



IT214 : Database Management System  
Group 6

# Social Media Management System

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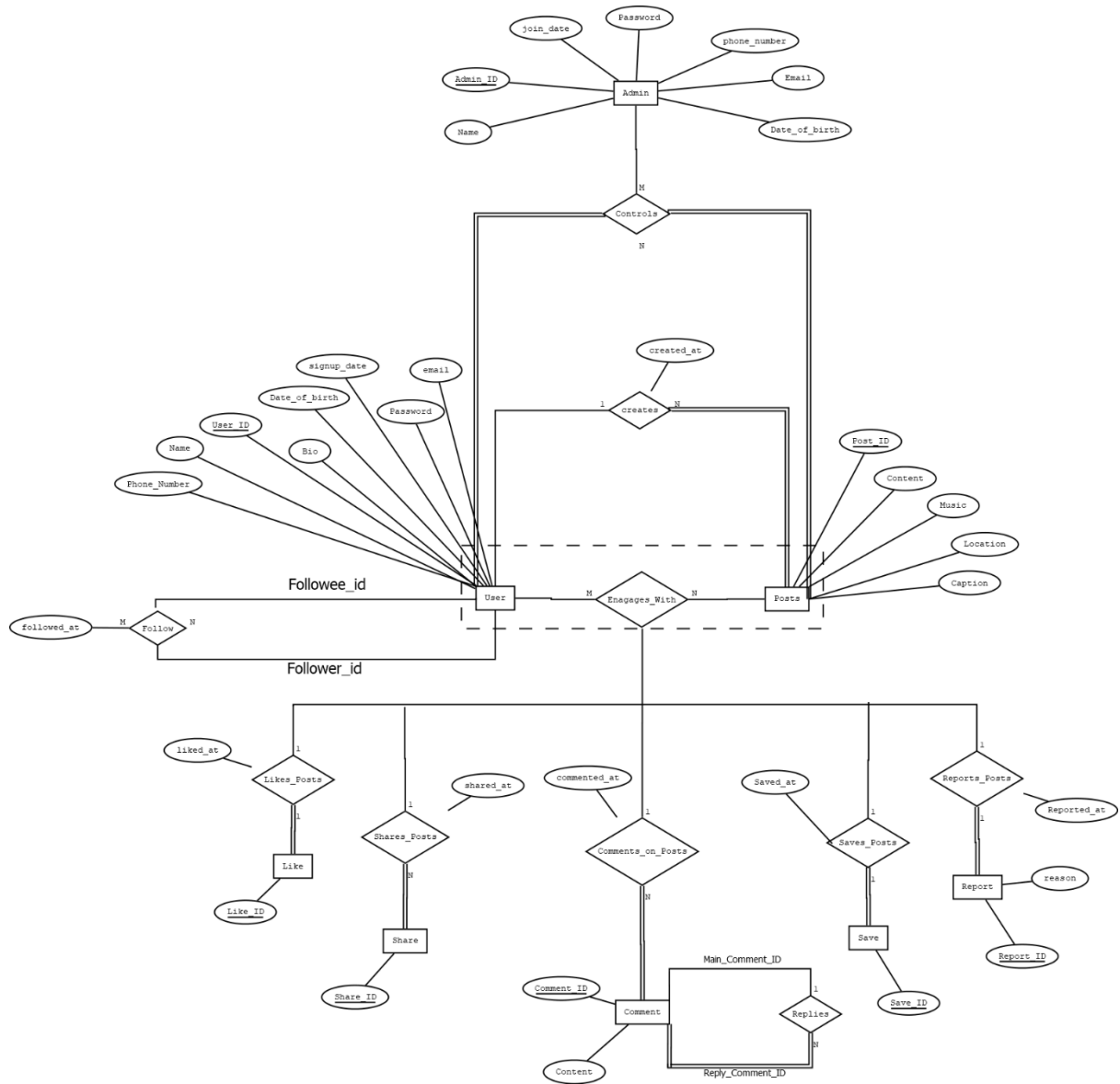
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→ We have developed a database management system named “Social Media Management System”.

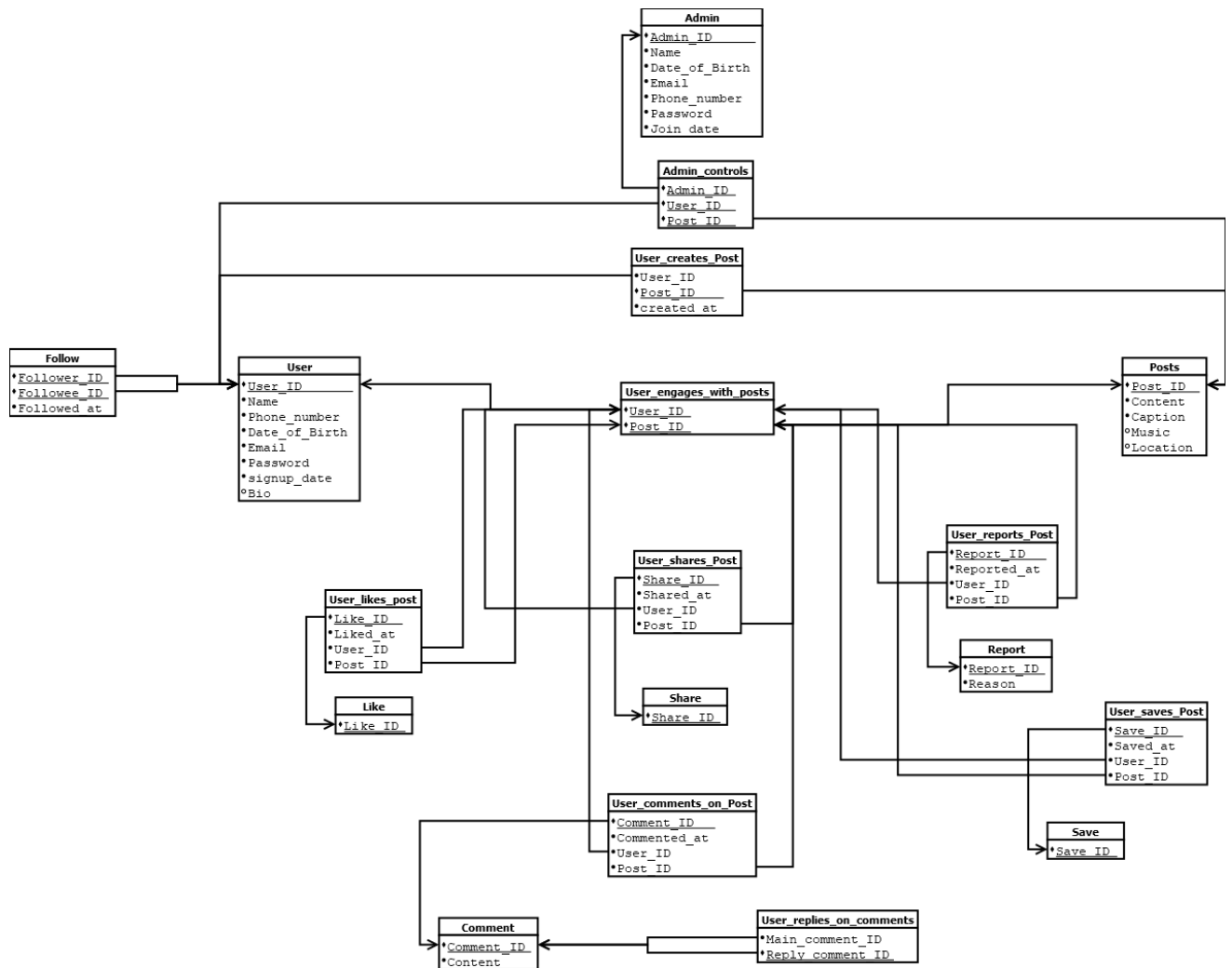
→ We have improvised our database and also updated our Entity-Relationship Diagram.

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→ Updated ER - diagram :



## → Relational Schema :



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## → Functional Dependencies :

### 1. User:-

User\_ID → Name, Phone\_number, Date\_of\_Birth, Email, Password, signup\_date, Bio

### 2. Admin:-

Admin\_ID → Name, Date\_of\_Birth, Email, Phone\_number, Password, Join\_date

### 3. Posts:-

Post\_ID → Content, Caption, Music, Location

### 4. Follow:-

Follower\_ID, Followee\_ID → Followed\_at

### 5. Admin\_controls:-

Admin\_ID, User\_ID, Post\_ID → (No non-key attributes)

### 6. User\_creates\_Post:-

User\_ID, Post\_ID → created\_at

### 7. User\_engages\_with\_post:-

Composite key, no non-key attributes

### 8. Like:-

Like\_ID → Like\_ID (trivial FD)

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9. User\_likes\_post

Like\_ID  $\rightarrow$  Liked\_at, User\_ID, Post\_ID

10. Share:-

Share\_ID  $\rightarrow$  Share\_ID (trivial FD)

11. User\_shares\_post:-

Share\_ID  $\rightarrow$  Shared\_at, User\_ID, Post\_ID

12. Comment:-

Comment\_ID  $\rightarrow$  Content

13. User\_comments\_on\_Post:-

- Comment\_ID  $\rightarrow$  Commented\_at, User\_ID, Post\_ID

14. User\_replies\_on\_comments:-

Composite key, no non-key attributes

15. Report:-

Report\_ID  $\rightarrow$  Reason

16. User\_reports\_post:-

Report\_ID  $\rightarrow$  Reported\_at, User\_ID, Post\_ID

17. Save:-

Save\_ID  $\rightarrow$  Save\_ID (trivial FD)

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18. User\_saves\_post:-

Save\_ID  $\rightarrow$  Saved\_at, User\_ID, Post\_ID

### **$\rightarrow$ Minimal FD set and BCNF analysis :**

$\rightarrow$  Here's the reduced minimal FD set along with proof of relations being in BCNF :

1.User:-{User\_ID}  $\rightarrow$  {Name, Phone\_number, Date\_of\_Birth, Email, Password, signup\_date, Bio}

- Candidate Key: User\_ID
- Analysis: Since User\_ID is the candidate key and it determines all other attributes, this relation is in BCNF.

2.Admin:-{Admin\_ID}  $\rightarrow$  {Name, Date\_of\_Birth, Email, Phone\_number, Password, Join\_date}

- Candidate Key: Admin\_ID
- Analysis: Admin\_ID is the candidate key and it determines all other attributes, so this relation is in BCNF.

3.Posts:-{Post\_ID}  $\rightarrow$  {Content, Caption, Music, Location}

- Candidate Key: Post\_ID
- Analysis: The determinant Post\_ID is the candidate key and it determines all other attributes, so this relation is in BCNF.

4.Follow:-{Follower\_ID, Followee\_ID}  $\rightarrow$  {Followed\_at}

- Candidate Key: (Follower\_ID, Followee\_ID)
- Analysis: The composite key is the determinant, so the relation is in BCNF.

5.Admin\_controls:- (No FDs needed, all PK)

- FDs: There are no non-key attributes; the entire tuple
- (Admin\_ID, User\_ID, Post\_ID) forms the key.

- 
- Analysis: Since there are no nontrivial FDs (or only trivial ones), the relation is in BCNF.

6. User\_creates\_Post:  $\{-\{User\_ID, Post\_ID\} \rightarrow \{created\_at\}$

- Candidate Key: (User\_ID, Post\_ID)
- Analysis: The composite key is the determinant, ensuring BCNF.

7. User\_engages\_with\_posts: (No FDs needed, all PK)

- FDs: No non-key attributes
- Analysis: With only the key attributes, this relation is trivially in BCNF.

8. Like :-(Trivial, can be ignored)

- FD: Like\_ID  $\rightarrow$  Like\_ID (trivial)
- Analysis: Only trivial dependencies exist, so no violation.

9. User\_likes\_post:  $\{-\{Like\_ID\} \rightarrow \{Liked\_at, User\_ID, Post\_ID\}$

- Candidate Key: Like\_ID
- Analysis: Since Like\_ID (the candidate key) determines all other attributes, BCNF is satisfied.

10. Share:-(Trivial, can be ignored)

- FD:  $\{Share\_ID\} \rightarrow \{Share\_ID\}$  (trivial)
- Analysis: Trivial FD; BCNF holds.

11. User\_shares\_post:  $\{-\{Share\_ID\} \rightarrow \{Shared\_at, User\_ID, Post\_ID\}$

- Candidate Key: Share\_ID
- Analysis: With Share\_ID as the candidate key, this relation is in BCNF.

12. Comment:  $\{-\{Comment\_ID\} \rightarrow \{Content\}$

- Candidate Key: Comment\_ID

- 
- Analysis: The candidate key determines all other attributes, so it's in BCNF.

13. User\_comments\_on\_Post {Comment\_ID} → {Commented\_at, User\_ID, Post\_ID}

- Candidate Key: Comment\_ID
- Analysis: Since Comment\_ID is the candidate key, BCNF is satisfied.

14. User\_replies\_on\_comments: -{Main\_comment\_ID, Reply\_comment\_ID} → (no non-key attr)

- FD: The composite key {Main\_comment\_ID, Reply\_comment\_ID} determines nothing extra (no non-key attributes).
- Analysis: There are no nontrivial FDs; the relation is in BCNF.

15. Report: -{Report\_ID} → {Reason}

- Candidate Key: Report\_ID
- Analysis: Report\_ID is the candidate key, so BCNF holds.

16. User\_reports\_post: -{Report\_ID} → {Reported\_at, User\_ID, Post\_ID}

- Candidate Key: Report\_ID
- Analysis: With Report\_ID as the candidate key, this relation is in BCNF.

17. Save: - (Trivial, can be ignored)

- FD: {Save\_ID} → {Save\_ID} (trivial)
- Analysis: Only trivial FD; BCNF is satisfied.

18. User\_saves\_post: -{Save\_ID} → {Saved\_at, User\_ID, Post\_ID}

- Candidate Key: Save\_ID
- Analysis: Since Save\_ID is the candidate key, this relation is in BCNF.

Therefore, all relations are in BCNF.



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## → DDL Script :

```
--1.Admin Table:-

CREATE TABLE Admin (

    Admin_ID SERIAL PRIMARY KEY,

    Name VARCHAR(100),

    Date_of_Birth DATE,

    Email VARCHAR(100) UNIQUE,

    Phone_number VARCHAR(15) UNIQUE,

    Password VARCHAR(100),

    Join_date DATE DEFAULT CURRENT_DATE

);

--2.Users Table:-

CREATE TABLE Users (

    User_ID SERIAL PRIMARY KEY,

    Name VARCHAR(100),

    Phone_number VARCHAR(15) UNIQUE,

    Date_of_Birth DATE,

    Email VARCHAR(100) UNIQUE,

    Password VARCHAR(100),
```

```
Signup_date DATE DEFAULT CURRENT_DATE,

Bio TEXT

);

--3.Posts Table:-

CREATE TABLE Posts (

    Post_ID SERIAL PRIMARY KEY,

    Content TEXT,

    Caption TEXT,

    Music VARCHAR(100),

    Location VARCHAR(100),

    Created_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP

);

--4.Follow Table:-

CREATE TABLE Follow (

    Follower_ID INT,

    Followee_ID INT,

    Followed_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP,

    PRIMARY KEY (Follower_ID, Followee_ID),

    FOREIGN KEY (Follower_ID) REFERENCES Users(User_ID) ON DELETE CASCADE,
```

```
FOREIGN KEY (Followee_ID) REFERENCES Users(User_ID) ON DELETE CASCADE
);

--5.User_creates_post Table:-
CREATE TABLE User_creates_Post (
    User_ID INT,
    Post_ID INT,
    Created_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP,
    PRIMARY KEY (User_ID, Post_ID),
    FOREIGN KEY (User_ID) REFERENCES Users(User_ID) ON DELETE CASCADE,
    FOREIGN KEY (Post_ID) REFERENCES Posts(Post_ID) ON DELETE CASCADE
);

--6. User_engages_with_posts Table:-
CREATE TABLE User_engages_with_posts (
    User_ID INT,
    Post_ID INT,
    PRIMARY KEY (User_ID, Post_ID),
    FOREIGN KEY (User_ID) REFERENCES Users(User_ID) ON DELETE CASCADE,
    FOREIGN KEY (Post_ID) REFERENCES Posts(Post_ID) ON DELETE CASCADE
);
```

---

--7. Likes Table:-

```
CREATE TABLE Likes (  
  
    Like_ID SERIAL PRIMARY KEY  
  
);
```

--8. User\_likes\_post Table:-

```
CREATE TABLE User_likes_post (  
  
    Like_ID INT PRIMARY KEY,  
  
    Liked_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP,  
  
    User_ID INT,  
  
    Post_ID INT,  
  
    FOREIGN KEY (Like_ID) REFERENCES Likes(Like_ID) ON DELETE CASCADE,  
  
    FOREIGN KEY (User_ID, Post_ID) REFERENCES User_engages_with_posts(User_ID,  
Post_ID) ON DELETE CASCADE  
  
);
```

--9. Shares Table:-

```
CREATE TABLE Shares (  
  
    Share_ID SERIAL PRIMARY KEY  
  
);
```

```
--10. User_shares_post Table:-

CREATE TABLE User_shares_post (

    Share_ID INT PRIMARY KEY,

    Shared_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP,

    User_ID INT,

    Post_ID INT,

    FOREIGN KEY (Share_ID) REFERENCES Shares(Share_ID) ON DELETE CASCADE,

    FOREIGN KEY (User_ID, Post_ID) REFERENCES User_engages_with_posts(User_ID,
Post_ID) ON DELETE CASCADE

);

--11. Comments Table:-

CREATE TABLE Comments (

    Comment_ID SERIAL PRIMARY KEY,

    Content TEXT

);

--12. User_comments_on_post Table:-

CREATE TABLE User_comments_on_post (

    Comment_ID INT PRIMARY KEY,

    Commented_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP,

    User_ID INT,

    Post_ID INT,
```

```

        FOREIGN KEY (Comment_ID) REFERENCES Comments(Comment_ID) ON DELETE CASCADE,

        FOREIGN KEY (User_ID, Post_ID) REFERENCES User_engages_with_posts(User_ID,
Post_ID) ON DELETE CASCADE

);

--13. User_replies_on_comments Table:-

CREATE TABLE User_replies_on_comments (

    Main_comment_ID INT,

    Reply_comment_ID INT,

    PRIMARY KEY (Reply_comment_ID),

    FOREIGN KEY (Main_comment_ID) REFERENCES Comments(Comment_ID) ON DELETE
CASCADE,

    FOREIGN KEY (Reply_comment_ID) REFERENCES Comments(Comment_ID) ON DELETE
CASCADE

);

--14.Saves Table:-

CREATE TABLE Saves (

    Save_ID SERIAL PRIMARY KEY

);

--15.User_saves_post Table:-

CREATE TABLE User_saves_post (

    Save_ID INT PRIMARY KEY,

    Saved_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP,

```

```

    User_ID INT,

    Post_ID INT,

    FOREIGN KEY (Save_ID) REFERENCES Saves(Save_ID) ON DELETE CASCADE,

    FOREIGN KEY (User_ID, Post_ID) REFERENCES User_engages_with_posts(User_ID,
Post_ID) ON DELETE CASCADE

);

--16.Reports Table:-

CREATE TABLE Reports (

    Report_ID SERIAL PRIMARY KEY,

    Reason TEXT

);

--17. User_reports_post Table:-

CREATE TABLE User_reports_post (

    Report_ID INT PRIMARY KEY,

    Reported_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP,

    User_ID INT,

    Post_ID INT,

    FOREIGN KEY (Report_ID) REFERENCES Reports(Report_ID) ON DELETE CASCADE,

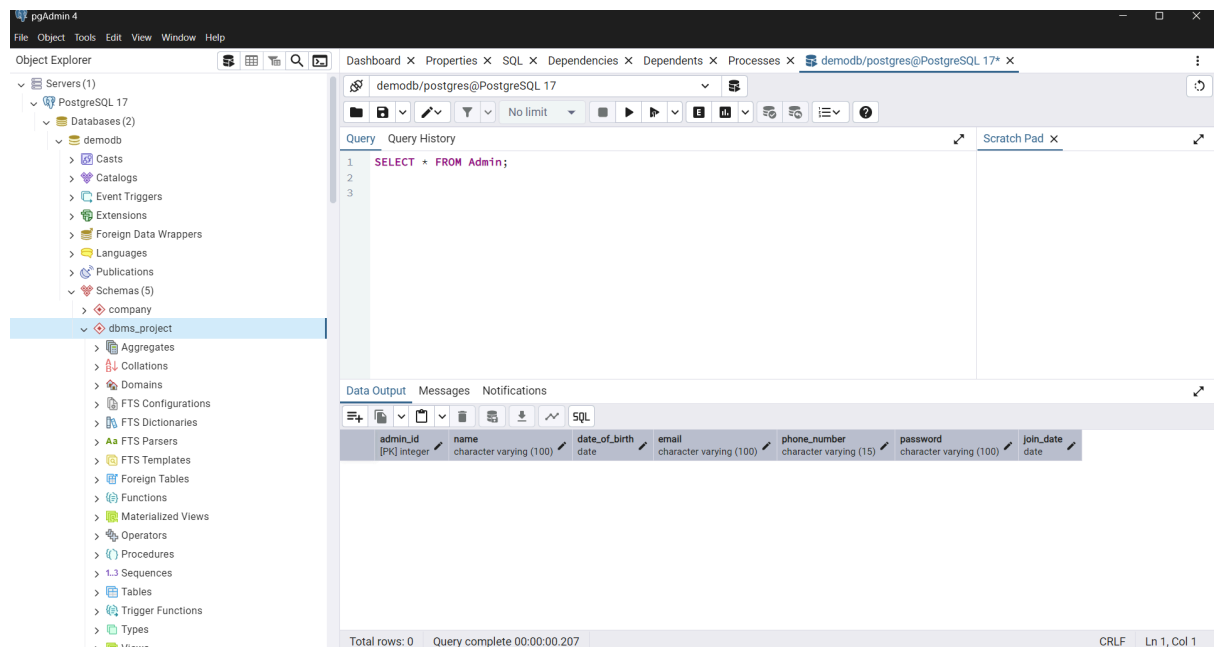
    FOREIGN KEY (User_ID, Post_ID) REFERENCES User_engages_with_posts(User_ID,
Post_ID) ON DELETE CASCADE

);

```

```
--18. Admin_controls Table
```

```
CREATE TABLE Admin_controls (  
  
    Admin_ID INT,  
  
    User_ID INT,  
  
    Post_ID INT,  
  
    PRIMARY KEY (Admin_ID, User_ID, Post_ID),  
  
    FOREIGN KEY (Admin_ID) REFERENCES Admin(Admin_ID) ON DELETE CASCADE,  
  
    FOREIGN KEY (User_ID) REFERENCES Users(User_ID) ON DELETE CASCADE,  
  
    FOREIGN KEY (Post_ID) REFERENCES Posts(Post_ID) ON DELETE CASCADE  
  
);
```





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demodb/postgres@PostgreSQL 17

Query Query History

```
1 SELECT * FROM Users;
```

Data Output Messages Notifications

user_id	name	phone_number	date_of_birth	email	password	signup_date	bio
---------	------	--------------	---------------	-------	----------	-------------	-----

user\_id [PK] integer name character varying (100) phone\_number character varying (15) date\_of\_birth date email character varying (100) password character varying (100) signup\_date date bio text

Successfully run. Total query runtime: 123 msec. 0 rows affected.

Total rows: 0 Query complete 00:00:00.123 CRLF Ln 2, Col 1

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demodb/postgres@PostgreSQL 17

Query Query History

```
1 SELECT * FROM Posts;
```

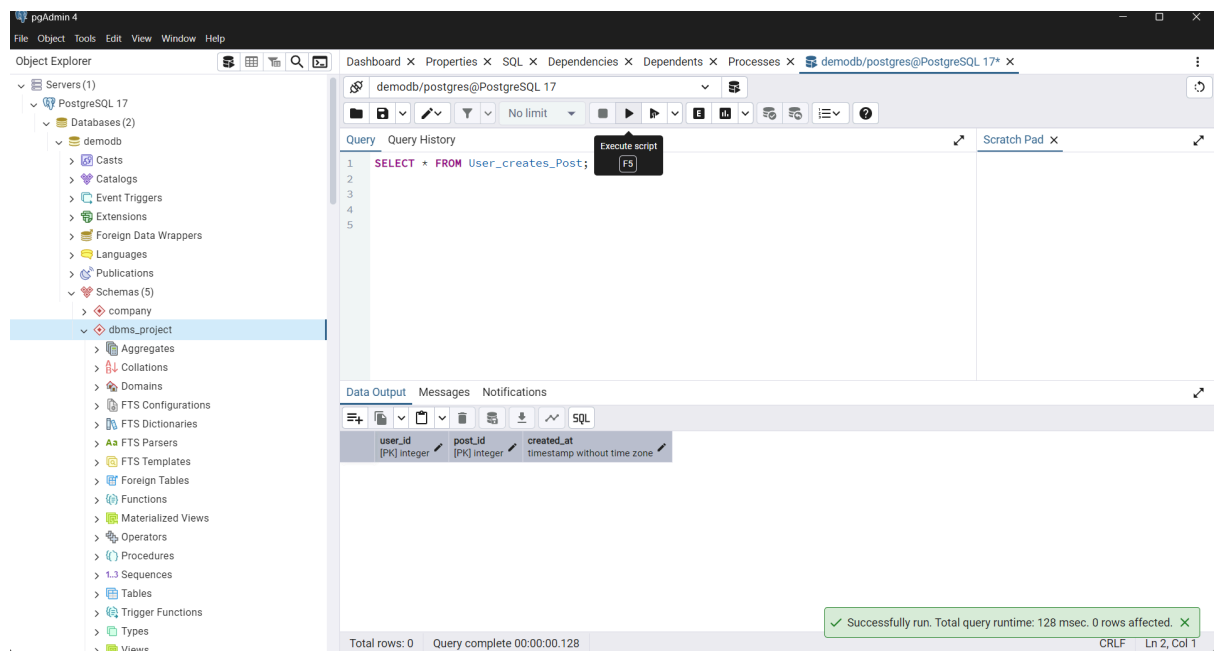
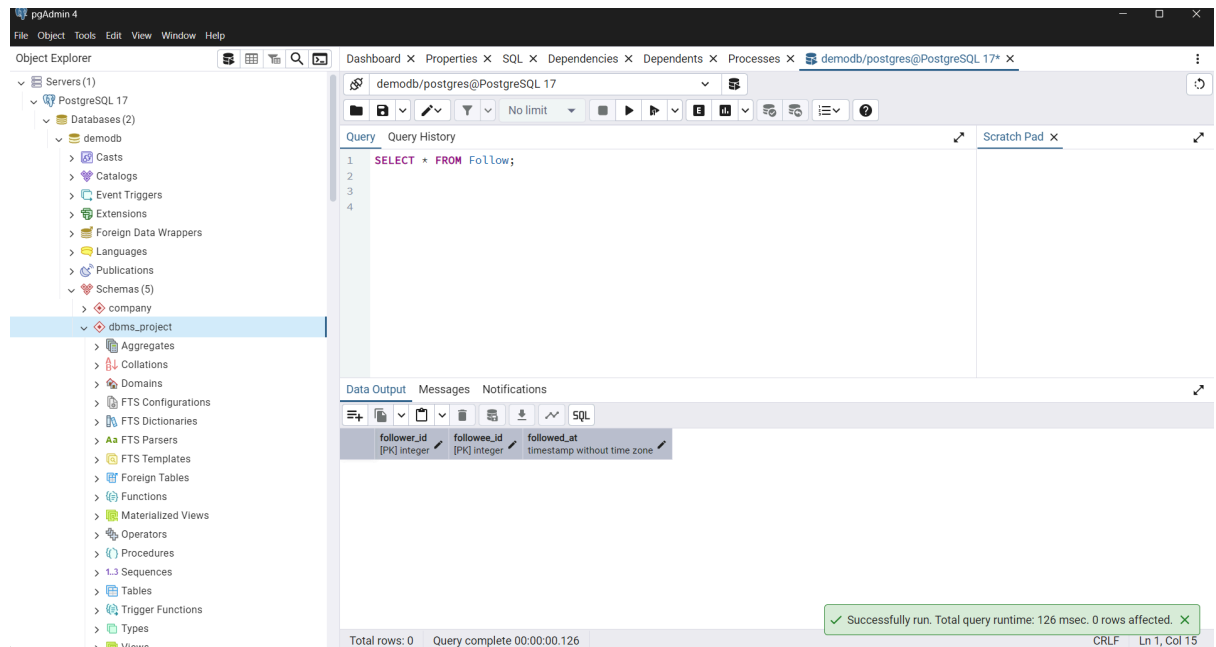
Data Output Messages Notifications

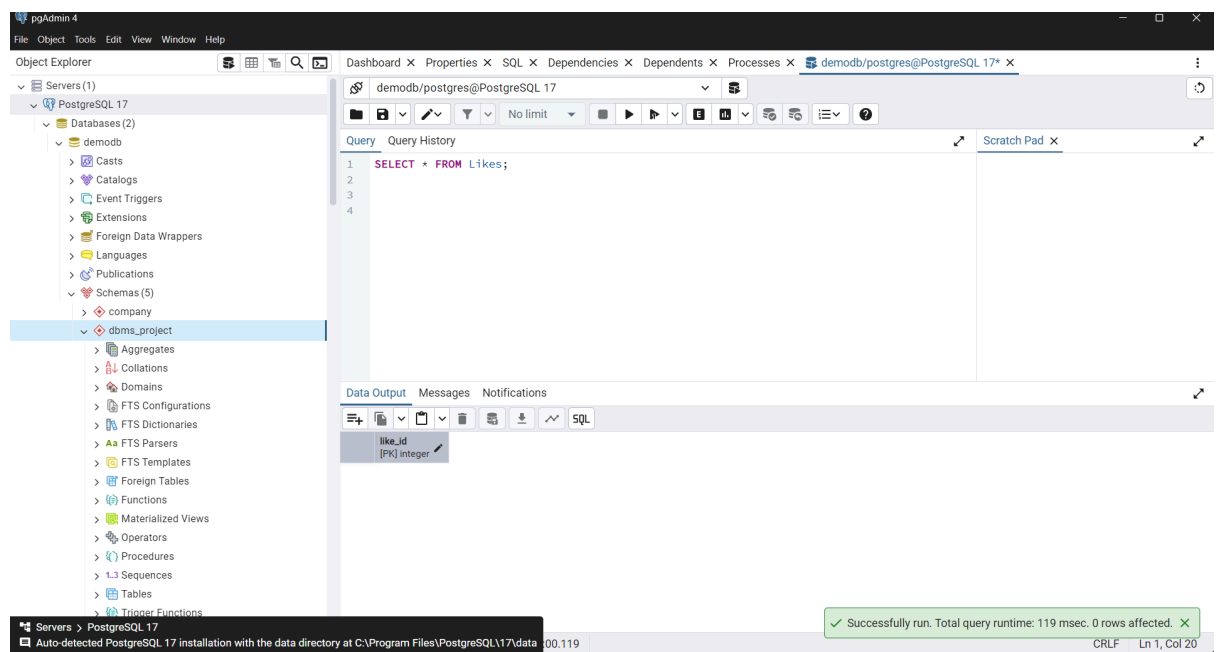
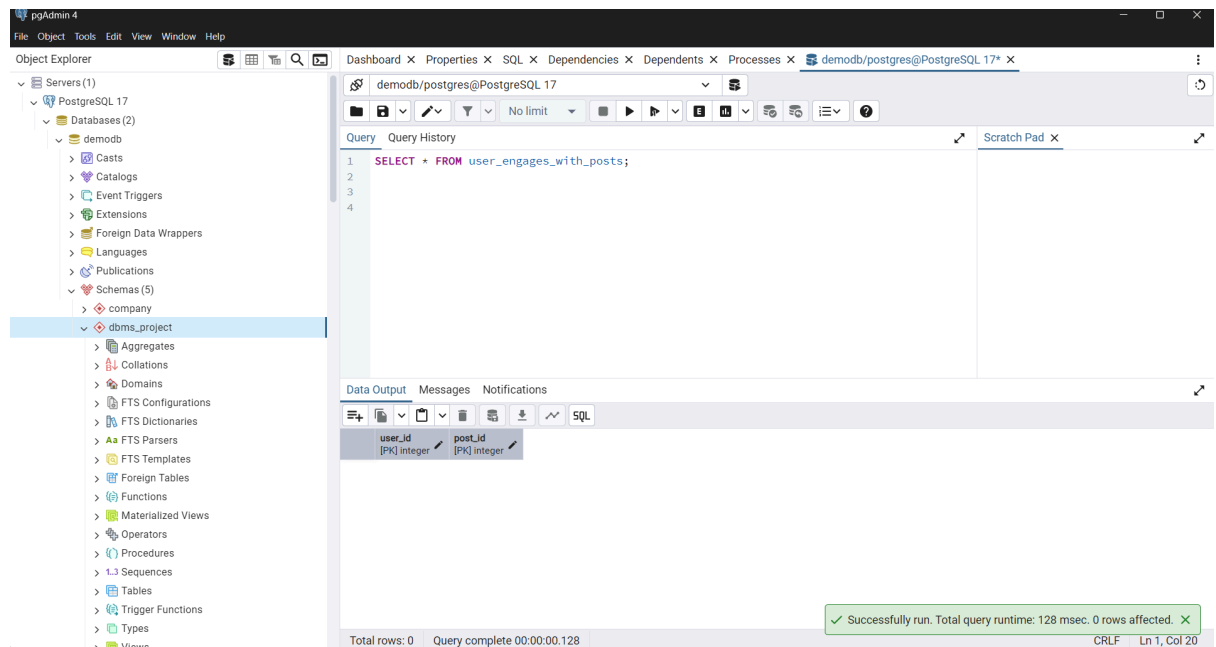
post_id	content	caption	music	location	created_at
---------	---------	---------	-------	----------	------------

post\_id [PK] integer content text caption text music character varying (100) location character varying (100) created\_at timestamp without time zone

Successfully run. Total query runtime: 131 msec. 0 rows affected.

Total rows: 0 Query complete 00:00:00.131 CRLF Ln 1, Col 20







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demodb/postgres@PostgreSQL 17

Query Query History

```
1 SELECT * FROM user_shares_post;
```

Data Output Messages Notifications

share_id	shared_at	user_id	post_id
[PK] integer	timestamp without time zone	integer	integer

Successfully run. Total query runtime: 116 msec. 0 rows affected.

Total rows: 0 Query complete 00:00:00.116 CRLF Ln 1, Col 31

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demodb/postgres@PostgreSQL 17

Query Query History

```
1 SELECT * FROM Comments;
```

Data Output Messages Notifications

commentId	content
[PK] integer	text

Successfully run. Total query runtime: 129 msec. 0 rows affected.

Total rows: 0 Query complete 00:00:00.129 CRLF Ln 1, Col 23

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demodb/postgres@PostgreSQL 17

Query Query History

```
1 SELECT * FROM user_comments_on_post;
```

Scratch Pad

Data Output Messages Notifications

comment_id	commented_at	user_id	post_id
[PK] integer	timestamp without time zone	integer	integer

Successfully run. Total query runtime: 118 msec. 0 rows affected. X

Total rows: 0 Query complete 00:00:00.118 CRLF Ln 1, Col 36

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            - Minor

demodb/postgres@PostgreSQL 17

Query Query History

```
1 SELECT * FROM user_replies_on_comments;
```

Scratch Pad

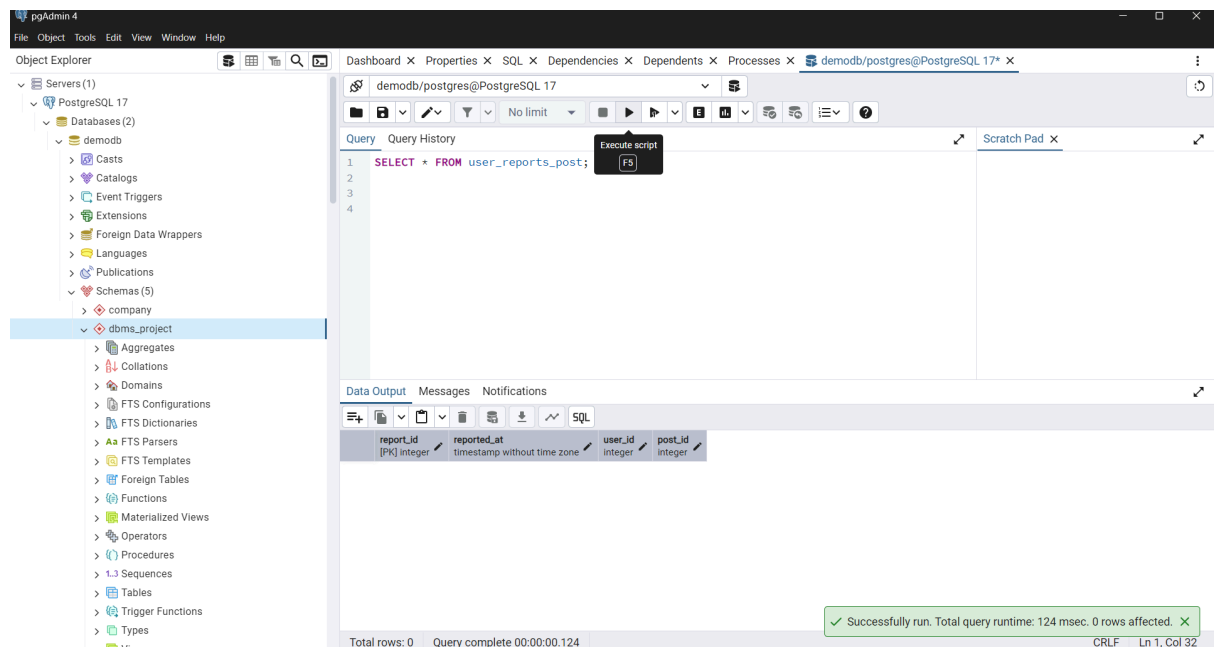
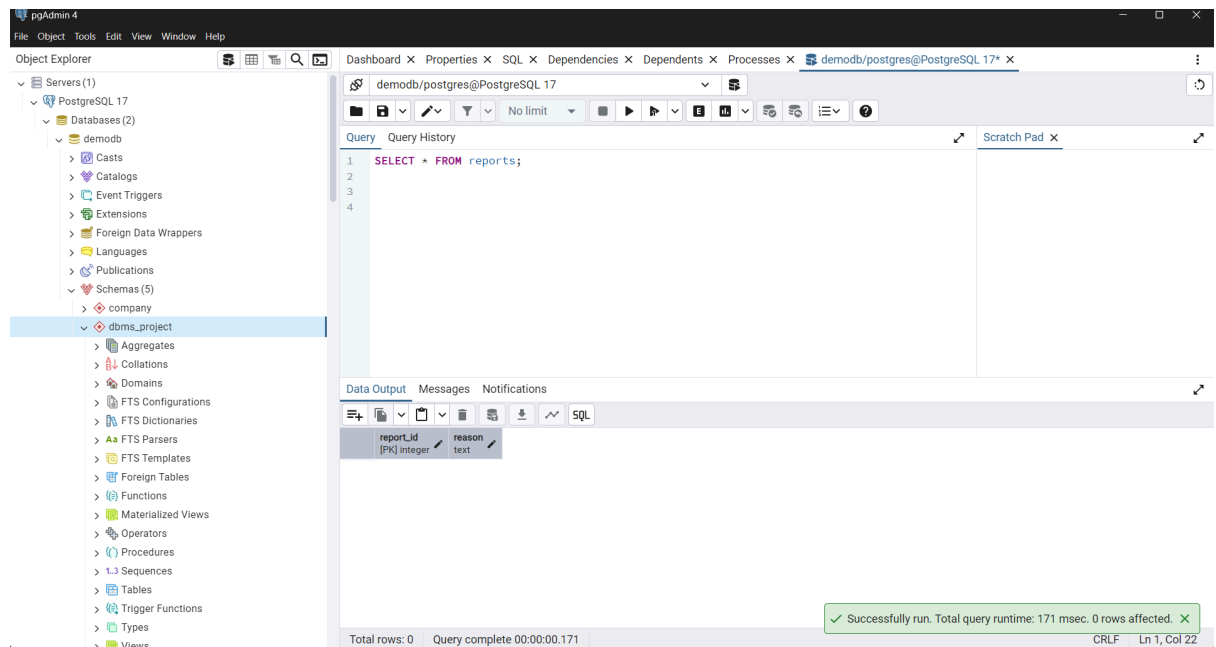
Data Output Messages Notifications

main_comment_id	reply_comment_id
integer	[PK] integer

Successfully run. Total query runtime: 148 msec. 0 rows affected. X

Total rows: 0 Query complete 00:00:00.148 CRLF Ln 1, Col 39







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Object Explorer

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demodb/postgres@PostgreSQL 17\*

Query Query History

```
1 SELECT * FROM admin_controls;
```

Execute script FS

Data Output Messages Notifications

admin_id	user_id	post_id
[PK] integer	[PK] integer	[PK] integer

Total rows: 0 Query complete 00:00:00.081

Successfully run. Total query runtime: 81 msec. 0 rows affected.

CRLF Ln 1, Col 29