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University

Title of the project

“TRIO MARK CLOTHING”

Course: Project Based – Spring’25

Department of Computing and Information System (CIS)

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APPROVAL

This Project titled “TRIO MARK CLOTHING”, submitted by **Tarak Rahman**, ID: 191-16-409 to the Department of CIS, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in CIS and approved as to its style and contents. The presentation has been held on 31-05-2025.

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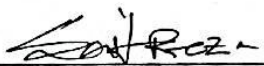
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I hereby declare that, this project has been done by me under the supervision of **Ms. Sonia Nasrin, Lecturer, Department of CIS**, Daffodil International University. I am also declaring that this project or any part of there has never been submitted anywhere else for the award of any educational degree like, B.Sc., M.Sc., Diploma or other qualifications.

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I am sincerely grateful to them for their kindness, assistance and belief in my abilities. Their mentorship has not only helped me navigate through difficult tasks but has also taught me how to excel in demanding situations and handle large-scale projects in the future.

Abstract

The proposed system identified as Trio Mark Clothing project aims to cover the different classification and purchase sites for apparels, as well as improving the shopping experience for the customer and the ease of operations for the apparels business. Standing on a foundation of React, Node.js, MongoDB, and TailwindCSS, the platform provides user registration and authentication, products catalog, and order placement. For administrators, it offers a set of powerful instruments for working with products, users, and promotions, as well as statistical specifications for the decision-making process. The project also focuses on factorability with features such as load balancing and efficient database queries for large traffic and volume data. Though, there has been a provision of security with compliance to standards for data protection and payment gateway integration. Some of the activities involved were designed to come up with the product included testing and documenting to ascertain whether the product was functional, reliable, and easy to maintain. The issue like performance, responsiveness, and the usability design was solved through the use of incremental problem-solving and teamwork. Through the use of these technologies and adopting the latest trends in designing, the platform seeks to help businesses grow while at the same time making shopping for their products easy and enjoyable for clients while equipping businesses with effective tools in their operation.

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Chapter 1

Introduction

1.1 Introduction

Today, another form of buying and selling clothes and other related accessories through the internet is severally practiced. Trio Mark Clothing is a complete e-shopping hub that has been developed to be efficient and easy for the user or the customer as well as the administrator. The platform employs advanced solutions in technology, guaranteeing efficiency in the processing of transactions while meeting the increasing need for online retail platforms.

Desk enrolled in React to achieve a lively frontend, a combination of Node.js and an Express.js framework form the stable platform of the backend to make it more solid and scalable. mongodb is used as the database, which provides the secure and efficient storage of data, and TailwindCSS and DaisyUI give a nice look to the frontend. Basically, the Vite build tool improves development time and allows one to create a simple structure for a project.

For administrators, the platform provides a wide range of benefits: Administrative backend with statistic and charts as well as management of products, users and offers based on an Admin Dashboard. Admins can provide information about products, change user roles if needed, and apply temporary discounts if desired to promote the product more. Custom admin authentication guarantees the fact that certain features are administered only by allowed users.

On the user side, Trio Mark Clothing focuses on new economy aspects of internet technologies: convenience and personalization. These are easy to register, verify the identity of users, and modify basic information and pictures of user profiles. The Home Page also depicts some categories of items sold, featured products, and discounts, and “Shopping Specials” and “Specials of the week”. Also they include secure payment methods, returns policy, free delivery and 24/7 support for enhancing company image and customer confidence.

Having rather saturated functionality, a laconic and simple interface, and advanced functionality for administrators, Trio Mark Clothing can be considered an effective development for creating various e-shops aimed at improving the flow and usability of online stores.

1.2 Purpose of Project

The primary motive of the Trio Mark Clothing project is to establish a new age efficient and satisfactory platform that connects the sellers and the buyers in the online market place. This platform is intended to serve the needs of both customers and administrators through its practical design carrying out secure transactions and easy management tools.

For customers; the goal is to offer them a good shopping experience. The platform has features such as easy, user-friendly, navigation, personal profile, secured payment methods, and real time discounts which makes it easy for users to browse, select, and purchase products. Extension of services including free delivery, clear return policy and 24/7 customer service personnel are other factors improve the customers' satisfaction and hence their loyalty.

From the perspective of administrators, the project is designed to make business incredibly easy by offering complex and efficient solutions for organizing product and users as well as promoting campaigns. The Admin Dashboard consolidates crucial KPIs, letting admins check the sales and spot the user engagement levels through the charts. Such as user management, product updates and offers creation allows admins to make changes and move all inventory and marketing aspects in order to enhance business outcomes.

It also response to the problem of ensuring that the architecture is safe and expandable while the platform receives an increasing amount of traffic. Using such tech as React, Node.js, MongoDB, and TailwindCSS, the platform provides high-quality user experience while keeping many options for future changes.

In the end, the Trio Mark Clothing project provides a one-stop shop for business enterprises that seek to set up or scale their e-commerce operations in the rapidly growing digital marketplace to offer their clients value.

Chapter 2

Initial Study

2.1 Purpose of Project

The primary motive of the Trio Mark Clothing project is to establish a new age efficient and satisfactory platform that connects the sellers and the buyers in the online market place. This platform is intended to serve the needs of both customers and administrators through its practical design carrying out secure transactions and easy management tools.

1. Project Overview

This is an all-round Apparel Merchants' e-shop meant for convenient and efficient shopping for customers and administration. It embeds current technologies to create a solution to establish, sell and manage clothes and accessories in an organization thereby giving the response, security and the requisite features. The goals of the project are to meet the Wants of users and the Needs of the businesses to bring closer the concepts of retailing needs in the digital world with the real world functionality.

2. Objectives

Deliver the best experience when a customer is shopping with the assistance of the product.

Provide administrators with good solutions for organizing products, customers, and promotions.

Need for a platform that will be able to accommodate a growing traffic and amounts of data as it will play a key role in the organization's performance.

Some of these include, creating user accounts, protection of payment details, and availability of customer care services, all aimed at empowering trust and ensuring people stick with you.

3. Key Features

Admin Features:

Admin Dashboard for tracking of real-time statistic data.

Tools used to manage product, users, and offers.

Specific and authorized access solutions for administration.

User Features:

It is easy to sign up and verification is done through the users email.

Online profile development with the capacity to upload photo.

It includes the home page with products and new offers and deals section.

General Features:

Besides integrating a secure payment gateway for customers.

The delivery free of cost and having a transparent return policy.

Customer support available all day and night so that customers are well catered for at all times.

4. Technologies Used

Frontend: React, React-DOM, React-Router-DOM, TailwindCSS, DaisyUI.

Backend: Node.js, Express.js.

Database: MongoDB.

Build Tool: Vite.

5. Benefits

For customers: Convenience when it's time to shop with an assurance of safe and efficient payment, not to mention the fast shipping services.

For administrators: Increased efficiency due to the use of management tools and analytics arranged in one place.

For businesses: There is potentially increased usage of digital platforms, reaching more customers within a shorter time and offering a sustainable model adaptable to business size.

2.2 Project Scope

The main project for Trio Mark Clothing is the creation of a functional and enhanced e-shop conception for the customers and administration. This entails having an effective frontend to facilitate easy navigation, and actual shopping process, as well as a robust backend to safely store all relevant information and securely carry out all essential business. The features to be included within the scope are basic, yet contain registration, personal account, product catalog, safe methods of payment option, and support. It offers the administrative control panel for products, users and promotions, real-time data and statistical data visualization. Technologically developed through React, Node.js, and MongoDB, the intended platform architecture for the businesses and the customers is comprehensive, secure, and malleable for any further enhancements that may be needed to provide long-term value for both the businesses and consumers.

2.3 Background of the project

This change of growth in e-commerce has impacted the whole retail business as most organizations use the internet to expand their market. It means that the modern consumer demands the necessity for efficiently and safely shopping. However, the development, management and scaling of such practices present many problems for the small and medium-sized enterprises. Understanding this necessity, Trio Mark Clothing was designed to be a fully functional online store eliminating these problems for its creating team and offering an easily navigable environment for buyers and sellers.

It therefore model the project with e-commerce giants attempting to import most of the present technological and design aspects into the platform. Built with the help of React, Node.js, and MongoDB, the platform guarantees fast and secure work with a high degree of scalability. It also focuses on such aspects as personal user profiles, safety of payments, and advertizing campaigns in order to increase the share of customers' satisfaction. For administrators, such options as the integrated management tools delivering superior performance information in real time will help make work easier and allow business to concentrate in the areas of growth and client satisfaction. It is therefore the goal of Trio Mark Clothing organization to ensure that any technological development found in the marketplace will meet the applicable practical needs of the digital retail business.

2.4 Objective

In using the appropriate internet technologies, the platform will become convenient for the users making the shopping experience enjoyable while giving the administrators the essential means and ways to attend to the products, the users, and the sales as well. The emphasis is on the integration of functionality, expandability and security to provide a solid basis for electronic retailing enterprises.

To customers, the goal is to give them one-stop shopping experience that has been made enjoyable, easy and safe. Some of these are easily available registration and sign up, member profile pages, various options for product and service search and listings, SSL secure payment options, and free online customer support to ensure full customer trust and satisfaction. The addition of dynamic features like featured products, Weekly Special Offer, and category specials helps to remind customers of new products and discounts, and existing ones.

From the business standpoint, the work of the project is to provide administrators with effective tools for organizing their activities. The Admin Dashboard presents analytics, charts, and performance insights into sales, users and the product. A few features for product management and user interface are incorporated to help companies address current requirements and adjust to them. Thus, it is with an aim to balance between the primary clients' requirements and the business's objectives that the Trio Mark Clothing project focuses on becoming a multifunctional and effective solution for the developing sphere of e-commerce.

Chapter 3

Literature Review

3.1 Discussion on problem domain based on available solution

The issue area of Trio Mark Clothing is therefore concerned with developing a sound, feasible, and effective electronic commerce application in the context of the apparel trade. Current clothes and apparel e-commerce site has solved some of these problems in the market like operations, product handling, and security to mention but few. But, sadly, most of these platforms share the same problems of slow loading times, bad customer support, relatively low levels and customization options, and weak admin tools. Moving on, basing on literature and research on e-commerce evolution, firms have a challenging time in dealing with large stocks, data, and customization. Issues such as speech zijn social media platforms, including Zara, H&M and ASOS have sought to resolve these issues and incorporate AI for suggestions, elaborate descriptions and the arbitrary design of investments for extra convenience for getting around particularly on a mobile phone. However, many rely on complex systems that need significant levels of maintenance as well as updates.

However, Trio Mark Clothing was designed to be an easier-to-use online store that is safe, simple to navigate, and easy to make purchases with good management tools. Taking a cue from current trends, the platform empowers such aspects as a Dynamic UI through React and backend optimization using Node.js to overcome the challenges observed in current system implementations. More so, it is armed with the User Interface features known as the Admin Dashboard, where graphically represented data is displayed in real time, therefore Mary administrators can gauge the performance of the platform and manage the site accordingly based on real-time data. It is against this back drop that the goal is to make operations easier for clothing retailers as well as delivering an appealing shopping experience to customer, thus alleviating the challenges highlighted in the literature and building on the existing solutions.

3.2 Discussion on problem solution based on available solution

Trio Mark Clothing is an extensive solution for all the problems that both investors and customers experience in the context of e-commerce focused on clothing rental services. Some current software solutions provide limitations in organizing complex user interfaces, miscalculating inventory, and no real-time monitoring for administrators. To solve these problems, the Trio Mark Clothing uses the computer technologies and focuses on its customers. For instance, usage of React

and feature-rich TailwindCSS guarantees a smooth user interface and perfect adaptivity to the SharpCommerce shopping experience across devices. This solution addresses the issue of rendering poorly built and low-quality mobile experiences, typical for many online shops.

For the administrators, the Admin Dashboard is perhaps the most effective and simple to use tool for tracking the sales, users, the products in real time. Chart and metrics helps to make decisions faster and to track business performance more effectively when data visualization is used. This solution answers the typical problem that arises wherein ineffective systems must be monitored manually and proved to have inaccuracies. Besides, the MongoDB database and Node.js backend provide the scalability and desynchronous handling of data, giving a credible answer to growing number of users and large stocks without risking performance.

The Trio Mark Clothing platform also addresses the complexity of safe and convenient transactions, a major concern for any online company. With embedded payment solutions and enhanced security features the safeguard consumption of buyers and safe shopping atmosphere is provided. Due to the feature-based approach with regards to users, administrative panels and architecture, it eliminates some of the drawbacks of present clothing E-commerce solutions becoming more effective, safe and user-friendly for the client and the company.

3.3 Recommended Approach

AI For developing this platform, the most suitable methodology to use is the agile approach, given that it consists of making improvements repeatedly. The project setup should be designed starting with the fundamental functionalities like registration of users, management of products and payments and then successfully incorporate other functionalities like the Admin Dashboard and real-time analysis. In particular, focused on the aspects concerning the customers, like their convenience and security of a transaction in a chosen site, it is possible to organize a thoroughly effective purchase-ascent from the beginning.

In terms of scalability, choosing React for the frontend guarantees a fast response, the product catalog to be handled as the traffic and the number of products grows. MongoDB integration enables scalable data storage and means the platform has the capacity for growth in the future. Moreover, when it comes to styling, using TailwindCSS and DaisyUI will help to achieve clean,

non-trivial, and at the same time, responsive look and feel while won't negatively impact performance. The main development effort should go to the administration interface that should be easy to use for working with users, products and offers. This will be at a central level through big data and straightforward admin interfaces that will optimize performance.

Finally, it will be possible to maintain constant feedbacks from the regular users during the developmental stages so as to come across some of these challenges and alterations in order to develop a platform that will meet the need of the customers as well as the managers. That way Tri Mark Clothing will be better prepared to offer safe, efficient, and convenient e-commerce solution for this aggressive online retail market.

Chapter 4

Methodology

When it comes to Trio Mark Clothing, the approach used is the agile development based on the development of a set of core technologies with periodic enhancements. React, Node.js, MongoDB, and TailwindCSS makes the design effective, scalable, responsive and enable an optimal user and admin management.

4.1 What to use

The Project, Trio Mark Clothing has opted for React for the front end, Node .js and express.js for the back end, an efficient database for data storage is also considered. Styling is done by TailwindCSS and DaisyUI, with web building by Vite. Others are the payment gateways with high levels of security; high-level admin panels; data visualization libraries for the analytics sections.

4.1.1 Agile Model

Agile model is another style of software development that is iterative and collaborative in nature. It is centered on releasing usable software every sprint, and the flexibility and customer involvement. Daily scrum meetings, sprint reviews and other gatherings that occur allow for the free exchange of information and permit fast decision making. This brings the ability to change or to make iterations to be added at any given number of phases in development based on changing requirements or customer demands.



Figure 4-1: Agile Model

4.2 Why to use

The technologies in Trio Mark Clothing e-commerce select for offering a modern, scalable and efficient e-business solution.

React makes the UI highly responsive to the user and has reusable components for the enhanced development of processes.

Node.js as well as, Express.js offer a micro-framework that is flexible and compatible with the extensive traffic and real-time operations.

MongoDB has adaptable features when it comes to handling and storing massive data, popular during changes in inventories.

TailwindCSS and DaisyUI offer a quick way to implement attractive aesthetics that adhere to the latest design conventions together with a responsive layout framework.

It also provides that the development speed will be fast with the help of fast build and hot module replacement.

4.3 Implementation Plan

Here's Phase 1: I chose the topic Planning and Design from the weekly options available on the course, so, Week 1 and Week 2 revolve around this theme.

Collect and write information about project needs.

Design mockups for the user interface and the back end and admin interface.

The table structure for product, user, order and offer should be defined and finalized.

Phase 2: Frontend development plan (Week 3-6)

We decided to configure the basic React environment using the Vite tool for faster development.

Utilize the user interface with TailwindCSS with DaisyUI for its responsive functionality.

Develop key pages: Home, Product Description, Shopping Cart, Customer Profile, and orders and sellers control panel.

From this lesson, I implemented React Router DOM to handle navigation between different pages.

Phase 3: Backend Development (Week 7-10).

Install the Node.js server and the Express.js framework.

Include modules of authentication, products, orders, and offers.

Integrate it with the MongoDB for storage of data back end to the MongoDB database.

Ensure to validate admin authentication by use of custom hooks.

Phase 4: Integration and Testing phase outlines in this section of the paper includes weeks 11 to 13.

Make frontend integrate with backend APIs for it to work as intended.

Test user features: transactional web services like registration, user login, updating user profile, placing orders and making check out.

Test admin features: for product management, user management as well as the creation of offers.

Perform performance, security and cross-browser test.

Phase 5: Deployment and maintenance are the two key strategies that are scheduled for the sixteenth week of the plan.

host the platform on a cloud hosting service

Such performance will allow detecting and solving the problems related to post-deployment, which is critical for any IT project.

Of course, you keep on collecting feedback from the user for future improvement of your application.

Chapter 5

Project Plan

5.1 Work Break Down structure

The work breakdown structure for Trio Mark Clothing is to segregate the project into five major phases. First, the Planning and Design phase is the process of requirement gathering, joining a number of wireframes, and establishing the final database schema. Secondly, the Frontend Development phase concerns layout and interface creation based on the user interface design utilizing React, TailwindCSS, and DaisyUI; navigation structure. The Backend Development can be divided into such steps as the setup of Node.js and Express.js setting, API implementation and usage of MongoDB for data management. Thus, there is Integration and Testing to guarantee that all the parts work together, Deployment and, at last, Maintenance for post-deployment enhancements. That is why our project has been divided into few subtasks and we have worked out a strict schedule of which part of the project will be given how much time. It enables us to see the entire project at the same timetable.

Task Name	Duration (days)	Start	End
Introduction	8	1 Jul-2024	8 Jul-2024
Initial Study	5	9 Jul-2024	13 Jul-2024
Literature Review	3	14 Jul-2024	16 Jul-2024
Methodology	5	17 Jul-2024	21 Jul-2024
Project Plan	8	22 Jul-2024	29 Jul-2024
Feasibility Study	7	30 Jul-2024	5 Aug-2024
Foundation	7	6 Aug-2024	12 Aug-2024
Exploration	9	13 Aug-2024	21 Aug-2024
Engineering	12	22 Aug-2024	2 Sep-2024
UI/UX Developm	5	3 Sep-2024	7 Sep-2024
Development	37	8 Sep-2024	15 Oct-2024
Testing	7	16 Oct-2024	22 Oct-2024
Implementation	5	23 Oct-2024	28 Oct-2024
Critical Appraisa	2	29 Oct-2024	30 Oct-2024
Lesson Learned	4	31 Oct-2024	3 Nov-2024
Conclusion	4	4 Nov-2024	7 Nov-2024
	Total: 130 days		

Figure 5-1: Work Break down Structure

5.2 Resource Allocation

Resource management is defined as the distribution and application of resources for executing project activities and achieving the defined goals of the project.

Task Name	Duration(days)	Resource
Introduction	8	Analyst, User
Initial Study	5	Analyst
Literature Review	3	Analyst, Team Leader
Methodology	5	Analyst, Developer, Project Manager
Project Plan	8	Analyst, Project Manager, Team Leader
Feasibility Study	7	Analyst, Project Manager, Team Leader, User
Foundation	7	Analyst, Team Leader
Exploration	9	Analyst, Developer, Team Leader, Designer
Engineering	12	Project Manager, Team Leader
UI/UX Development	5	Designer, Developer, Team Leader, User
Development	37	Developer, Analyst, Tester
Testing	7	Tester, Developer, Team Leader, User
Implementation	5	Project Manager, Developer, Tester
Critical Appraisal & Evaluation	2	Analyst, Developer, User
Lesson Learned	4	Developer , Analyst
Conclusion	4	Analyst
	Total: 130 days	

Figure 5-2: Resource Allocation

5.3 Time Boxing

Time boxing can be described as project management technique or approach that presupposes that time is divided into certain fixed time segments called time boxes. It assist in the development of a conscientious work attitude, work culture and time - sensitive working norms within specified working hours. We have certain time boxing which is mentioned in the below part of this project.

Time Boxes	Task Name	Duration(days)	Resource
TB1	Introduction	8	Analyst, User
	Initial Study	5	Analyst
TB 2	Literature Review	3	Analyst, Team Leader
	Methodology	5	Analyst, Developer, Project Manager
TB 3	Project Plan	8	Analyst, Project Manager, Team Leader
	Feasibility Study	7	Analyst, Project Manager, Team Leader, User
	Foundation	7	Analyst, Team Leader
TB 4	Exploration	9	Analyst, Developer, Team Leader, Designer
	Engineering	12	Project Manager, Team Leader
	UI/UX Development	5	Designer, Developer, Team Leader, User
TB 5	Development	37	Developer, Analyst, Tester
TB 6	Testing	7	Tester, Developer, Team Leader, User
	Implementation	5	Project Manager, Developer, Tester
TB 7	Critical Appraisal & Evaluation	2	Analyst, Developer, User
	Lesson Learned	4	Developer , Analyst
	Conclusion	4	Analyst
		Total: 130 days	

Figure 5-3: Time Boxing

5.4 Gantt chart

A Gantt chart is a graphical project management tool which displays the schedule of your tasks or activities and their dependencies, over time. It lists when tasks begin and end, as well as their dependencies and milestones.

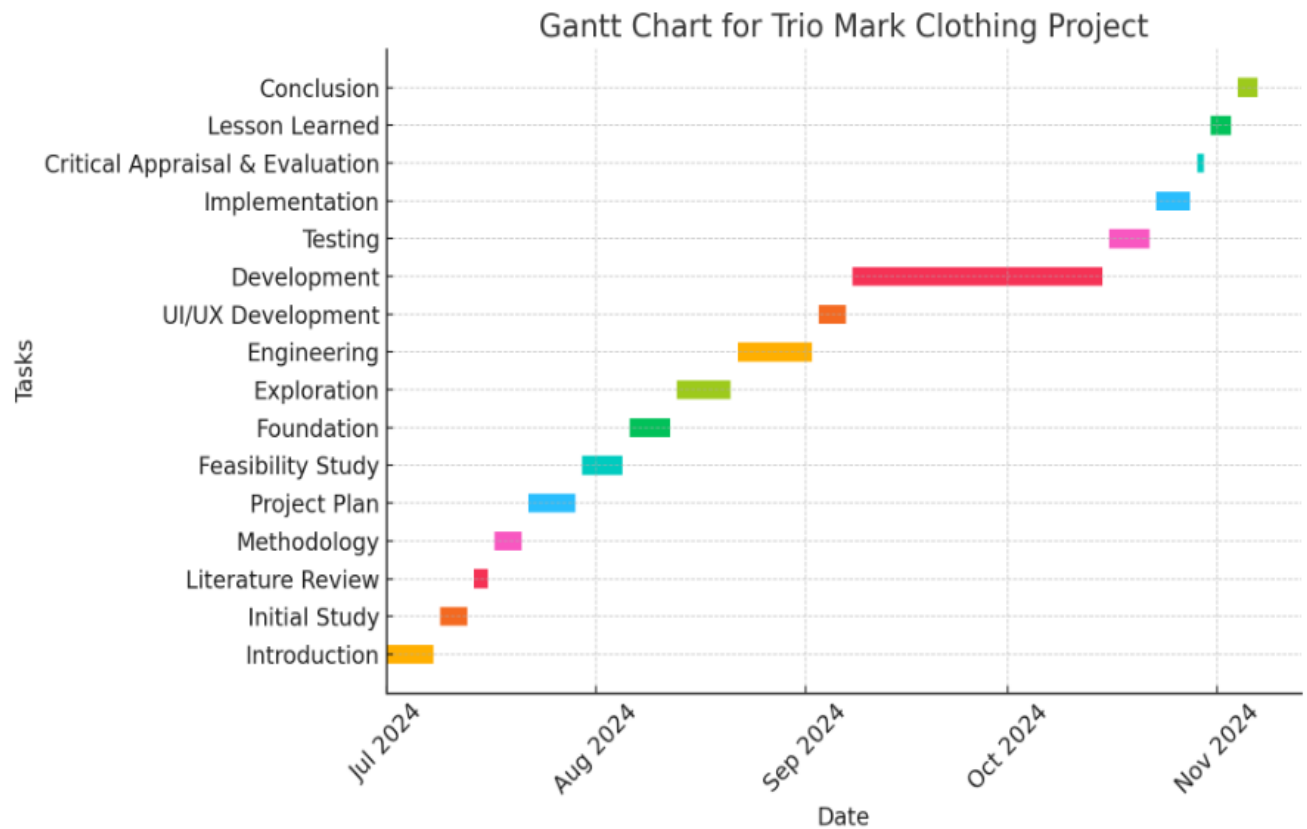


Figure 5-4: Gantt chart

Chapter 6

Feasibility Study

6.1 All possible types of feasibility study:

The common types of feasibility studies are technical feasibility that is checking on the available technology and resources, economic feasibility that focuses on the cost/benefit analysis and return on investment, operational feasibility that checks whether the project meets the users' requirement, legal feasibility that checks whether the project complies with the law and lastly schedule feasibility that looks at the viability of completing the project within the set timeframe.

6.2 Technical Feasibility:

The technical capabilities and existing resources, which will be need to deliver the project. The React, Node.js, MongoDB, and TailwindCSS technologies provide scalability, efficient performance, and up-to-date approach in the Trio Mark Clothing plan.

6.3 Economic Feasibility:

This study examines of Trio Mark Clothing platform and determines whether the project can yield repeatable returns to make the investments viable. The initial development cost comprises of technology (platform and languages used: React, Node.js, and MongoDB), physical infrastructure (servers and hosting service), and human resource (developers, testers, designers). The main cost operation costs are related to server maintenance, advertising, and consumers' service. This is because the platform's revenue generating model will rely on sales, promotions, and subscriptions for the premium account. A breakeven calculation and ROI forecast suggests that further growth into functional domains backed by the systematic implementation of advertising, acquisition, and other promotional techniques presents appealing and sustainable acquisitive and profitable opportunities in the long term.

6.4 Operational Feasibility:

There are three key subtypes in analyzing Operational Feasibility for the Trio Mark Clothing platform, to do with the question of whether the system can be effectively kept running and managed in the long run. As for the usability, the platform is non-complex from customers' perspective and does not require complex backend administration. Some of these are staff training and documentation to facilitate easy operation of the organization. Therefore, the availability of large cloud-based structure facilitates management of extra traffic and orders is facilitated.

Moreover, the incorporation of the safe payment options as well as strong customer care confirms that various functional problems of the platform, for instance, handling fine or numerous customer complaints, are efficiently solved, which contributes to the site's continuous popularity.

6.5 Legal & Compliance Feasibility:

Legal & Compliance Feasibility for the Trio Mark Clothing platform checks the compatibility of each proposed system in meeting legal requirements. This coupled with other Data protection laws that tackle issues like GDPR (General Data Protection Regulation) when it comes to handling customers data, PCI-DSS (Payment Card Industry Data Security Standard) when it comes to processing of customer's payments. The platform also needs to observe legal requirements pertaining to consumers' protection when using online shopping services such as returns policies, and strategies of pricing. Also, the platform has to adhere to rules of intellectual property for the product images and content as well. Legal compliance is imperative in as it reduces risks related to the firm as well as increase the confidence of the users and stakeholders in the company.

Chapter 7

Foundation

7.1 The problem area identification:

Trio Mark Clothing is that existing e-commerce solutions often offer a subpar user experience, are inefficient for product management, don't provide real-time analytical tools, and payment is not always safe. The adopted approach of slow performance results in challenging usability for customers, and administrators are often limited when trying to manage inventory, users, or promotions effectively. Furthermore, few platforms have individualisation and compatibility, making customer interactions less enjoyable and organisational processes less effective. In order to address these challenges this project sets for itself a goal of implementing an easily navigable, expandable and secure e-commerce solution appropriate for customer and administrative use.

7.2 Interview:

Surveys include getting information from customers, entrepreneurs and managers, which would be interested to use Trio Mark Clothing platform. They revolve around choices, drawbacks with existing e-commerce models, required features, and functional issue. This feedback also helps to define or clarify requirements, and keep a project on track.

7.3 Questionnaire:

An assessment form for the project includes all necessary information about users and administrators to improve the features of the Trio Mark Clothing site. To the users, it is important to understand their choice in navigation, product(s) categories, mode of payment and the support services they expect. For administrators, questions are concerned with the difficulties in handling inventory, users, offers, and needed analytics. The questionnaire also aims at getting an opinion on issues to do with security, mobile compatibility, and convenience. It also helps in the identification of the platform that meets the stakeholders' needs and offer the best and efficient solution.

7.4 Requirement Specification:

The Requirement Specification for Trio Mark Clothing identifies the features that are functional and the un-functional of the intended platform. Functional requirements are the registration of users, management of profiles, search and view products, secure payment for the products, special sections for the administrative management of users, products and offers. Non-functional requirements include scalability, performance, security of data and the ability to provide with work on a mobile interface. The platform has to cater for the ease of making purchase, the organization's back end processes as well as analytics in real-time. The return to modern solutions and business goals is guaranteed by such technologies as React, Node.js, MongoDB, and Tailwind CSS.

Chapter 8

Exploration

8.1 Activity diagram:

Activity diagrams are most useful for modeling the behavior of a system or a process, documenting the activities that are necessary and identifying the utilization or opportunities for improvement. They offer an illustration of complex methodologies, and the relative positioning of different activities can be easily ascertained by the different stakeholders.

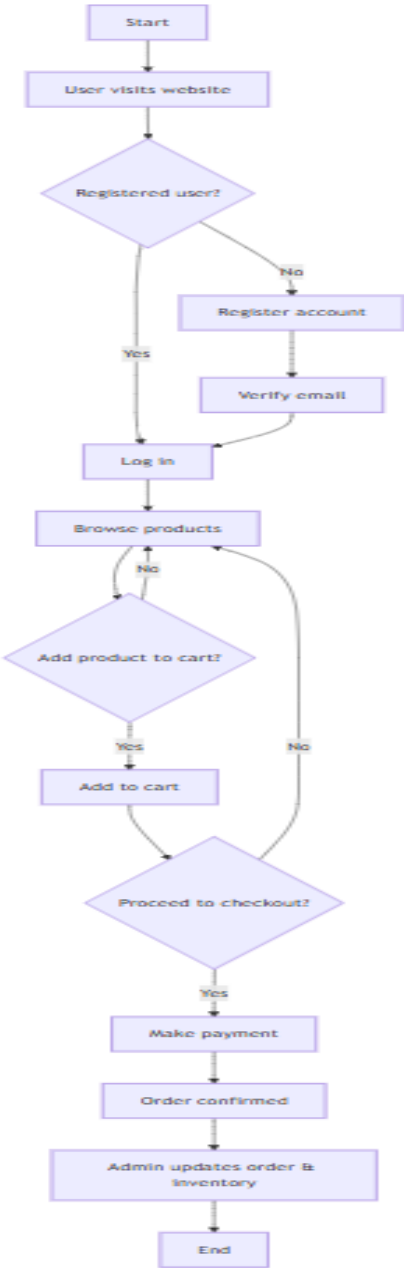


Figure 8-5: Activity Diagram

8.2 Use case of Dashboard:

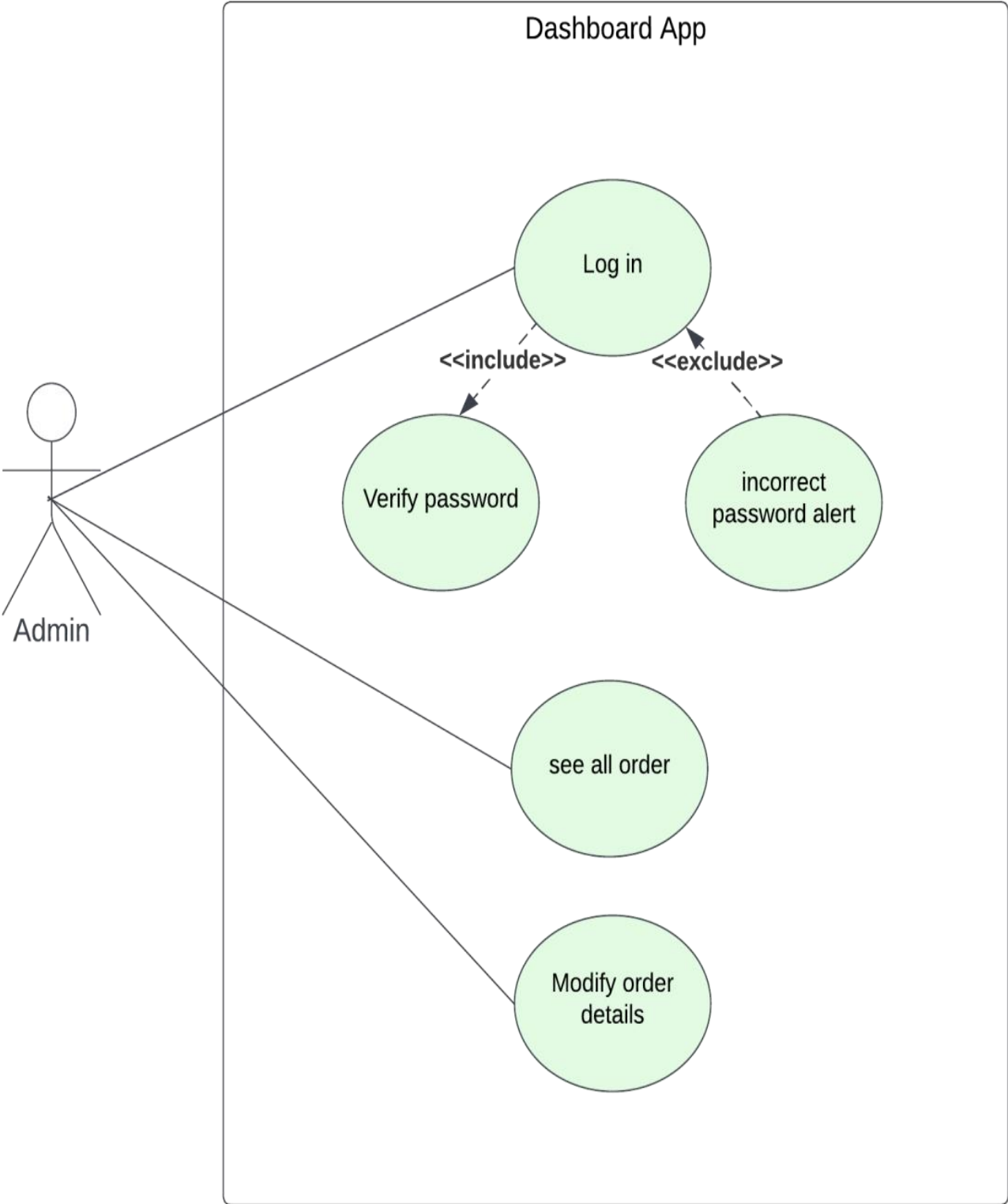


Figure 8-5: Use case of Dashboard

Chapter 9

Exploration

9.1 Module of the system:

Serial of Action	User Action	System Interaction
1	User opens the platform	System loads the homepage with navigation options.
2	User registers/logs in	System validates credentials and grants access.
3	User browses products	System fetches and displays product categories and details.
4	User adds product to cart	System updates the cart and stores product details.
5	User proceeds to checkout	System displays the checkout page and payment options.
6	User completes payment	System processes the payment and confirms the order.
7	User views order status	System fetches and displays order tracking information.
8	Admin logs in	System authenticates admin credentials and displays the dashboard.
9	Admin manages products	System updates the product database based on admin actions.
10	Admin reviews user details	System fetches and displays user data for management.
11	Admin updates offers	System applies offer settings to the selected products.

Table 8.1.3-1: Table of Module system

9.2 Class diagram of the system:

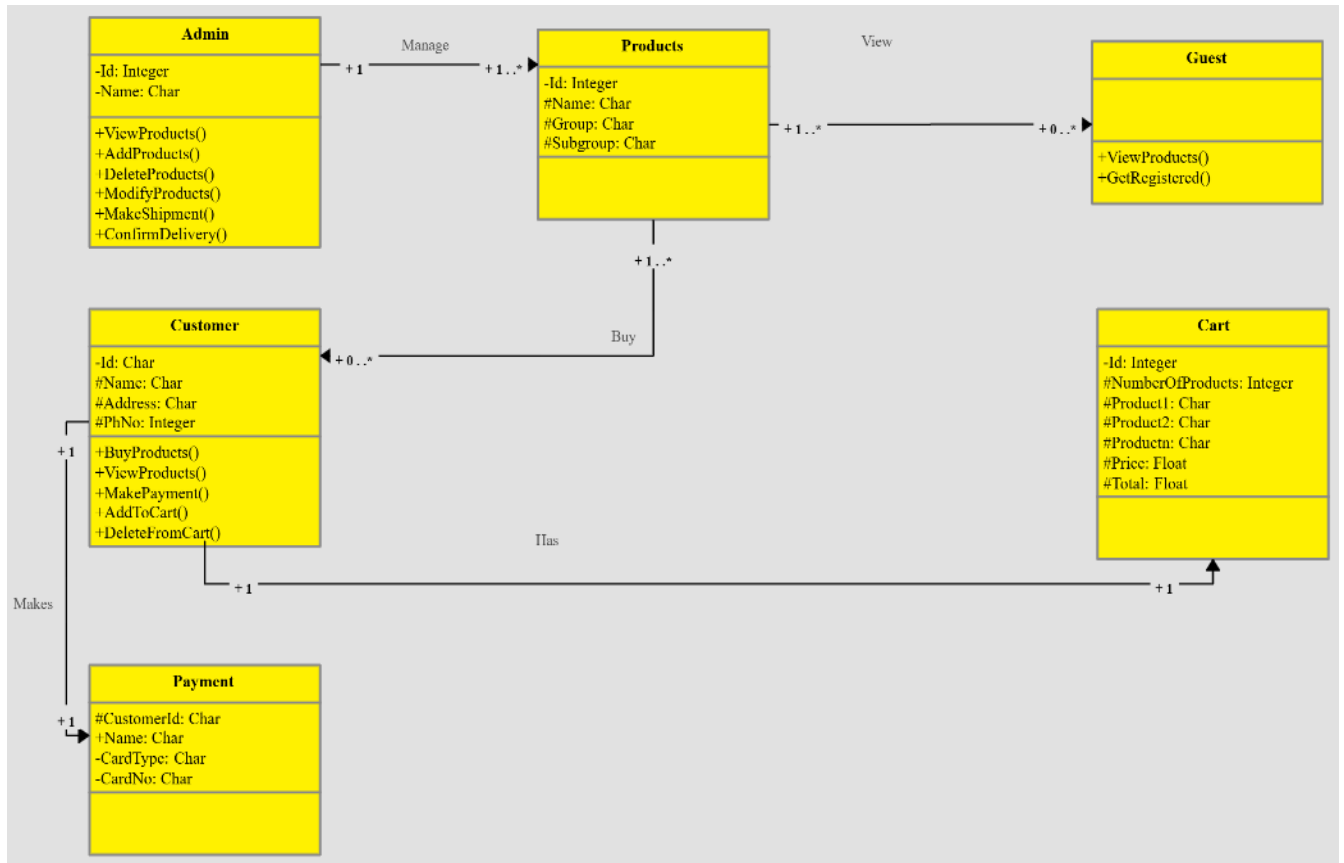


Figure 9-1: Class Diagram

9.3 High-fidelity prototype of the system:



Figure 9-8: High Fidelity prototype (Home page)



Figure 9-9: High fidelity prototype (customize page)

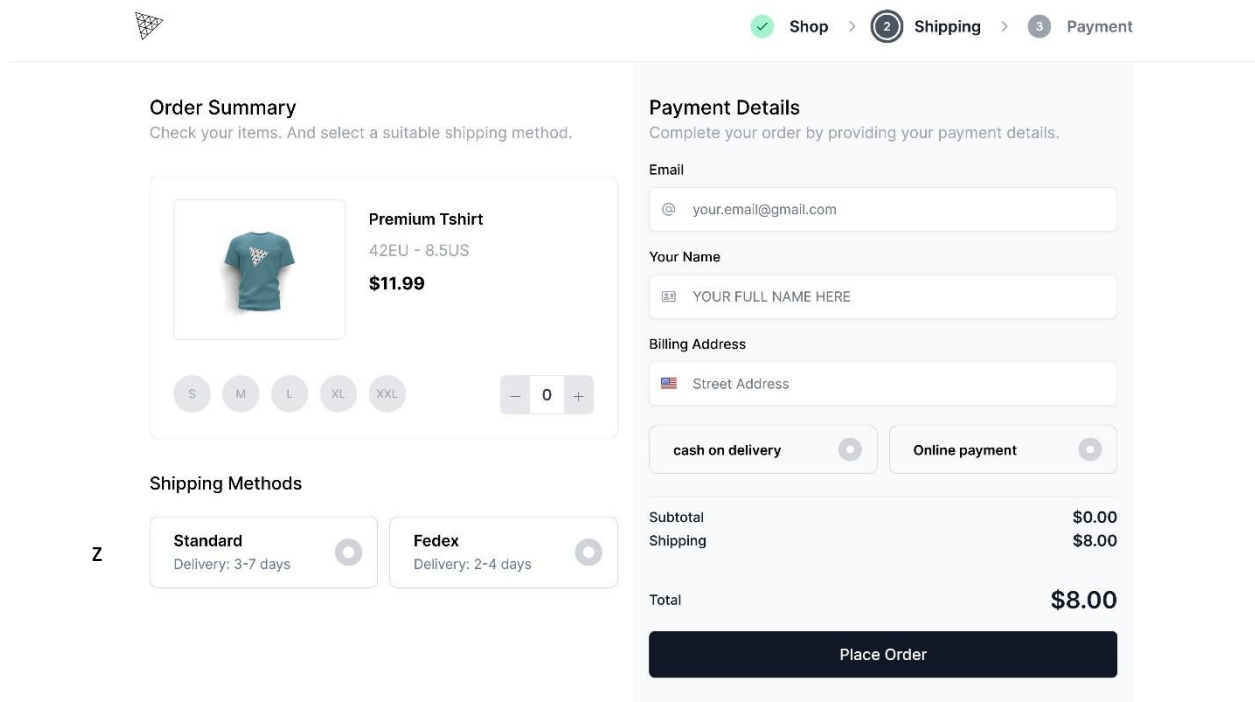


Figure 9-10: High fidelity prototype (Order page)

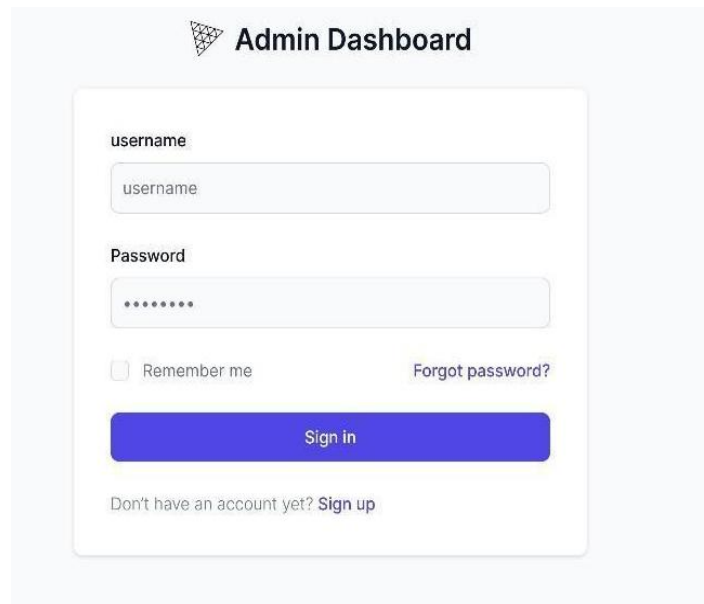


Figure 9-11: High fidelity prototype (Login page)

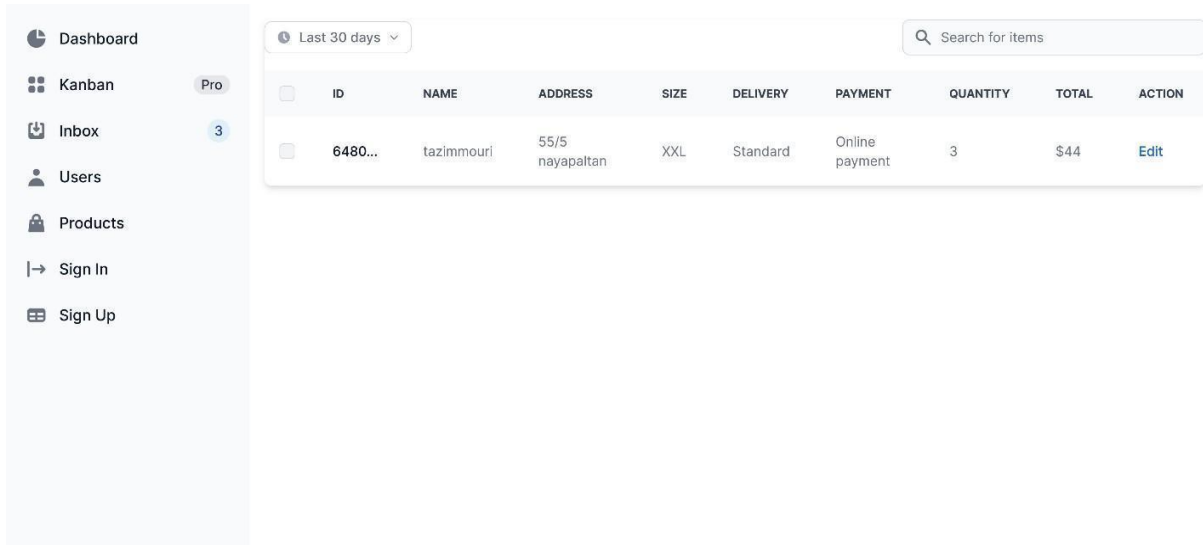


Figure 9-12: High fidelity prototype (dashboard page)

Chapter 10

Development

10.1 Folder structure of the system:

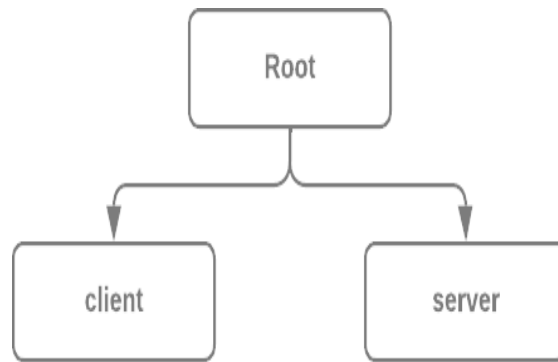


Figure 10-1: Root folder

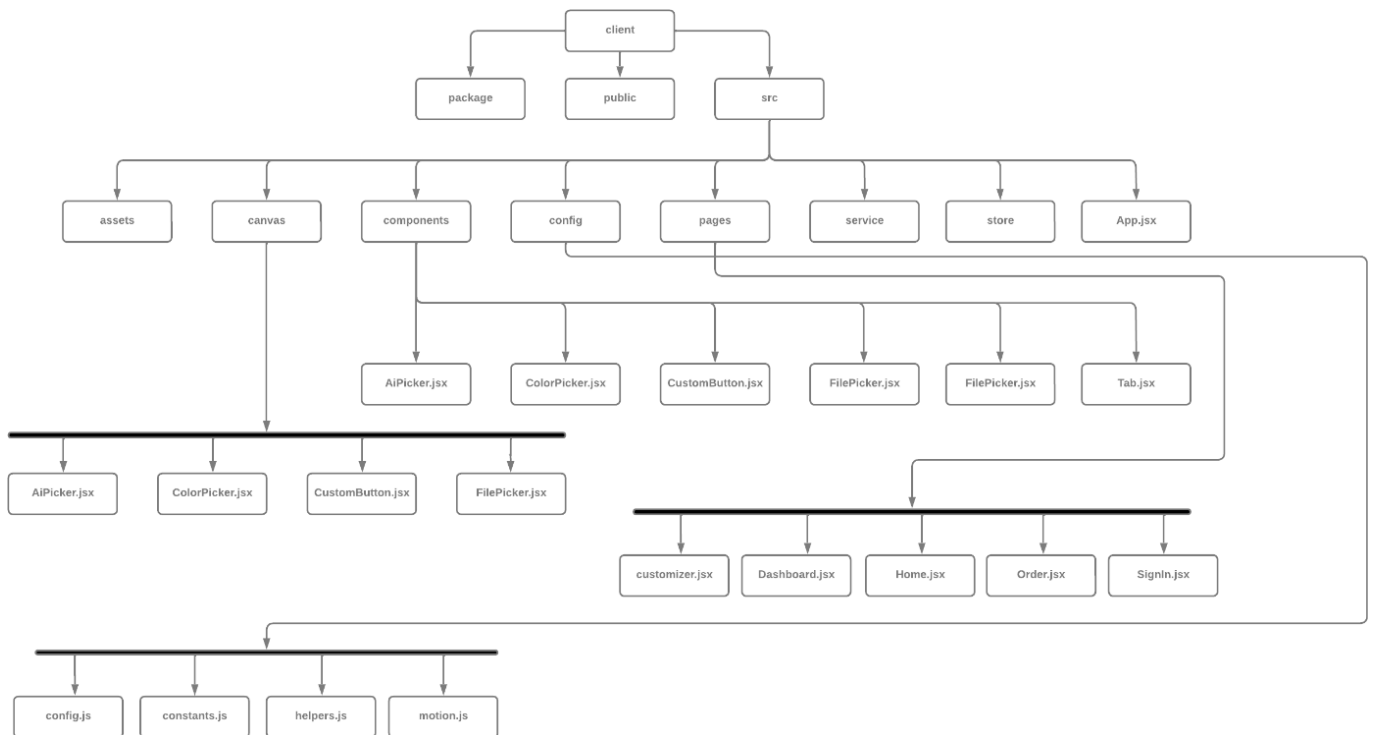


Figure 10-2: Client-side Folder structure

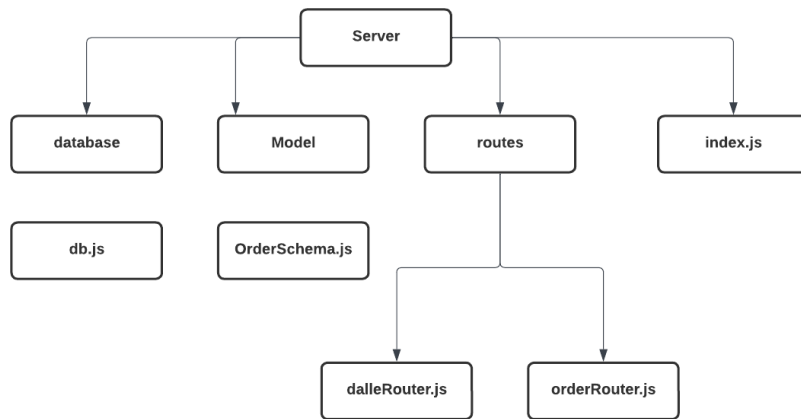


Figure 10-3: Server-side folder structure

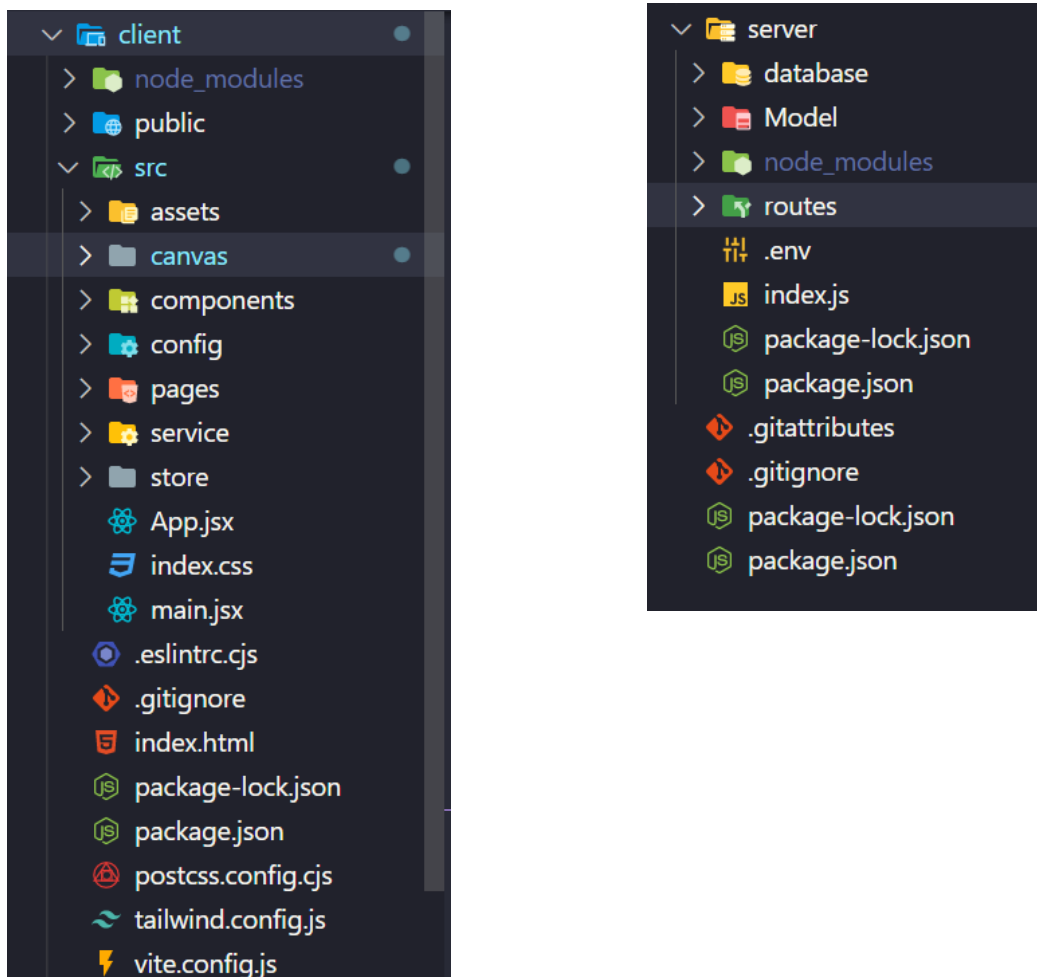


Figure 10-4: Actual folder Structure Sample

10.2 Core module output sample:



Figure 10-6: Output of Home



Figure 10-5: Output of Color-Picker Module



Figure 10-7: Output of File-picker module (1)

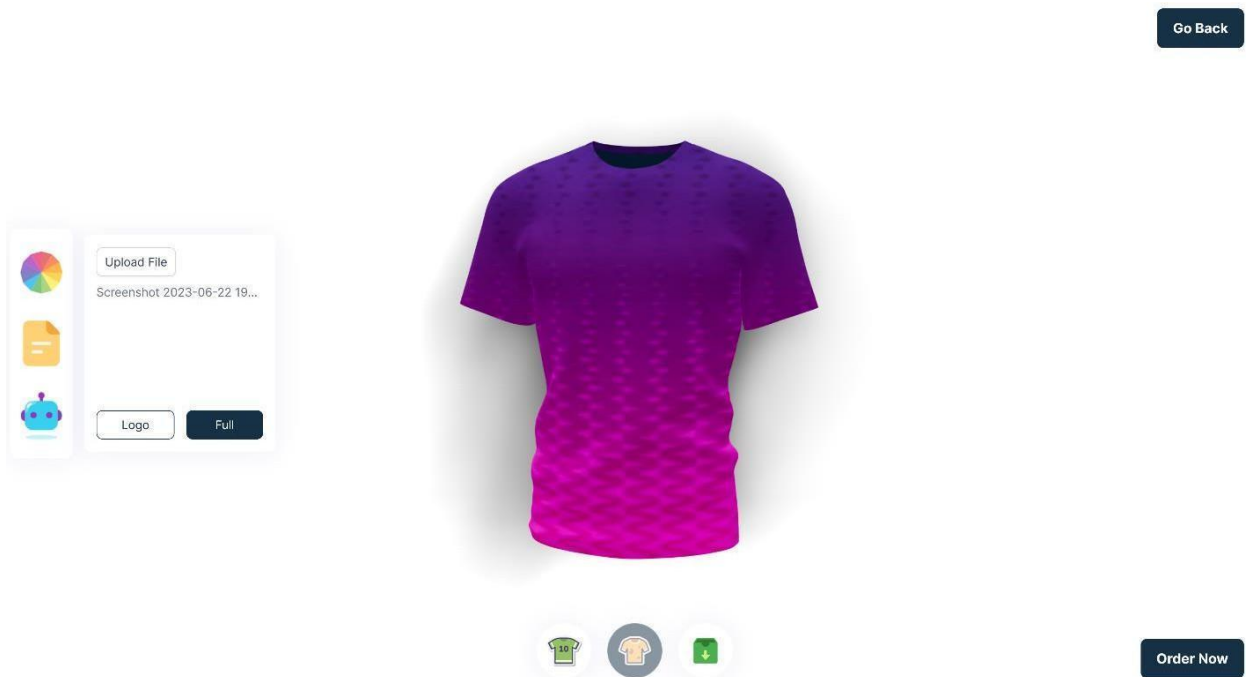


Figure 10-8: Output of File-picker module (2)



Figure 10-9: Output of Ai-picker module (1)

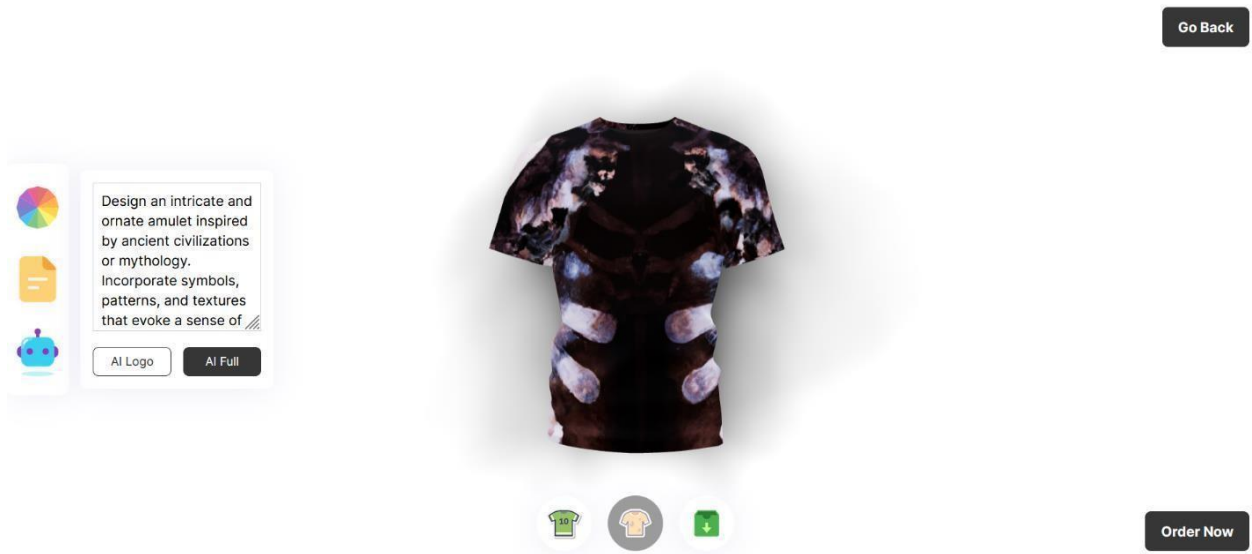






Figure 10-10: Output of Ai-picker Module (2)

 Shop >
  Shipping >
  Payment

Order Summary

Check your items. And select a suitable shipping method.



Premium Tshirt

42EU - 8.5US

\$11.99

S M L XL XXL

− 3 +

Shipping Methods

Standard

Delivery: 3-7 days

Fedex

Delivery: 2-4 days

Payment Details

Complete your order by providing your payment details.

Email

Your Name

Billing Address


cash on delivery

Online payment

Subtotal	\$36.00
Shipping	\$8.00
Total	\$44.00

Place Order

Figure 10-11: Output of Order processing Module



Admin Dashboard

username

Password

Remember me
 Forgot password?

Sign in

Don't have an account yet? [Sign up](#)

Figure 10-12: Output of Admin login Module

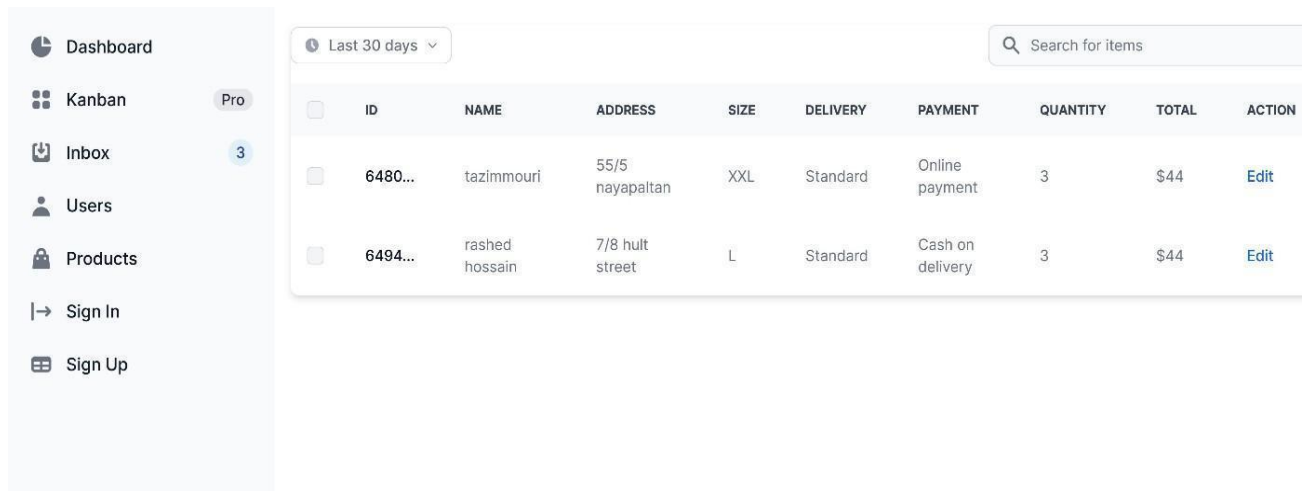


Figure 10-13: Output of Dashboard Module

10.3 Prioritization while developing:

Serial	Requirements
1	User registration and authentication with email verification.
2	User profile management (update name, email, phone, address).
3	Product browsing with filtering and sorting options.
4	Shopping cart functionality (add/remove products, view total).
5	Secure checkout with multiple payment methods.
6	Order management (view order status, track orders).
7	Admin login and dashboard for managing users and products.
8	Admin product management (add, update, delete products).
9	Admin offer management (create, update, remove offers).
10	Real-time order and user statistics for admin.
11	Integration of secure payment gateways.
12	Mobile responsiveness for optimal user experience.

Table 10-8.1.3-1: Table of Module system

Chapter 11

Testing

11.1 Test Case:

Test Case ID	Test Scenario	Test Steps	Expected Result	Status
TC1	User Registration	<ol style="list-style-type: none"> 1. Navigate to the registration page. 2. Enter valid email, password, and other details. 3. Click on "Register". 	User is registered successfully and email verification sent.	Pending
TC2	User Login	<ol style="list-style-type: none"> 1. Navigate to the login page. 2. Enter valid credentials (email and password). 3. Click on "Login". 	User is logged in and redirected to the homepage.	Pending
TC3	Product Browsing	<ol style="list-style-type: none"> 1. Navigate to the product catalog. 2. Select a category. 3. Click on a product to view details. 	Product details are displayed correctly with price and description.	Pending
TC4	Add Product to Cart	<ol style="list-style-type: none"> 1. Browse products and select one. 2. Click "Add to Cart". 3. Go to the cart page. 	Product is added to the cart and displayed with correct quantity.	Pending
TC5	Checkout Process	<ol style="list-style-type: none"> 1. Go to the cart page. 2. Click on "Proceed to Checkout". 3. Enter payment details. 	User completes checkout and receives order confirmation.	Pending
TC6	Admin Product Management	<ol style="list-style-type: none"> 1. Admin logs in. 2. Navigate to "Manage Products". 3. Add a new product. 	Product is added successfully and appears in the product list.	Pending

TC7	Admin Manage Offers	<ol style="list-style-type: none"> 1. Admin logs in. 2. Navigate to "Manage Offers". 3. Create a new offer for a product. 	Offer is applied to the product and displayed on the product page.	Pending
TC8	Admin View Analytics	<ol style="list-style-type: none"> 1. Admin logs in. 2. Navigate to "Analytics". 3. View sales and user statistics. 	Real-time analytics (sales, orders, users) are displayed correctly.	Pending
TC9	Order Tracking for User	<ol style="list-style-type: none"> 1. User logs in. 2. Navigate to "Order History". 3. Select an order to track. 	Order status and tracking details are displayed correctly.	Pending
TC10	User Profile Update	<ol style="list-style-type: none"> 1. User logs in. 2. Navigate to "Profile". 3. Update personal information. 	Profile is updated with new details and saved successfully.	Pending

Chapter 12

Implementation

12.1 Scaling:

Scalability therefore means the ability of the Trio Mark Clothing platform to affordably accommodate higher volumes of users, products, orders and data as the business scales up. ., caching for faster access to frequently updated data, content delivery network (CDN) to handle much larger numbers of users, and database sharding to maintain efficient CPU usage under higher load.

To achieve scalability, the system can be scaled in two primary ways: vertical scaling (the way of enhancing the capability of the several servers) and horizontal scaling (the way of adding the number of the servers to reduce pressure on shared server). For instance, one can escalate the frontend and the backend through the cloud structure. This enables easy management of with influx of visitors during festive seasons or during promotion exercises. In MongoDB for instance, Data can be partitioned with increased capacity across several servers thereby guaranteeing high availability and performance. The backend can be improved for more efficient loads, using load balancing to split the requests for an application across this infrastructure.

Moreover, frontend may be optimized for the scalability using the client-side rendering techniques in the framework of React and decreasing a number of the requests to the server.

Why it is important to use scalability when designing the platform is that it will allow the Trio Mark Clothing to handle new users, products, and orders, all these form factors without any significant issues.

12.2 Load Balancing:

Load balancing is a process of distributing the loads of incoming network traffic over the number of servers or other resources so as to avoid over Taxing the resources of any h, Load balancing helps to enhance performance, reliability and availability of the system. Generally on Trio Mark Clothing platform, load balancing guarantees that the platform can be able to support multiple users especially in generative events such as sales promotions.

load balancing approaches are of diverse types and include round-robin method, least connections method, and IP hash method. In round-robin load balancing, the Internet client connections are

distributed systematically in cycles round various servers, that is, load balancing is cyclic. The least connections method wants to send requests to that server which is having the least number of connections and helps in consuming the resources in the best manner. IP hash works by taking a client's IP address to decide which server should serve their request so that if the request comes with the same client several times, it is served by the same server. If the server is having issues or maybe it receives a high number of requests it can easily redirect the request to other servers making the servers highly available. It is a flexible solution that keeps the speed of responses high and makes shopping convenient for users – even under the conditions of high loads [20].

Chapter 13

Critical Appraisal and Evaluation

13.1 Objective that could be met:

The objectives that may be realized by the Trio Mark Clothing platform are as follows: The platform may meet the objective of offering convenient and efficient e-commerce for the users and equally strong administrative controls for the functioning of the platform. For consumers, the platform facilitates the necessary product search as well as secure check-out and account management, thus providing satisfaction and relevant convenience. For administrators it provides options to manage products, users and orders, informative sales' and users' activity real-time statistics. Tools that are used by the platform including responsive design, secured payment gateways, and efficient load balancing make the platform reliable, scalable, and fast. Overall, these objectives are focused on improving customer interaction and facilitating the development of the business in a highly competitive online selling environment, as well as on improving corporate efficiency.

13.2 How much better could have been done:

Despite the fact that the Trio Mark Clothing platform integrates nearly all aspects of online shopping, there are a few areas that could be enhanced to optimise the platform's functionality and the resulting user experience. Some sample enhanced AI-enabled functionalities that can enhance engagement and sales include: Offering user specific products based on the behavior and choices displayed on the website. Adding more than two languages as the primary option and also implementing correct pricing for a specific area would make the platform more accepting. In the same way, combining a high level of analytics with a system of predictive insights could launch administrators to the data-oriented level of governance. On the technical side, replacing a monolithic pattern of architecture by the microservices one might be beneficial for performance and reliability issues. Finally, the inclusion of other AR options, for example, try-on options could positively differentiate shoemakers from their competitors. With these improvements, the platform could become more relevant and ready for the changes in the further e-commerce environment.

13.3 Which features could not be touched:

Certain features of the Trio Mark Clothing platform must remain untouched as they form the core functionality and user expectations of the system. These include the secure and intuitive user registration and login process, as they ensure account safety and ease of access. The product catalog with detailed descriptions and images is essential for enabling users to browse and select items. Similarly, the checkout process, including secure payment gateways and order confirmation, must remain robust and reliable to build customer trust. The admin dashboard with its product and user management capabilities is critical for smooth operations. Additionally, features like order tracking, returns policy, and 24/7 customer support are fundamental to the user experience and should remain fully functional to uphold customer satisfaction and platform credibility.

Chapter 14

Lesson Learned

14.1 Pre Project – Review – Closing:

Pre-Project Phase

The pre-project phase is about scope of the project, requirement analysis, and possibility of project implement. In other words, feasibility entails collecting market information, identifying goals and outlining a specific plan. Everyone affected by its implementation defines the issues that the project may face, the features are agreed, and the resources are assigned. Pre feasibility (technical and operational) and post feasibility (financial) studies are conducted to check the project feasibility. There is also formation of a clear chart and time line that helps in the development process to take place.

Review Phase

This is routine checking as well as approval of the project at some intervals to ensure that it meets the laid down objectives or not. There are periodical progress meetings, unit, integration and system tests, and feedback from stakeholders. During this phase developers make sure that all subsystems work rightly ,all the laid down user interface is right and its back bone systems are efficient. Any questions or variances that come up, are resolved so the project does not experiences any delay.

Closing Phase

The closing phase is a process in which the product is completed and a project is final, and deliver to the stakeholders. This is undertaken through the installation of the plat form in a live environment being tested and confirmed if all features are working properly and offering necessary user and administrator training. For purpose of determining if the project was successful, and to conduct an assessment and get feedback of the project and the lessons learnt, the post project review is conducted. Preventive and support strategies are also developed to make certain that the system continues to be dependable and current when actually implemented.

14.2 The Problem I Have Faced:

Several problems were considered and resolved in the course of establishment of the Trio Mark Clothing platform during the development stage. An important challenge of the systems was how to cope with large number of users on the platform, for instance when promotional offers were conducted. Another consideration was efficiency and cost – while it is possible to achieve high performance, doing so without choking the back end and relying on appropriate load bearing and distribution mechanisms is another matter.

Further, implementing secure payment gateways posed difficulties mainly because of the concern with payment standard compliance and data security. Extra features such as real time analytics and offer management were implemented through frequent and complex database queries and optimisations which early on proved to be a drag on the systems velocity. On the side of the user interface it was essential to make sure that the design works well on different devices, which required testing of the project and its changes several times.

The second big challenge was to balance the functionality of the admin side and the user side which was a problem because the two had to have completely different features but had to be used in conjunction. Last but not the least; communication and versioning with multiple groups for frontend, backend and data management had become a tedious task and needed to be enhanced in terms of synchronization avoiding conflicts of conflicts of development within the development cycle.

14.3 What Solutions Occurred:

In connection with the identified challenges of the Trio Mark Clothing platform's development, several solutions were applied. Regarding horizontal scaling, tools such as Nginx together with AWS allowed loading balancing to ensure that the platform could handle large traffic while maintaining great performance. Isolating the backend and refactoring it to use asynchronous programming, such as completing many operations at the same time, and employing caching services (e.g., Redis) increased speed and relieved servers additional demands.

For payment integration feature, commonly used technology platforms were used like Stripe and PayPal to conform to data protection and payments. Better indexing of the databases used and using MongoDB to format the data for a large number of queries used in real-time analytics and offer management improved its performance.

On the frontend, testing on more than one device with tool like BrowserStack facilitated responsiveness and on the feedback received in successive loop the user interface of the sites was redesigned to accommodate the necessary updates for access and convenience. By decoupling the administration and user functionality, the module was designed to be independent of the other and free of conflicts.

For better coordination of works accomplished by different teams and =branches=, Git and GitHub were used for version controlling and for better follow ups and smooth communication and =handling of tasks=, Agile methodologies such as Trello were employed. In one way or the other, all these solutions helped to cover the problems and guarantee the successful implementation of the platform.

Chapter 15

Lesson Learned

15.1 Summary of the project:

Trio Mark Clothing project is a concept that started as an online shopping site where users who want to purchase fashionable wear will be able to find it easy while providing adequate administrative tools that will allow for easy management of the site. Using React for the frontend, and Node JS for backend, supplemented by Tailwind CSS and MongoDB database this application includes such intuitive UI options as account creation, product viewing, purchase, and personal profiles. cache administrators have a privileged access that covers the management of users, products, orders, and offers all in one easy to use dashboard. Security of payments, analytics, and scalability combine reliably with challenges for offering enhanced competitive online shopping platform.

15.2 Goal of the project:

Trio Mark Clothing is the created project aimed to propose all necessary updates for making the modern e-shopping more convenient for customers and effective for employees and management. It is supposed to offer convenient navigation, safe payments, as well as customizable user tools like personal account and order status indication. For administrators it can potentially provide convenient means of managing products, users and analytics. Through the adaptive features including integrated added technologies, secure payment gateways, and responsive design, the project aims to assist business development and bring value to its users.

15.3 What I have done in Documentation:

This document of Trio Mark Clothing project includes every stage of the platform development from the planning point to the deployment point. I described the aims and characteristics of the project and provided the features for the user and administrator interfaces. These are React, Node.js, MongoDB, and TailwindCSS on which I explained in detail on the parts they played in the creation of the system. Also, I prepared user and admin documentation setting out the registration process, products, and orders management. I also created technical specifications, activity diagram, class diagram, and test cases to make it easier to come back to and modify. The documentation is intended for further evolution of the system, as well as for testing and staff training.

My Experience:

While working on the Trio Mark Clothing project, I learned about the peculiarities of web development and the management of the project. I was writing both frontend and backend code using React, Node.js MongoDB and using frameworks like TailwindCSS. I wrote interfaces and served as an interface between frontend and backend, created dynamic plots generated in respond to user interaction.

I also did some architectural tuning of the platform to make it run faster and to support the planned growth of user numbers through horizontal scaling techniques and by improving the database performance. Also, I work in cooperation with my colleagues, adhere to the process of the regular meetings' conducting, and take an active part in documentation. I was able to pick improvements in my problem solving skills especially when it comes to understanding and handling numerous demands in different system aspects.

All in all, the project consolidated the knowledge of creating full-stack applications and improve the skills in overcoming problems in technical as well as in a team setting.

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