Database Management System

Semester – III (Batch-2024)

Campus Info Management System

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Introduction

Enhancing campus experiences and fostering student engagement is an important goal for any educational institution. Traditional campus exploration and social interaction are often limited by physical presence and timing, which can restrict students from fully experiencing and participating in campus life. A **Campus Info Management System** provides a structured platform for students to explore, interact with, and share experiences from their campus in a digital environment. The goal of this system is to create an exclusive platform for university students, where they can navigate the campus virtually, upload memories, and engage with peers through questions and answers. By digitizing these interactions, the system reduces physical constraints, encourages community building, and ensures seamless access to campus information.

The system offers an **interactive 2D map of the campus**, allowing students to navigate different locations virtually. By clicking on specific spots, users can view photos and information about those locations, providing a realistic and immersive campus experience from anywhere, at any time.

To further enhance engagement, the platform incorporates a **Q&A forum**, enabling students to post questions related to academics, campus events, or other student activities. Peers can respond to queries, fostering a culture of knowledge sharing and peer-to-peer support. By centralizing these interactions, the system promotes connectivity, accessibility, and inclusivity among students.

By leveraging technology to bridge the gap between physical presence and digital interaction, the system not only enhances student engagement but also serves as a valuable resource for preserving and sharing campus culture and memories.

E-R Diagram

An Entity-Relationship Diagram (ERD) is a visual representation of the entities in a database and the relationships between them. It helps in structuring data efficiently before creating the actual database schema. It provides a high-level view of how data is stored, processed, and connected in a system.

Key Components of an E-R Diagram :

1. Entities:

- An entity represents a real-world object, concept or thing about which data is stored in a database.

2. Attributes:

- Attributes are characteristics/properties that define an entity.
- Example in our project: *Student*: Roll Number, Name, Batch, Course, Favourite Spot, Review.

3. Primary Key:

- A unique attribute that identifies each record of an entity.
- Example in our project: *Roll Number* for Students, *Department ID* for Departments.

4. Relationships:

- Relationships define how entities interact with each other.
- Example: Students may belong to Clubs and Locations may be associated with Departments.

Entities :

1. Student table

- **Key Attributes:** RollNo (PK, FK in Clubs Table), Name, Batch, Course, FavSpot, Review
- **Purpose:** Stores information about students and their preferences.
- **Relationships:**
  - Belongs to → Batch
  - Enrolls in → Course
  - Likes → FavSpot
  - Writes → Review
  - Member of → Club

2. Clubs table

- **Key Attributes:** ClubName (PK), Head, Faculty, NoOfMembers, HeadEmail, Category.
- **Purpose:** Stores details of different student clubs, their heads, and activities.
- **Relationships:**
  - Headed by → Student (Head)
  - Managed by → Faculty
  - Belongs to → Category
  - Associated with → Location
  - Consists of → NoOfMembers

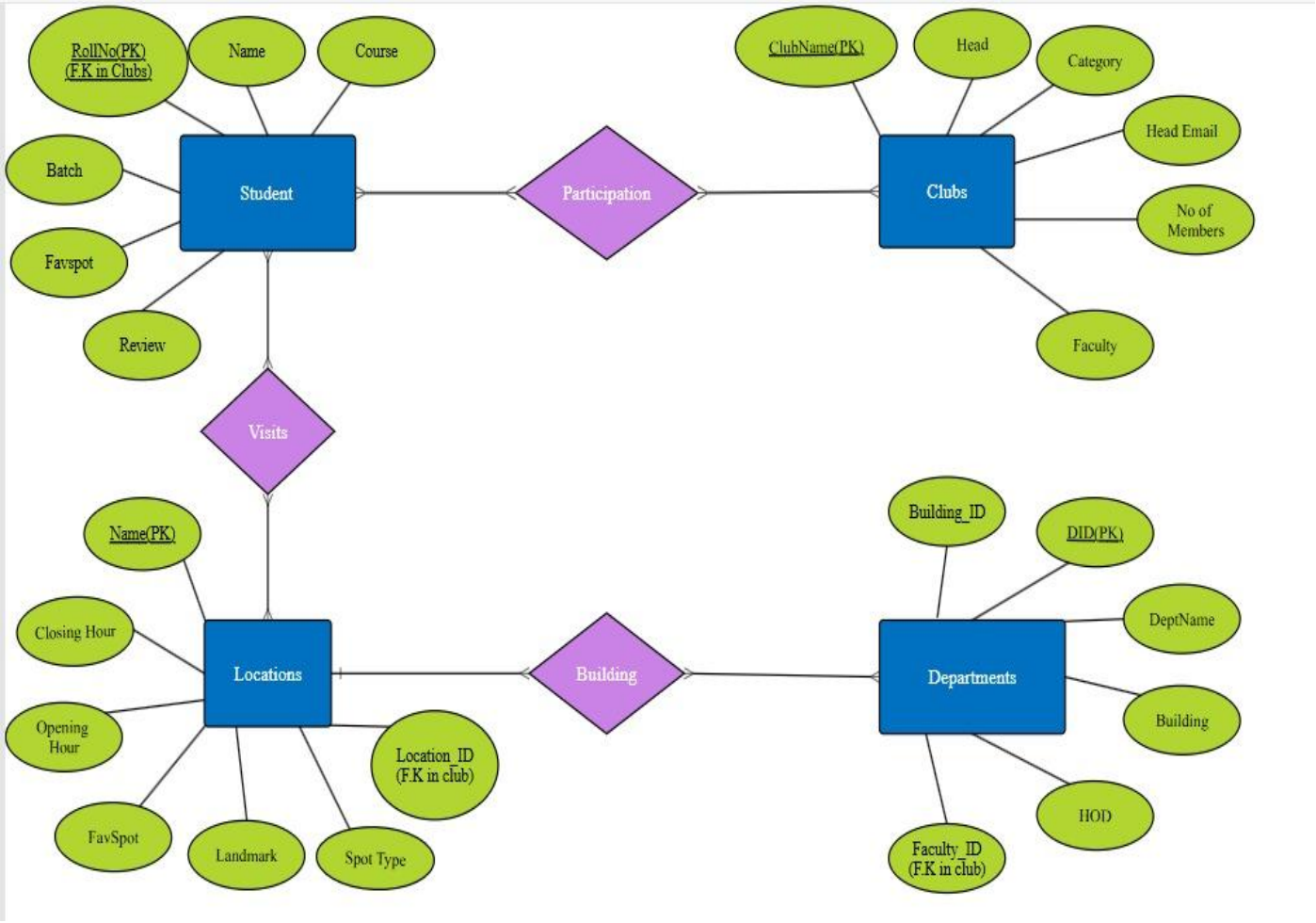
3. Locations table

- **Key Attributes:** LocationName (PK), SpotType, Landmark, FavSpot, OpeningHour, ClosingHour.
- **Purpose:** Stores information about spots/places within the campus.
- **Relationships:**
  - Is a type of → SpotType
  - Located near → Landmark
  - Has → FavSpot (a specific favorite spot within the location)
  - Is open from → OpeningHour
  - Is open until → ClosingHour

4.Departments Table

- **Key Attributes:** D.ID (PK), DeptName, HOD, Building
- **Purpose:** Stores details of departments, their heads, and associated buildings.
- **Relationships:**
  - Has → HOD (Head of Department)
  - Located in → Building

ER Diagram:



Normalization Used *(Un-normalized form)*

- Un-normalised Student table :

RollNo(PK)	Name	Batch	Course	FavSpot	Review
101	Ruhani	CSE-1	CSE	Turing, Library	Peaceful to study, Lots of books
102	Riya	CSE-2	CSE	Library, Sq1	Lot of books, Spicy food
103	Meghna	CSE-7	CSE	Exploratorium, Sq2	Lots of events, Food and chill
105	Tanveer	BBA-5	BBA	Sq1, Turing	Chilly food, Good place to study

Fig 3.1 (un-normalized Students Table)

- Un-normalised Clubs table :

ClubName(PK)	Head	Faculty	NoOfMembers	HeadEmail	Category
Natraj	Riya	Dr. A, Dr. D	10	riy@gmail.com	Talent
Dhwani	Ruhani	Dr. B	15	ruh@gmail.com	Talent
OSC	Riya	Dr. C	42	riy@gmail.com	Tech
ICCE	Tanveer	Dr. D, Dr. E	42	tan@gmail.com	Tech
Cricket	Meghna	Dr. C	22	meg@gmail.com	Sports

Fig 3.2 (un-normalized Clubs Table)

- Un-normalised Locations table :

LocationName(PK)	SpotType	Landmark	FavSpot	OpeningHour	ClosingHour
Sq1	Food	near Rockefeller Block	Chaat corner, Chai Nagri	9:00 a.m.	10:00 p.m.
Turing	Study	Near Parking	Reading Room	9:00 a.m.	8:00 p.m.
Exploratorium	Events	Near Gate 2	Main Hall	10:30 a.m.	8:00 p.m.
Sportorium	Sports , Club Activities	Near Gate 4	Pool	10:30 a.m.	4:00 p.m.
Library	Study	Near Fleming	Table 4,6	8:30 a.m.	10:00 p.m.

Fig 3.3 (un-normalized Locations Table)

- Un-normalised Departments table :

DID(PK)	DeptName	HOD	Building
D01	CSE	Dr. A	Turing, Pythagoras
D02	Mech	Dr. C	Tesla
D03	ECE	Dr. D	Fleming

Fig 3.4 (un-normalized Departments Table)

First Normal Form (1NF)

- All values in each column must be atomic (single, indivisible).
- No repeating groups or arrays are allowed in a column.
- Each record (row) must be unique.

- Table 1: Students

RollNo(PK)	Name	Batch	Course	FavSpot	Review
101	Ruhani	CSE-1	CSE	Turing	Peaceful to study
101	Ruhani	CSE-1	CSE	Library	Lots of books
102	Riya	CSE-2	CSE	Library	Lots of books
102	Riya	CSE-2	CSE	Sq1	Spicy food
103	Meghna	CSE-7	CSE	Exploratorium	Lots of events
103	Meghna	CSE-7	CSE	Sq2	Food and chill
105	Tanveer	BBA-5	BBA	Sq1	Chilly Food
105	Tanveer	BBA-5	BBA	Turing	Good place to study

Fig 3.5 (1-NF table for Students)

- Table 2: Clubs

ClubName(PK)	Head	Faculty	NoOfMembers	HeadEmail	Category
Natraj	Riya	Dr. A	10	riy@gmail.com	Talent
Natraj	Riya	Dr. D	10	riy@gmail.com	Talent
Dhwani	Ruhani	Dr. B	15	ruh@gmail.com	Talent
OSC	Riya	Dr. C	42	riy@gmail.com	Tech
ICCE	Tanveer	Dr. D	42	tan@gmail.com	Tech
ICCE	Tanveer	Dr. E	42	tan@gmail.com	Tech
Cricket	Meghna	Dr. C	22	meg@gmail.com	Sports

Fig 3.6 (1-NF table for Clubs)

- Table 3: Locations

LocationName(PK)	SpotType	Landmark	FavSpot	OpeningHour	ClosingHour
Sq1	Food	Near Rockefeller Block	Chaat corner	9:00 a.m.	10:00 p.m.
Sq1	Food	Near Rockefeller Block	Chai Nagri	9:00 a.m.	10:00 p.m.
Turing	Study	Near Parking	Reading Room	9:00 a.m.	8:00 p.m.
Exploratorium	Events	Near Gate 2	Main Hall	10:30 a.m.	8:00 p.m.
Sportorium	Sports	Near Gate 4	Pool	10:30 a.m.	4:00 p.m.
Sportorium	Club Activities	Near Gate 4	Badminton Court	10:30 a.m.	4:00 p.m.
Library	Study	Near Fleming	Table 4	8:30 a.m.	10:00 p.m.
Library	Study	Near Fleming	Table 6	8:30 a.m.	10:00 p.m.

Fig 3.7 (1-NF table for Locations)

- Table 4: Departments

DID(PK)	DeptName	HOD	Building
D01	CSE	Dr. A	Turing
D01	CSE	Dr. A	Pythagoras
D02	Mech	Dr. C	Tesla
D03	ECE	Dr. D	Fleming

Fig 3.8 (1-NF table for Departments)

Second Normal Form (2NF)

A table is said to be in Second Normal Form (2NF) if:

- It is already in 1NF.
- All non-key attributes are fully dependent on the entire primary key (not on part of it).

- Table 1: Students

RollNo(PK)	Name	Batch	Course
101	Ruhani	CSE-1	CSE
102	Riya	CSE-2	CSE
103	Meghna	CSE-7	CSE
105	Tanveer	BBA-5	BBA

RollNo(PK)	FavSpot	Review
101	Turing	Peaceful to study
101	Library	Lots of books
102	Library	Lots of books
102	Sq1	Spicy food
103	Exploratorium	Lots of events
103	Sq2	Food and chill
105	Sq1	Chilly Food
105	Turing	Good place to study

Fig 3.9 (2-NF table for Students)

- Table 2: Clubs

ClubName(PK)	Head	NoOfMembers	Category	HeadEmail
Natraj	Riya	10	Talent	riy@gmail.com
Dhwani	Ruhani	15	Talent	ruh@gmail.com
OSC	Riya	42	Tech	riy@gmail.com
ICCE	Tanveer	42	Tech	tan@gmail.com
Cricket	Meghna	22	Sports	meg@gmail.com

Fig 3.10 (2-NF table for Clubs)

ClubName(PK)	Faculty
Natraj	Dr. A
Natraj	Dr. D
Dhwani	Dr. B
OSC	Dr. C
ICCE	Dr. D
Cricket	Dr. C

- Table 3: Locations

LocationName(PK)	Landmark	SpotType	OpeningHour	ClosingHour
Sq1	lear Rockefeller Bloc	Food	9:00 a.m.	10:00 p.m.
Turing	Near Parking	Study	9:00 a.m.	8:00 p.m.
Exploratorium	Near Gate 2	Events	10:30 a.m.	8:00 p.m.
Sportorium	Near Gate 4	Sports	10:30 a.m.	4:00 p.m.
Sportorium	Near Gate 4	Club activities	10:30 a.m.	4:00 p.m.
Library	Near Fleming	Study	8:30 a.m.	10:00 p.m.

LocationName(PK)	FavSpot
Sq1	Chaat corner
Sq1	Chai Nagri
Turing	Reading Room
Exploretorium	Main Hall
Sportorium	Pool
Sportorium	Badminton Court
Library	Table 4
Library	Table 6

Fig 3.11 (2-NF table for Locations)

- Table 4: Department

DID(PK)	DeptName	HOD
D01	CSE	Dr. A
D02	Mech	Dr. C
D03	ECE	Dr. D

DID(PK)	Building
D01	Turing
D01	Pythagoras
D02	Tesla
D03	Fleming

Fig 3.12 (2-NF table for Departments)

Third Normal Form (3NF)

A table is said to be in Third Normal Form (3NF) if:

- It is already in 2NF.
- No transitive dependency exists (i.e., non-key attributes should depend only on the primary key, not on other non-key attributes).

- Table 1: Students

- Table 1: Students

RollNo(PK)	Name	Batch
101	Ruhani	CSE-1
102	Riya	CSE-2
103	Meghna	CSE-7
105	Tanveer	BBA-5

RollNo(PK)	Course
101	CSE
102	CSE
103	CSE
105	BBA

RollNo(PK)	FavSpot	Review
101	Turing	Peaceful to study
101	Library	Lots of books
102	Library	Lots of books
102	Sq1	Spicy food
103	Exploratorium	Lots of events
103	Sq2	Food and chill
105	Sq1	Chilly Food
105	Turing	Good place to study

Fig 3.13 (3-NF table for Students)

- Table 2: Clubs

ClubName(PK)	Category	NoOfMembers
Natraj	Talent	10
Dhwani	Talent	15
OSC	Tech	42
ICCE	Tech	42
Cricket	Sports	22

LocationId(FK)	Venue	ClubName(PK)
L3	Exploretorium	Natraj
L3	Exploretorium	Dhwani
L5	Library	OSC
L2	Turing	ICCE
L4	Sportorium	Cricket

RollNo(FK)	HeadName	ClubName
101	Riya	Natraj
101	Riya	OSC
102	Ruhani	Dhwani
105	Tanveer	ICCE
103	Meghna	Cricket

FacultyID (FK)	FacultyName	ClubName(PK)
F1	Dr. A	Natraj
F2	Dr. B	Dhwani
F3	Dr. C	OSC
F3	Dr. C	Cricket
F4	Dr. D	ICCE
F4	Dr. D	Natraj

Fig 3.14 (3-NF table for Clubs)

- Table 3: locations

LocationName(PK)	SpotType	OpeningHour	ClosingHour
Sq1	Food	9:00 a.m.	10:00 p.m.
Turing	Study	9:00 a.m.	8:00 p.m.
Exploratorium	Events	10:30 a.m.	8:00 p.m.
Sportorium	Sports/Clubs	10:30 a.m.	4:00 p.m.
Library	Study	8:30 a.m.	10:00 p.m.

LocationId(PK)	LocationName (PK)
L1	Sq1
L2	Turing
L3	Exploratorium
L4	Sportorium
L5	Library

LocationName(PK)	Landmark
Sq1	Near Rockefeller Block
Turing	Near Parking
Exploratorium	Near Gate 2
Sportorium	Near Gate 4
Library	Near Fleming

LocationName(PK)	FavSpot
Sq1	Chaat corner
Sq1	Chai Nagri
Turing	Reading Room
Exploretorium	Main Hall
Sportorium	Pool
Sportorium	Badminton Court
Library	Table 4
Library	Table 6

Fig 3.15 (3-NF table for Locations)

- Table 4: Departments

DID (PK)	DeptName	HOD
D01	CSE	Dr. A
D02	Mech	Dr. C
D03	ECE	Dr. D

DeptBuildingID (PK)	DID	Building
DB1	D01	Turing
DB2	D01	Pythagoras
DB3	D02	Tesla
DB4	D03	Fleming

Faculty ID(PK)	HOD
F1	Dr. A
F3	Dr. C
F4	Dr. D

Fig 3.15 (3-NF table for Departments)

Database Schema

Schema vs ERD

- **ERD:** Conceptual representation of entities and relationships.
- **Schema:** Logical/physical implementation with actual tables, columns, and constraints.

The database schema represents the final logical design of our database. It defines the tables, columns, and relationships.

Constraints Used in Schema

- **Primary Key (PK):** Uniquely identifies each row in a table.
- **Foreign Key (FK):** Ensures referential integrity between related tables.
- **Unique:** Ensures no duplicate values in a column.
- **Not Null:** Ensures a column must have a value.

SQL Schema

```
CREATE TABLE StudentDetails (
   RollNo INT PRIMARY KEY,
   Name VARCHAR(50) NOT NULL,
   Batch VARCHAR(20),
   Course VARCHAR(20),
   FavSpot VARCHAR(100),
   Review TEXT
);
describe StudentDetails;


CREATE TABLE Club (
   ClubName VARCHAR(50) PRIMARY KEY,
   Head VARCHAR(50),
   Faculty VARCHAR(100),
   NoOfMembers INT CHECK (NoOfMembers >= 0),
   HeadEmail VARCHAR(100) UNIQUE NOT NULL,
   Category VARCHAR(50)
);
describe Club;
```

```
CREATE TABLE Location (
   LocationName VARCHAR(50) PRIMARY KEY,
   SpotType VARCHAR(50),
   Landmark VARCHAR(100),
   FavSpot VARCHAR(100),
   OpeningHour VARCHAR(20),
   ClosingHour VARCHAR(20)
);
describe Location;



CREATE TABLE Departments (
   DeptID VARCHAR(10) PRIMARY KEY,
   DeptName VARCHAR(20) NOT NULL,
   HOD VARCHAR(50),
   Building VARCHAR(50)
);
DESCRIBE Departments;
```

Database Schema Table

Attributes	Type	Key
Roll No	INT	PK, FK in clubs
Name	VARCHAR	
Batch	VARCHAR	
Course	VARCHAR	
Favspot	TEXT	
Review	TEXT	

Attributes	Type	Key
ClubName	VARCHAR	PK
Faculty	TEXT	
Faculty_ID	VARCHAR	
Head	TEXT	
Roll No (Head)	INT	
Head Email	VARCHAR	
LocationID(venue)	VARCHAR	
NoofMembers	INT	
Category	TEXT	

Attributes	Type	Key
LocationName	VARCHAR	PK
LocationID	VARCHAR	FK in Clubs
Spot type	TEXT	
Landmark	VARCHAR	
Fav spot	TEXT	
Opening Hour	TIME	
Closing Hour	TIME	

Attributes	Type	Key
DeptID	VARCHAR	PK
Dept Name	TEXT	
HOD	VARCHAR	
Building	TEXT	
FacultyID	VARCHAR	FK in Clubs

5. References

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