CPS 662 Database Management Systems II

Architecting a Social Network: Crafting a Social Media Platform's Database

Sandeep Srivatsava Singaraju
1017432390

Entity-Relationship (ER) Diagram for Mini-Instagram

The diagram represents the main entities, their attributes, and the relationships among them. We have chosen the most important entities and relationships to avoid unnecessary complexity.

Entities:

1. User:
   - Attributes: User_ID (PK), Username, Gender, Date_Joined
   - Assumption: Each user has a unique user ID.

2. File:
   - Attributes: File_ID (PK), User_ID (FK), Title, Date_Uploaded, Content
   - Relationships: User (Ownership)
   - Assumption: Each file is associated with a user.

3. Photo:
   - Attributes: Photo_ID (PK), File_ID (FK), Categories
   - Relationships: File (Inheritance)
   - Assumption: Photos are a specific type of file and can belong to multiple categories.

4. Video:
   - Attributes: Video_ID (PK), File_ID (FK), Categories
   - Relationships: File (Inheritance)
   - Assumption: Videos are a specific type of file and can belong to multiple categories.

5. Blog:
   - Attributes: Blog_ID (PK), File_ID (FK), Categories
   - Relationships: File (Inheritance)
   - Assumption: Blogs are a specific type of file and can belong to multiple categories.

6. Group:
   - Attributes: Group_ID (PK), Owner_ID (FK), Group_Name
   - Relationships: User (Ownership), User (Membership)
   - Assumption: Each group has a unique group ID, and a user can own and be a member of multiple groups.

7. Comment:
   - Attributes: Comment_ID (PK), User_ID (FK), File_ID (FK), Content, Date_Posted
   - Relationships: User (Author), File (Belongs_To)
   - Assumption: Users can leave comments on files.

8. Like:
   - Attributes: Like_ID (PK), User_ID (FK), File_ID (FK), Date_Liked
   - Relationships: User (Likes), File (Belongs_To)
   - Assumption: Users can like files.

9. School:
   - Attributes: School_ID (PK), School_Name
   - Relationships: User (Affiliation)
   - Assumption: Each school has a unique school ID, and a user can be affiliated with only one school.

Additional Assumptions:

1. A user can own multiple files (photos, videos, blogs).
2. Files can have multiple comments and likes.
3. A group can have multiple members.

Relationships:

1. User - Ownership - File:
   - Each User can own multiple Files (photos, videos, blogs), indicated by the "Ownership" relationship.
   - This is a one-to-many relationship because one user can own multiple files, but each file is owned by only one user.

2. Group - Membership - User:
   - Users can be members of multiple Groups, depicted by the "Membership" relationship.
   - It's a many-to-many relationship because one user can be a member of multiple groups, and a group can have multiple members.

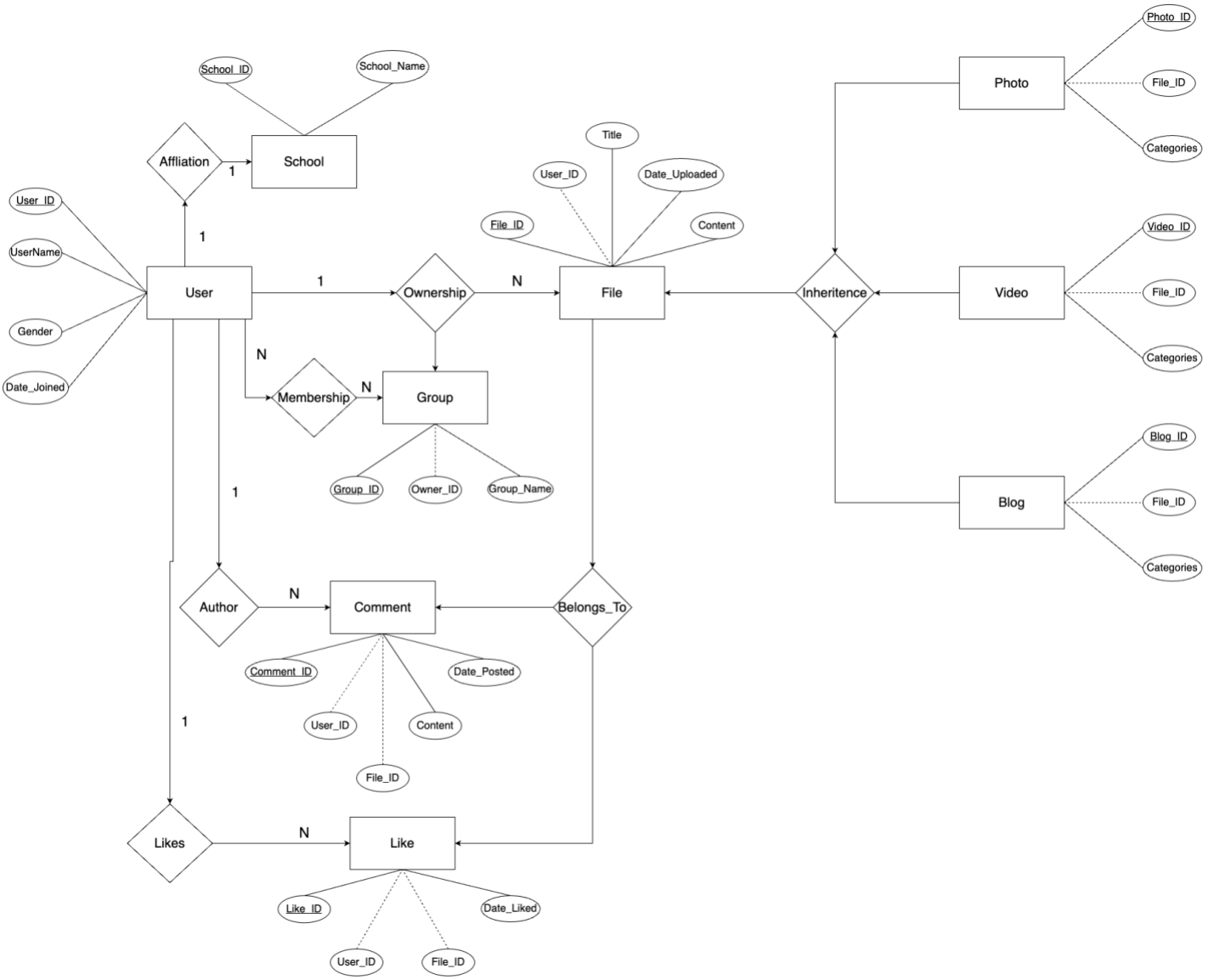
3. Comment - Author - User:
   - Users can be the authors of multiple Comments, shown by the "Author" relationship.
   - It's a one-to-many relationship since one user can author multiple comments, but each comment has only one author.

4. Like - Likes - User:
   - Users can like multiple Files, as illustrated by the "Likes" relationship.
   - Again, it's a one-to-many relationship because one user can like multiple files, but each like is associated with only one user.

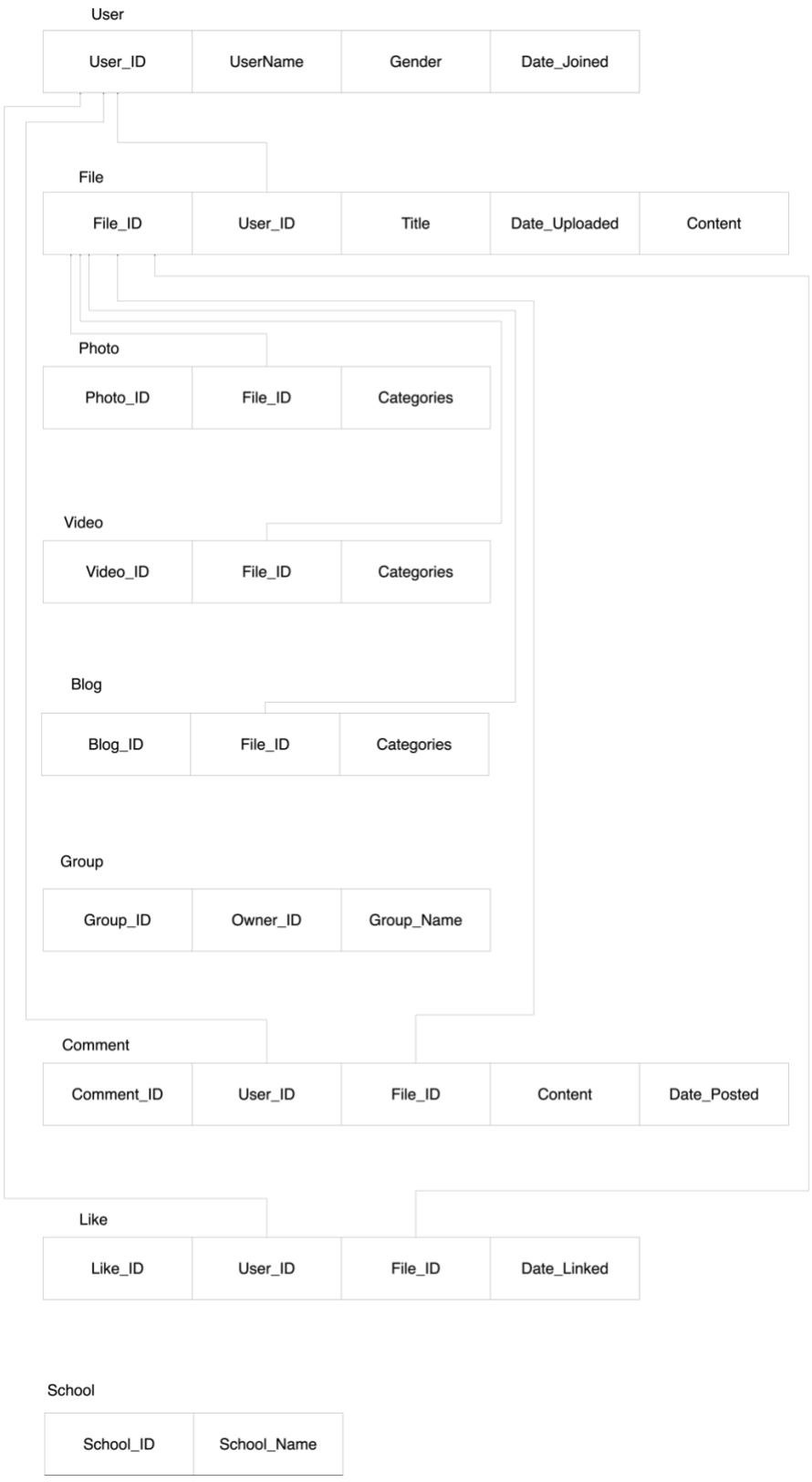
5. File - Inheritance - Photo, Video, Blog:
   - Files (photos, videos, blogs) share common attributes in the "File" entity, represented by the "Inheritance" relationship.
   - It's a type of specialization/generalization or inheritance relationship, where specific file types (Photo, Video, Blog) inherit attributes from the general "File" entity.

6. User - Affiliation - School:
   - Users can be affiliated with one School, demonstrated by the "Affiliation" relationship.
   - It's a one-to-one relationship because each user is affiliated with only one school, and each school has only one affiliated user.

ER Diagram


School_ID
School_Name
School
Affliation
1
1
User_ID
UserName
Gender
Date_Joined
User
1
Ownership
N
File
Title
User_ID
Date_Uploaded
File_ID
Content
N
Membership
N
Group
Group_ID
Owner_ID
Group_Name
1
Inheritence
Photo
Photo_ID
File_ID
Categories
Video
Video_ID
File_ID
Categories
Blog
Blog_ID
File_ID
Categories
Author
N
Comment
Belongs_To
Comment_ID
Date_Posted
User_ID
Content
File_ID
1
Likes
N
Like
Like_ID
Date_Liked
User_ID
File_ID

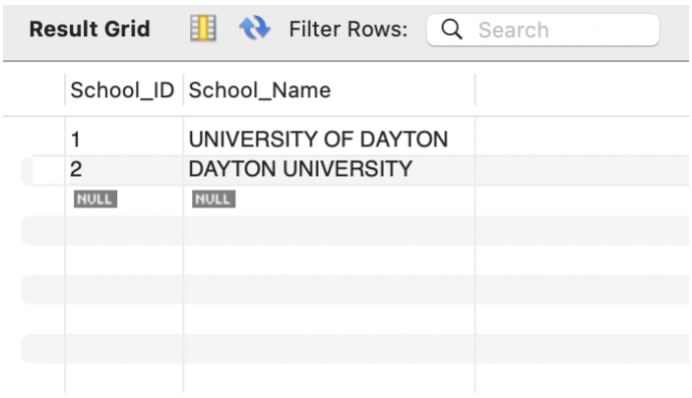
Relational Schema



INSERT INTO:
The `INSERT INTO` statement in MySQL is essential for adding new records to a table. It necessitates specifying the target table and providing corresponding values for the columns. The column order should align, or explicit column names can be listed before values. This statement is fundamental for populating database tables with data.

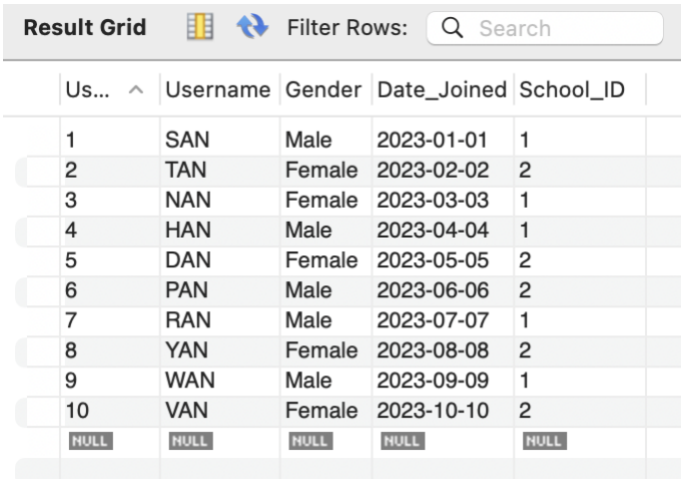
So, we populated the tables with data using INSERT INTO method and following are the tables.

School Table



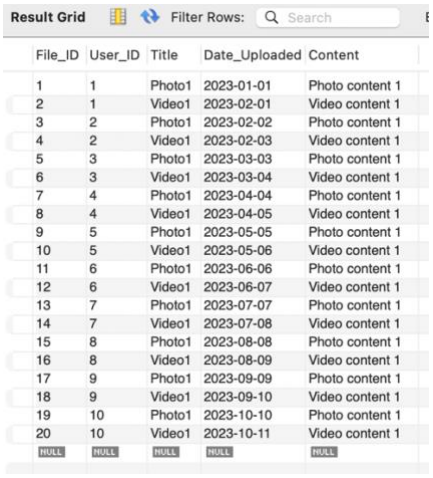
School_ID	School_Name
1	UNIVERSITY OF DAYTON
2	DAYTON UNIVERSITY
NULL	NULL

User Table



Us...	Username	Gender	Date_Joined	School_ID
1	SAN	Male	2023-01-01	1
2	TAN	Female	2023-02-02	2
3	NAN	Female	2023-03-03	1
4	HAN	Male	2023-04-04	1
5	DAN	Female	2023-05-05	2
6	PAN	Male	2023-06-06	2
7	RAN	Male	2023-07-07	1
8	YAN	Female	2023-08-08	2
9	WAN	Male	2023-09-09	1
10	VAN	Female	2023-10-10	2
NULL	NULL	NULL	NULL	NULL

File Table



File_ID	User_ID	Title	Date_Uploaded	Content
1	1	Photo1	2023-01-01	Photo content 1
2	1	Video1	2023-02-01	Video content 1
3	2	Photo1	2023-02-02	Photo content 1
4	2	Video1	2023-02-03	Video content 1
5	3	Photo1	2023-03-03	Photo content 1
6	3	Video1	2023-03-04	Video content 1
7	4	Photo1	2023-04-04	Photo content 1
8	4	Video1	2023-04-05	Video content 1
9	5	Photo1	2023-05-05	Photo content 1
10	5	Video1	2023-05-06	Video content 1
11	6	Photo1	2023-06-06	Photo content 1
12	6	Video1	2023-06-07	Video content 1
13	7	Photo1	2023-07-07	Photo content 1
14	7	Video1	2023-07-08	Video content 1
15	8	Photo1	2023-08-08	Photo content 1
16	8	Video1	2023-08-09	Video content 1
17	9	Photo1	2023-09-09	Photo content 1
18	9	Video1	2023-09-10	Video content 1
19	10	Photo1	2023-10-10	Photo content 1
20	10	Video1	2023-10-11	Video content 1
NULL	NULL	NULL	NULL	NULL

Photo Table

Result Grid Filter Rows:

Photo_ID	File_ID	Categories
1	1	Nature
2	3	Travel
3	5	Cityscape
4	7	Architecture
5	9	Wildlife
6	11	Adventure
7	13	Beach
8	15	Sunset
9	17	Portrait
10	19	Fashion
NULL	NULL	NULL

Video Table

Result Grid Filter Rows:

Video_ID	File_ID	Categories
1	2	Travel
2	4	Nature
3	6	Science
4	8	Documentary
5	10	Music
6	12	Technology
7	14	Education
8	16	Entertainment
9	18	Sports
10	20	Cooking
NULL	NULL	NULL

Blog Table

Result Grid Filter Rows:

Blog_ID	File_ID	Categories
1	2	Technology
2	4	Travel
3	6	Food
4	8	Fashion
5	10	Health
6	12	Science
7	14	Business
8	16	Art
9	18	Music
10	20	Education
NULL	NULL	NULL

Group Table

Result Grid Filter Rows: Sea

Group_ID	Owner_ID	Group_Name
1	1	Book Club
2	2	Fitness Enthusiasts
3	3	Techies
4	4	Adventure Seekers
5	5	Foodies
6	6	Art Lovers
7	7	Music Enthusiasts
8	8	Photography Club
9	9	Business Network
10	10	Fashionistas
NULL	NULL	NULL

Comment Table

Result Grid | Filter Rows: Search | Edit:

Comment_ID	User_ID	File_ID	Content	Date_Posted
1	1	4	Great video!	2023-03-05
2	2	2	Interesting blog!	2023-03-06
3	3	3	Love the photo!	2023-03-07
4	4	4	Awesome content!	2023-03-08
5	5	6	Impressive video!	2023-03-09
6	6	8	Well-written blog!	2023-03-10
7	7	7	Beautiful photo!	2023-03-11
8	8	8	Great work!	2023-03-12
9	9	10	Amazing video!	2023-03-13
10	10	12	Fantastic blog!	2023-03-14
11	1	11	Love the content!	2023-03-15
12	2	14	Inspirational blog!	2023-03-16
13	3	13	Well-captured ph…	2023-03-17
14	4	16	Enjoyed the video!	2023-03-18
15	5	18	Insightful blog!	2023-03-19
16	6	16	Unique photo!	2023-03-20
17	7	17	Great storytelling!	2023-03-21
18	8	20	Impressive video!	2023-03-22
19	9	19	Engaging!	2023-03-23
20	10	20	Fantastic content!	2023-03-24
NULL	NULL	NULL	NULL	NULL

Like Table

Result Grid | Filter Rows: Se

Like_ID	User_ID	File_ID	Date_Liked
1	1	1	2023-03-25
2	2	3	2023-03-26
3	3	5	2023-03-27
4	4	7	2023-03-28
5	5	9	2023-03-29
6	6	11	2023-03-30
7	7	13	2023-03-31
8	8	15	2023-04-01
9	9	17	2023-04-02
10	10	19	2023-04-03
11	1	2	2023-04-04
12	2	4	2023-04-05
13	3	6	2023-04-06
14	4	8	2023-04-07
15	5	10	2023-04-08
16	6	12	2023-04-09
17	7	14	2023-04-10
18	8	16	2023-04-11
19	9	18	2023-04-12
20	10	20	2023-04-13
NULL	NULL	NULL	NULL

Here are 10 typical queries that you might run frequently on mini-Instagram database, along with English questions and SQL statements.

-- 1--> "Retrieve all photos uploaded by User X."

-- 2--> "Display all files in the 'Travel' category."

-- 3--> "Show the latest blog posts by users in School Y."

-- 4--> "Display all comments on Photo Z."

-- 5--> "Identify the most liked video."

-- 6--> "Get all files liked by User A."

-- 7--> "Count the total number of likes for File B."

-- 8--> "Display all files uploaded in the last 100 days."

-- 9 --> "Show all users affiliated with School X."

-- 10 --> -- To select Male Users