



DBMS

PROJECT REPORT

GROUP MEMBERS:

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Introduction :

The project involves developing an e-commerce web application for Mina Electric, a wholesaling business located in Karachi Electric Market and running since 1985, specializing in various lighting products. The application aims to provide a user-friendly platform for customers to browse product categories, view details, and place orders. It is a database-driven project designed to manage product inventory, customer orders, and other related functionalities. The system will feature a modern, responsive interface built using React.js for the frontend and Node.js with Express.js for the backend. The database used will be MySQL, and the application will be hosted on Supabase.

Background:

The project is based on a wholesaling business, as mentioned earlier. To maintain a high volume of stock and cash flow, the need arose to transform the business into a database-driven project with an online platform. This platform would enable users to safely purchase their electrical products online, avoiding the haphazard conditions of the city and the inconvenience of traveling. Additionally, small retailers who are unable to visit the wholesale market in person would have the opportunity to place orders online, making the process more efficient and accessible.haphazard

Project Specification:

Functional Requirements

1. Product Management:
Manage product listings, including name, description, price, stock status, and images.
2. User Management:
Registration and login system for customers and business clients (retailers), allowing profile creation and management.
3. Order Management:
Customers can add products to the cart, proceed to checkout, and manage payment and delivery.

4. Search and Filtering:
Search and filter products by categories, price range, etc., to help users find relevant items.
5. Admin Panel:
Admin interface to manage product catalog, orders, and inventory levels. Admin users can add, update, and delete products.

Non-Functional Requirements

1. Security:
Secure login, payment handling, and encryption to protect user data and transactions.
2. Performance:
Optimized for fast load times and smooth interactions.
3. Scalability:
Designed to scale, handling an increasing number of users and products over time.
4. Usability:
Intuitive and user-friendly interface for both customers and admin users.

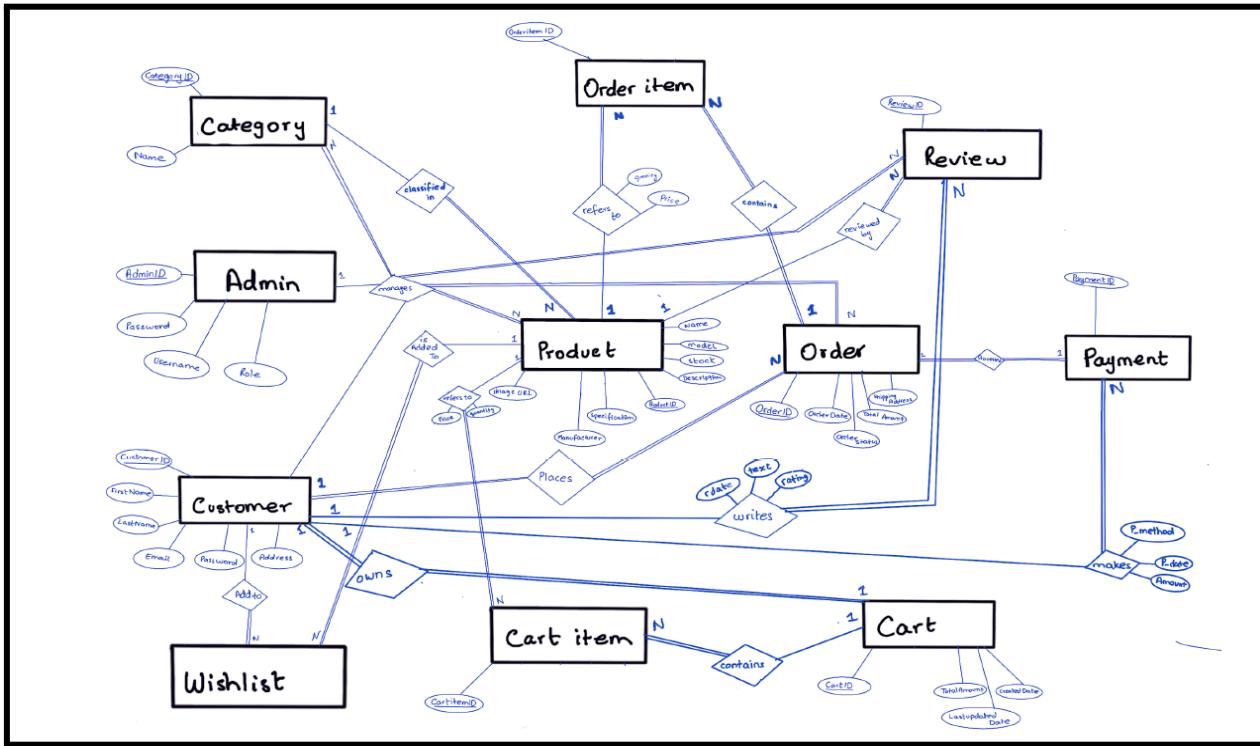
Database Design

1. Normalization Process

The database schema is normalized from 1NF to BCNF to minimize redundancy and ensure efficient relationships between entities.

2. Entity-Relationship Diagram (ERD)

The ERD visually represents the relationships between entities like Products, Users, and Orders.



Problem Analysis:

1. Lack of an Online Presence for Mina Electric:

Mina Electric, a well-established wholesaling business, operates primarily through physical transactions in Karachi Electric Market. However, it lacks an online platform for customers and small retailers to conveniently purchase products, leading to missed sales opportunities, especially in a competitive digital marketplace.

2. Inconvenience of Physical Shopping:

Customers and retailers currently need to physically travel to the market, which is time-consuming and difficult due to traffic and crowded conditions. This creates barriers for customers who may prefer to shop from home or need to place orders quickly.

3. Limited Reach:

The current business model restricts the reach to only those who can visit the market. This limits Mina Electric's potential customer base, particularly among smaller retailers who could benefit from ordering products online without the need to visit the wholesale market.

Solution Design

1. Frontend Design

The frontend of the application is divided into two views:

- **Admin View:** The Admin Dashboard is a centralized management system that enables the administrator to easily manage products, categories, orders, reviews, and customers. Key features include:
 - Product Management: Admins can add, edit, delete, and view products.
 - Category Management: Admins can manage product categories.
 - Order Management: Admins can view and manage orders, update statuses, and view detailed order information.
 - Review Management: Admins can moderate reviews, approve or reject them.
 - Customer Management: Admins can view and manage customer accounts.
- **Customer View:** The customer view provides an easy-to-use interface for customers to interact with the platform. Features include:
 - Registration and Login: Users can create an account, log in, and manage their profile.
 - Product Browsing: Customers can view categories, products, and search/filter products based on their preferences.
 - Wishlist and Cart: Customers can add products to their wishlist and cart, modify quantities, and proceed to checkout.
 - Checkout: After adding products to the cart, users can proceed to checkout, enter shipping details, and make a purchase.
 - Order Confirmation: After completing the order, users are shown the order summary and payment details.

2. Backend Design

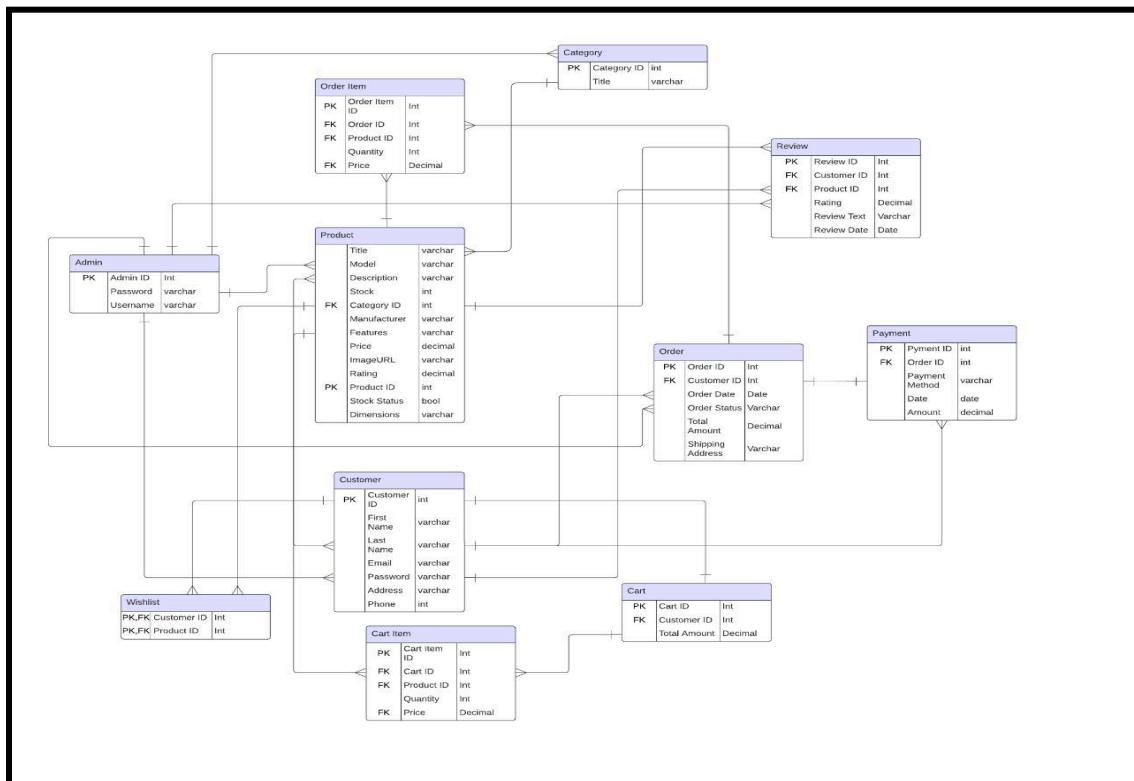
The backend is responsible for handling the business logic, database interactions, and API services for the frontend. The main backend functionalities include:

- Authentication: Using secure login and registration APIs to allow users to log in and access their personal details.
- User Profile Management: APIs for users to view, update, and delete their profiles.
- Product Management: APIs for managing products, including adding, editing, deleting, and retrieving product data.
- Order Management: APIs for placing orders, updating order status, and viewing order history.
- CRUD Operations for Admin: Admins can perform CRUD operations to manage products, categories, orders, reviews, and customers.

Technologies used in the backend include Node.js with Express.js, and database queries are made using SQL. Authentication is handled securely with token-based authentication (JWT).

3. Database Design

1. Schema :



1. Advanced SQL Queries:

- Purpose: Used for complex data retrieval, such as joining related tables or performing aggregation operations.
- Example: Joining OrderItem and Product tables to get product details in an order.

2. Transactions:

- Purpose: Ensures data consistency by grouping multiple operations (e.g., order creation and cart updates) into a single, atomic transaction.
- Example: When an order is placed, both the Cart and Orders tables are updated in a transaction.

3. CRUD Operations:

- Purpose: Provides the ability to create, read, update, and delete records.
- Example: Admins can add or remove products, while customers can update their profiles and place orders.

4. Indexing:

- Purpose: Speeds up the retrieval of data from tables by creating indexes on frequently queried columns (e.g., product name, category).
- Example: Indexes on Product.Title or CategoryID allow faster searches for products by name or category.

5. Foreign Keys & Constraints:

- Purpose: Maintains data integrity by enforcing relationships between tables and ensuring valid data input.
- Example: Foreign keys ensure that an Order references an existing Customer, and OrderItem references an existing Product.

6. Aggregations and Built-in Functions:

- Purpose: Used for calculating sums, averages, or counts, which is essential for reporting and analytics.
- Example: Using SUM() to calculate the total order amount and COUNT() to find the number of reviews for a product and AVG(): Calculates the average rating for a product to show the average customer review rating.

7. User Input Handling:

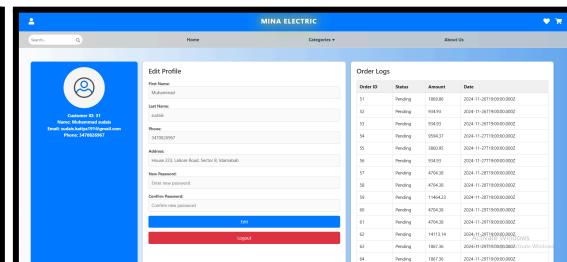
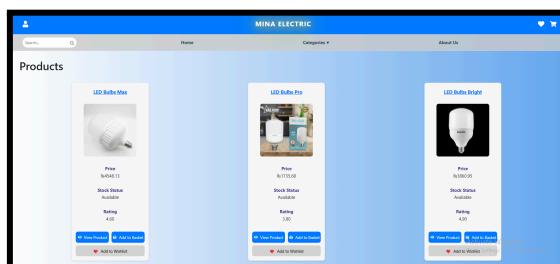
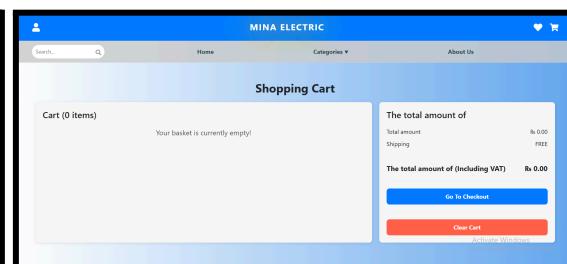
- Purpose: Allows dynamic querying and updating of records based on user inputs, such as search or profile update requests.
- Example: Search queries for products by price range or category, and updating customer information such as address.

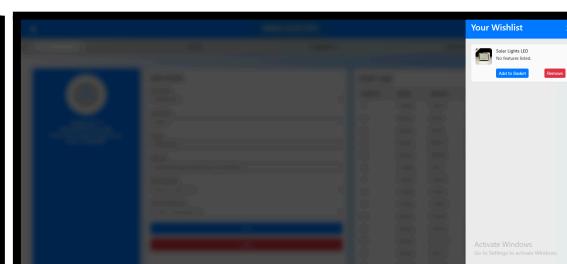
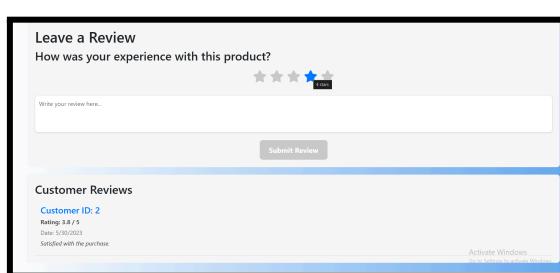
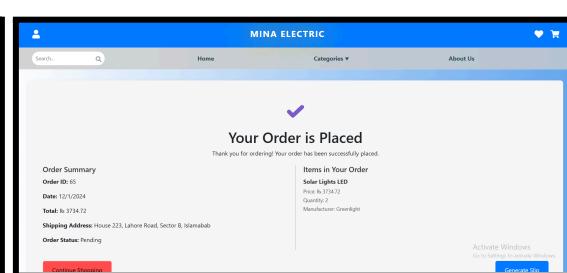
Project Breakdown Structure :

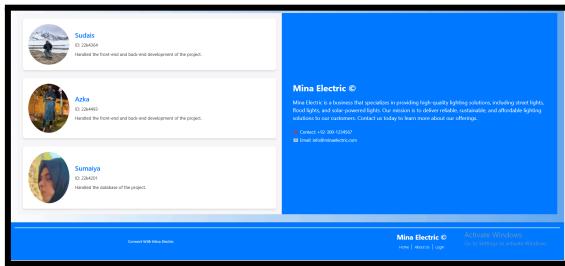
Phase	Task/Subtask	Assigned To	Timeline(Semester weeks)	MileStone
Phase 1: Planning & Design	Gather Requirements	Sudais k224364	Week 4	Requirements Finalized
	Define Technical Specifications	Sumaiya k224201	Week 4	Technical Specs Completed
Phase 2: Database Design	Create Database Schema	Azka k224493	Week 5 - Week 6	Database Setup Completed
	Implement Relationships & Foreign Keys	Azka k224493	Week 5 - Week 6	Schema & Relationships OK
Phase 3: Development	Build User Authentication	Sudais k224364	Week 7 - Week 8	Auth System Developed
	Develop Product Catalog Page	Sudais k224364	Week 7 - Week 8	Catalog Page Live
	Implement Cart & Checkout	Sudais k224364	Week 9 - Week 10	Cart & Checkout Ready
	Develop Admin Management Pages	Azka k224493	Week 9 - Week 10	Admin Pages Developed
Phase 4: Testing	Perform Unit Testing	Sumaiya k224201	Week 11	Unit Testing Complete
	Integration Testing	Sumaiya k224201	Week 12	Integration Complete

Results(screenshots):

Customers View:



Admin View:

Mina Electric Admin Dashboard

Total Products	Total Categories
50	5

Total Orders	Total Customers
50	30

Mina Electric Admin Dashboard

Products

ProductID	Title	Category	Price	Stock	Actions
1	Panel Lights Max	Panel Lights	4704.38	28	<button>Edit</button> <button>Delete</button>
2	Floodlights Smart	Flood Lights	934.93	59	<button>Edit</button> <button>Delete</button>
3	Floodlights Warm	Flood Lights	9594.37	327	<button>Edit</button> <button>Delete</button>
4	Solar Lights Bright	Solar Lights	671.07	233	<button>Edit</button> <button>Delete</button>
5	Street Lights Lite	Street Lights	5753.95	73	<button>Edit</button> <button>Delete</button>
6	Solar Lights LED	Solar Lights	1887.36	251	<button>Edit</button> <button>Delete</button>

Add New Product

Edit Product

Categories

CategoryID	Category Name	Actions
1	Solar Lights	<button>Edit</button> <button>Delete</button>
2	Flood Lights	<button>Edit</button> <button>Delete</button>
3	LED Bulbs	<button>Edit</button> <button>Delete</button>
4	Panel Lights	<button>Edit</button> <button>Delete</button>
5	Street Lights	<button>Edit</button> <button>Delete</button>

Add New Category

Category Name

The dashboard features a sidebar with navigation links: Dashboard, Products, Categories, Orders, Customers, and Reviews. The main content area is divided into three sections:

- Orders**: A table showing OrderID, Customer ID, Total Amount, Order Date, Status, Actions, and Items. Data includes:

OrderID	Customer ID	Total Amount	Order Date	Status	Actions	Items
1	18	57067.61	6/15/2023	Shipped	Cancelled	Show Items
2	5	31227.71	12/5/2022	Shipped	Cancelled	Show Items
3	12	41513.23	3/20/2023	Pending	Pending	Show Items
4	25	37488.86	9/11/2022	Cancelled	Cancelled	Show Items
5	8	42395.11	1/27/2023	Delivered	Delivered	Show Items
6	7	36079.23	11/22/2022	Shipped	Shipped	Show Items
7	15	10447.14	4/16/2023	Refunded	Refunded	Show Items
- Customers**: A table showing CustomerID, First Name, Last Name, Email, Address, and Phone. Data includes:

CustomerID	First Name	Last Name	Email	Address	Phone
1	Muhammad	Sherikh	customer1@gmail.com	House 223, Lahore Road, Sector B, Islamabad	3470826967
2	Zain	Faiq	customer2@gmail.com	House 101, Lahore Road, Area 7, Quetta	3268907744
3	Rubab	Iqbal	customer3@gmail.com	House 486, Greenwood Lane, Defence Phase 3, Peshawar	3051253114
4	Zara	Iqbal	customer4@gmail.com	House 386, Greenwood Lane, Sector 5, Sialkot	314117965
5	Zain	Sherikh	customer5@gmail.com	House 44, Lahore Road, Sector 5, Peshawar	3489096981
6	Hassan	Iqbal	customer6@gmail.com	House 436, Saddar Avenue, Phase 2, Karachi	3325417649
7	Zain	Hussain	customer7@gmail.com	House 272, Gulshan-e-Iqbal, Sector 5, Faisalabad	305863823
8	Usman	Faiq	customer8@gmail.com	House 344, F-11 Markaz, Block A, Peshawar	3282027867
- Reviews**: A table showing ReviewID, Customer Name, Product Name, Rating, Comment, Date, and Actions. Data includes:

ReviewID	Customer Name	Product Name	Rating	Comment	Date	Actions
1	Zahid	Street Lights Max	4.7	Amazing product quality and features.	4/10/2023	Delete
2	Rubab	Floodlights Smart	3.5	Decent product but overpriced.	6/15/2023	Delete
3	Zain	Solar Lights Bright	4.2	Very satisfied with the purchase.	1/19/2022	Delete
4	Hassan	Floodlights Party	5.0	Absolutely love it! Highly recommended.	2/14/2023	Delete
5	Rubab	Panel Lights Lite	2.3	Not happy with the durability.	3/1/2023	Delete
6	Zahid	Solar Lights Max	4.0	Good value for money.	7/4/2023	Delete
7	Zain	Solar Lights Max	3.8	Features are okay but could be improved.	1/12/2023	Delete

Conclusion (Summary & Discussion):

This project presents a robust and efficient e-commerce database design that effectively supports the various functionalities required for managing an online shopping platform. The design focuses on key entities such as users, products, orders, reviews, and payments, with their relationships clearly defined through foreign keys and appropriate normalization to ensure data consistency and integrity.