1. Introduction

1.1 Project Overview

ShopEZ is a user-friendly E-Commerce web application developed using the MERN Stack (MongoDB, Express.js, React.js, Node.js). The platform allows users to register via email and password, browse products, manage their cart, and place orders. A unique aspect of ShopEZ is the manual admin-based user confirmation, which adds an extra layer of control and security.

The application is designed to deliver a smooth shopping experience while being scalable and modular. It focuses on essential e-commerce features including product listings, filtering, order placement, and basic user account management — all within a modern, responsive interface.

1.2 Purpose

The primary purpose of ShopEZ is to provide a simplified, secure, and intuitive online shopping platform. It aims to:

- Offer customers a seamless way to explore and purchase products.
- Give administrators control over user verification and product management.
- Create a base platform that can be extended with advanced features like reviews, payment gateways, and tracking systems.
- Serve as a full-stack project for understanding practical implementation of authentication, CRUD operations, and user interactions in the MERN stack.

2. Ideation Phase

2.1 Problem Statement

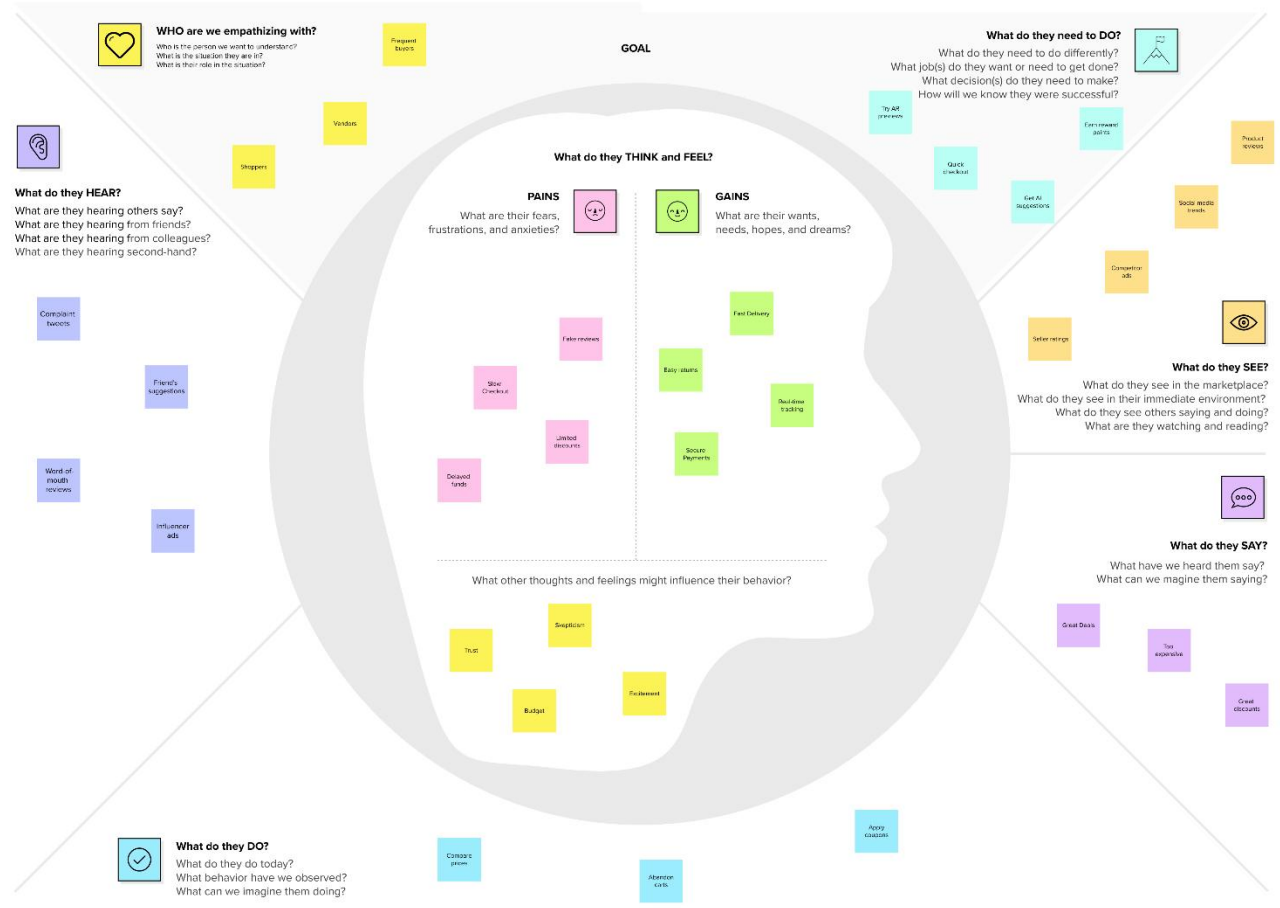
In today's digital age, users expect fast, secure, and convenient online shopping experiences. However, many small-scale e-commerce platforms struggle to offer a streamlined user experience, leading to issues such as complicated registration processes, poor navigation, limited product discovery, and lack of admin control over user access.

- There is a need for a scalable e-commerce platform that:
- Simplifies the product browsing and purchasing process for customers.
- Ensures only verified users gain access to key functionalities through manual admin confirmation.
- Provides a clean and responsive UI for seamless shopping on both desktop and mobile.
- Allows for easy management of products, users, and orders through an intuitive backend.
- ShopEZ aims to address these gaps by offering a minimal yet robust e-commerce solution built with modern web technologies (MERN Stack), focusing on usability, performance, and security from both user and admin perspectives.

2.2 Empathy Map Canvas

Develop shared understanding and empathy

Summarize the data you have gathered related to the people that are impacted by your work. It will help you generate ideas, prioritize features, or discuss decisions.



2.3 Brainstorming

Brainstorming & idea prioritization

10 minutes to prepare
1 hour to collaborate
4 people

Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

10 minutes

A **Team gathering**

Our group comprises of a total of 4 members -

Shardul Rana - 22BSA10251
Shreya Kumari - 22BSA10289
Nishan Chakraborty - 22BCE10762
Yashasvi Singh - 22BCE11445

B **Set the goal**

The goal of this brainstorming session is to:

- Define the core features of the E-commerce website.
- Finalize the tech stack and tools required.
- Plan the database connectivity - MongoDB.
- Distributing roles and responsibilities for the project.

C **Learn how to use the facilitation tools**

- Familiarize with Mural for workflow visualization.
- Utilizing GitHub and VS Code for multiple user connectivity.

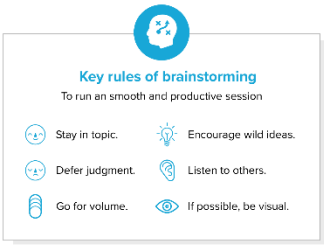
1 Define your problem statement

In today's digital era, customers expect a seamless and personalized online shopping experience. However, many existing eCommerce platforms struggle with issues like slow website performance, inefficient product recommendations, and lack of secure payment options. Our solution aims to create a user-friendly and secure eCommerce website that enhances customer engagement, ensures fast transactions, and provides a personalized shopping experience.

5 minutes

PROBLEM

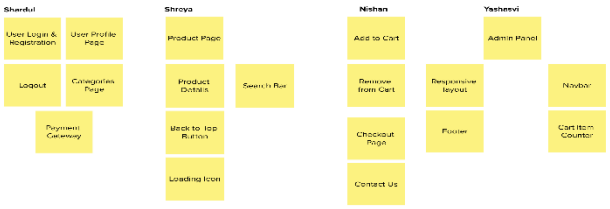
How might we create a secure and scalable E-commerce website



2 Brainstorm

Jotting down innovative ideas and well-structured plans to enhance the website's efficiency, improve performance, streamline user interactions, and ensure a seamless shopping experience.

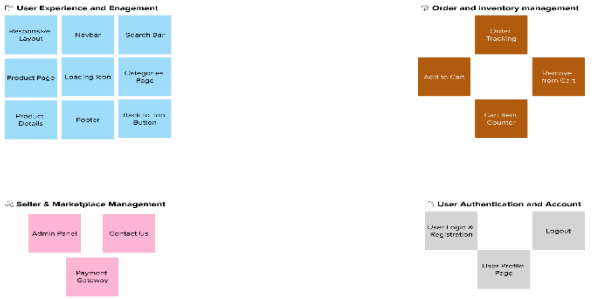
10 minutes



3 Group ideas

Exploring each team member's contributions, we'll delve into the details, break down their significance, and uncover how they can revolutionize our E-commerce platform, ensuring a seamless and engaging shopping experience.

20 minutes

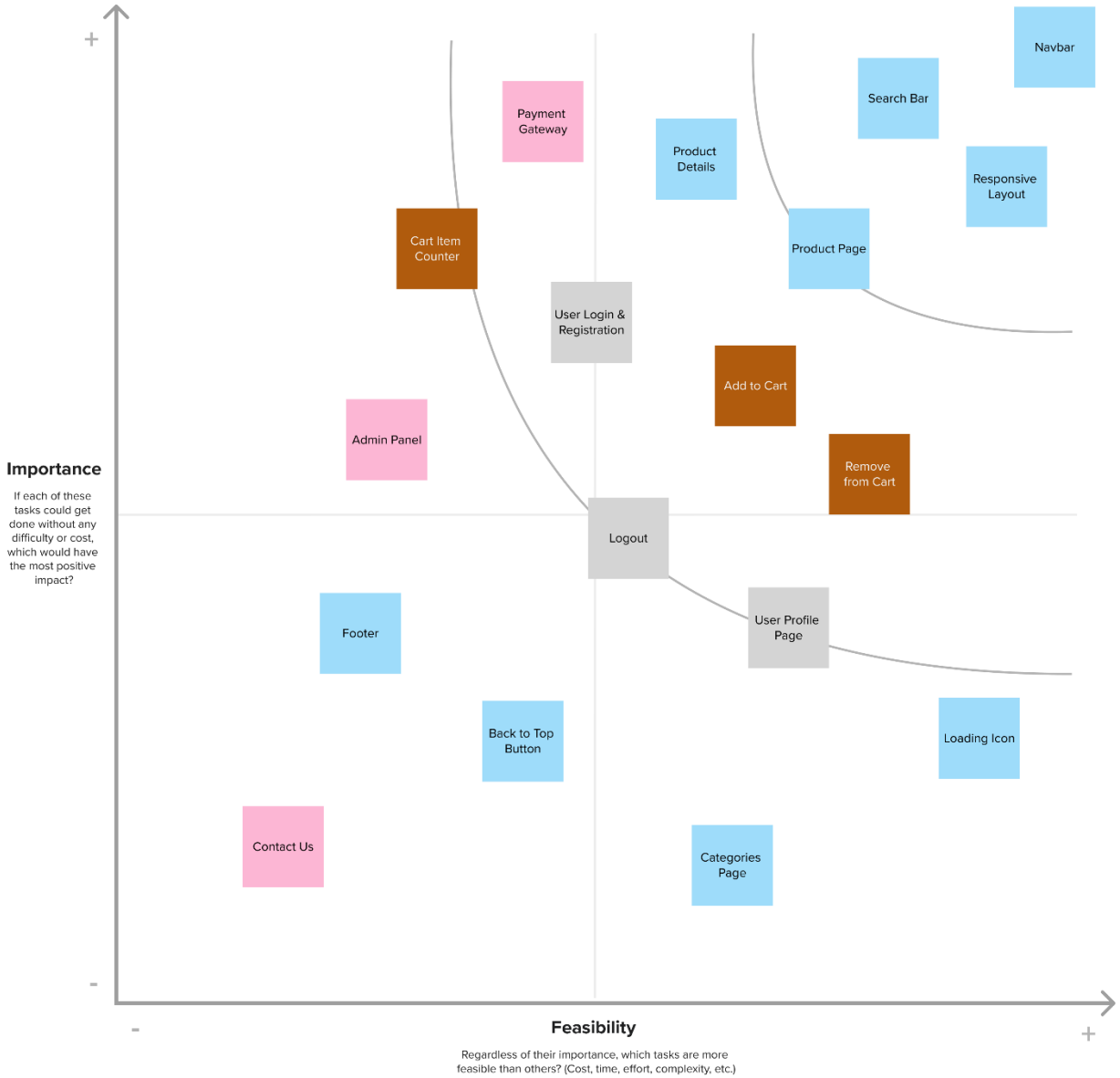


4

Prioritize

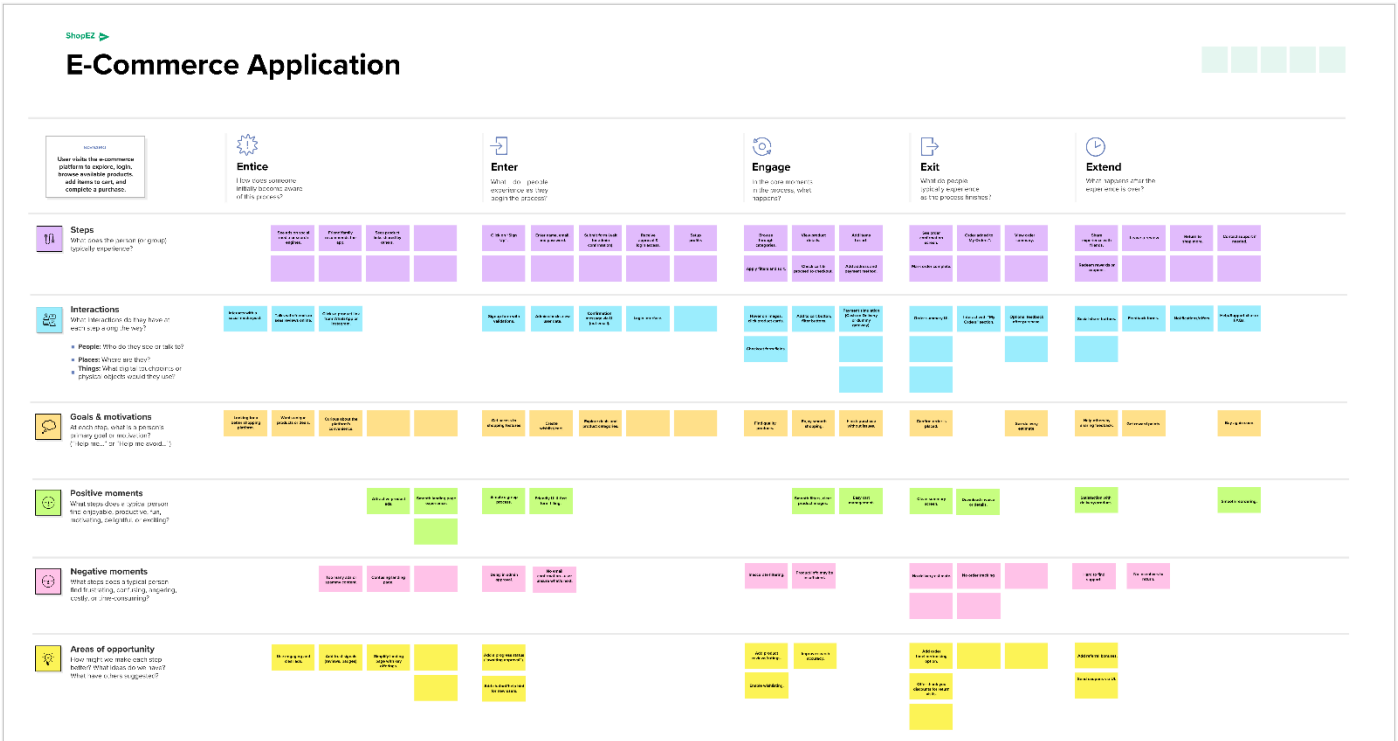
Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes



3. Requirement Analysis

3.1 Customer Journey Map



3.2 Solution Requirement

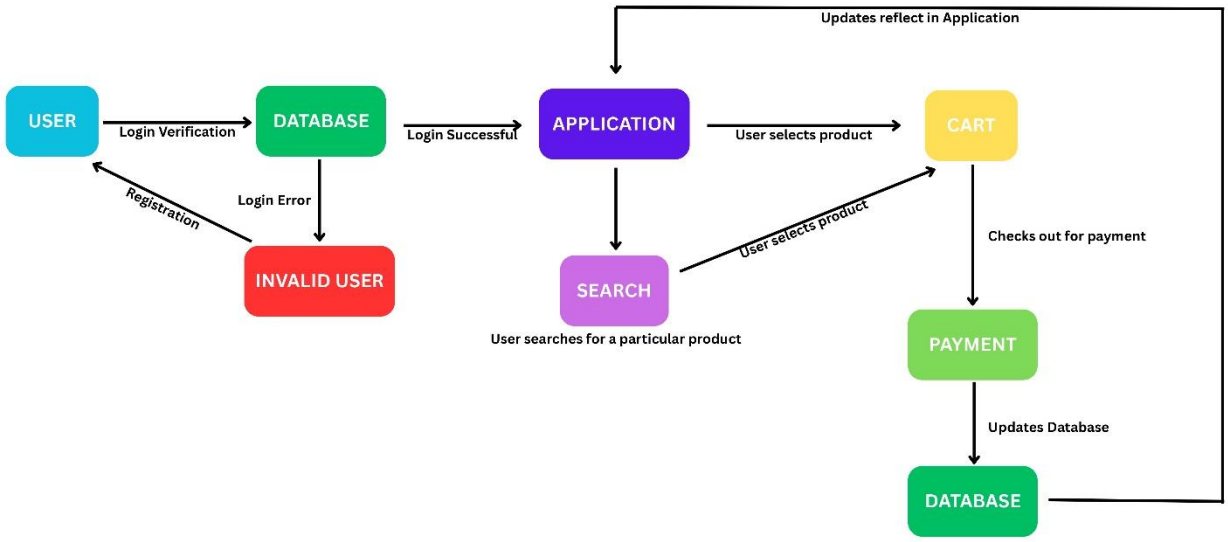
Functional Requirements:

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	• Registration with email and password • Validation of required fields • Password strength check
FR-2	User Confirmation	• User confirmation via database verification • Status update after successful registration
FR-3	Product Browsing & Cart	• Browse product listings • Add products to cart • View and update cart
FR-4	Checkout & Order	• Checkout flow • Order confirmation • Store order details in database

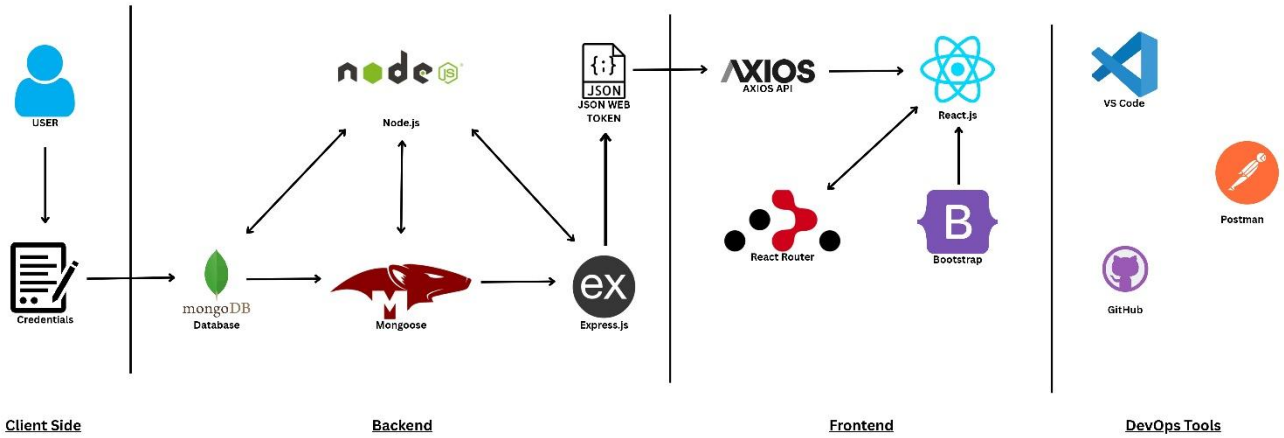
Non-functional Requirements:

NFR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Interface should be user-friendly, responsive, and intuitive for both customers and admins.
NFR-2	**Security**	Implement secure authentication (JWT), password encryption, and role-based access control.
NFR-3	**Reliability**	System should ensure consistent uptime and functioning under expected loads.
NFR-4	**Performance**	Pages should load within 2 seconds and support concurrent users without lag.
NFR-5	**Availability**	System should maintain 99.9% uptime with failover recovery.
NFR-6	**Scalability**	Easily scale database, backend, and frontend to support growing users/products.

3.3 Data Flow Diagram

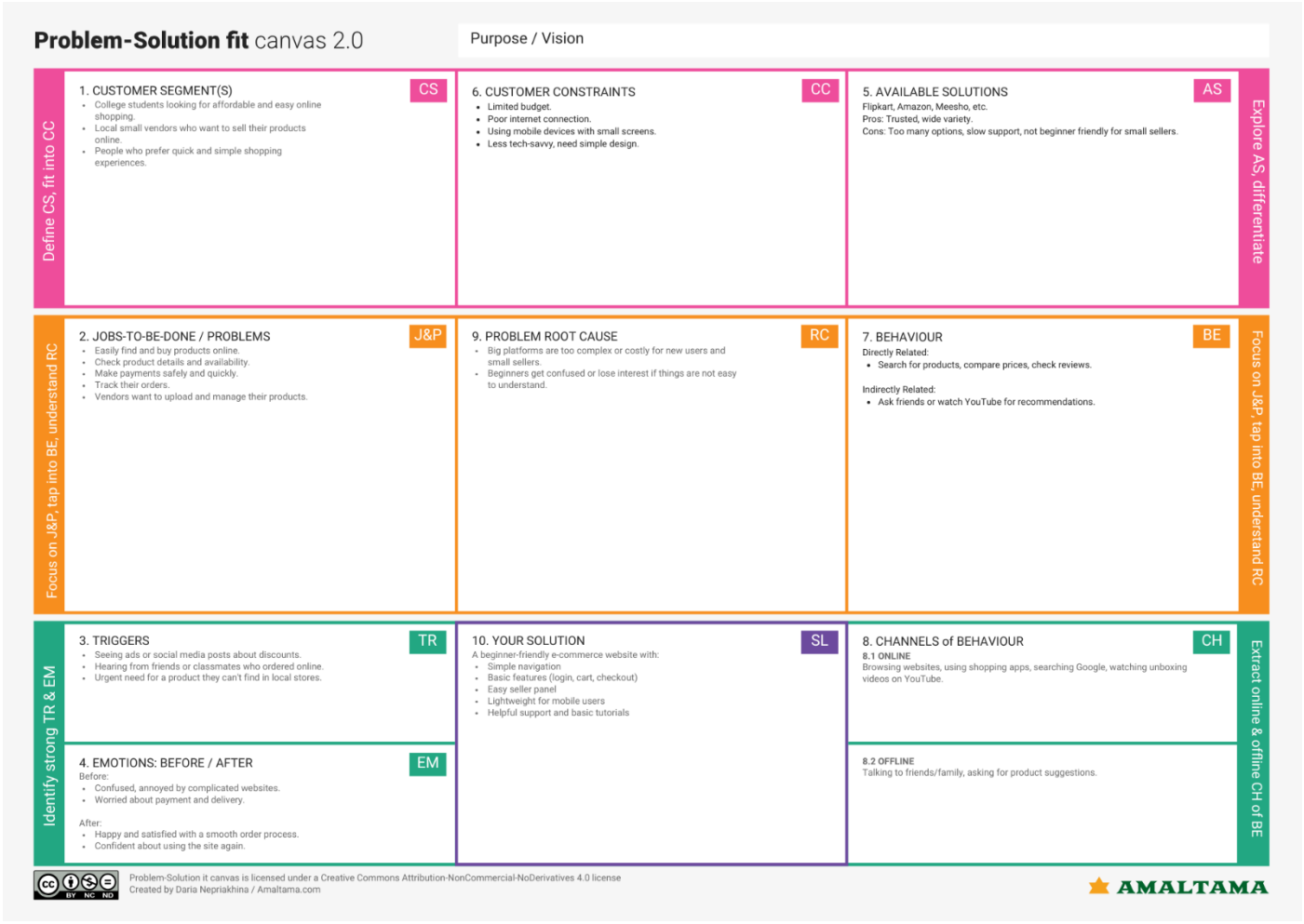


3.4 Technology Stack



4. Project Design

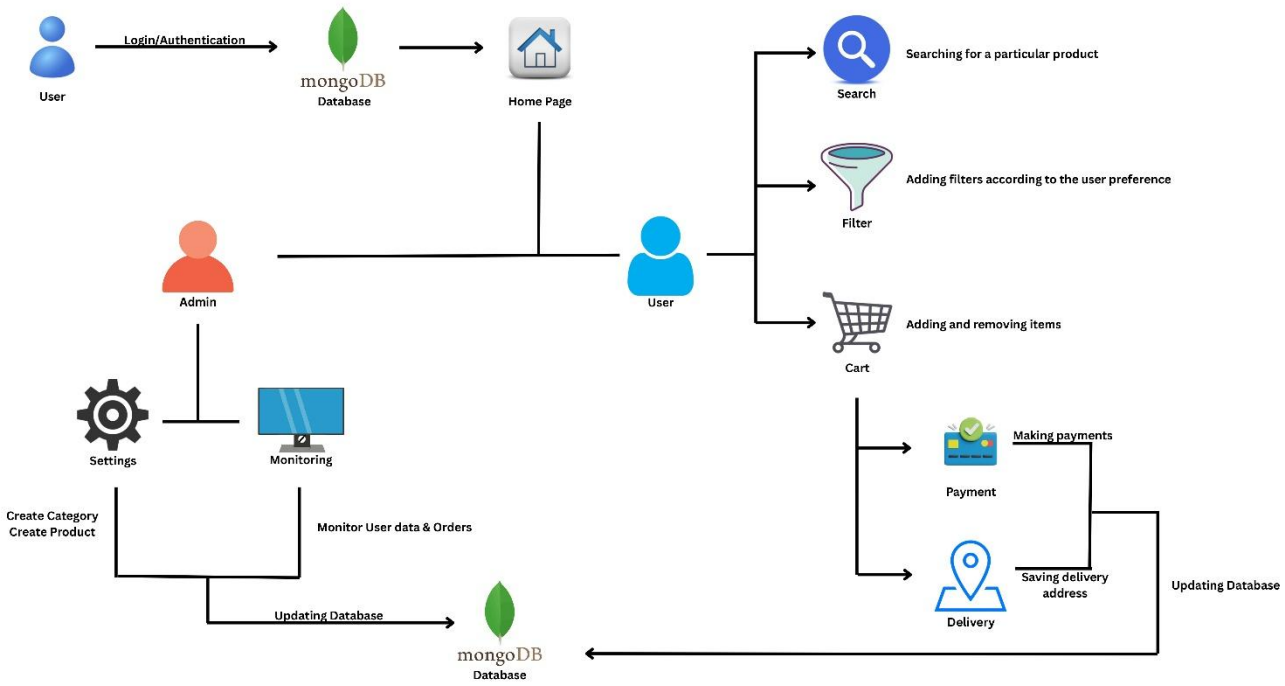
4.1 Problem Solution Fit



4.2 Proposed Solution

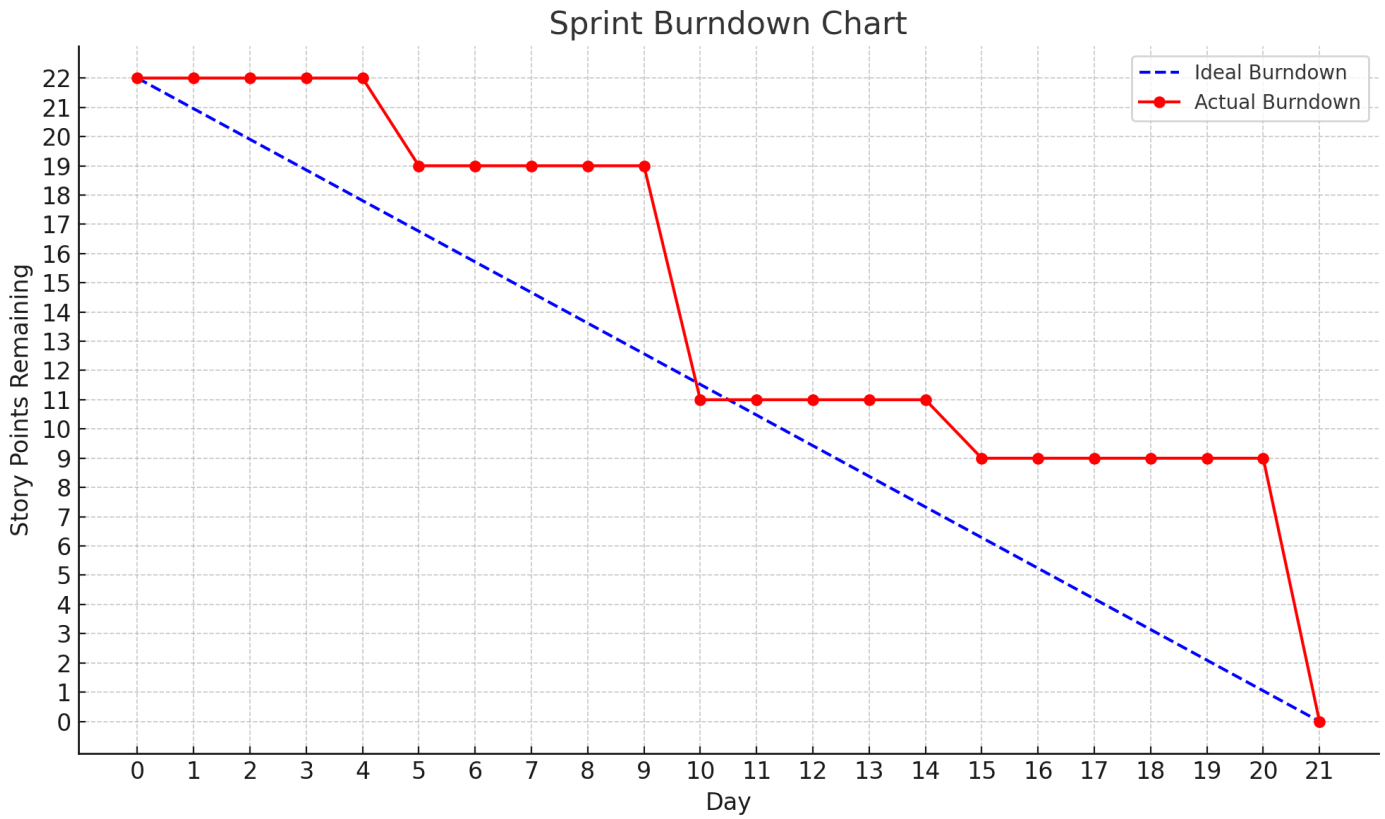
S.no.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Many online shopping platforms are too complex for new users and small sellers. They face trouble with finding products, making payments, and managing product listings easily.
2.	Idea / Solution description	Our project is a simple e-commerce website with features like product browsing, cart, checkout, order tracking, and a basic admin panel. It's easy to use for both buyers and new sellers.
3.	Novelty / Uniqueness	Unlike large platforms, our website focuses on simplicity. It's built for beginners with clean navigation, fewer distractions, and easy-to-understand features.
4.	Social Impact / Customer Satisfaction	Helps local sellers go online easily. Buyers get a smooth, stress-free experience. The website is fast, mobile-friendly, and easy to understand, increasing user satisfaction.
5.	Business Model (Revenue Model)	We can earn through small commissions on each sale, featured product promotions, and affordable subscriptions for sellers who want more tools.
6.	Scalability of the Solution	The website can easily grow by adding more features like recommendations, offers, multi-language support, and onboarding more sellers as user base increases.

4.3 Solution Architecture



5. Project Planning & Scheduling

5.1 Project Planning



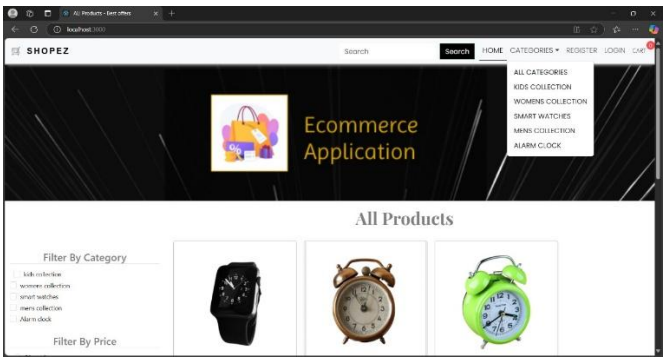
6. Functional & Performance Testing

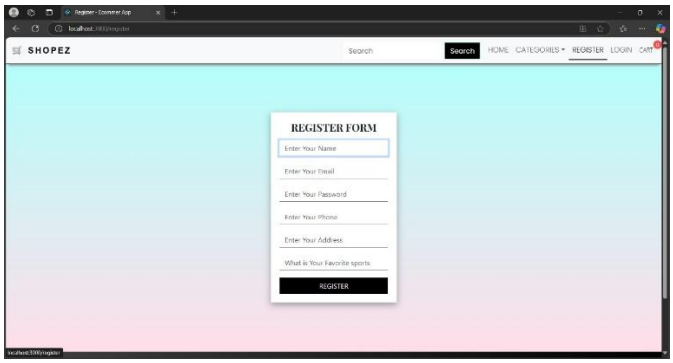
6.1 Performance Testing

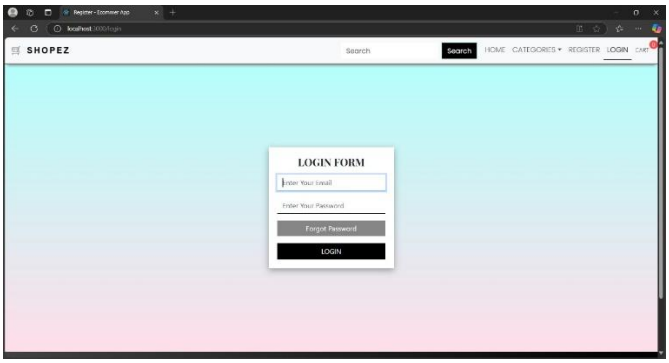
API Type	API Endpoint	Status Code	Response Time (ms)
Category	/api/v1/category/get-category	304	51.753
Product	/api/v1/product/product-list/1	304	46.899
Product Img	/api/v1/product/product-photo/67f93a1537dabe8278f60a34	304	45.206
Payment	/api/v1/product/braintree/token	200	1355.800
Auth	/api/v1/auth/user-auth	304	25.447

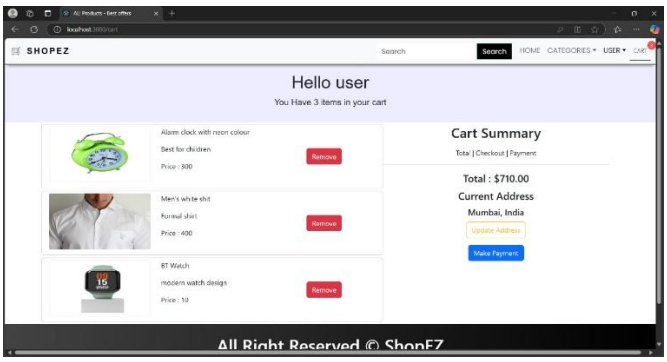
7. Results

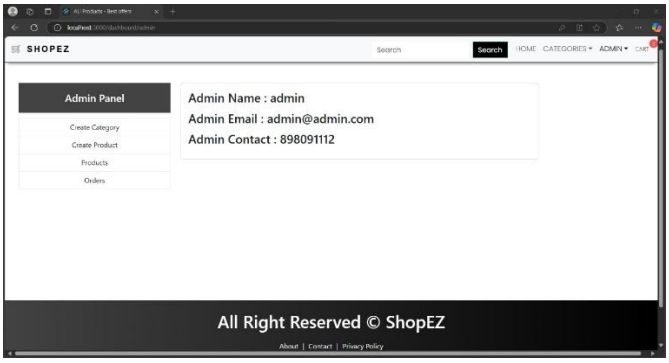
7.1 Output Screenshots

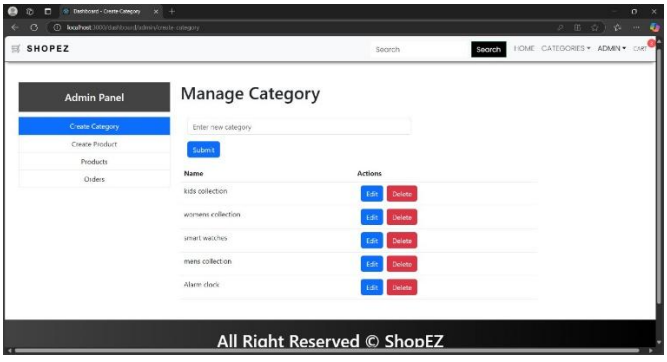












8. Advantages & Disadvantages

Advantages

- Modern Tech Stack (MERN): Utilizes MongoDB, Express.js, React, and Node.js, which allows for fast development, easy scalability, and a highly interactive UI/UX.
- Manual User Confirmation: Adds an extra layer of security and admin control by allowing only verified users into the system—useful for exclusive or limited-access platforms.
- Customizable & Scalable: Designed with flexibility in mind so features like search, filters, cart, and order tracking can be easily expanded.
- Responsive Design: Optimized for both desktop and mobile devices, ensuring accessibility across all user platforms.
- Admin Control Panel: Enables admins to manage users, products, and orders effectively, giving full control over operations.
- User-Friendly UI: Simple and intuitive navigation encourages longer sessions and higher conversion rates.

Disadvantages

- Manual Confirmation Delays: The user approval process might slow down onboarding, especially during high-traffic periods.
- Limited Automation: Features like auto-confirmation, email notifications, or analytics are not present by default and would need to be custom-built.
- Scalability Concerns: While scalable, managing a growing product catalog or user base might require more complex features like caching, search indexing, or load balancing.
- Security Dependencies: Without thorough testing and security layers (e.g., role-based access, rate limiting), the app might face vulnerabilities typical of web-based platforms.

9. Conclusion

The ShopEZ E-Commerce Application offers a robust and flexible platform for users to browse, select, and purchase products with ease, while also providing administrators with the control to manage users and inventory efficiently. By leveraging the powerful MERN stack, the project ensures a modern, responsive, and scalable solution suited for today's online retail demands. Though it has certain limitations like manual user confirmation and the absence of automation in some areas, these are trade-offs made for enhanced control and customization. Overall, the project lays a strong foundation for a secure and efficient e-commerce experience, with ample scope for future enhancements and feature expansion.

10. Future Scope

- Automated Email Verification & OTP Authentication: Implementing email or mobile verification through OTP can enhance security and user trust during registration and login processes.
- AI-Based Product Recommendations: Leveraging machine learning to suggest products based on user behaviour, purchase history, and preferences can improve user engagement and sales.
- Admin Dashboard with Analytics: Introducing advanced admin features like sales tracking, user activity monitoring, and inventory analytics can help in decision-making and business growth.
- Chatbot for Customer Support: Integrating a chatbot for answering FAQs and handling common queries will improve customer support availability and efficiency.
- Order Tracking System: Implement real-time order tracking and delivery status updates for better transparency and customer satisfaction.
- Multi-Vendor Support: Expanding the platform to support multiple vendors and sellers can scale it into a marketplace.
- Personalized User Dashboard: Enhance user profiles with past orders, recommended products, saved addresses, and personalized settings.

11. Appendix

GitHub link –

https://github.com/shreyakumari99/Smartbridge-MERN-STACK-Project

Demo Video link –

https://drive.google.com/file/d/198e8aDMMsn7KW8zSnFFg_vPN5xbRY3zu/view?usp=drive_link