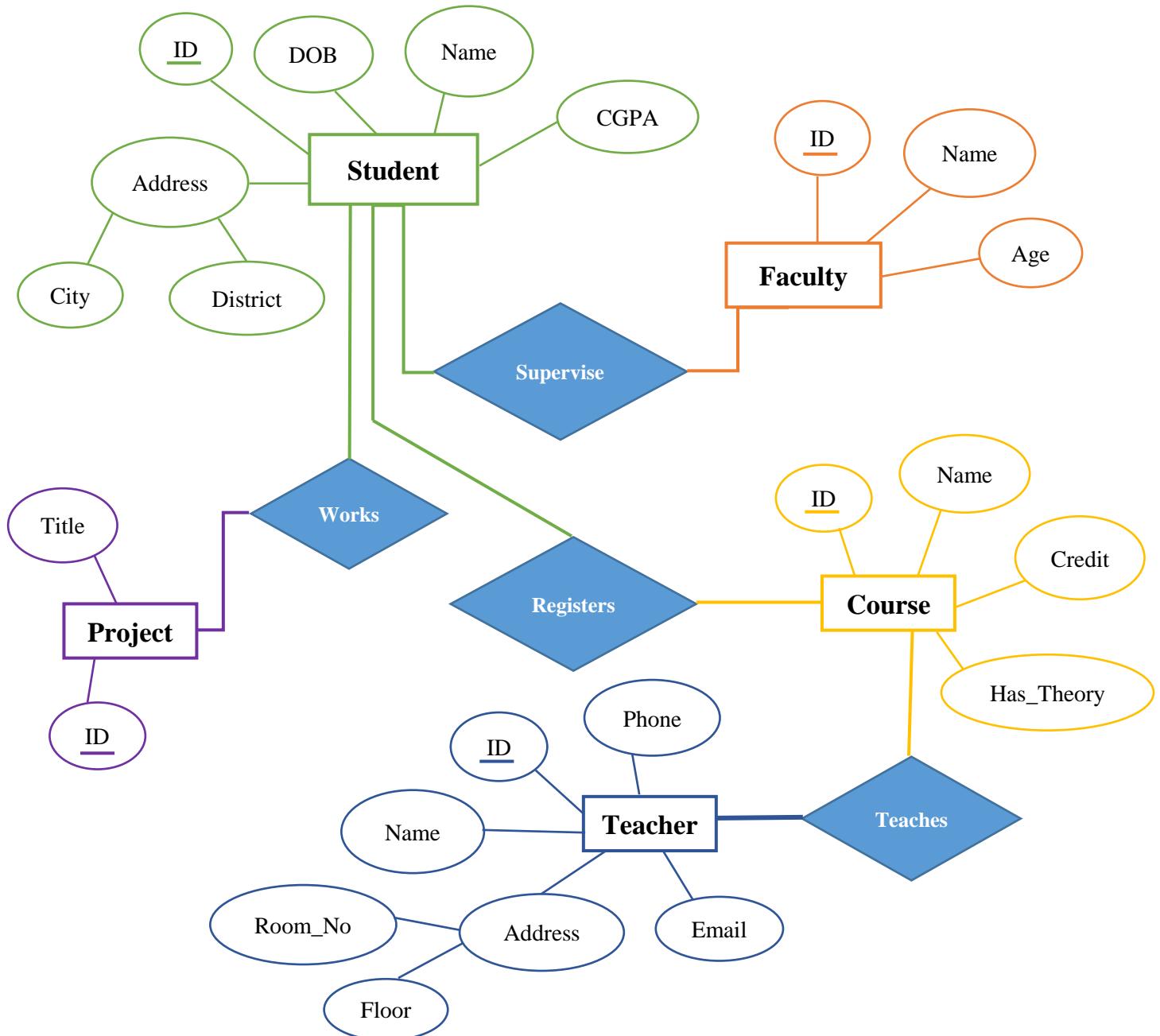
Q3. Explaining the type of entity that is described by Mr. Mehedi regarding the blood donation system.

Answer:

The **blood donation system** describes a **strong entity** with multiple **associative relationships**. It includes:

1. **Donors (Primary Entity):** Stores **Donor_ID, Name, Blood Type, Age, and Contact Details**.
2. **Receivers (Related Entity):** Tracks **Receiver_ID, Name, and Required Blood Type**.
3. **Donation Transactions (Association Entity):** Links **donors and receivers**, containing **Donation_ID, Date, and Hospital Details**.

This system requires **many-to-many relationships** since multiple donors can provide blood to multiple receivers.

Task – 2**Q4. Drawing the ER Diagram for the DIU Student Database.****Answer:**The **ER Diagram** includes:**Fig:** ER Diagram for DIU Student Database

Q5. Creating a Data Dictionary for the Competition Database.

Answer:

1. Student

Attribute Name	Data Type	Length	Primary Key	Foreign Key	Reference Table
sid	varchar	20	Yes		
name	varchar	100			
dob	date				
cgpa	float				
age	int				
city	varchar	100			
district	varchar	100			

2. Faculty

Attribute Name	Data Type	Length	Primary Key	Foreign Key	Reference Table
fid	varchar	20	Yes		
name	varchar	100			
age	int				

3. Project

Attribute Name	Data Type	Length	Primary Key	Foreign Key	Reference Table
pid	varchar	30	Yes		
title	varchar	255			

4. Teacher

Attribute Name	Data Type	Length	Primary Key	Foreign Key	Reference Table
tid	varchar	20	Yes		
name	varchar	100			
phone	varchar	15			
email	varchar	50			
room_No	varchar	10			
floor	varchar	10			

5. Course

Attribute Name	Data Type	Length	Primary Key	Foreign Key	Reference Table
cid	varchar	20	Yes		
cname	varchar	60			
credit	int				
has_theory	boolean				

6. Works_On

Attribute Name	Data Type	Length	Primary Key	Foreign Key	Reference Table
sid	varchar	20		Yes	Student
pid	varchar	30		Yes	Project
fid	varchar	20		Yes	Faculty

7. Enrolls

Attribute Name	Data Type	Length	Primary Key	Foreign Key	Reference Table
sid	varchar	20		Yes	Student
cid	varchar	20		Yes	Course

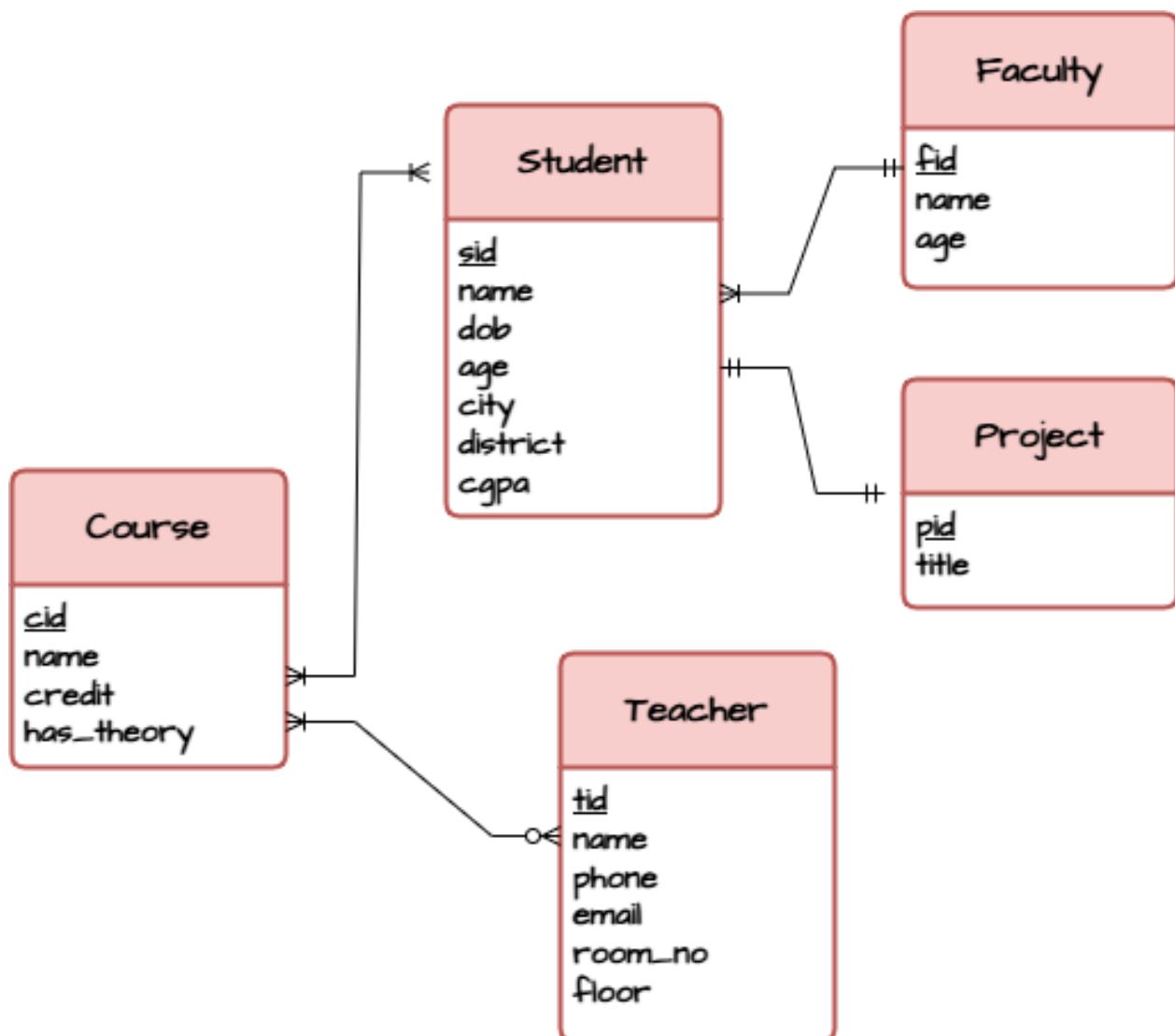
8. Teaches

Attribute Name	Data Type	Length	Primary Key	Foreign Key	Reference Table
tid	varchar	20		Yes	Teacher
cid	varchar	20		Yes	Course

Q6. Drawing the Relational Model for the Database.

Answer:

This involves converting the ER model into **normalized relational tables** with **PK-FK relationships**.



Q7. Writing down the SQL solutions that are provided by Mr. Fahim and Mr. Minhaj at the competition.

Answer:

-- Query 1: Find students who registered for more than two courses.

```
SELECT s.sid, s.name
FROM Student s
INNER JOIN Enrolls e
ON s.sid=e.student_id
GROUP BY s.sid
HAVING COUNT(e.course_id) > 2;
```

-- Query 2: Find teachers whose email contains 'diu' and phone starts with '017'.

```
SELECT Name, Email, Phone
FROM Teacher
WHERE Email LIKE '%diu%' AND Phone LIKE '017%';
```

-- Query 3: Find students from 'Dhaka' with CGPA > 3.65.

```
SELECT Name, CGPA
FROM Student
WHERE City = 'Dhaka' AND CGPA > 3.65;
```

-- Query 4: Find students who are NOT from 'Dhaka' or 'Chittagong'.

```
SELECT Name, City, District
FROM Student
WHERE City NOT IN ('Dhaka', 'Chittagong');
```

-- Query 5: Find students taking courses CIS222, CIS223, or CIS224.

```
SELECT s.sid, s.name, e.course_id
FROM Student s
LEFT JOIN Enrolls e
ON s.sid = e.student_id
WHERE e.course_id IN ('CIS222', 'CIS223', 'CIS224');
```

-- Query 6: Find projects with 'Library' or 'AI' in the title.

```
SELECT * FROM Project WHERE Title LIKE '%Library%' OR Title LIKE '%AI%';
```

-- Query 7: Find students aged 20-24 with CGPA > 3.71.

```
SELECT Name, Age, CGPA  
FROM Student  
WHERE Age BETWEEN 20 AND 24 AND CGPA > 3.71;
```

-- Query 8: Find courses without students enrolled.

```
SELECT c.cid, c cname  
FROM COURSE c  
LEFT JOIN ENROLLS e ON c.cid = e.course_id  
WHERE e.student_id IS NULL;
```

-- Query 9: List courses with more than one student enrolled.

```
SELECT c.cid, c cname  
FROM COURSE c  
JOIN ENROLLS e ON c.cid = e.course_id  
GROUP BY c.cid, c cname  
HAVING COUNT(e.student_id) > 1;
```

-- Query 10: Find students supervised by a specific faculty (FacultyID = 7100028XX). ['XX' = Last two digits of your Student ID]

```
SELECT DISTINCT name  
FROM student s  
LEFT JOIN works_on w  
ON s.sid=w.student_id  
WHERE w.faculty_id='710002852';
```

Lab Part

Task – 1

Q1. Displaying all the relations created by Mr. Fahim and Mr. Minhaj in MySQL based on the queries asked by Mr. Abdullah.

1. Student

sid	name	dob	age	city	district	cgpa
232-16-042	Mushfiqul Islam Ruhit	2000-08-19	25	Cumilla	Cumilla	3.7
232-16-044	Tusher	2002-12-09	23	Rangpur	Rangpur	3.5
232-16-045	Aowlad Hasan	2002-04-30	23	Mymensingh	Mymensingh	3.95
232-16-047	A.F.M. Shah Arefin Atiq	2001-01-25	24	Khulna	Khulna	4
232-16-049	Tanzimul Islam	2002-06-15	23	Sylhet	Sylhet	3.75
232-16-050	Jobair Hassan	2001-03-12	24	Chittagong	Chattogram	3.85
232-16-051	Rokon Al Hasan	2000-11-11	25	Barishal	Barishal	3.65
232-16-052	Rafsan Bin Habib	2000-01-01	25	Dhaka	Dhaka	3.8
232-16-063	Rakibul Islam	2001-10-22	24	Rajshahi	Rajshahi	3.9
NULL	NULL	NULL	NULL	NULL	NULL	NULL

2. Faculty

fid	name	age
710002765	Dr. Nazneen Sultana	47
710002789	Dr. Saima Rahman	48
710002836	Dr. Arif Chowdhury	51
710002845	Dr. Khalid Mahmud	49
710002848	Dr. Rina Alam	43
710002852	Dr. Mahmud Hossain	50
710002853	Dr. Zia Uddin	52
710002879	Dr. Tariq Hasan	55
710002890	Dr. Amina Khatun	45
NULL	NULL	NULL

3. Teacher

tid	name	email	phone	room_no	floor
1	Mr. Imran Hossain	imran@diu.edu	01710000001	101A	1
2	Ms. Jannat Ara	jannat@diu.edu	01710000002	102B	1
3	Mr. Rezaul Karim	rezaul@diu.edu	01710000003	203A	2
4	Ms. Shirin Akter	shirin@diu.edu	01710000004	204B	2
5	Mr. Kamrul Islam	kamrul@diu.edu	01710000005	305A	3
6	Ms. Tanzina Rahman	tanzina@diu.edu	01710000006	306B	3
7	Mr. Nayeem Ahmed	nayeem@diu.edu	01710000007	407A	4
8	Ms. Tania Sultana	tania@univ.edu	01710000008	408B	4
9	Mr. Wasim Hasan	wasim@univ.edu	01710000009	509A	5
NULL	NULL	NULL	NULL	NULL	NULL

4. Course

CIS115	Structured Programming	3	1	5
CIS132	Algorithms	3	1	2
CIS133	Web Development	3	0	9
CIS211	Computer Networks	3	1	5
CIS222	Database Systems	3	1	3
CIS223	Machine Learning	3	1	7
CIS224	Data Structures	3	1	1
CIS232	Operating Systems	4	1	4
CIS235	Software Engineering	3	1	8
CIS313	Artificial Intelligence	3	1	6
NONE	NONE	NONE	NONE	NONE

5. Project

pid	title
P1	Smart Library System
P2	AI in Healthcare
P3	Blockchain Voting System
P4	Weather Forecasting App
P5	Voice Controlled Home
P6	E-Commerce Recommendation
P7	Bangla OCR Tool
P8	Cyber Security Scanner
P9	Social Media Sentiment Analysis
NONE	NONE

QL2. Displaying the output of the queries asked by Mr. Abdullah.

Query1:

sid	name
232-16-052	Rafsan Bin Habib

Query 2:

Name	Email	Phone
Mr. Imran Hossain	imran@diu.edu	01710000001
Ms. Jannat Ara	jannat@diu.edu	01710000002
Mr. Rezaul Karim	rezaul@diu.edu	01710000003
Ms. Shirin Akter	shirin@diu.edu	01710000004
Mr. Kamrul Islam	kamrul@diu.edu	01710000005
Ms. Tanzina Rahman	tanzina@diu.edu	01710000006
Mr. Nayeem Ahmed	nayeem@diu.edu	01710000007

Query 3:

Name	CGPA
Rafsan Bin Habib	3.8

Query 4:

Name	City	District
Mushfiqul Islam Ruhit	Cumilla	Cumilla
Tusher	Rangpur	Rangpur
Aowlad Hasan	Mymensingh	Mymensingh
A.F.M. Shah Arefin Atiq	Khulna	Khulna
Tanzimul Islam	Sylhet	Sylhet
Rokon Al Hasan	Barishal	Barishal
Rakibul Islam	Rajshahi	Rajshahi

Query 5:

sid	name	course_id
232-16-042	Mushfiqul Islam Ruhit	CIS223
232-16-044	Tusher	CIS224
232-16-050	Jobair Hassan	CIS222
232-16-051	Rokon Al Hasan	CIS222
232-16-052	Rafsan Bin Habib	CIS222
232-16-052	Rafsan Bin Habib	CIS223
232-16-052	Rafsan Bin Habib	CIS224
232-16-063	Rakibul Islam	CIS223

Query 6:

pid	title
P1	Smart Library System
P2	AI in Healthcare
P3	Blockchain Voting System
NULL	NULL

Query 7:

Name	Age	CGPA
Aowlad Hasan	23	3.95
A.F.M. Shah Arefin Atiq	24	4
Tanzimul Islam	23	3.75
Jobair Hassan	24	3.85
Rakibul Islam	24	3.9

Query 8:

cid	cname
CIS115	Structured Programming

Query 9:

cid	cname
CIS133	Web Development
CIS211	Computer Networks
CIS222	Database Systems
CIS223	Machine Learning
CIS224	Data Structures
CIS232	Operating Systems
CIS235	Software Engineering
CIS313	Artificial Intelligence

Query 10:

name
Rafsan Bin Habib

Task – 2

QL3. Explain details about your lab work (Task-1) and make a short video. ([Click Here](#))

--THE END--