Ecommerce Library Database Project — Detailed Explanation

1. Project Introduction

This project is about building a database for an online library. The library allows users to browse and buy different products (like books, electronics, clothes, etc.) online.

The database helps organize all the information such as users, products, orders, and payment methods. When data is organized well, it's easier to search, generate reports, and keep the system efficient and reliable.

2. Requirements Analysis & Identifying Entities and Users

Before designing the database, we first analyze what data we need to store:

- **Entities:** These are the main things or people involved in the system. For example:
    - **Users:** People who register and buy products.
    - **Products:** Items available for sale.
    - **Orders:** Transactions made by users.
    - **Payment Methods:** Ways to pay like credit card or PayPal.
    - **Categories:** Grouping products into types like books, electronics, clothes.

    - **Address:** User addresses for shipping.

- **Users:** Mainly customers who buy products, but in bigger systems, there can be admins or staff too.

In our project, we focus on customers.

3. Database Design (ERD and Mapping)

What is an ERD?

Entity-Relationship Diagram (ERD) visually shows how entities relate to each other.

For example:

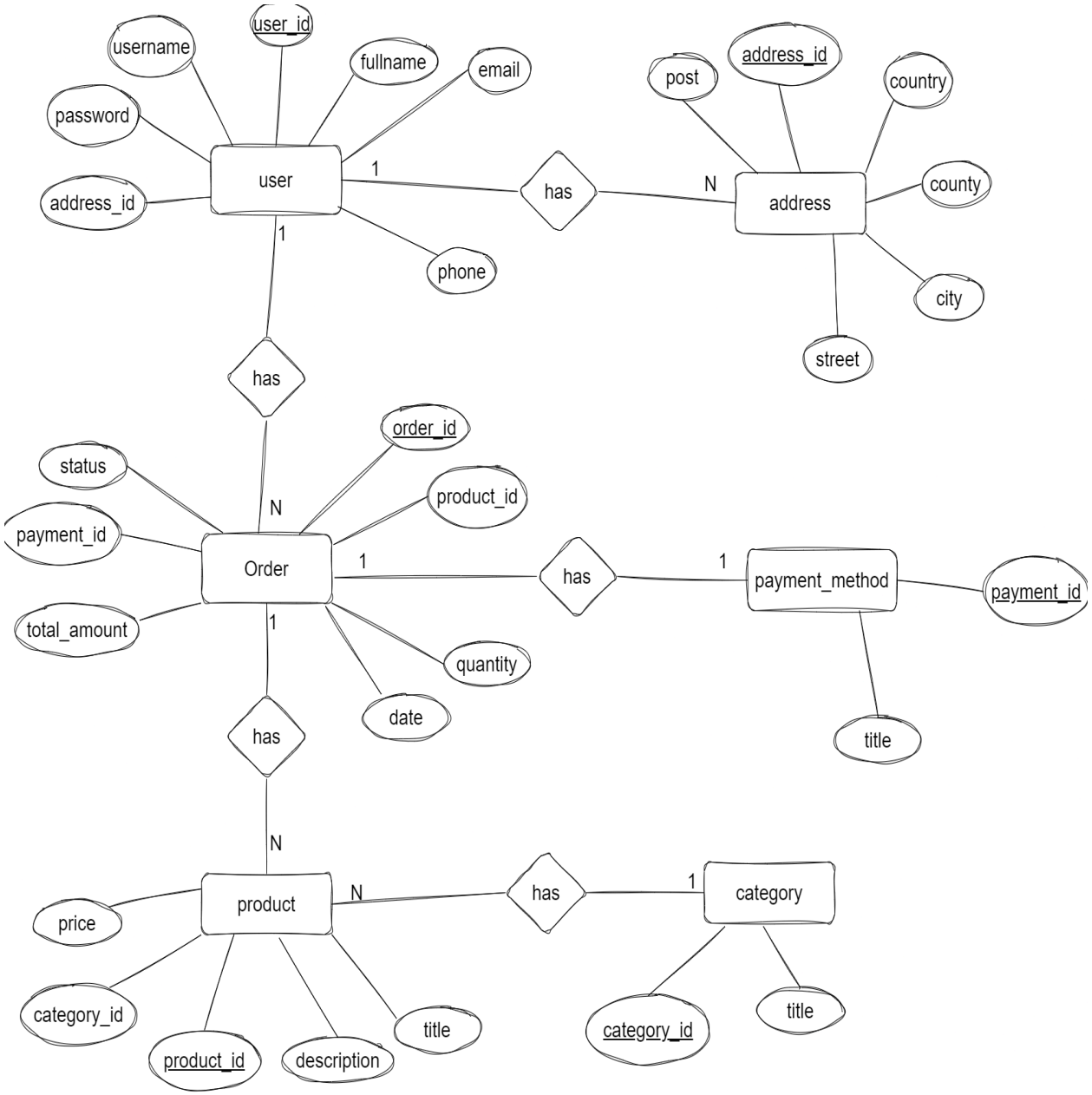
- A **User** can place many **Orders** → One-to-Many relationship.
- Each **Order** can include many **Products** and each **Product** can appear in many **Orders** → Many-to-Many relationship, handled by a join table called `order_product`.

Mapping ERD to Tables

Once the ERD is ready, we convert it to actual database tables by:

- Creating one table per entity.
- Representing relationships with foreign keys or join tables.

- Each **Product** belongs to one **Category** → One-to-Many rel



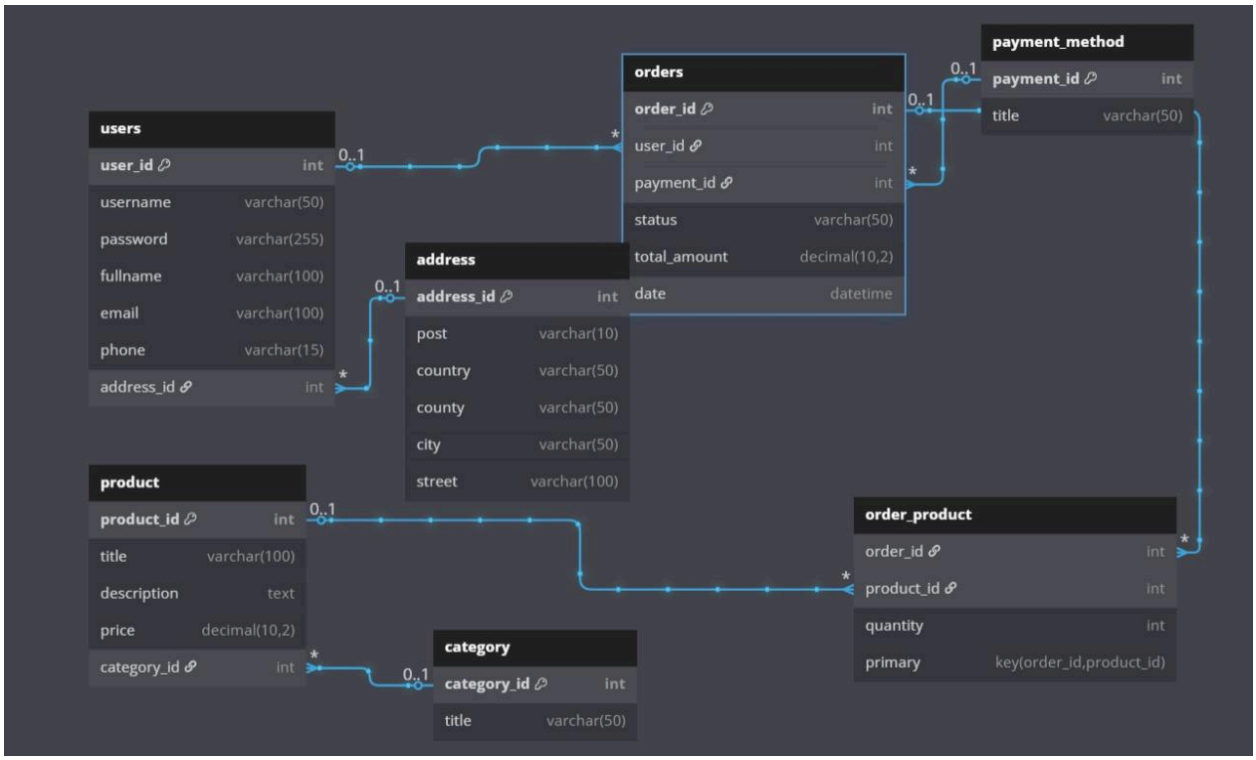
4. Normalization

Why normalize?

Normalization organizes data to reduce duplication and avoid inconsistencies.

Normal Forms:

- **1NF (First Normal Form):**
    - Each column contains atomic (indivisible) values.
    - No repeating groups or arrays in a column.
- **2NF (Second Normal Form):**
    - Every non-key column depends fully on the primary key.
    - If there’s a composite key, no column depends on just part of it.
- **3NF (Third Normal Form):**
    - No transitive dependencies.
    - Non-key columns don’t depend on other non-key columns



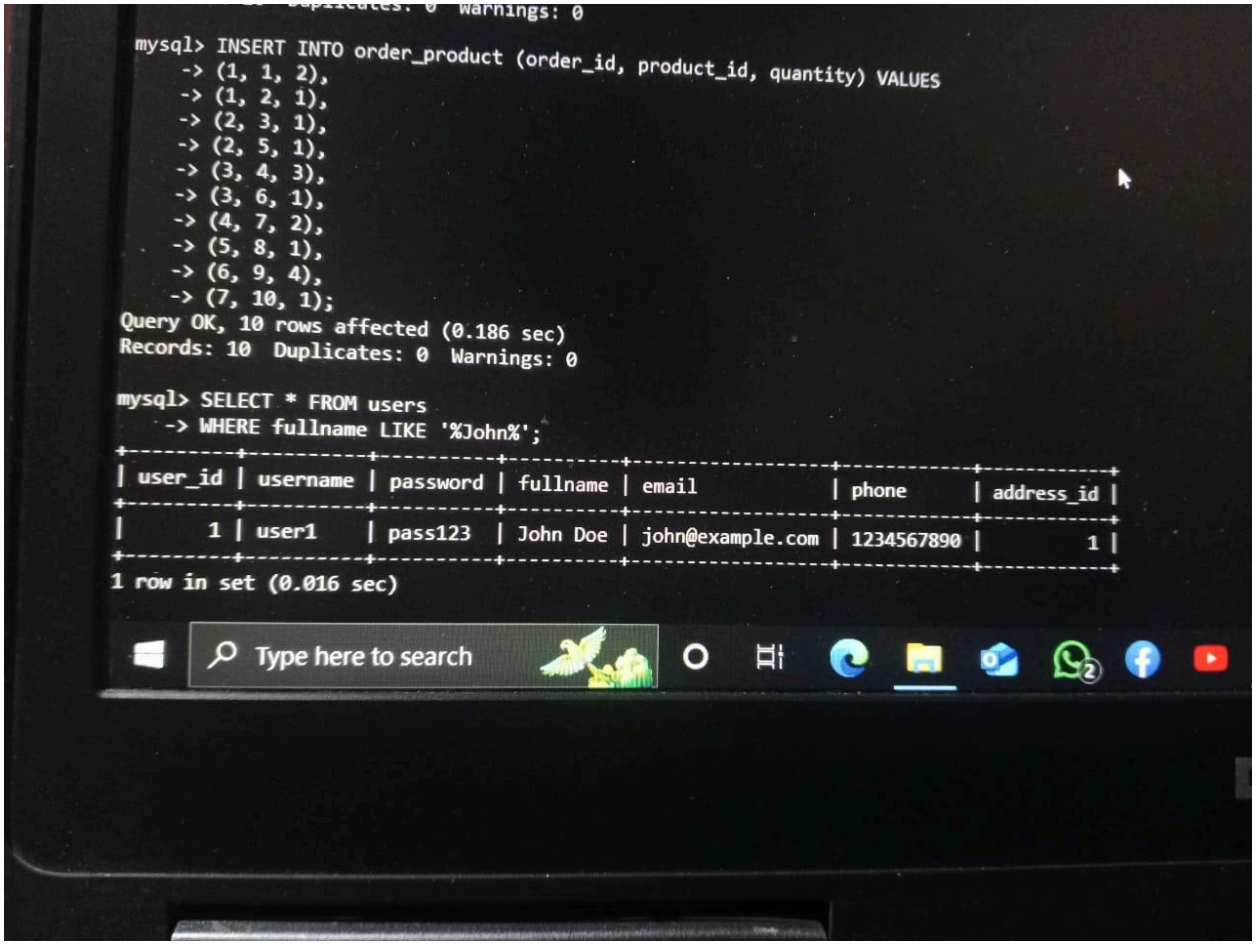
5. Creating Database and Tables

- Using MySQL commands like `CREATE DATABASE` and `CREATE TABLE` we set up the database.
- Main tables created:
    - `users` (stores user info)
    - `address` (stores user addresses)
    - `payment_method` (stores payment types)
    - `category` (stores product categories)
    - `product` (stores product info)

- `orders` (stores order info)
- `order_product` (joins orders and products)

7. Main SQL Queries output

1_



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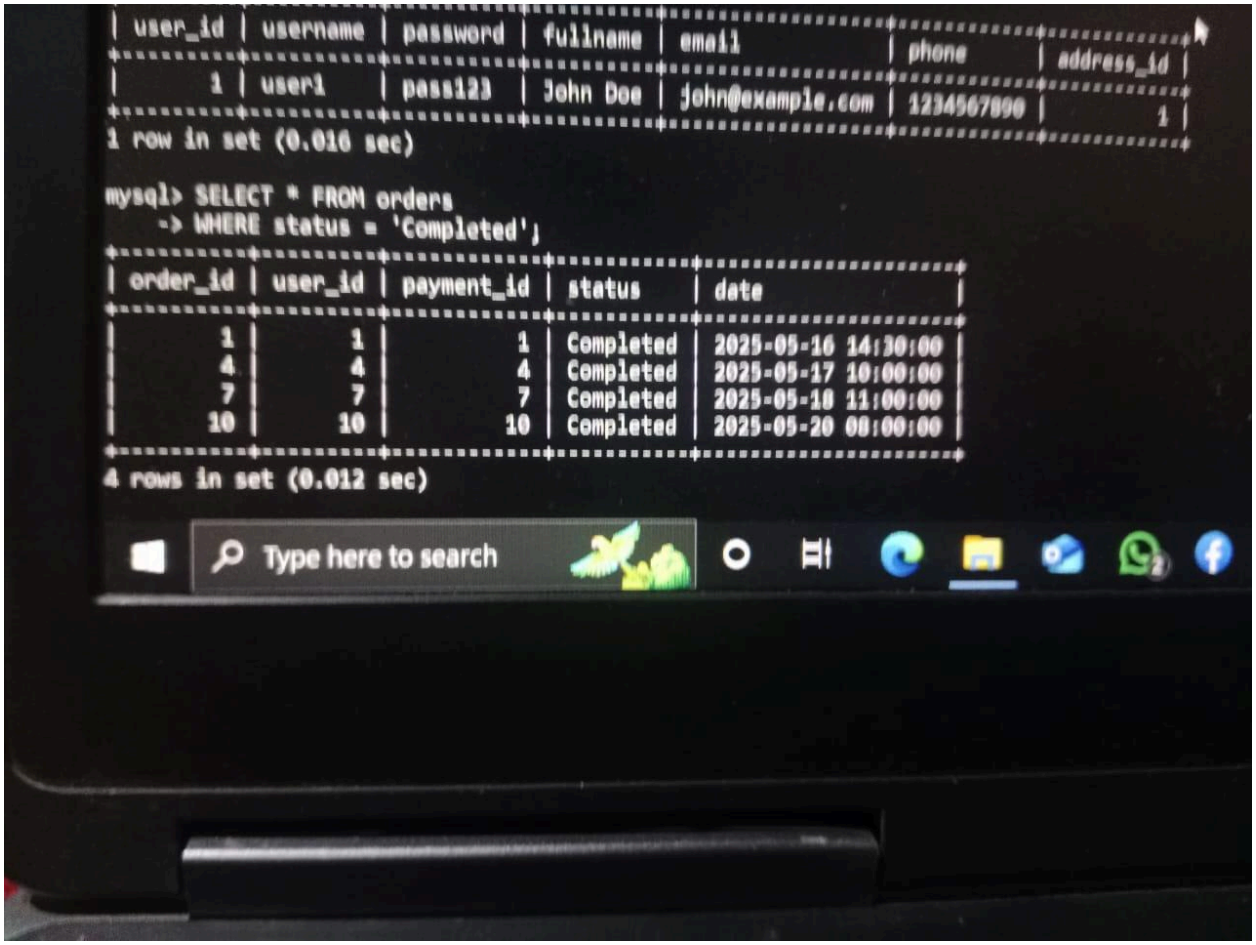
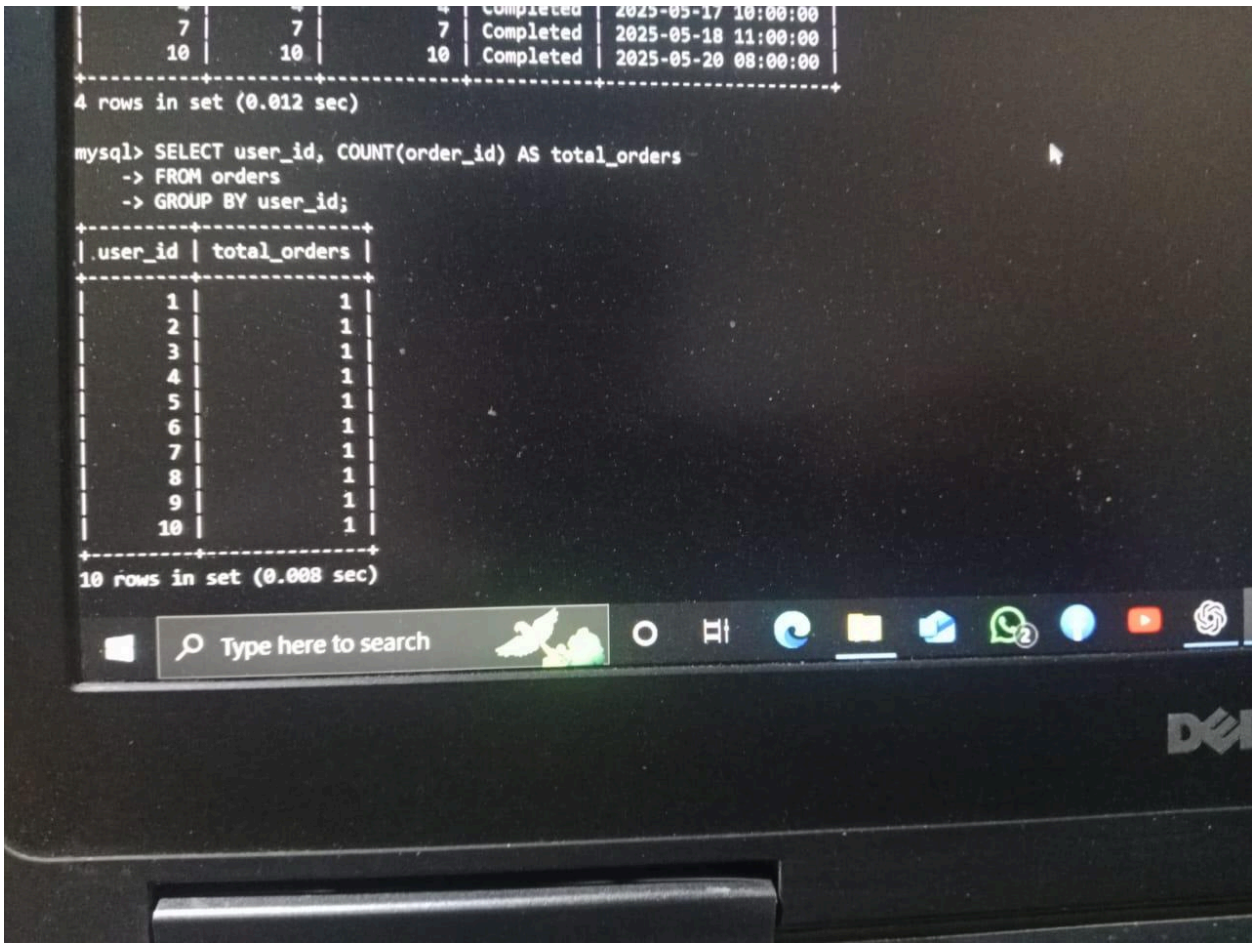
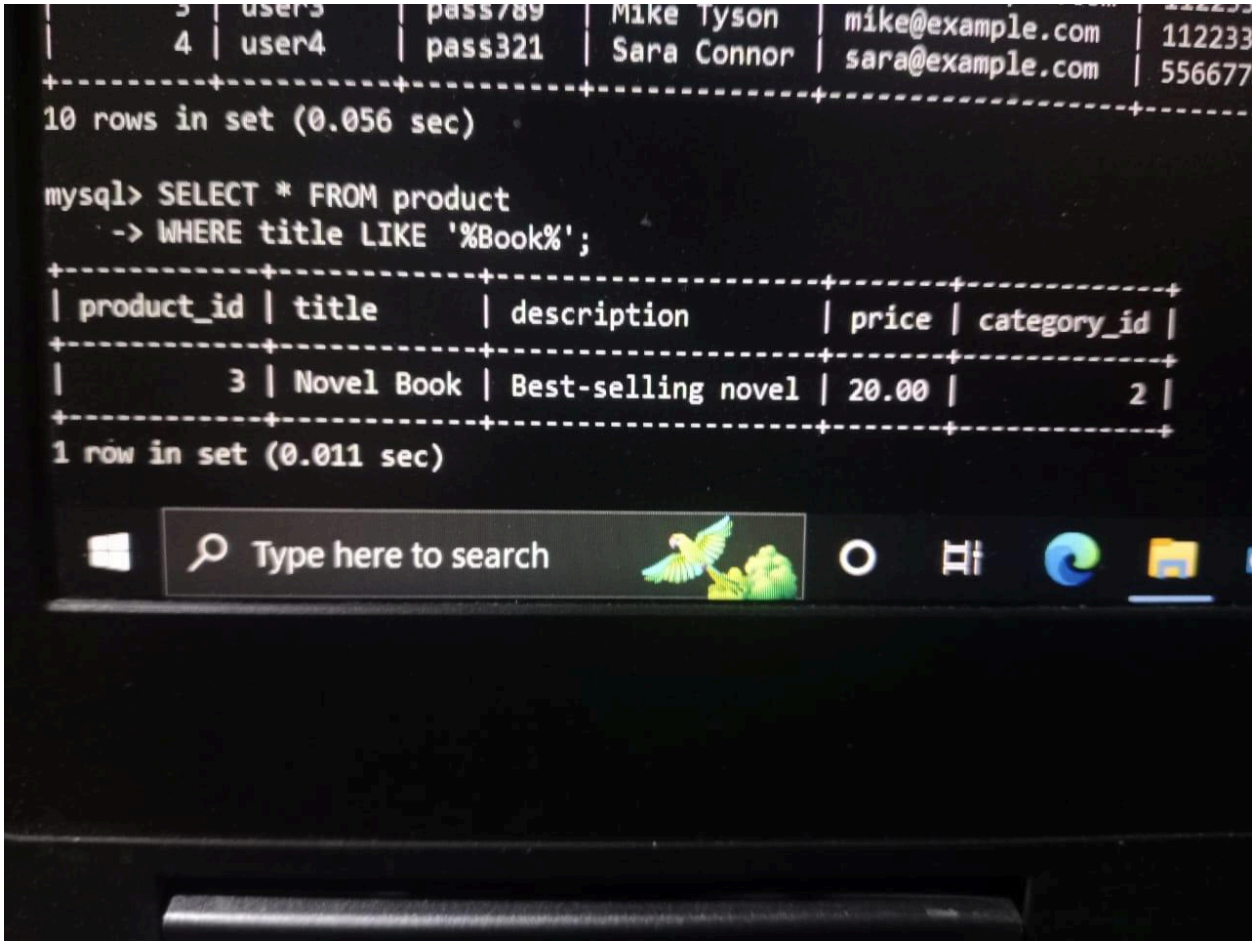

| user_id | username | password | fullname | email | phone | address_id |
| 1 | user1 | pass123 | John Doe | john@example.com | 1234567890 | 1 |
1 row in set (0.016 sec)
mysql> SELECT * FROM orders
-> WHERE status = 'Completed';
order_id	user_id	payment_id	status	date
1	1	1	Completed	2025-05-16 14:30:00
4	4	4	Completed	2025-05-17 10:00:00
7	7	7	Completed	2025-05-18 11:00:00
10	10	10	Completed	2025-05-20 08:00:00
4 rows in set (0.012 sec)
Type here to search

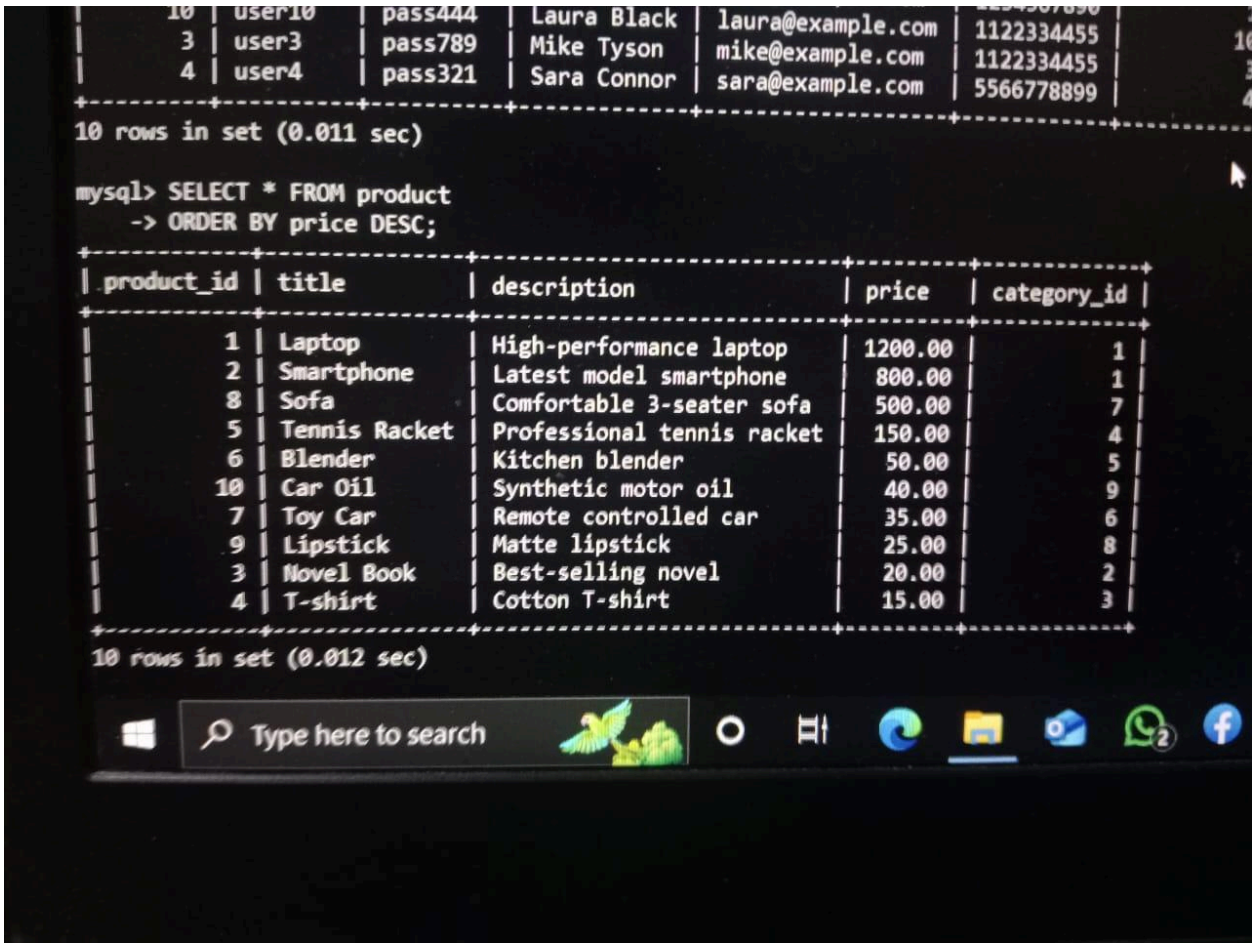
3_


7 | 7 | 7 | Completed | 2025-05-17 10:00:00
10 | 10 | 10 | Completed | 2025-05-18 11:00:00
10 | 10 | 10 | Completed | 2025-05-20 08:00:00
4 rows in set (0.012 sec)
mysql> SELECT user_id, COUNT(order_id) AS total_orders
-> FROM orders
-> GROUP BY user_id;
user_id | total_orders
1 | 1
2 | 1
3 | 1
4 | 1
5 | 1
6 | 1
7 | 1
8 | 1
9 | 1
10 | 1
10 rows in set (0.008 sec)
Type here to search

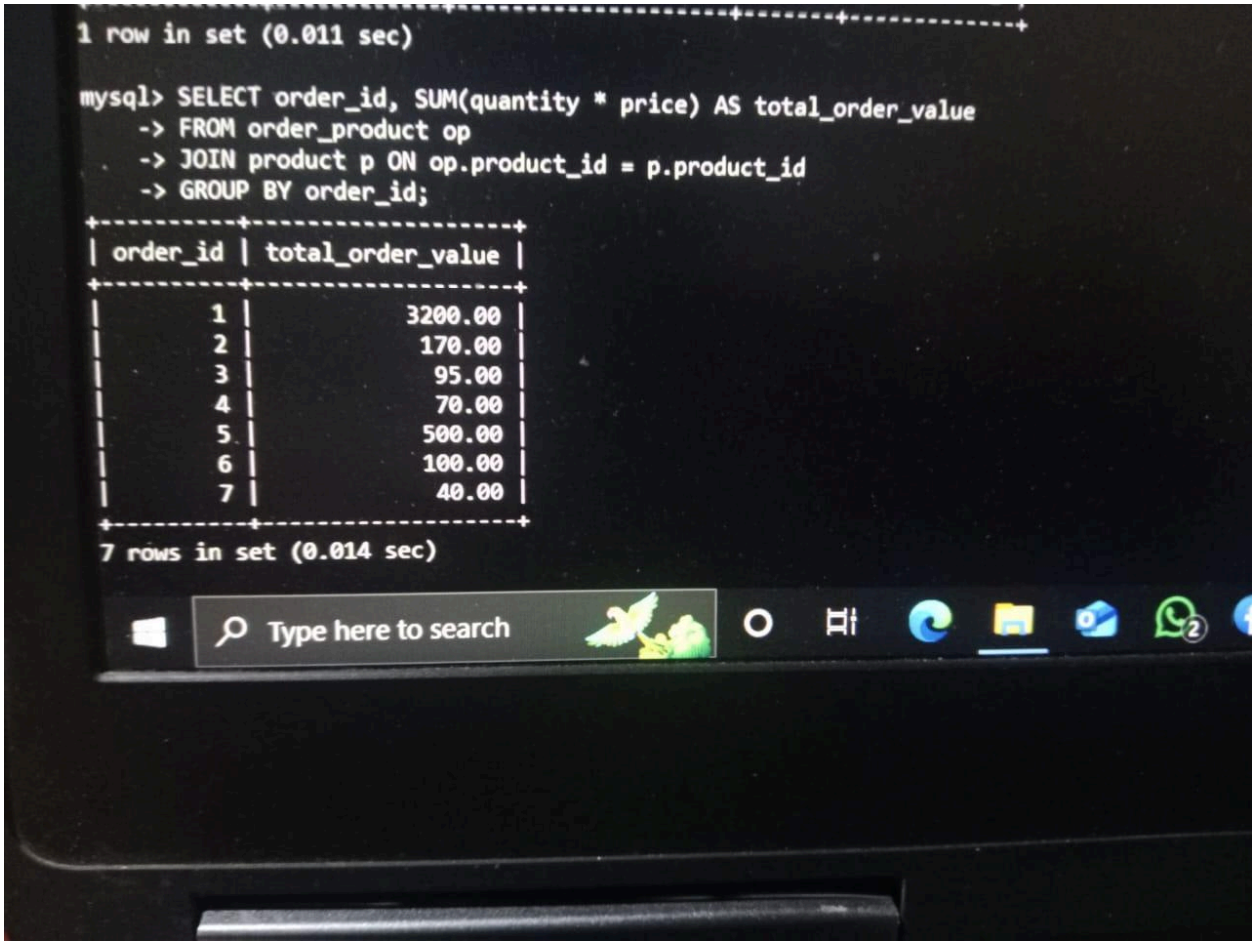
4_


| 4 | user4 | pass321 | Sara Connor | sara@example.com | 556677
10 rows in set (0.056 sec)
mysql> SELECT * FROM product
-> WHERE title LIKE '%Book%';
| product_id | title | description | price | category_id |
| 3 | Novel Book | Best-selling novel | 20.00 | 2 |
1 row in set (0.011 sec)
Type here to search

5_


10	user10	pass444	Laura Black	laura@example.com	1122334455
3	user3	pass789	Mike Tyson	mike@example.com	1122334455
4	user4	pass321	Sara Connor	sara@example.com	5566778899
10 rows in set (0.011 sec)
mysql> SELECT * FROM product
-> ORDER BY price DESC;
product_id	title	description	price	category_id
1	Laptop	High-performance laptop	1200.00	1
2	Smartphone	Latest model smartphone	800.00	1
8	Sofa	Comfortable 3-seater sofa	500.00	7
5	Tennis Racket	Professional tennis racket	150.00	4
6	Blender	Kitchen blender	50.00	5
10	Car Oil	Synthetic motor oil	40.00	9
7	Toy Car	Remote controlled car	35.00	6
9	Lipstick	Matte lipstick	25.00	8
3	Novel Book	Best-selling novel	20.00	2
4	T-shirt	Cotton T-shirt	15.00	3
10 rows in set (0.012 sec)
Type here to search

6_


1 row in set (0.011 sec)
mysql> SELECT order_id, SUM(quantity * price) AS total_order_value
-> FROM order_product op
-> JOIN product p ON op.product_id = p.product_id
-> GROUP BY order_id;
order_id	total_order_value
1	3200.00
2	170.00
3	95.00
4	70.00
5	500.00
6	100.00
7	40.00
7 rows in set (0.014 sec)
Type here to search