Database Project Report

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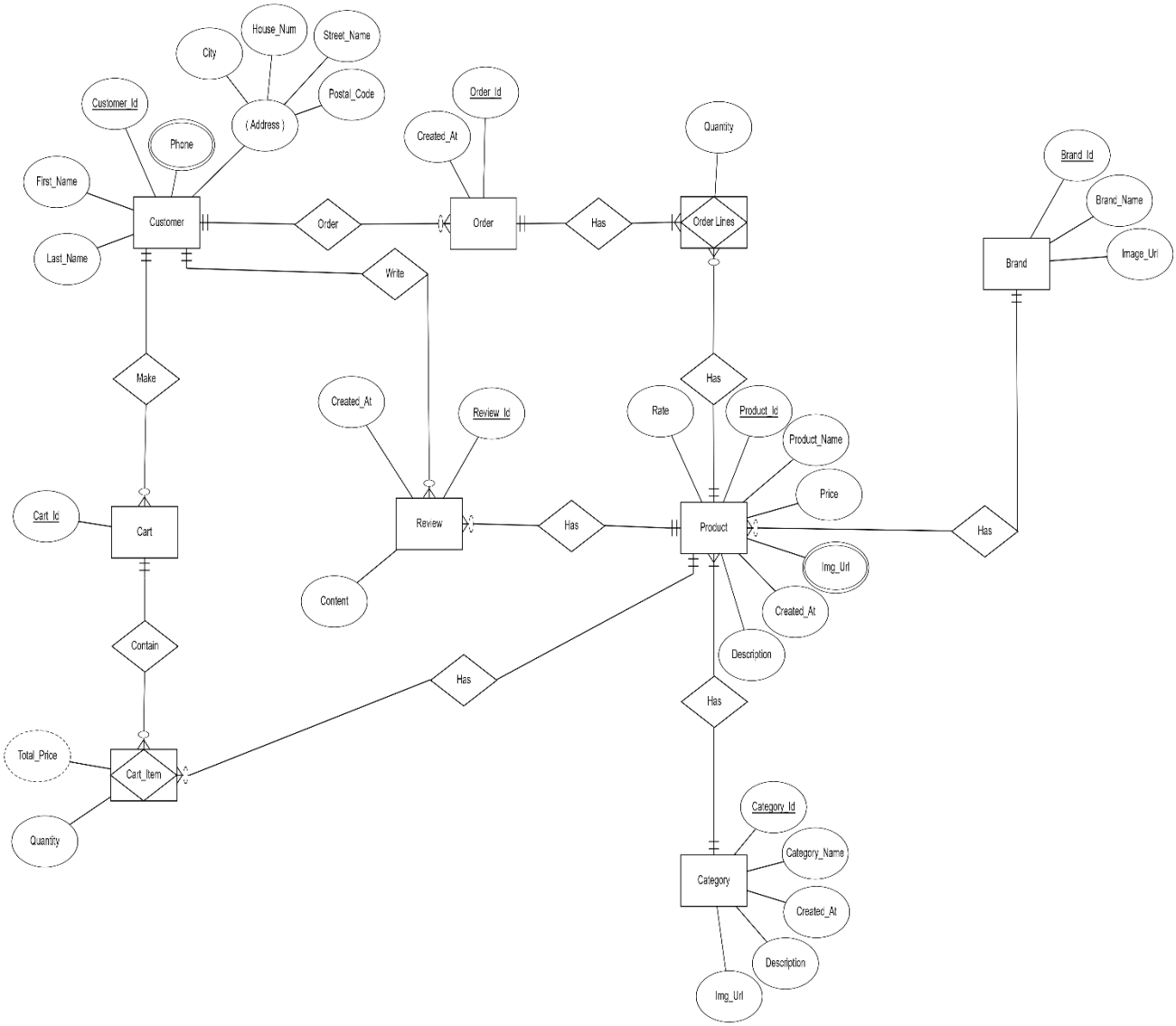
22010018	احمد خليفه عبدالرؤوف محمد	Ecommerce Website & SQL Code
22010037	احمد محمد صابر	SQL Code

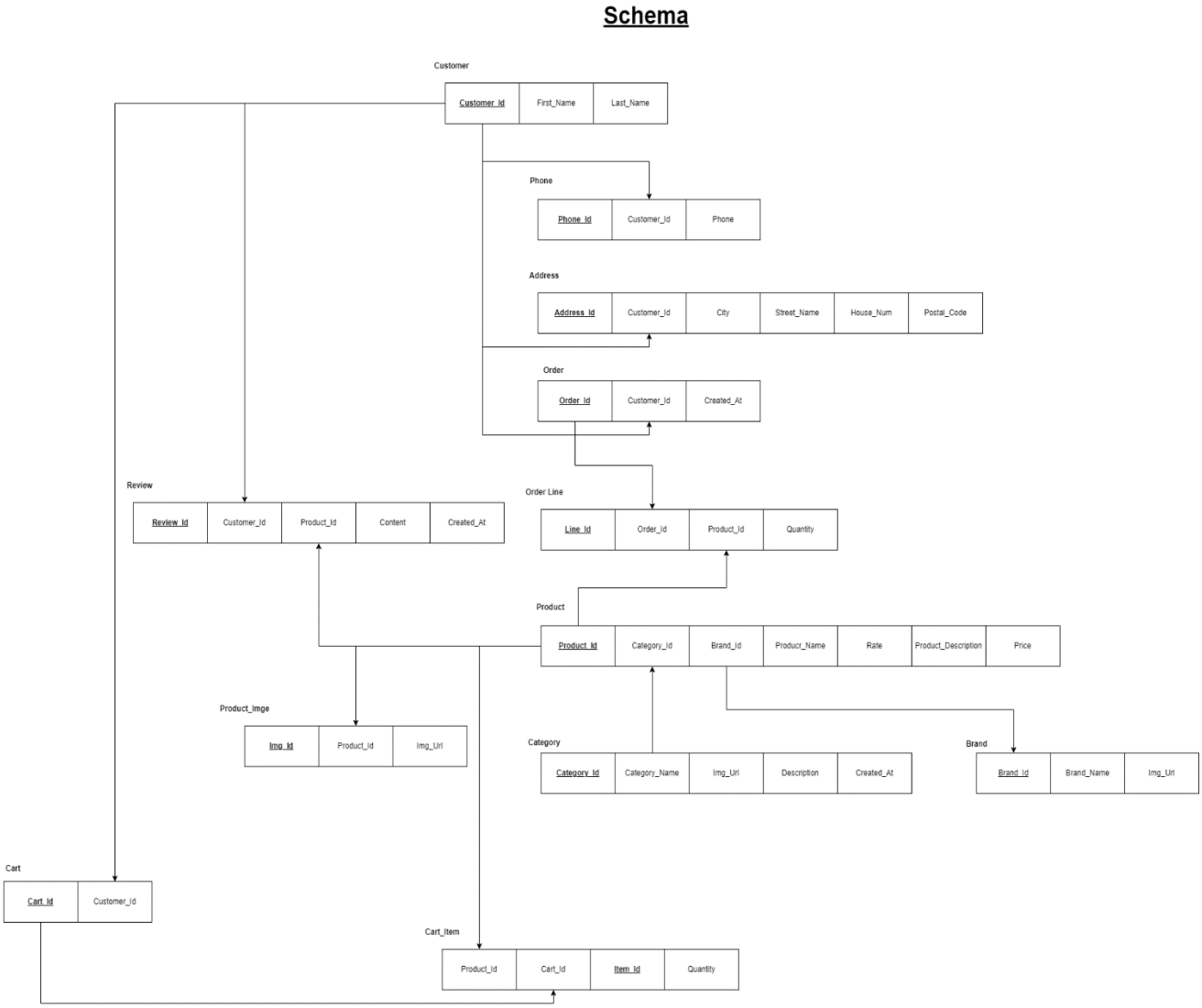
Define Project Business Rules

1- Customer can order one or more order & order must be ordered by one customer.
2- Order must have one or more order line & order lines must be for one order only.
3- Product may have one or more order lines & order lines must be for one product only.
4- Category must have one or more product & the product must be from one category only.
5- Customer can write one or more reviews & reviews must be written by only one customer.
6- Review must have one product & product may have one or more reviews.
7- Customer may make one or more carts & carts must be made by only one customer.
8- Carts may contain one or more cart items & cart item must be in one cart.
9- Cart items must have one product and the product must be a single item in the shopping cart.
10- Brand may have one or more product & product must be from one brand.

Database ERD



Logical Data Model



Normalization

1- Customer Table: we break down the composite attribute “address” into individual attributes and To enhance normalization, reduce redundancy and allow easier management of “address” information; We separate “address” into its own table.

Also we break down “Phone” attribute because we need every cell contain an atomic value so we break down “Phone” attribute to its own table.

2- We break down the relationships between the order-product, the shopping cart -product because they are many to many relationships, and this promotes normalization, avoids redundancy, facilitates querying, and improves data integrity.
3- Product has multivalued attribute “Image” and we break down it because we need every cell contain an atomic value ,avoid redundancy, facilitate querying, and improve data integrity.

Tables:

1- categories
   - Columns:
     - id (primary key, Auto increment)
     - name (Unique, Not Null)
     - description
     - img (Not Null)
2- brands
   - Columns:
     - id (primary key, Auto increment)
     - name (Unique, Not Null)
     - img (Not Null)
3- users
   - Columns:
     - id (primary key, Auto increment)
     - username (Unique, Not Null)
     - email (Not Null)
     - fname (Not Null)
     - lname (Not Null)
     - img (Not Null)
     - password (Not Null)
4- phone
   - Columns:
     - id (primary key, Auto increment)
     - user_id (Foreign Key, Not Null)
     - phone (Not Null)

5- products
    - Columns:
        - id (primary key, Auto increment)
        - name (Not Null)
        - price (Not Null)
        - description (Not Null)
        - rate (Not Null)
        - brand_id (Foreign Key – References brands(id))
        - category_id (Foreign Key – References categories(id))
6- address
    - Columns:
        - id (primary key, Auto increment)
        - user_id (Foreign Key – References users(id))
        - city (Not Null)
        - town (Not Null)
        - street
        - house-num
        - postal_code
7- orders
    - Columns:
        - id (primary key, Auto increment)
        - user_id (Foreign Key – References users(id))
        - created_at (Not Null)
8- carts
    - Columns:
        - id (primary key, Auto increment)
        - user_id (Foreign Key – References users(id))
9- order_line
    - Columns:
        - id (primary key, Auto increment)
        - quantity (Not Null)
        - order_id (Foreign Key – References orders(id))
        - product_id (Foreign Key – References products(id))
10- review
    - Columns:
        - id (primary key, Auto increment)

    - user_id (Foreign Key – References users(id))
    - product_id (Foreign Key – References products(id))
    - content (Not Null)
    - created_at

11-review

- Columns:
    - id (primary key, Auto increment)
    - img (Not Null)
    - product_id (Foreign Key – References products(id))

12-cart_item

- Columns:
    - id (primary key, Auto increment)
    - quantity (Not Null)
    - cart_id (Foreign Key – References carts(id))
    - product_id (Foreign Key – References products(id))

Relationships:

- users.id is referred by phone.user_id , address.user_id, orders.user_id, carts.user_id, review.user_id.
- brands.id is referred by products.brand_id
- categories.id is referred by products.category_id
- products.id is referred by order_line.product_id, review.product_id, product_img.product_id, cart_item.product_id

Additional Notes:

- The database supports an e-commerce system with features like user management, product listings, orders, reviews, and cart management.
- The database is designed to maintain data integrity through foreign key relationships.
- Images for categories, brands, products, and user avatars are stored as file paths in the database.

Executive Summary:

The eCommerce project is a robust and scalable platform developed using Node.js and React, with MySQL serving as the primary database. The project aims to provide a seamless and user-friendly shopping experience while ensuring efficient management of products, orders, and user accounts.

Technologies Used:

Frontend: React.js

Backend: Node.js

Database: MySQL

Project Architecture:

Frontend Architecture:

- Component-based architecture using React.
- Responsive UI with Styled Components.

Backend Architecture:

- RESTful API design with Node.js and Express.
- Secure API endpoints to interact with the database.
- Performance Optimization:
    - Caching mechanisms for frequently accessed data.
    - Image optimization for faster loading times.
    - Asynchronous operations to improve response times.