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TECHNOLOGICAL UNIVERSITY DUBLIN

CITY CAMPUS - GRANGEGORMAN

CMPU 2007 – Databases 1

Year 2

SEMESTER 1 EXAMINATIONS 2024/25

Databases 1

Internal Examiner(s):
Dr. Mariana Rocha
Dr. Paul Doyle

External Examiner(s):
Dr. Colm O'Riordan (TU856/TU858)

Exam Duration: *Two hours*

Instructions:
Answer ALL questions. There is a syntax table on the last page to assist you.

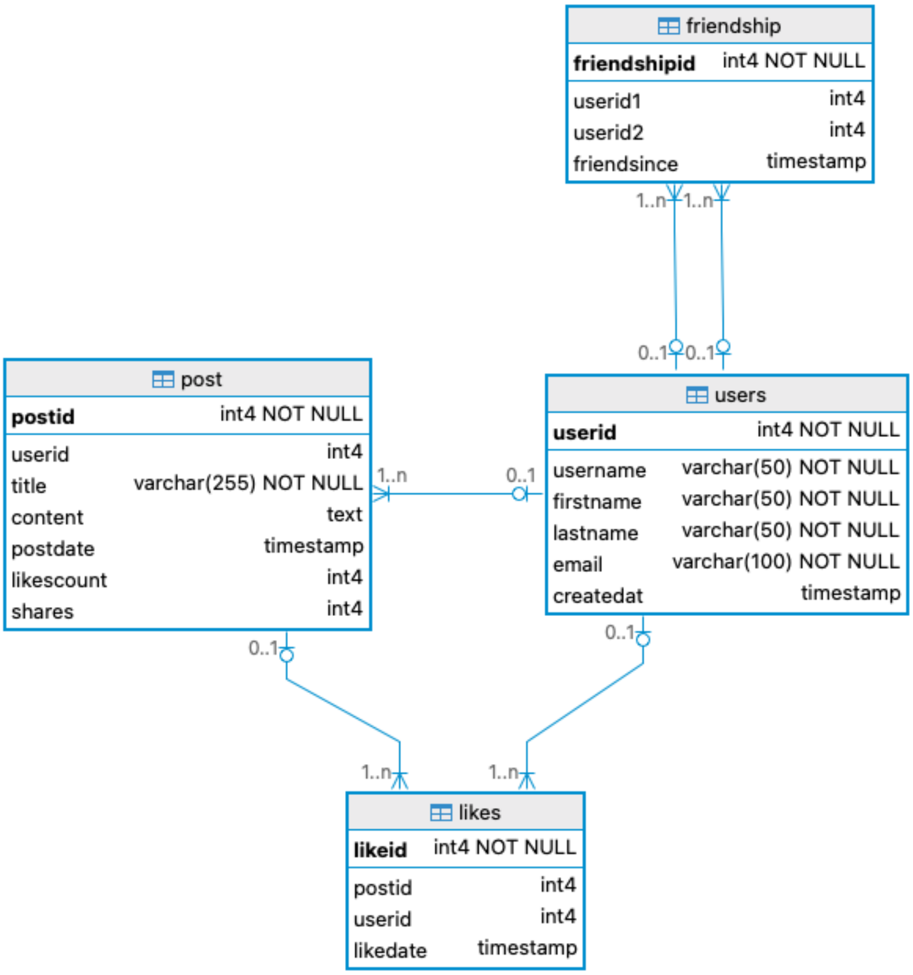
Case Study – Social media database

The following relational schema will be used in the subsequent questions:

A team of developers designed a database system for managing information related to a social media platform. This platform allows users to share posts, like posts, and connect with friends.

The database structure includes tables such as User, Post, Like, and Friendship. Users can view posts shared by their friends, besides being able to like posts, and interact with the platform by sharing their own content.

The developers worked on an Entity Relationship Diagram (ERD) to represent this database, resulting in the diagram below:



friendship	
friendshipid	int4 NOT NULL
userid1	int4
userid2	int4
friendsince	timestamp

post	
postid	int4 NOT NULL
userid	int4
title	varchar(255) NOT NULL
content	text
postdate	timestamp
likescount	int4
shares	int4

users	
userid	int4 NOT NULL
username	varchar(50) NOT NULL
firstname	varchar(50) NOT NULL
lastname	varchar(50) NOT NULL
email	varchar(100) NOT NULL
createdat	timestamp

likes	
likeid	int4 NOT NULL
postid	int4
userid	int4
likedate	timestamp

(Question 1 starts in the next page)

Question 1

1.(a) Refer to the Entity Relationship diagram (ERD) for the social media platform case study presented before and clearly explain the following concepts and provide an example of each:

- Entity
- Attribute
- Relationship
- Primary Key
- Foreign Key

(10 marks)

1.(b) Using a join clause, write an SQL query to retrieve the titles of posts made before 1 January 2023, along with the usernames of the authors.

(10 marks)

1.(c) Write an SQL query to display the full names (combination of their first and last names) of users who have never made any post. The result should be displayed in a single column named FullName, with a space between the first and last names.

(8 marks)

1.(d) Write an SQL query to retrieve each post's title along with its average number of likes.

(6 marks)

1.(e) Write an SQL query to add a new column "Shares" to the Post table. This column has data type INTEGER.

(6 marks)

Question 2

2.(a) Considering the process of database normalisation:

- What are the primary objectives of normalisation?
- Define the three main normal forms

(10 marks)

2.(b) Considering the social media database illustrated in the case study, propose a new entity relevant to this platform to be added to the diagram, including its attributes and relationships with existing entities.

(10 marks)

2.(c) The following SQL queries were written as an attempt to insert data into the social media database. However, each query returned an error. Identify and explain the errors in the queries below:

(10 marks)

```
INSERT INTO Post VALUES (202, 'First Day', 'user123', '2024-01-01');
INSERT INTO User (UserID, Username, Email) VALUES (201, "user@example.com",
"User Name");
INSERT  INTO  User  (UserID,  Username,  Email)  VALUES  (101,  'alice',
'alice@example.com', '2023-01-01');
```

Question 3

3.(a) Provide an ALTER TABLE statement to add a NOT NULL constraint to the PostDate attribute in the Post table of the social media database. Explain the significance of adding this constraint and how it ensures data integrity.

(10 marks)

3.(b) Write an SQL query that retrieves the titles of all posts along with the PostDate formatted as 'DD Mon YYYY' (e.g., 31 Jan 2023). In the resulting output, name the column showing the dates in the new format as “FormattedDate”.

(10 marks)

3.(c) Considering the social media database previously illustrated in the ERD:

- Explain the concept of referential integrity
- Describe how it maintains data consistency

(10 marks)

(End of exam questions)

SYNTAX SHEET

DELETE FROM tablename WHERE condition;

INSERT INTO tablename [{column-name,}] VALUES (data-value-list)
INSERT INTO tablename [{column-name,}] SELECT …

SELECT column-list FROM tablename
[JOIN] tablename2 <alias> USING {column-name,}
…
[JOIN] tablenameN <alias> USING {column-name,}]
[WHERE condition]

[ORDER BY column-list [desc]]
[GROUP BY column-name]
[HAVING condition]

SELECT column-list FROM tablename
[JOIN] tablename2 <alias> ON condition]
…
[JOIN] tablenameN <alias> ON condition]
[WHERE condition]
[ORDER BY column-list]
[GROUP BY column-name]
[HAVING condition]
Conditions : =,>,<,>=,<=,<>, BETWEEN .. AND.., IN (list), IS NULL, LIKE, EXISTS
Logical operators: AND, OR, NOT
Set operations: UNION, EXCEPT, INTERSECT

UPDATE tablename
[SET column-name= <data-value>] [WHERE condition]

Date functions
    Current date NOW() or CURRENT_DATE
Subtract 5 days from a date THISDATE:
    SELECT THISDATE - interval '5 days';
    Intervals can also be 'months' or 'years'.

Create or replace view <ViewName> as
SELECT (statement as above)