Instagram User Analytics

SQL Fundamentals

Project Description:

The project report describes analysis of user interactions and engagement with the Instagram app. We're able to find various highlights about user interactions which are used to develop different strategies for app improvement. This will help provide valuable insights to developers and investors that can help the business grow.

Approach:

The tasks have been divided as information for the developer team and investors.
We start by creating the database in MySQL using MySQL workbench.
Various SQL commands have been used to retrieve information from the database according to our requirement.
We start by creating our database in MySQL.
Next we run a command to use the said database that has been created.
The data is stored in a tabular format. These tables are created using the CREATE command.
INSERT command is used to insert data in the tables.
We use various DDL and DML queries like SELECT, FROM, GROUP BY, ORDER BY, etc to retrieve and show information from the database.

Tech-Stack Used:

Intel Core i5
Windows 10
MySql 8.0 CE Workbench
Local host MySQ80

Insights:

Creating a database in MySQL:

CREATE DATABASE ig_clone;
Command has been used to create a database named as ig_clone.

USE ig_clone;
USE database command is run to select the database that we work on.

Creating a table:

Creating a table named users to save information related to users of instagram app.

```
CREATE TABLE users(
   id INT AUTO_INCREMENT UNIQUE PRIMARY KEY,
   username VARCHAR(255) NOT NULL,
   created_at TIMESTAMP DEFAULT NOW()
);
```

CREATE TABLE command is used to create the table.
We create three columns in our table, namely

1) Id
   id INT AUTO_INCREMENT UNIQUE PRIMARY KEY,
   The query receives a unique integer value as input. We define the ID column as the primary key to reference other foreign key tables.
   Primary key values are unique and distinct.
2) username
   username VARCHAR(255) NOT NULL,
   The query receives a string as input. **NOT NULL** specifies the input value can't be null.
3) created_at
   created_at TIMESTAMP DEFAULT NOW()
   This column specifies the date and time on which the user id was created.

Similarly, we create our other tables for
Photos uploaded on the app

```
CREATE TABLE photos(
        id INT AUTO_INCREMENT PRIMARY KEY,
        image_url VARCHAR(355) NOT NULL,
        user_id INT NOT NULL,
        created_dat TIMESTAMP DEFAULT NOW(),
        FOREIGN KEY(user_id) REFERENCES users(id)
);
```

Foreign Key is used to reference the primary key which in our case is the **id** column.

Database for all comments on the app

```
CREATE TABLE comments(
        id INT AUTO_INCREMENT PRIMARY KEY,
        comment_text VARCHAR(255) NOT NULL,
        user_id INT NOT NULL,
```

```
        photo_id INT NOT NULL,
        created_at TIMESTAMP DEFAULT NOW(),
        FOREIGN KEY(user_id) REFERENCES users(id),
        FOREIGN KEY(photo_id) REFERENCES photos(id)
);
```

For likes

```
CREATE TABLE likes(
        user_id INT NOT NULL,
        photo_id INT NOT NULL,
        created_at TIMESTAMP DEFAULT NOW(),
        FOREIGN KEY(user_id) REFERENCES users(id),
        FOREIGN KEY(photo_id) REFERENCES photos(id),
        PRIMARY KEY(user_id,photo_id)
```

For follows

```
CREATE TABLE follows(
        follower_id INT NOT NULL,
        followee_id INT NOT NULL,
        created_at TIMESTAMP DEFAULT NOW(),
        FOREIGN KEY (follower_id) REFERENCES users(id),
        FOREIGN KEY (followee_id) REFERENCES users(id),
        PRIMARY KEY(follower_id,followee_id)
);
```

For hashtags

```
CREATE TABLE tags(
        id INTEGER AUTO_INCREMENT PRIMARY KEY,
        tag_name VARCHAR(255) UNIQUE NOT NULL,
        created_at TIMESTAMP DEFAULT NOW()
);
```

Then we create photo_tags table as junction table

```
CREATE TABLE photo_tags(
        photo_id INT NOT NULL,
        tag_id INT NOT NULL,
        FOREIGN KEY(photo_id) REFERENCES photos(id),
        FOREIGN KEY(tag_id) REFERENCES tags(id),
        PRIMARY KEY(photo_id,tag_id)
);
```

Inserting values in table columns:

Inserting values in table/columns we have created, we use
INSERT INTO tablename (column1, column2,..column n) VALUES (expression1,expression2,.....expression n);
where tablename is the table we want to add values to, column refers to the columns in the table and expressions are the values that we want to add.

Result:

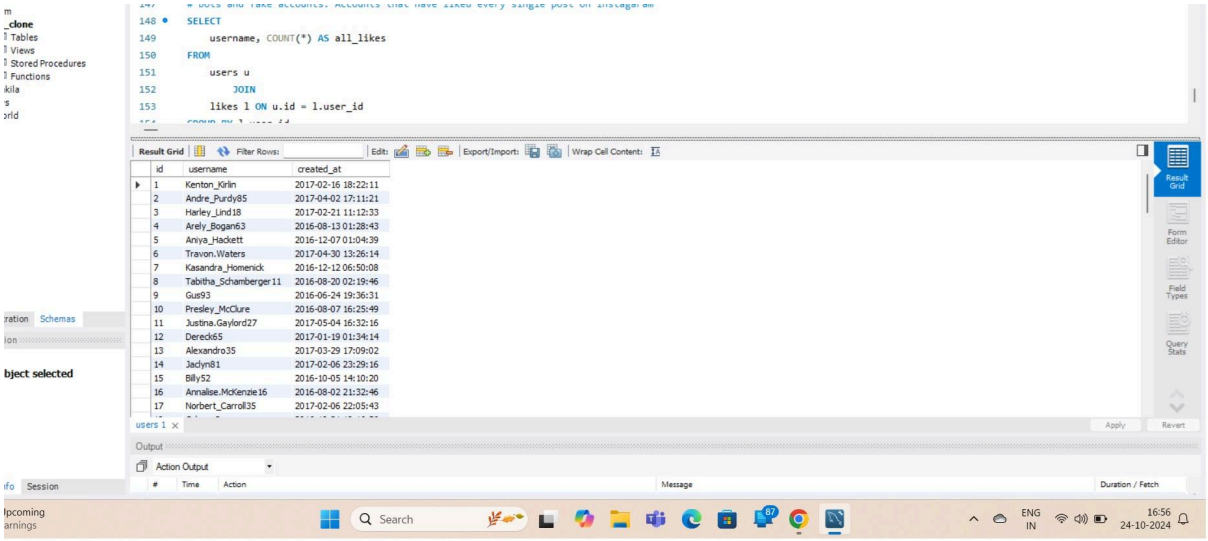
In order to visualize the data in tables we use query

SELECT * FROM tablename;

To visualize data from users table we use command

select * from users;

we get output as



Marketing Analysis

1.Loyal User Reward:

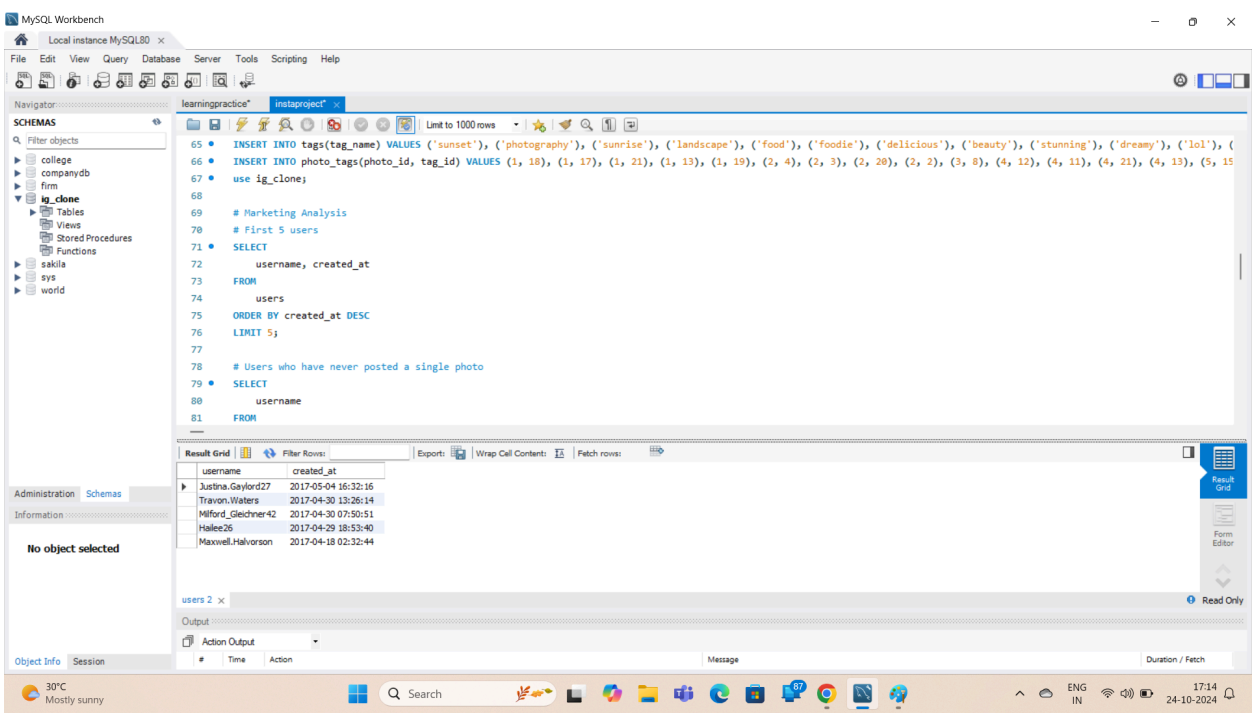
The marketing team wants to reward the most loyal users, i.e., those who have been using the platform for the longest time.
Your Task: Identify the five oldest users on Instagram from the provided database.

Query:

```
SELECT
   username, created_at
FROM
   users
ORDER BY created_at DESC
LIMIT 5;
```

Explanation:
We select columns username and created_at from users table and order the entries from created_at in descending order. We limit the number of rows to 5.

Result:



Conclusion:
Justina.Gaylord27, Travon.Waters, Milford_Gliechner42, Hailee26, Maxwell.Halvorson are the first five users of instagram app.

2. Inactive User Engagement:

The team wants to encourage inactive users to start posting by sending them promotional emails.
Your Task: Identify users who have never posted a single photo on Instagram.

Query:

```
SELECT
    username
FROM
    users
        LEFT JOIN
    photos ON users.id = photos.user_id
WHERE
    photos.id IS NULL;
```

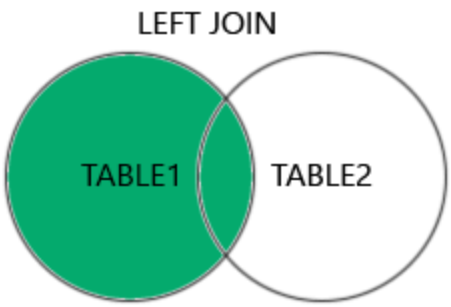
Explanation:

Here we use **JOINT** clauses to join photos on users. To find records where users id having null join records in photos are given as output.

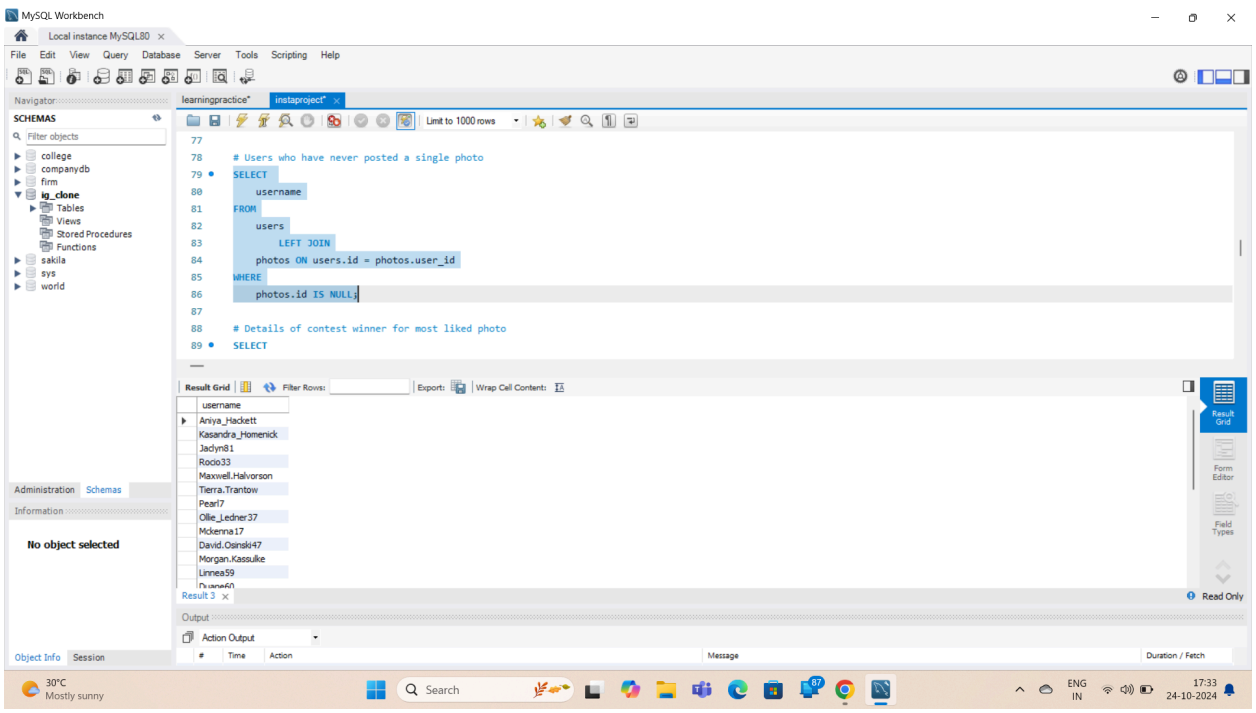
The **WHERE** clause is used to filter records. It is used to extract only those records that fulfill a specified condition.

LEFT JOIN

The LEFT JOIN command returns all rows from the left table, and the matching rows from the right table.



Result:



Conclusion:

The result table displays the usernames of IDs who have never uploaded a single photo on instagram.

3. Contest Winner Declaration:

The team has organized a contest where the user with the most likes on a single photo wins. Your Task: Determine the winner of the contest and provide their details to the team.

Query:

```
SELECT
   username,
   photos.id,
   photos.image_url,
   COUNT(*) AS total_likes
FROM
   photos
      INNER JOIN
   likes ON likes.photo_id = photos.id
      INNER JOIN
   users ON photos.user_id = users.id
GROUP BY photos.id
ORDER BY total_likes DESC
LIMIT 1;
```

Explanation:

SELECT command is used to show selected columns.

COUNT(*) is used to count the number of entries in the photos table.

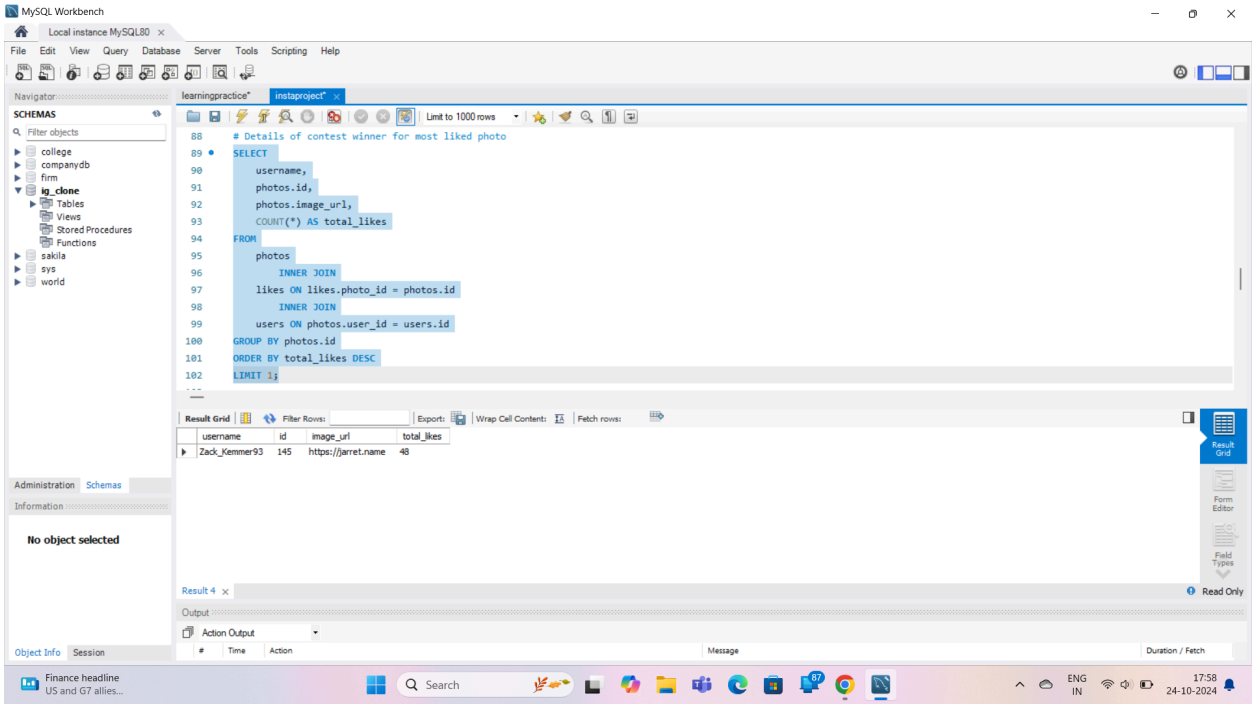
INNER JOIN

The INNER JOIN clause in SQL is used to combine multiple tables and fetch records that have the same values in the common columns.

First inner join is applied as a likes on likes (photos_id) column. Another is applied as users on photos(user_id) column.

The result is given in descending order using GROUP BY and DESC. Entries are limited to 1.

Result:



Conclusion:

User Zack_Kemmer93 is the winner of the contest with 48 likes which is most number of likes on a single post.

4. Hashtag Research:

A partner brand wants to know the most popular hashtags to use in their posts to reach the most people.
Your Task: Identify and suggest the top five most commonly used hashtags on the platform.

Query:

```
SELECT

    tag_name, COUNT(tag_name) AS most_popular

FROM

    tags

        JOIN

    photo_tags ON tags.id = photo_tags.tag_id
```

GROUP BY tags.id

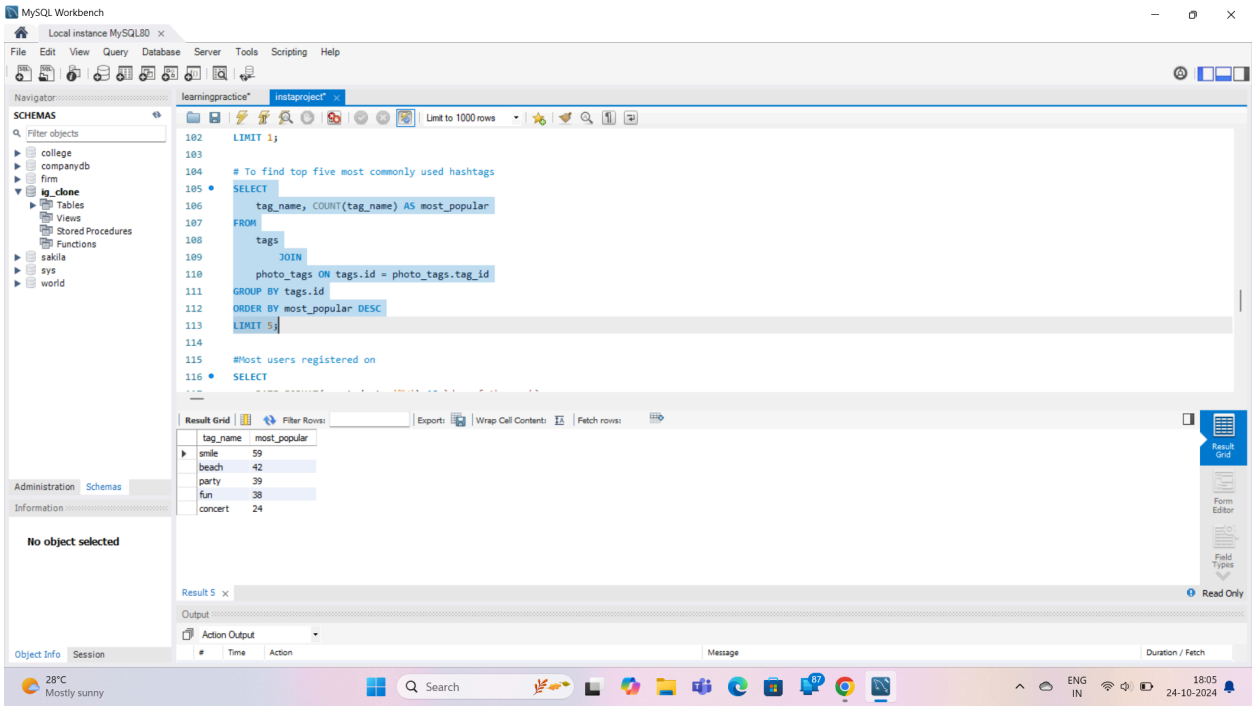
ORDER BY most_popular DESC

LIMIT 5;

Explanation:

In COUNT(tag_name) AS most_popular query, AS is used as an alias to give name to created aliases.

Result:



Conclusion:

Smile, Beach, Party, Fun, Concert are the most popular hashtags used by users on instagram in a descending order.

5. Ad Campaign Launch:

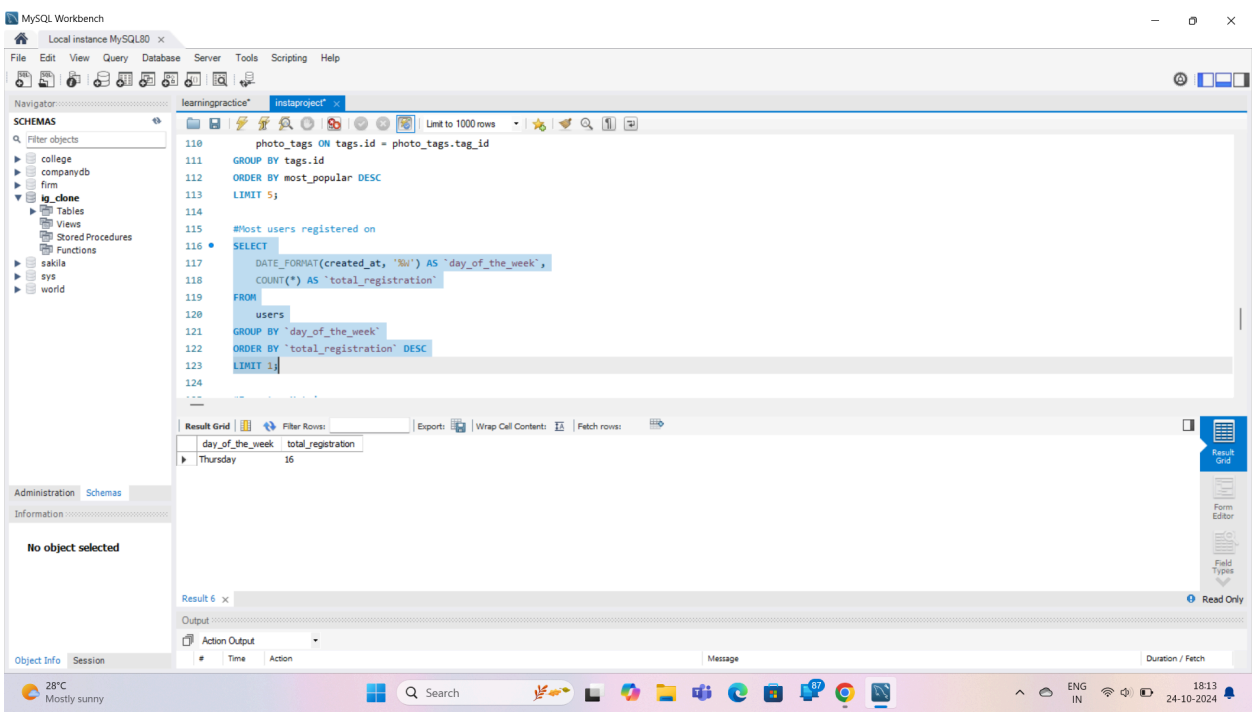
The team wants to know the best day of the week to launch ads.
Your Task: Determine the day of the week when most users register on Instagram. Provide insights on when to schedule an ad campaign.

Query:

```
SELECT
   DATE_FORMAT(created_at, '%W') AS `day_of_the_week`,
   COUNT(*) AS `total_registration`
FROM
   users
GROUP BY `day_of_the_week`
ORDER BY `total_registration` DESC
LIMIT 1;
```

Explanation:
The DATE_FORMAT() function formats a date as specified.
%W is a parameter used to give weekday names in full (Sunday to Saturday).

Result:



Conclusion:
16 registrations which is the most out of all weeks has been done on a thursday. Hence, the ad campaign should be scheduled on a thursday.

B) Investor Metrics:

1. User Engagement:

Investors want to know if users are still active and posting on Instagram or if they are making fewer posts.
Your Task: Calculate the average number of posts per user on Instagram. Also, provide the total number of photos on Instagram divided by the total number of users.

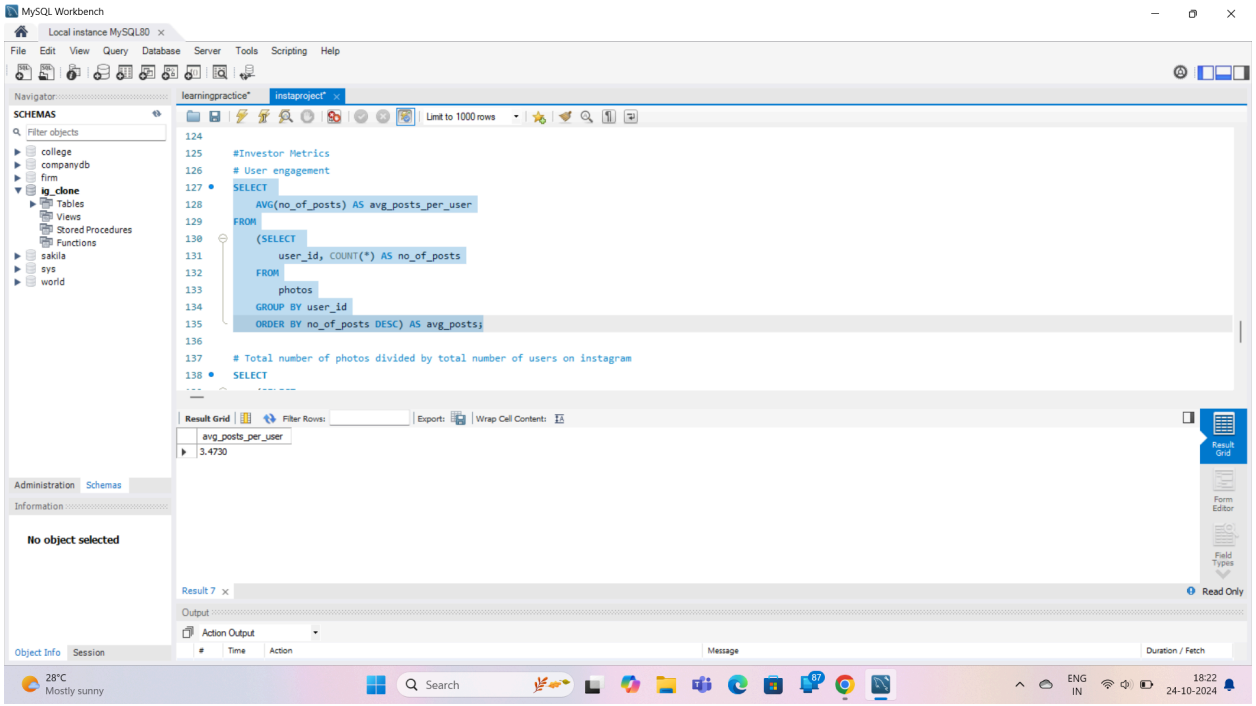
Query:

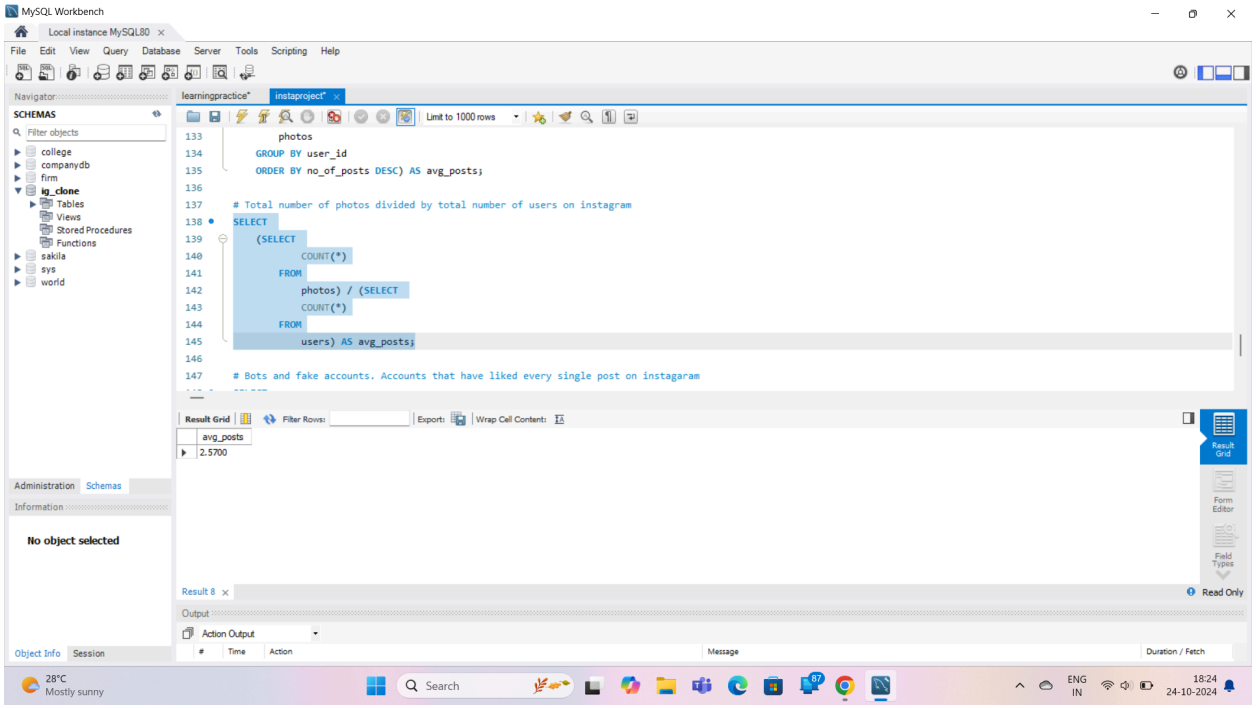
```
SELECT
   AVG(no_of_posts) AS avg_posts_per_user
FROM
   (SELECT
      user_id, COUNT(*) AS no_of_posts
   FROM
      photos
   GROUP BY user_id
   ORDER BY no_of_posts DESC) AS avg_posts;


SELECT
   (SELECT
         COUNT(*)
      FROM
         photos) / (SELECT
         COUNT(*)
      FROM
         users) AS avg_posts;
```

Explanation:
Nested query has been used where an independent query is nested inside a dependent query.
Execution of outer query is dependent on inner query.
/ is used as a mathematical operator to perform division.

Result:





Conclusion:

Average number of posts per user on instagram is 3.4730.

Total number of photos divided by the total number of users on instagram is 2.5700.

2. Bots & Fake Accounts:

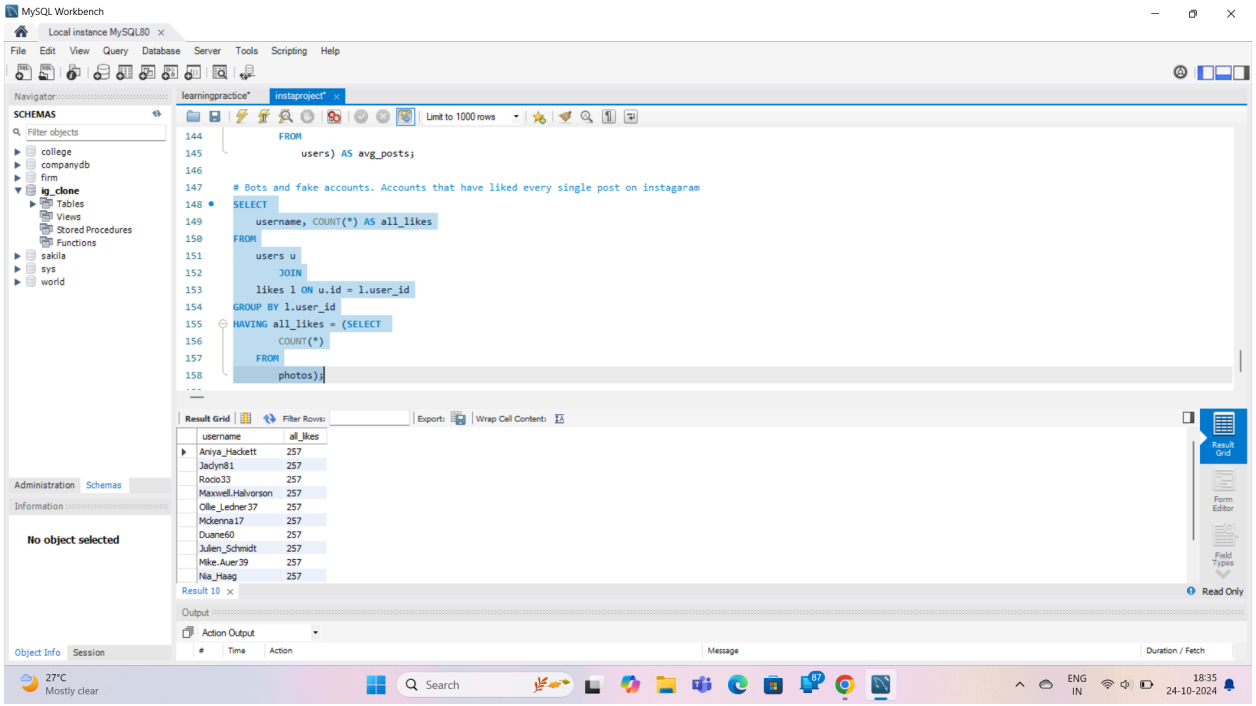
Investors want to know if the platform is crowded with fake and dummy accounts.
Your Task: Identify users (potential bots) who have liked every single photo on the site, as this is not typically possible for a normal user.

Query:

```
SELECT
   username, COUNT(*) AS all_likes
FROM
   users u
      JOIN
   likes l ON u.id = l.user_id
GROUP BY l.user_id
HAVING all_likes = (SELECT
      COUNT(*)
   FROM
      photos);
```

Explanation:
The HAVING clause was introduced in SQL to allow the filtering of query results based on aggregate functions and groupings.

Result:



Conclusion:

Multiple IDs that have liked all the photos on the app could potentially be bots as its humanly not possible. The result table displays such IDs.