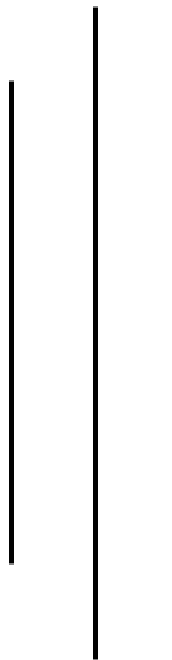




**TRIBHUVAN UNIVERSITY  
INSTITUTE OF ENGINEERING  
PULCHOWK CAMPUS**



**DBMS PROJECT ON E-COMMERCE WEBSITE**

**Submitted By:**

Arjun Ray (077BEI011)

Manish Kumar Yadav (077BEI022)

Rhythm Pantha (077BEI033)

**Submitted To: Department of Electronics And Computer Engineering**

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## 1. Acknowledgment

We would like to express our deepest gratitude and sincere appreciation to all those who supported and contributed to the successful completion of this Database Management System project.

First and foremost, We extend our heartfelt thanks to Mrs. **Bibha Sthapit**, for her valuable guidance, unwavering support, and expert insights throughout the duration of this project. Her mentorship played a pivotal role in shaping the direction of this work.

We are also immensely thankful to our friends and classmates who provided valuable feedback, engaged in insightful discussions, and offered their encouragement during the development and testing phases of the project. Your collaborative spirit was instrumental in refining the project and making it more robust.

Thank you all for your contributions, support, and belief in this project. Your involvement has made this endeavor truly rewarding.

## **2. Abstract:**

This project outlines the development of a straightforward yet functional e-commerce website utilizing HTML, CSS, Flask, and MySQL. The primary objective of this project is to create a user-friendly platform that facilitates product browsing, selection, and ordering across various categories.

The user interface is crafted using HTML and CSS, focusing on simplicity and ease of navigation. Although the website may not boast intricate responsive features, it ensures a functional experience across standard screen sizes. Basic CSS styling maintains a coherent and visually pleasant layout throughout the site.

Flask, a lightweight Python web framework, is employed to manage server-side operations. Users can explore distinct sections, such as fashion and sports, view product details, and place orders. The limited feature set is intended to serve as an introduction to e-commerce operations and web application development.

The project utilizes MySQL for fundamental data storage and retrieval operations. Product information is stored in the database, allowing users to browse and select items. While the system doesn't incorporate advanced order tracking, it demonstrates the process of linking user actions to database operations.

In terms of security, basic practices such as user input validation and data sanitization are implemented to mitigate common vulnerabilities. While the emphasis on security is minimal, the project introduces students to essential security considerations when developing web applications.

To summarize, this e-commerce website project provides a stepping stone for learners to grasp the fundamental concepts of web development, database integration, and user interaction. By incorporating HTML, CSS, Flask, and MySQL, this project delivers hands-on experience in constructing a simple e-commerce platform, enabling users to explore products across categories and place orders while introducing them to the basics of responsive design and basic security practices.

### **3. Introduction:**

The purpose of this project is to design and develop an E-commerce website that integrates various technologies, including a relational database management system (DBMS) using MySQL, front-end development with HTML and CSS, and a back-end server using Flask. The project aims to create a functional and user-friendly online shopping platform where users can browse, search, add items to their cart, make purchases, and manage their accounts.

### **4. Problem Statement:**

Design and implement an E-commerce website that utilizes a DBMS to create a feature-rich online shopping platform. The system should encompass user registration, product catalog management, cart handling, order processing, and user account management. The project should demonstrate the effective integration of MySQL, HTML, CSS, and Flask to build an interactive website that addresses the following challenges:

#### **4.1 Database Design and Management:**

Develop a well-structured database schema using MySQL to efficiently manage user data, product information, cart contents, and order history. Ensure data consistency, integrity, and security through appropriate data normalization and indexing strategies.

#### **4.2 User Registration and Authentication:**

Implement a secure user registration and authentication system. Store user credentials securely in the database using encryption techniques to safeguard sensitive information.

#### **4.3 Product Catalog Management:**

Create a dynamic product catalog that allows administrators to add, edit, and remove products. Design a user-friendly interface for users to browse and search for products based on categories, keywords, and attributes.

#### **4.4 Cart Management:**

Develop a mechanism for users to add products to their shopping carts, view cart contents, and modify quantities. Ensure that cart data is accurately maintained in the database and accessible across sessions.

#### 4.5 Order Processing:

Design an order processing system that enables users to checkout, create orders. Implement features such as order tracking, status updates, and generating invoices.

### 5. Objectives

The main objectives of this project are as follows:

- **Structured Database Schema:** Develop a well-organized MySQL database schema to efficiently manage user details, products, carts, and orders, focusing on data integrity through normalization and indexing.
- **Basic User Authentication:** Implement a simple user registration and authentication system, securely storing user information and allowing authorized access.
- **Product Catalog Handling:** Design an interface for administrators to manage products, and enable users to explore products by categories. While responsiveness isn't a priority, ensure a functional experience.
- **Straightforward Cart Handling:** Create a user-friendly cart system for adding, modifying, and removing products, storing cart data in the database for consistency.
- **Minimalist Order Processing:** Develop an uncomplicated order processing system, enabling users to place orders and administrators to manage order statuses.
- **Functional UI Design:** Utilize HTML, CSS, and Flask to create a basic yet interactive e-commerce platform, with an emphasis on functionality rather than responsiveness.

## **6. Technologies Used:**

MySQL: Used for creating and managing the database schema that stores user data, product information, cart details, and order history.

HTML and CSS: Utilized for designing the front-end user interface, including layout, styling, and interactive components.

Flask: Employed as the backend framework to handle user requests, process data, interact with the database, and render HTML templates.

Python: Used in conjunction with Flask for server-side programming and integrating the back-end with the front-end.

## **7. System Architecture:**

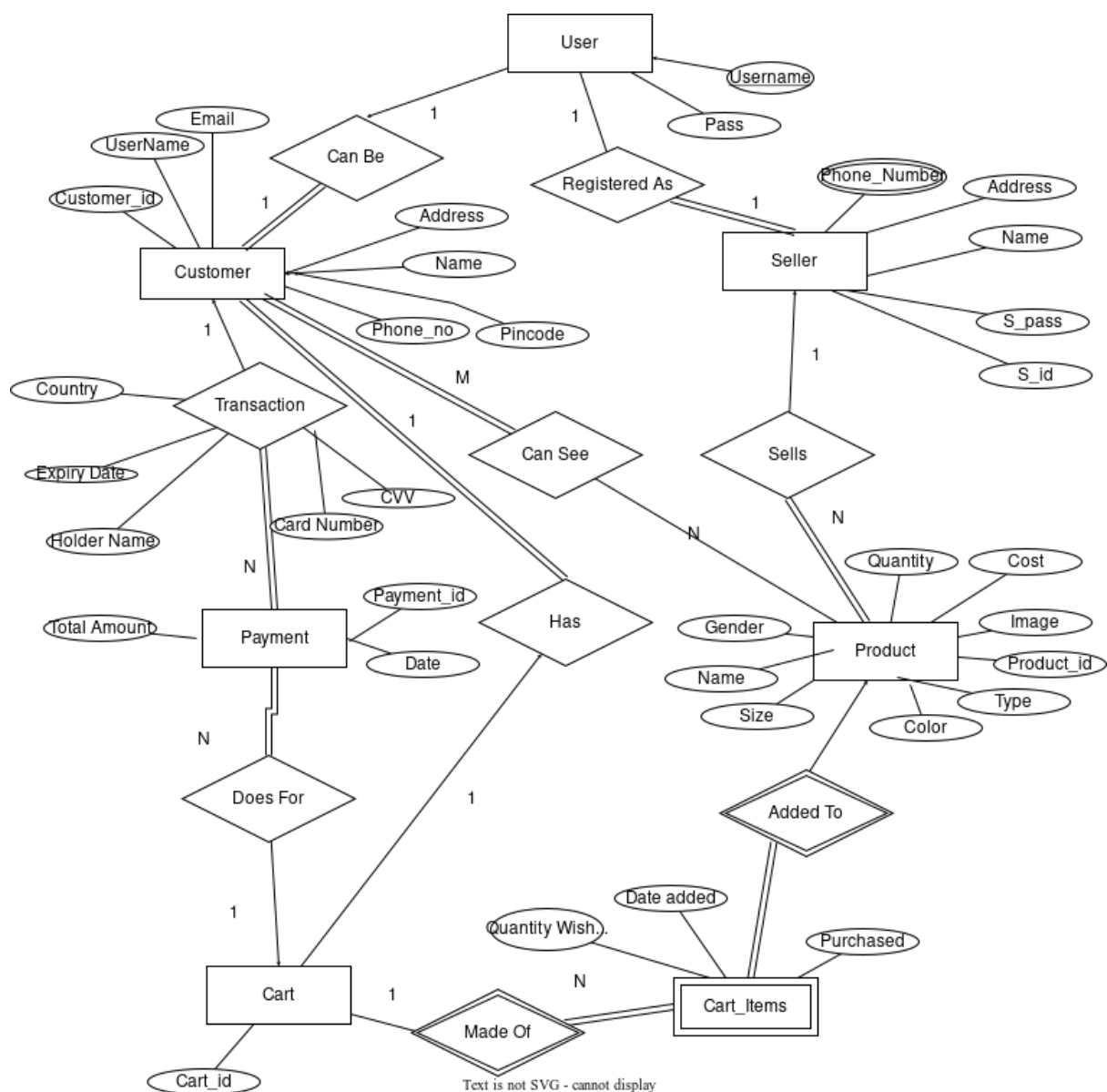
The system follows a client-server architecture. Users interact with the website's front-end through a web browser. The Flask application on the server processes user requests, communicates with the MySQL database, and serves dynamic HTML content to the client.

## 8. Database Design

The foundational aspects of our database design, including the Entity-Relationship (ER) diagram that depicts the logical structure of our relational database and the process of data normalization.

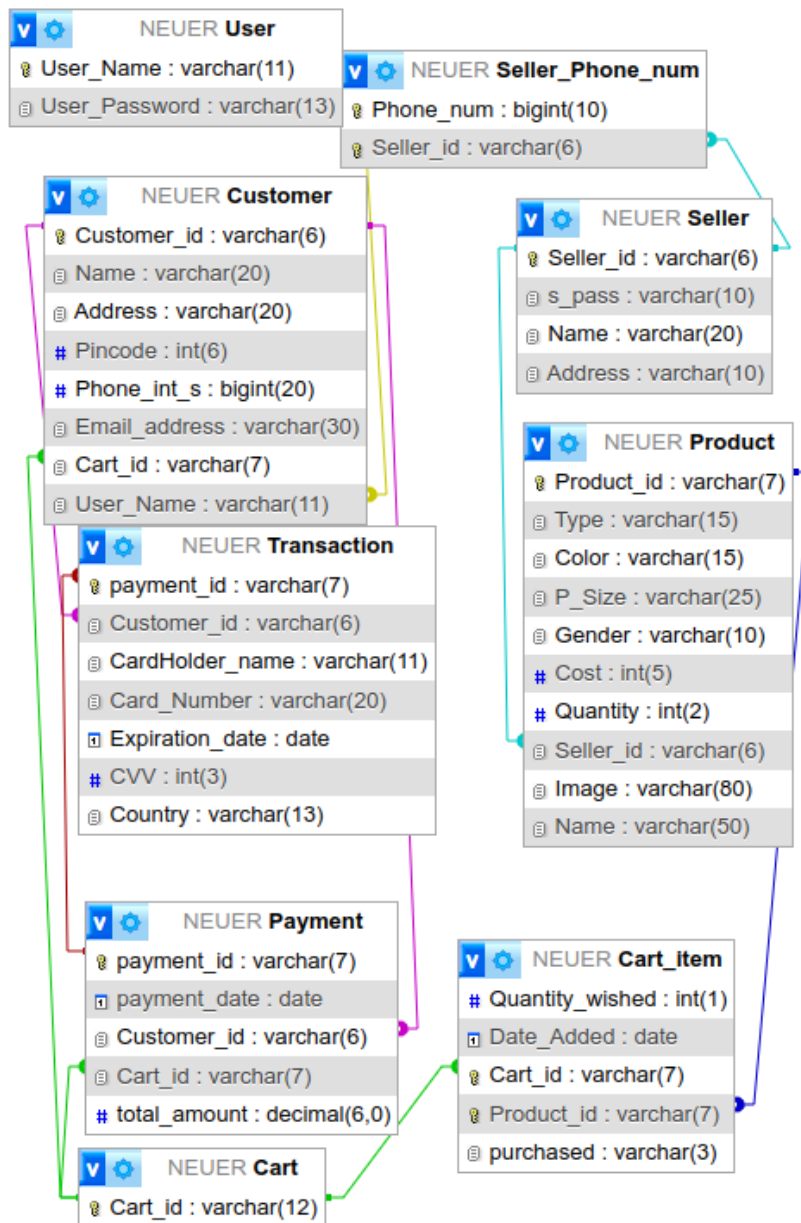
### 8.1 Entity-Relationship (ER) Diagram

The ER diagram visually represents the entities, relationships, and attributes within our database system. It serves as a crucial tool for understanding the data organization and flow within our E-commerce platform. Below is the ER diagram showcasing the key entities and their relationships:





## 8.2 Relationship model



### 8.3 Data normalization

In the context of our database design, all tables except for the "Customer" table have been appropriately normalized. Currently, the "Customer" table exists in the Second Normal Form (2NF), and our aim is to elevate it to the Third Normal Form (3NF) to ensure data integrity and structure. Notably, the "Customer" table demonstrates the absence of partial dependencies, thereby aligning with the principles of the Second Normal Form.

For this normalization process, the following attributes have been identified as candidate keys: `customer_id`, `cart_id`, and `username`. These attributes collectively possess the unique identification capability required by the table.

Among these attributes, `customer_id`, `username`, and `cart_id` are prime attributes. They contribute to the determination of the table's uniqueness and play a pivotal role in the identification process.

In contrast, the attributes `name`, `address`, `phone`, `pincode`, and `email` are non-prime attributes. While crucial, they are not part of the candidate keys and do not directly contribute to the unique identification of tuples.

By scrutinizing and addressing transitive dependencies, the "Customer" table has been successfully normalized to the Third Normal Form (3NF). This ensures a structured and organized database.

The figure illustrates the ideal decomposition of the "Customer" table in its Third Normal Form (3NF):

#### Attributes

Pincode Address

#### Functional Dependencies

Pincode → Address

#### Attributes

Email Name

#### Functional Dependencies

Email → Name

#### Attributes

Customer\_id Pincode Phone Cart\_id UserName Email

#### Functional Dependencies

Cart\_id → UserName

UserName → Cart\_id Email Pincode Customer\_id Phone

Customer\_id → UserName

## 9. Functions And Triggers

Routine name	<input type="text" value="numCartId"/>		
Type	FUNCTION ▾		
	<b>Name</b>	<b>Type</b>	<b>Length/Values</b>
Parameters	⬆ <input type="text" value="cd"/>	VARCHAR ▾	10
	<b>Add parameter</b>		
Return type	INT ▾		
Return length/values	<input type="text" value="11"/>		
Return options	▾		
Definition	<pre>1 BEGIN 2   DECLARE total INT DEFAULT 0; 3 4   SELECT COUNT(*) INTO total 5   FROM Cart_item 6   WHERE Cart_id = cd; 7 8   RETURN total; 9 END</pre>		

<b>Details</b>			
Routine name	<input type="text" value="total_cost"/>		
Type	FUNCTION ▾		
	<b>Name</b>	<b>Type</b>	<b>Length/Value:</b>
Parameters	⬆ <input type="text" value="cId"/>	VARCHAR ▾	10
	<b>Add parameter</b>		
Return type	INT ▾		
Return length/values	<input type="text" value="11"/>		
Return options	▾		
Definition	<pre>1 BEGIN 2   DECLARE total INT DEFAULT 0; 3 4   SELECT SUM(cost) INTO total 5   FROM Product 6   JOIN Cart_item ON Product.Product_id = Cart_item.Product_id 7   WHERE Cart_item.Cart_id = cId; 8 9   RETURN total; 10 END</pre>		

**Details**

Trigger name

before\_customer

Table

customer

Time

BEFORE

Event

INSERT

Definition

```
1 BEGIN
2   DECLARE c VARCHAR(10);
3   DECLARE n INT;
4
5   SET c = NEW.Cart_id;
6   SET n = numCartId(c);
7
8   IF n > 0 THEN
9     SIGNAL SQLSTATE '45000' SET MESSAGE_TEXT = 'Sorry';
10  END IF;
11
12  INSERT INTO Cart VALUES (c);
13 END
```

Definer

root@localhost

**Edit**

**Details**

Trigger name

before\_pay\_up

Table

payment

Time

BEFORE


Event

INSERT

```
1 BEGIN
2   SET new.total_amount= total_cost(new.Cart_id);
3 END
```

## 10. Results

### - Registration And Login



### Register

**Username:**

**Password:**

**Name:**


**Address:**

**Pincode:**

**Phone:**

**Email:**

[Back to Login](#)



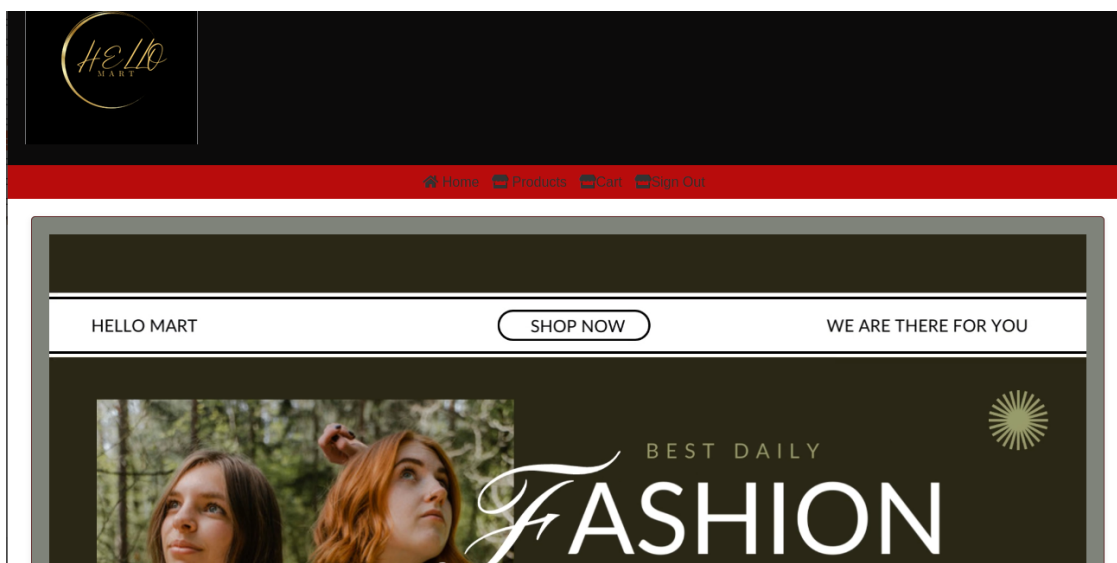
### Login

**User ID:**

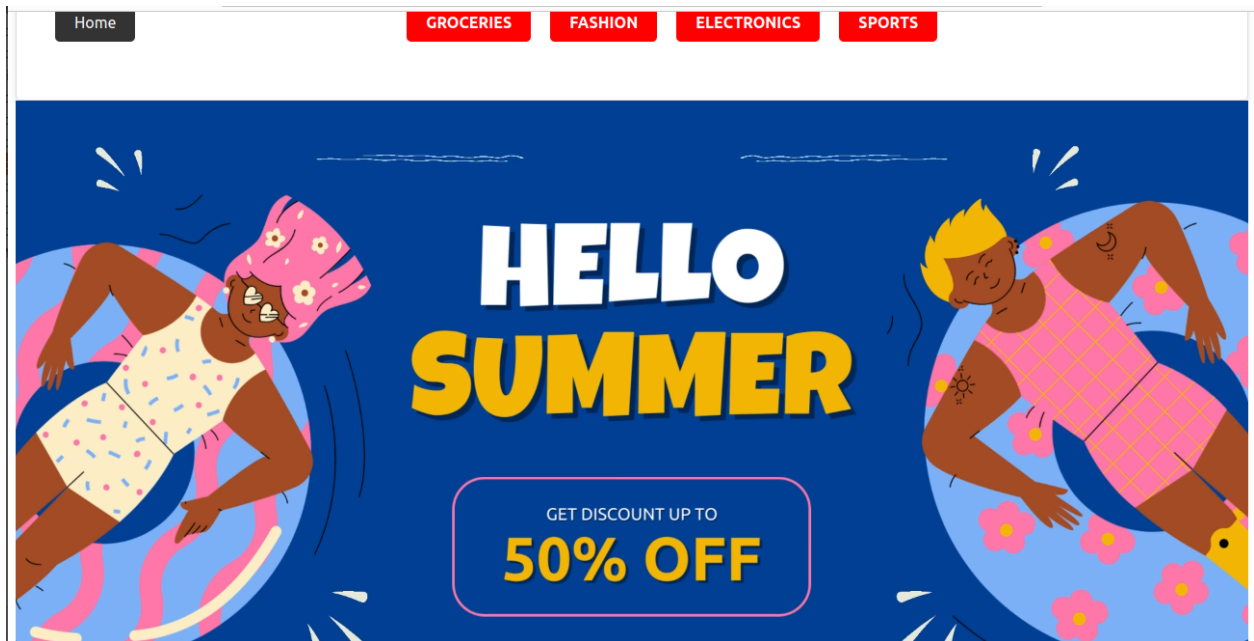
**Password:**

**New User?**  
Create an account to join our Family.  
[Register here](#)

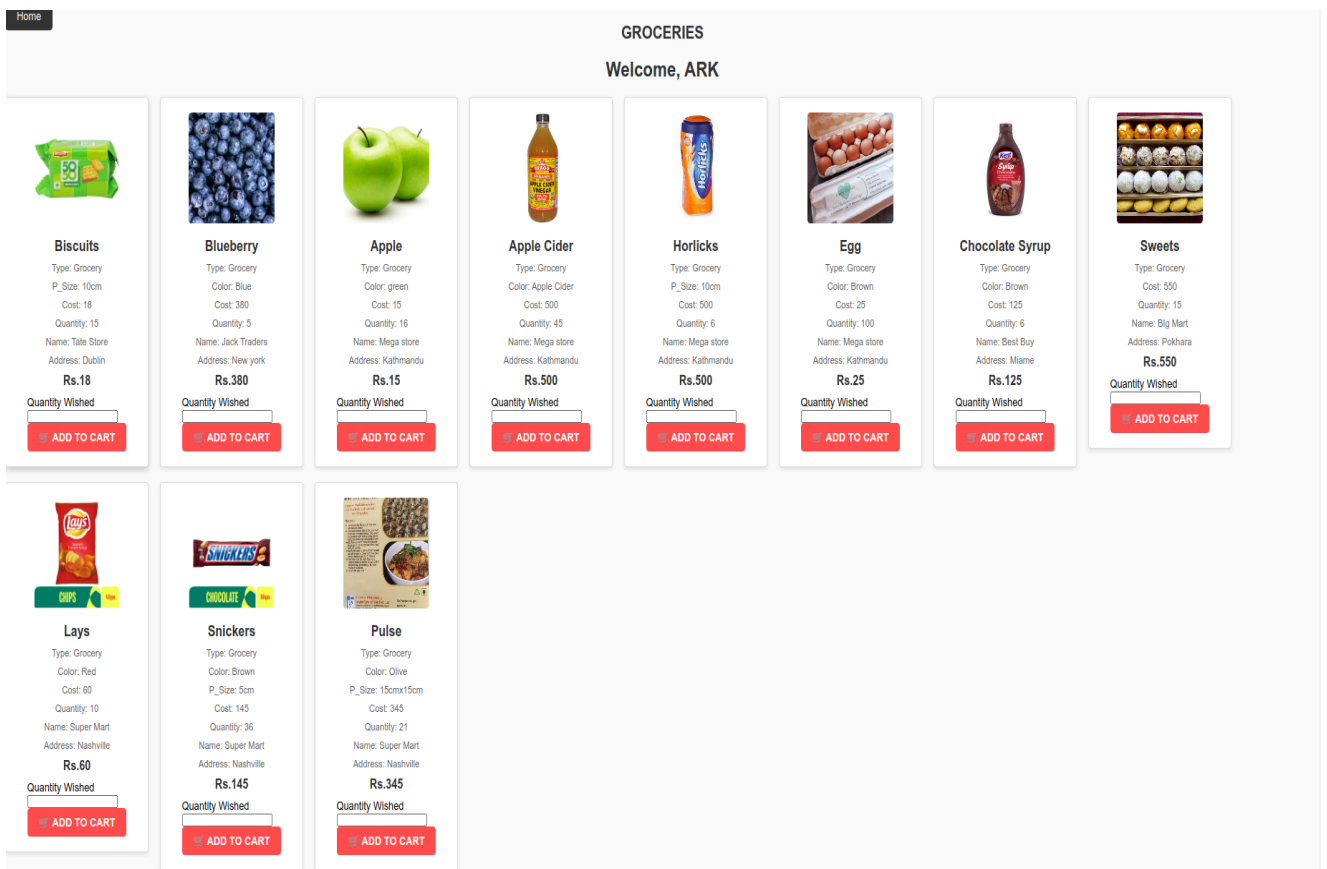
### - Homepage



## - Product page with various categories



## - Inside Various Categories



FASHION  
Welcome, ARK**Bag**

Type: Fashion  
Color: Red  
P\_Size: 45 litres  
Gender: Male  
Cost: 3210  
Quantity: 2  
Name: Oliz Store  
Address: New Road

**Rs.3210**

Quantity Wishd

ADD TO CART

**Suit**

Type: Fashion  
Color: Black  
P\_Size: Large  
Gender: Male  
Cost: 19000  
Quantity: 8  
Name: Tate Store  
Address: Dublin

**Rs.19000**

Quantity Wishd

ADD TO CART

**Daura Suruwal**

Type: Fashion  
Color: Olive  
P\_Size: Medium  
Gender: Male  
Cost: 3200  
Quantity: 1  
Name: G Mail  
Address: Koteswior

**Rs.3200**

Quantity Wishd

ADD TO CART

**Jacket**

Type: Fashion  
Color: Red  
P\_Size: 32  
Gender: Male  
Cost: 2200  
Quantity: 6  
Name: G Mail  
Address: Koteswior

**Rs.2200**

Quantity Wishd

ADD TO CART

**Hoodie**

Type: Fashion  
P\_Size: Medium  
Gender: Male  
Cost: 1300  
Quantity: 3  
Name: G Mail  
Address: Koteswior

**Rs.1300**

Quantity Wishd

ADD TO CART

**Shirt**

Type: Fashion  
Color: Red  
P\_Size: 42  
Gender: Female  
Cost: 950  
Quantity: 3  
Name: Ghatghatani  
Address: Paris

**Rs.950**

Quantity Wishd

ADD TO CART

**Shawl**

Type: Fashion  
Color: Black  
Gender: Female  
Cost: 1050  
Quantity: 2  
Name: Ghatghatani  
Address: Paris

**Rs.1050**

Quantity Wishd

ADD TO CART

**Jeans**

Type: Fashion  
Color: Sky  
P\_Size: 23  
Gender: Male  
Cost: 1100  
Quantity: 4  
Name: Ghatghatani  
Address: Paris

**Rs.1100**

Quantity Wishd

ADD TO CART

**Gloves**

Type: Fashion  
P\_Size: Small  
Gender: Male  
Cost: 320  
Quantity: 8  
Name: Universal  
Address: Berlin

**Rs.320**

Quantity Wishd

ADD TO CART

SPORTS  
Welcome, ARK**Football**

Type: Sports  
Color: White  
Gender: Male  
Cost: 300  
Quantity: 29  
Name: Oliz Store  
Address: New Road

**Rs.300**

Quantity Wishd

ADD TO CART

**Keeping Gloves**

Type: Sports  
Color: Green  
Cost: 450  
Quantity: 44  
Name: Tate Store  
Address: Dublin

**Rs.450**

Quantity Wishd

ADD TO CART

**Helmet**

Type: Sports  
Color: Green  
Gender: Female  
Cost: 1400  
Quantity: 9  
Name: G Mail  
Address: Koteswior

**Rs.1400**

Quantity Wishd

ADD TO CART

**Shuttle**

Type: Sports  
Color: Green  
P\_Size: 6cm  
Cost: 25  
Quantity: 100  
Name: Jack Traders  
Address: New york

**Rs.25**

Quantity Wishd

ADD TO CART

**Punching Bag**

Type: Sports  
Color: Black  
P\_Size: 1m  
Gender: Male  
Cost: 4000  
Quantity: 8  
Name: Ghatghatani  
Address: Paris

**Rs.4000**

Quantity Wishd

ADD TO CART

**Tennis Ball**

Type: Sports  
Color: Green  
P\_Size: 4cm  
Cost: 80  
Quantity: 17  
Name: Mega store  
Address: Kathmandu

**Rs.80**

Quantity Wishd

ADD TO CART

**Bicycle**

Type: Sports  
Color: Black  
P\_Size: 2mX1m  
Gender: Male  
Cost: 15000  
Quantity: 3  
Name: Best Buy  
Address: Mame

**Rs.15000**

Quantity Wishd

ADD TO CART

**Air Pump**

Type: Sports  
Color: Black  
P\_Size: 14cm  
Cost: 390  
Quantity: 25  
Name: Super Mart  
Address: Nashville

**Rs.390**

Quantity Wishd

ADD TO CART

**Racket**

Type: Sports  
Color: Blue  
Gender: Female  
Cost: 999  
Quantity: 22  
Name: Universal  
Address: Berlin

**Rs.999**


Quantity Wishd

ADD TO CART




Home


ELECTRONICS  
Welcome, ARK




**Mobile**  
Type: Electronics  
Color: Black  
P\_Size: 6.1  
Cost: 150000  
Quantity: 1  
Name: Oliz Store  
Address: New Road  
**Rs.150000**  
Quantity Wishd  
ADD TO CART




**Camera**  
Type: Electronics  
Color: Black  
Cost: 122000  
Quantity: 4  
Name: Oliz Store  
Address: New Road  
**Rs.122000**  
Quantity Wishd  
ADD TO CART




**TV**  
Type: Electronics  
Color: White  
P\_Size: 54  
Cost: 50000  
Quantity: 2  
Name: Tale Store  
Address: Dublin  
**Rs.50000**  
Quantity Wishd  
ADD TO CART




**Laptop.jpg**  
Type: Electronics  
Color: Grey  
P\_Size: 35"  
Cost: 45000  
Quantity: 1  
Name: Tale Store  
Address: Dublin  
**Rs.45000**  
Quantity Wishd  
ADD TO CART



**Tablet**  
Type: Electronics  
Color: Blue  
P\_Size: 7.7  
Cost: 19000  
Quantity: 7  
Name: Tale Store  
Address: Dublin  
**Rs.19000**  
Quantity Wishd  
ADD TO CART



**Speaker**  
Type: Electronics  
Color: Black  
P\_Size: 10cm  
Cost: 3500  
Quantity: 3  
Name: Ghatghateni  
Address: Paris  
**Rs.3500**  
Quantity Wishd  
ADD TO CART




**Watch**  
Type: Electronics  
Color: Black  
P\_Size: 5cm  
Gender: Male  
Cost: 1600  
Quantity: 15  
Name: Best Buy  
Address: Miami  
**Rs.1600**  
Quantity Wishd  
ADD TO CART

Enjoy Shopping


## - My Cart

Home

MY CART  
Welcome, ARK



**TV**  
Type: Electronics  
Color: White  
P\_Size: 54  
Cost: 50000  
Quantity Ordered: 1  
**Rs.50000**



**Shirt**  
Type: Fashion  
Color: Red  
P\_Size: 42  
Gender: Female  
Cost: 950  
Quantity Ordered: 1  
**Rs.950**

TOTAL: 50950

Enjoy Shopping

## - Payment Process

YOUR PAYMENT

Cardholder Name

Andrew Tate

Card Number

4232 9618 8399 1847

Expiration Date

2028-05-22

CVV

517

Country

Nepal

Submit Payment

Enjoy Shopping

## **11. Conclusion**

The successful combination of a strong database system and a stylish design for the website's front part that works in the background led to the creation of our E-commerce website. People can easily move around our website, look at products, put things they like into their shopping carts, and smoothly finish their purchases. The teamwork involving MySQL, HTML, CSS, and Flask played a really important role in making the website interactive and user-focused.

## **12. Limitations and Future Enhancements**

### **12.1 Limitations:**

**Scalability:** As our user base and product offerings grow, the current system might face challenges in efficiently handling a large number of concurrent users and products. This could lead to performance issues and slower response times.

**Security:** While the basic security measures are in place, the website could benefit from additional layers of security to protect user data and prevent unauthorized access. Implementing features like secure user authentication and encrypted communication could enhance the overall security posture.

**Responsiveness:** The website's user interface is not fully responsive across all devices and screen sizes. Users may encounter difficulties in navigating and interacting with the website on smaller screens such as mobile devices and tablets.

### **12.2 Future Enhancements:**

**Scalability:** To address scalability concerns, we plan to explore techniques such as load balancing and cloud-based hosting. These measures will allow the website to handle increased traffic and provide a smooth experience to users even during peak usage.

**Enhanced Security:** We intend to implement advanced security practices, including two-factor authentication, data encryption, and regular security audits. This will bolster user trust and protect sensitive information from potential threats.

**Responsive Design:** The user experience will be significantly improved by implementing responsive design principles. This will ensure that the website

adapts seamlessly to different devices and screen sizes, providing a consistent and user-friendly experience.

**Payment Options:** Introducing a wider range of payment options, including digital wallets and various credit/debit cards, will offer users more flexibility during the checkout process, potentially increasing conversion rates.

**User Analytics:** Incorporating analytics tools will provide insights into user behavior, preferences, and patterns. This information will be invaluable in refining the user experience and making data-driven decisions for business growth.

**Personalization:** We plan to implement personalized product recommendations based on user browsing and purchasing history. This feature will enhance user engagement and drive sales by suggesting products tailored to individual preferences.

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