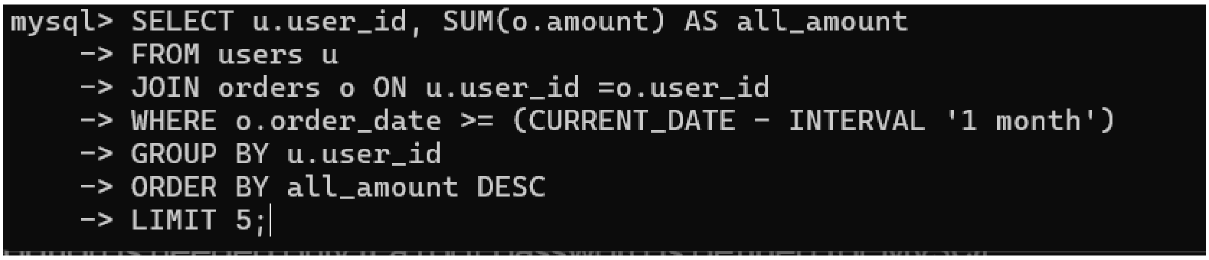
1. Database Query Optimization

Scenario: You have a PostgreSQL database with a `users` table and an `orders` table. The `orders` table has a foreign key reference to the `users` table. Write a SQL query to fetch the top 5 users with the highest total order amount in the last month. Assume that the `orders` table has columns `user_id`, `amount`, and `order_date`.

Requirements:

- Write the SQL query.
  Explain how you would index the tables to optimise the query.

---> **Query**



```
mysql> SELECT u.user_id, SUM(o.amount) AS all_amount
    -> FROM users u
    -> JOIN orders o ON u.user_id =o.user_id
    -> WHERE o.order_date >= (CURRENT_DATE - INTERVAL '1 month')
    -> GROUP BY u.user_id
    -> ORDER BY all_amount DESC
    -> LIMIT 5;
```

Explanation :

JOIN: Using the foreign key connection (user_id), this joins the users and orders tables.
WHERE: Filters records to include only orders made in the last month (order_date >= (CURRENT_DATE - INTERVAL '1 month')).
GROUP BY: Using this we can add up the total for every user, the results are grouped by user_id.
ORDER BY: Orders the results by the total amount in descending order to get the top users.
LIMIT 5: Restricts the result to the top 5 users.

Indexing the table to optimize the query :

i) To implement the query it is required to join the tables users and orders . The unique and common in both table is user_id .So if we index on orders.user_id it will speed up the join process by reducing no of rows that needs to be scanned.

ii) As we need to find relevant records within last month , we can index on the column of order_date . It will help to find relevant records.