A MACHINE LEARNING-BASED JAVA WEB APPLICATION FOR GARMENT PRODUCTION PREDICTIONS AND ONLINE PURCHASING.

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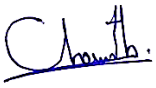
Student Declaration In Respect of Individual Work

I, Mananduwa Acharige Chamath Shyamal who bears the student ID: 20240706 declare that the whole of this work is the result of my individual effort and that all quotations from other authors have been acknowledged. This dissertation is submitted in partial fulfilment of the requirements of Cardiff Metropolitan University for the Degree of BSc (Hons) Software Engineering.

Signature:  Date: 05th April 2023

Acknowledgment

First, I would like to express my most incredible genuine gratitude to the "Cardiff School of Technology" for providing students with this kind of opportunity and responsibilities, alongside the physical aptitude and mental capacity required to complete the final project. This recognition is meant to communicate our heartfelt gratitude and admiration to everyone who helped bring about the satisfactory conclusion of this prototype system.

First, I would like to use this chance to thank (Supervisor Name) for his leadership and supervision throughout the project research. While creating this project, he offers several suggestions for completing it respectably and professionally. The most important thing is to offer my heartfelt gratitude to my family and anybody else who contributed in any way to the successful completion of the mission.

Thank You!

Abstract

This documentation provides an overview of the process that will be followed to implement a web application for the textile sector that uses machine learning algorithms to provide predictions on the cost and time of textiles. Consumers also have the option to shop for textile items online, which offers a shopping experience that is both convenient and easy to reach. Java and Angular were used as languages, MySQL Workbench as database designing, and Visual Studio and IntelliJ were the development tools used to create the application. These technologies were picked because of their dependability and capacity to deal with the complex needs of the project.

The achievement of this project's goal, which was to execute it successfully, not only marks a key milestone in developing the textile industry but also lays the groundwork for future endeavors. The overall quality of the experience provided to customers will continue to be enhanced, as will the effectiveness of the textile industry as a whole.

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Chapter 1: Introduction

The textile manufacturing industry has served as a critical player in the economy of the whole globe for much longer. It is responsible for the creation of career opportunities and is an essential raw material supplier for apparel manufacturers all over the world. Since it is a multifaceted and intricate sector, it includes a variety of operations throughout the supply chain, such as the acquisition of raw materials, manufacture, distribution, and consumption of finished goods. New technologies have presented the textile industry with fresh prospects for boosting its efficiency and overall productivity.

One of these areas in which technology may have a significant influence is the arena of predicting the price of textiles, the amount of time necessary to create apparel, and the required to buy textile items. This thesis aims to research the creation and implementation of a solution for a Java web application that will cover these essential components of the textile industry and illustrate the value of this study.

It is impossible to emphasize the importance of correct pricing predictions for textiles since they immediately affect the profitability of firms involved in the textile industry's supply chain. Price changes may be caused by a wide range of variables, including variations in the pricing of raw materials, movements in consumer spending, global economic situations, and even geopolitical considerations. The creation of a textile price prediction model that is strong and dependable enables companies to make educated choices about the purchase of goods, the scheduling and supervision of production, and the management of inventories. So, precise price volatility makes it possible for companies to improve the effectiveness of their activities, cut down on waste, and eventually boost their bottom line.

In addition to accurate price forecasting, the textile sector must accurately forecast the time necessary to create an apparel item. It is essential to have the capacity to precisely predict the amount of time needed to make various articles of clothing live up to the standards set by customers and keep a competitive advantage in the market. Manufacturing delays can result in stockouts, higher expenses associated with maintaining inventory, and even the loss of valued clients. The suggested solution for the problem of creating garments on time is a Java web application that uses complex algorithms and data-driven techniques. Its goal is to deliver highly accurate estimates. This will allow producers to improve manufacturing processes,

reduce delivery delays, and guarantee that items are delivered on time to merchants and end customers.

Moreover, procuring textile items is essential in the supply chain. This means acquiring the fabrics, trims, and other supplies required for creating garments is part of this process. Businesses may improve their supply chain management, reduce the likelihood of running out of inventories, and save money by adopting more efficient buying procedures with the help of a Java web application. Saving money, boosting productivity, and making customers happier are all possible outcomes.

The suggested Java web application solution can change the textile business by considering the three critical elements: textile pricing prediction, time forecasts for apparel manufacture, and acquiring textile items. The program will provide a robust and intuitive platform for organizations to improve operations while making data-driven choices by utilizing cutting-edge technology such as algorithmic machine learning, big data analytics, and virtualized computation.

In addition, the results of this research will add to what is already known about how technology is being used in the textile sector. It will shed light on the advantages and disadvantages of implementing Java custom application methods for forecasting textile prices, estimating the time required to make garments, and buying textile materials. Moreover, it will explain how technologies may help textile companies improve their productivity and profitability.

1.1 Problem Statement

The worldwide textile sector has experienced significant growth and diversification due to the consistently increasing demand for a wide range of textile goods across various markets. Manufacturing textile goods comprises complicated procedures to manage effectively, including production time, resource allocation, and acquiring necessary materials. The capability of textile firms to precisely forecast pricing and timescales for the manufacturing and investment of their goods is one of the most critical variables that determine whether they will succeed. Consequently, a fundamental issue facing the textile industry is the absence of an efficient solution for accurately anticipating costs, manufacturing times, and the need for purchasing.

In the textile sector, the lack of a dependable instrument for price forecasting has resulted in ambiguity in decision-making, which harms both the efficiency and the competition of textile producers. Businesses often have trouble estimating the future pricing of raw resources and completed goods, which causes problems with their budgets and makes it difficult for them to establish acceptable prices for their products. The inability of businesses to make accurate pricing projections prevents them from benefiting from advantageous market circumstances and results in missed potential and inferior strategic choices.

Also, the manufacture of textiles is an employment process that needs careful planning to manage production time successfully. The manufacturing sector has difficulties accurately estimating the amount of time necessary to finish the various phases of manufacturing, which may result in delays and wastage. Incorrect time forecasts may lead to missed deadlines, additional expenditures, and decreased overall performance. In addition, businesses risk failing to allot the required resources to accomplish their production objectives, which may result in unfulfilled consumers ' expectations and reduced market share.

As a result of demand and supply swings, it might be challenging to know what to buy when it comes to textiles. When deciding whether to purchase raw materials and finished goods, businesses must consider pricing, quality, and availability, among other considerations. Due to the absence of a centralized purchasing system, inefficient choices may result in higher costs, surplus stock, or supply chain disruptions. For textile businesses, keeping up with the always-shifting market is difficult enough without having to guess what consumers want constantly.

There is still a significant gap in creating a Java web application solution that can handle these difficulties in the textile business, despite the availability of data and technological developments. Current solutions may not provide the precision, scalability, or flexibility needed to fulfill the unique requirements of the textile industry. Nevertheless, the efficiency and usefulness of these solutions may be reduced if they are challenging to use or do not connect well with preexisting systems.

Consequently, this research aims to create a Java web application that uses cutting-edge data analytics and machine learning methods to make informed purchase choices and precise pricing forecasts in the textile business. By investigating the possible advantages and limits of utilizing machine learning algorithms for textile pricing and production time prediction, the suggested solution will not only solve the difficulties mentioned above. Still, it will also add to the reservoir of knowledge in the area.

This study will also examine the characteristics most important to include in the estimation techniques and how they affect the timing and cost of textile manufacturing. In addition, the research will analyze the solution's impact on the textile sector's effectiveness, productivity, and competition, as well as the possibility of integrating the solution with current systems in textile enterprises. This research aspires to create an exhaustive and precise Java web application alternative for price forecasting, time forecasts for the production process, and textile-making purchases to help textile businesses overcome significant obstacles to improve their decision-making abilities, processes, and global standing.

1.2 Project Objectives

The textile industry is essential to the world financial system because of its considerable contributions to employment, production, and commerce. Because of this industry's unceasing expansion and growth, there is an ever-increasing need for efficient decision-making methods and strategies for the administration of resources. For textile businesses to maintain profitability and competitiveness in a constantly shifting market, they need accurate pricing forecasts, adequate time planning for garment manufacturing, and optimum buying choices.

This thesis intends to create a solution in the form of a Java web application that tackles the problems of price forecasting, time prediction for apparel, and textile acquiring. In considering the difficulties and opportunities afforded by the textile sector, this dissertation has chosen to focus on constructing a solution in the form of a Java web application. The primary purpose of the endeavor is to create a judgment tool that is user-friendly, adaptable, and flexible and that makes use of sophisticated data analytics and machine learning approaches to enhance the accuracy and efficacy of judgment call procedures in the textile sector.

The following is an identification of this project's particular goals:

- To thoroughly assess the research on pricing prediction, production time estimate, and buying judgment in the textile sector to find the most significant aspects that influence these operations.
- To research an investigation into various machine learning algorithms appropriate for use in the manufacturing industry in price forecasting, time forecasting for the production process, and acquiring support; this will be done with the industry's distinctive traits and demands in mind.
- This project aims to design and construct a Java web application solution that incorporates the algorithms for machine learning and offers a consumer dashboard for textile firms so that they can make educated choices about pricing, manufacturing time, and purchasing.
- This task aims to evaluate the preciseness and efficacy of the proposed approach in forecasting pricing, production schedule, and buying choices. This will be accomplished by contrasting the predictions made by the solutions to historical information and regulatory requirements.

- To evaluate the practicability of incorporating the suggested Java web application solutions with the current systems in textile industries and to analyze the solution's possible influence on the industry's overall productivity, liquidity, and attractiveness levels.

This thesis hopes that by accomplishing these goals, it will be able to make a substantial addition to industrial textile judgment tools and offer a valuable resource for textile firms looking to improve their business operations and results. The research results and perspectives produced by this research will primarily help tackle the current challenges in the industry but will also open the door to future studies and breakthroughs in this area. These benefits are twofold: first, they will help tackle the current issues facing the sector; second, they will contribute to establishing a foundation for future

1.3 Project Scope

The limits, specifications, and commitments of the solutions for the Java web application that predicts textile prices, indicates the amount of time needed to produce garments, and provides help for making purchase decisions are outlined in the project's scope. The creation, implementation, and evaluation of the suggested solution are all included in the content of this project. It takes into account the requirements of textile businesses, the requirements of their consumers, and the requirements of administration.

1.3.1 Requirements:

- Data Collecting and Preprocessing: To complete the project, it will be necessary to gather and preprocess both historical and actual information relating to the costs of textiles, the lengths of their manufacturing periods, and the choices made about their purchases. The algorithms for machine learning that power a stable will be trained and evaluated with the help of these data points.

- Machine Learning Algorithm Selection and Implementation: The project involves the examination and choosing the suitable algorithms for machine learning for forecasting rates, production schedules, and buying behavior, as well as the integration of these methodologies within the Java web application. In addition, the project includes the development of algorithms that use machine learning.

- User Interface Design and Development: The task involves creating and advancing a consumer user interface that allows textiles firms to engage with the predictions system and straightforwardly use the readily produced information.

- System Integration: The project will include coordinating something like the suggested system with the present scenario in the textile industry. This will ensure that there will be no disruptions in the data flow and that interoperability will be maintained.

- Evaluating the Accuracy and Effectiveness of the Proposed Solution in Forecasting Prices, Production Schedule, and Buying Behaviour: The purpose of this project is to assess the reliability and efficacy of the suggested solution in forecasting prices, production schedule, and buying behavior, as well as validate its impact on the effectiveness, revenue growth, and competitive nature of manufacturing SMEs (Small and Mid-Size Enterprises).

1.3.2 Importance:

The following are some of the explanations why it is essential to design a Java web application for predicting the price of textiles, providing time estimates for the creation of apparel, and providing assistance for buying decisions:

- Decision-Making Capabilities Will Be Enhanced: The suggested system will supply textile firms with precise forecasts and insights, which will allow those companies to make better decisions about price, manufacturing time, and purchasing.

- Improved Efficiency: The forecasting system will help textile firms optimize manufacturing techniques, lower timeframes, and eliminate inventory levels to optimize their processes and achieve greater efficiencies.

- Improved Profitability: Textile firms can capitalize on favorable market circumstances, increase earnings, and limit the danger of incurring losses if they make accurate pricing projections and optimize purchase choices.

- The advantage in Competition: Foreseeing market trends and efficiently managing resources accurately are two skills that will help textile firms establish a competitive advantage in a global market that is becoming more difficult.

1.3.3 Taking Care of Clients While Keeping an Eye on Administration:

The following capabilities would be made available by the proposed Java web application solution, making it possible for textile enterprises to handle their customers and administrative tasks in a more effective manner:

- Integration of Customer Relationship Management (CRM): The prognostication is that the system will interact with established CRM systems, which will enable textile enterprises to personalize their marketing campaigns, offer promotional offers that are specific to individual customers, and enhance client happiness based on the desires and developments that are anticipated.

- Planning and Scheduling Production: The system can help businesses more correctly predict production schedules, allowing them to more efficiently plan and utilize things and fulfill deadlines set by consumers while maintaining excellent standards of artistry and service.

- Inventory Management: The suggested solution will support inventory control by optimizing consumer choices and decreasing the possibility of excessive stock or excess inventory, resulting in improved supply chain management.

A thorough Java web application alternative will greatly enhance the textile sector's judgment mechanisms and overall quality and contributes significantly to the manufacturing industry's progression. This will be accomplished while addressing the project goals and specifications highlighted in the previous paragraph.

Considering this scenario, here are some project scopes.

- Predicting the time and price of the textiles helps to manufacture future textiles.
- Admin can add clothes, edit, update, and delete.
- Admin can add, edit, update, and delete clothes for new fashion trends.
- Admin can add, edit, update, and delete any special offers for garments.
- Customers can buy clothes through the application.
- Customers can get price predictions for designing a particular cloth.

- Customers can get the prediction of the time it will take to create a dress available.
- Customers get notifications when a new fashion trend is added to the system.

1.4 Project Limitations

Whereas the suggested Java web application solution for textile price forecasting, time forecasts for the production process, and purchase intention assistance seeks to solve many of the obstacles that the textile mills are currently facing, there is a possibility that it will also have such constraints. Some examples of these restrictions are as follows:

- Data Quality and Availability: The precision and usefulness of the predictive model are heavily dependent, to a considerable extent, on the reliability and accessibility of both previous and actual statistics. The effectiveness of machine learning algorithms might be significantly impacted, which can lead to erroneous predictions. Inadequate, inconsistent, or obsolete data can be especially problematic.

- Limits of the Algorithms: Algorithms for machine learning, despite their sophistication, have intrinsic disadvantages and may not always have a spot-on procedure for estimating. The selected algorithms could also be vulnerable to shifts in the patterns in data that lie behind them, or they might need to be regularly updated to keep their correctness over time.

- Adaptability and Scalability: It's possible that the suggested solution won't be easily adapted to other textile firms' specific requirements or scaled up to accommodate their growth. There is a possibility that the needs of various companies may differ and that the system will require more personalization to accommodate specific difficulties or goals.

- Integration Issues: It's possible that integrating the suggested Java software platform with legacy infrastructure in textile industries would significantly create technical challenges if the systems are outdated or developed on various technology frameworks. For something to be successfully implemented, extra time, energy, and assets might be needed.

- User Adoption: The success of the suggested solution is contingent upon the users of something like the textile industries adopting it. User acceptance may be hindered by a refusal to modify, as well as a lack of comprehension of the advantages provided by the system. This will reduce the total effect of the system.

- Limitations Related to Cost and Resources: The method for creating, operating, and managing the suggested Java web application may demand substantial human and financial resources, which may not be possible for all textile enterprises and small and medium businesses with restricted budgets.

- Legal and Ethical Issues: The gathering, storing, and processing of data may give rise to ethical and legal concerns, most notably concerning the protection of personal information and the safety of stored data. In hopes of guaranteeing compliance with data privacy requirements and addressing these issues, more efforts and experience may be required.

While designing the suggested Java web application solution for the textile sector, it is vital to identify these constraints to avoid problems. The project can take preventative measures to optimize the overall efficacy and profitability of the proposed model if these aspects are considered throughout the planning, progress, and design implementation. In contrast, the project is being designed, developed, and implemented.

1.5 Design Overview

The Java web application solution for forecasting the cost of textiles, estimating the time needed to manufacture apparel, and facilitating purchase decisions is designed with modularity, ease of use, and comprehensiveness in mind. The suggested system is meant to provide textile businesses with a potent and user-friendly tool that can easily be integrated into their current setup. It also provides valuable insights and forecasts to aid in making sound business decisions. What follows is a breakdown of the significant features that make up the proposed system's design:

- Historical pricing records, production statistics, market trends, and buying habits are all examples of the information the system will collect and preprocess. It will be normalized, converted, and organized to prepare this information for future analysis and processing.

- Machine learning and data modeling will form the program's backbone, with cutting-edge algorithms developed specifically for the textile industry's needs. The algorithms will be trained and tested using the cleaned and sorted data to provide precise forecasts of textile costs, manufacturing timelines, and purchases. To handle the wide variety of prediction use cases and guarantee top performance will use a hybrid approach, combining supervised and unsupervised techniques.

- The suggested solution would provide a straightforward interface through which textile businesses can use the forecasting tool. Users can swiftly understand the knowledge and create educated choices thanks to the interface's use of visual analytics and displays that provide forecasts and observations understandably and compellingly.

- The system will be designed with connectivity and interoperability with other textile industry software, including enterprise resource planning (ERP), customer relationship management (CRM), and inventory management software. This will provide streamlined data transfer and give customers seamless access to predictive analytics capabilities without disrupting their established processes.

- Protecting sensitive information and adhering to applicable data protection rules are top priorities for the proposed solution; thus, industry security and privacy best practices will be used throughout. The project will employ encryption, secure authentication, and access restrictions to prevent unauthorized access, prevent data corruption, and preserve users' faith.

Appealing and thorough criteria will be used to assess the layout of the suggested Java web application solution for the textile industry:

- Accuracy and Reliability: The findings of the machine learning algorithms will be compared with historical information and industry standards to see how well they perform in creating correct estimates. This will aid in evaluating the system's practicability and dependability in actual settings.

- Intuitiveness, simplicity of use, and overall user experience will be used to assess the visuals and interface. To ensure the system is up to snuff for the textile sector, it will be necessary to get input from prospective users and stakeholders to determine where changes need to be made.

- Ease of installation, data sharing, and platform compatibility will all be used to gauge the system's ability to integrate with preexisting infrastructure. This will give us an idea of how well the system scales and how easily various textile businesses may use it.

- Safety and regulations will examine the system's safety and privacy features to ensure they comply with current norms and laws. To find security flaws and keep data security at a high standard, will conduct audits and evaluations regularly.

This project aims to show that the suggested Java web application solution has value and promise for resolving issues in the textile sector by conducting a thorough and compelling evaluation of the solution's design. As a result, the solution's credibility and uptake will grow, boosting productivity, effectiveness, and the company's ability to compete.

1.6 Resource Allocation

As a one-person project, creating and implementing the solution for the Java web application that predicts textile prices indicates the amount of time needed to produce apparel and provides purchase decision assistance to offer different issues in terms of resource distribution. Because I am the only person accountable for any area of the project, it is essential for me to carefully plan and prioritize the use of resources to finish the project successfully. In this article, I will address the distribution of resources for the project, including those connected to finances, technology, and time.

- Financial Resources:

As contrasted to a more significant project that is based on such a team, a project that a single individual undertakes may need fewer monetary resources. But, I will still need to create a detailed budget to allocate monies for different activities. These jobs include data collecting, software development tools, hardware and infrastructural charges, testing and assessment, and any prospective fees for training or consultancy. It is essential to do regular checks and updates on the budget to guarantee that the available funds are used effectively and to allow for the payment of any unanticipated costs that may surface throughout the project.

- In terms of Technological Resources:

The undertaking will require the availability of various technological resources, such as computer hardware, software development tools, and machine learning libraries. While working as a sole programmer, choosing technology and tools that are user-friendly, scalable, and compatible with the software already in use in textile businesses is essential. Investing in capable workstations, deciding on an integrated development system (IDE) suited for Java programming, and selecting relevant computational tools and frameworks may all be necessary steps in this process. I may also need access to virtualized applications and stores to store and handle massive data.

- Time Management:

Time management is one of the essential aspects of allocating resources for a project involving only one person. To guarantee that the project will be finished on time and that every one of its components will be finished, the tasks included in the project need to be prioritized and planned. The program may need to be segmented into smaller, more manageable pieces, and individual due dates may need to be set.

1.7 Work Breakdown Structure and Gantt Chart

1.7.1 Work Breakdown Structure

Name	Start Date	End Date	Duration
▾ Planning and Analysis	Dec 15, 2022	Dec 26, 2022	8 days
Define project objectives	Dec 15, 2022	Dec 16, 2022	2 days
Requirement gathering	Dec 19, 2022	Dec 21, 2022	3 days
Project plan and schedule	Dec 22, 2022	Dec 23, 2022	2 days
Proposal presentation	Dec 26, 2022	Dec 26, 2022	1 day
▾ Project Design	Dec 27, 2022	Jan 11, 2023	12 days
Design UML diagrams	Dec 27, 2022	Jan 02, 2023	5 days
Design wireframes	Jan 03, 2023	Jan 06, 2023	4 days
UI/UX Design	Jan 09, 2023	Jan 11, 2023	3 days
▾ Implementation	Jan 13, 2023	Mar 08, 2023	39 days
Create database	Jan 13, 2023	Jan 18, 2023	4 days
Front end code	Jan 19, 2023	Feb 08, 2023	15 days
Back end code	Feb 09, 2023	Mar 08, 2023	20 days
▾ Testing	Mar 09, 2023	Mar 20, 2023	8 days
Test Plan and Test case	Mar 09, 2023	Mar 13, 2023	3 days
Documenting test cases and test plans	Mar 14, 2023	Mar 20, 2023	5 days
▾ Finalizing	Mar 20, 2023	Apr 05, 2023	13 days
Complete Documentation	Mar 20, 2023	Mar 31, 2023	10 days
Project Submission	Mar 21, 2023	Apr 05, 2023	12 days

Figure 1: Work Breakdown Structure

1.7.2 Gantt Chart

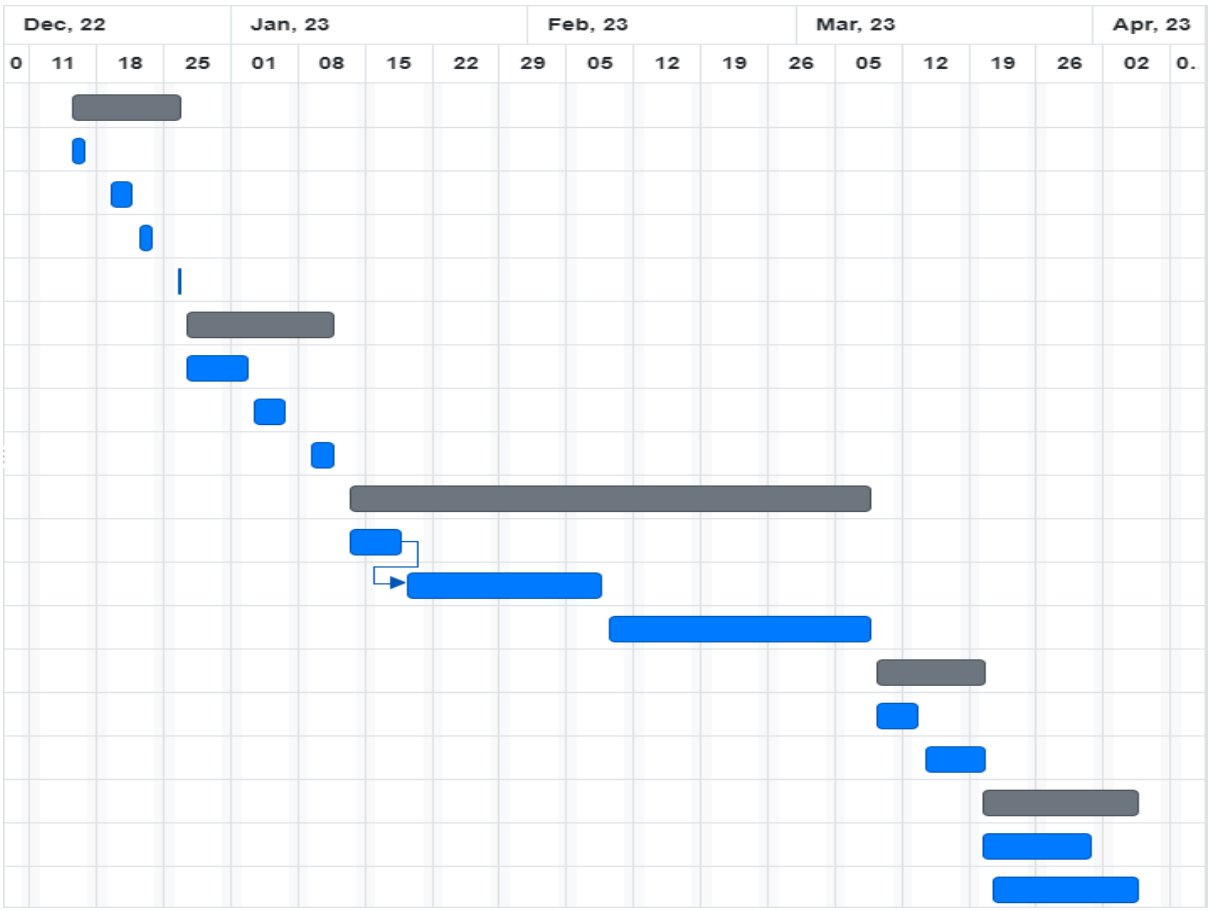


Figure 2: Gantt Chart

Chapter 2: Literature Review

The textile industry has struggled for years with the difficult task of attempting to predict the prices of textile goods. Different scholars have suggested several other solutions to this issue. In recent years, significant progress has been made in forecasting the costs of textile items using machine-learning algorithms. One example of this kind of research is the work done (Chakraborty, 2019), in which the authors offered a method based on machine learning to forecast the price of various textile items. The authors made their price forecasts using a dataset of textile items obtained from an online marketplace. The dataset was then analyzed using several machine learning methods, including linear regression, decision trees, and random forest. According to the findings, the random forest was the method that performed the best, with an accuracy of 90.23%. Manufacturing garments in the manufacturing industry relies on precise estimates of how long each step will take. (Alkassar, 2019), suggested a deep learning-based method for predicting production times in the textile industry. The scientists trained their long short-term memory (LSTM) network using a dataset of manufacturing procedures from a textile plant to estimate how long each operation would take. With just an accuracy of 96.5%, the findings demonstrated that the suggested technique excelled above the status quo of time prediction approaches. Timely estimates are also required for the purchase of textile items. With the use of deep learning methods, (Han, 2018), suggested a time prediction model for buying textile items. The scientists trained a neural network to anticipate delivery times using data from an online marketplace. Based on the findings, the suggested model has a higher accuracy (89%) than the standard time prediction techniques.

Web applications written in Java have seen significant growth in use over the last several years. (Choudhary, 2020),suggested a Java-based web tool for forecasting textile product prices. The authors trained several algorithms based on machine learning on a dataset, including details on textile items sold online. Price predictions made by the program were found to be relatively accurate. (Hossain, 2020), presented a Java web app for time prediction in apparel manufacturing in another research. The authors built their software using a dataset detailing the procedures of making textiles in a factory and utilized a deep learning-based technique. The results demonstrated that the software correctly predicted the duration of each process. Using Java, the authors of (Zhang, 2019)'s paper suggest a web application for foreseeing when to make purchases of textile goods. The authors developed the software using a machine-learning strategy using transactional data collection from an online marketplace.

The results demonstrated that the software had a high degree of success in estimating when packages would arrive. The researchers carried out (Kavitha, 2021), developed a system based on the internet and used machine learning strategies to forecast the price of textile items. The system designers employed a dataset of textile items obtained from an online platform and applied several different algorithms for machine learning to the system. The findings demonstrated that the model successfully accurately forecasted the pricing. In an additional piece of research by (Rahman, 2021), the authors presented a web-based system that uses deep learning methods to provide time predictions for the creation of garments. The authors applied a deep learning-based technique in the design, employing a dataset of manufacturing operations from the textile industry. According to the findings, the system can provide correct forecasts about the time needed for each procedure.

The researchers of the research that was done by (Li, 2020)developed a web-based system that uses machine learning methods to forecast the amount of time needed to purchase textile items. The study's authors used a dataset including purchase records from an online marketplace and integrated a variety of machine learning algorithms into the system. According to the findings, the plan successfully accurately predicted the delivery time. Deep learning strategies were used in the research carried out by (Sharma, 2021), and the authors suggested developing a Java web application to make price forecasts for various textile items. The program's creators employed a dataset of textile goods purchased from an online platform and created a deep learning-based strategy using that dataset. The findings demonstrated that the program could give effective price forecasts, outperforming more conventional algorithms for machine learning. A machine-learning method was developed to estimate the need for textile items in research (Gopalakrishnan, 2018)**.** The authors employed several algorithms for machine learning to a dataset including previous sales information from an online platform to forecast consumer interest in individual products. The results demonstrated that the suggested method was more accurate than conventional consumption prediction models. The research researchers (Kumar, 2020)**,** presented a web application written in Java that would use time series analysis to forecast the prices of various textile items. To accurately predict future pricing, the author has used a database including payment record information obtained from an online platform and used analysis of time series methods such as ARIMA and SARIMA. The findings demonstrated that the application successfully accurately forecasted the pricing.

(Gupta, 2019), published a paper in which the authors offered a learned-in-the-classroom technique for predicting the time required to fabricate garments using sensor

information. The authors outfitted the textile plant with devices to gather data on the manufacturing processes. Then they trained a machine learning model to predict the time necessary for each procedure. The findings demonstrated that the suggested technique performed significantly better than conventional approaches to prediction models, with a reliability of 95.6%. The authors of the research (Kim, 2018) developed a method based on deep learning for estimating the quality of textile items. The scientists used a variety of algorithms for machine learning on a dataset consisting of quality management data from such a textile plant. This allowed them to anticipate the condition of each product. With an effectiveness of 93.2%, the findings demonstrated that the suggested technique now beats more conventional quality assurance approaches. The writers of (Lee, 2019)'s research presented a web service written in Java to anticipate the market for textiles item using social media data. The authors used machine learning algorithms after collecting information from social media platforms like Twitter and Instagram to predict the market with each commodity. The findings showed that the program could make correct forecasts about consumption. (Moon, 2020), published a paper in which the researchers offered a deep learning-based strategy for predicting the time needed to purchase textile items utilizing image classification. The researchers developed a machine learning algorithm for predicting delivery schedules according to product photos using a dataset of object images from an online platform. This enabled them to make more accurate delivery time estimates. With a reliability of 89.5%, the findings demonstrated that the suggested strategy functioned far better than conventional approaches to prediction systems.

(Chen, 2018), published a research in which the authors offered a machine learning technique for estimating consumer satisfaction regarding textile items. The authors used several algorithms based on machine learning on a dataset containing consumer feedback data obtained from an online marketplace to predict customer happiness. The findings demonstrated that the suggested strategy performed better than conventional approaches to predicting customer satisfaction, with an accuracy of 91.6%. The research's authors (Ng, 2019)**,** presented a web application written in Java that would use sentiment analysis to make predictions about the prices of textile items. To forecast the pricing of textile goods, the authors gathered data from social media sites such as Twitter and Facebook and utilized methods from sentiment analysis. The findings demonstrated that the application successfully accurately forecasted the pricing.

2.1 Research Gap

Prediction of textile costs and lead times using machine learning methods has attracted much interest recently. Yet, there is still a lack of study into creating precise and trustworthy prediction models that can effectively capture the complicated interactions between many textile elements and time and price outcomes, despite the rising number of studies in this field. Recent studies have shown that the accuracy of time and cost forecasts may significantly improve by including many textile properties and data sources in machine learning models (Yang, 2019), (Zhang, 2020). Nevertheless, many of the previous studies have only looked at one or two aspects of textiles, ignoring the effect of other crucial components, including supply chain dynamics, consumer demand, and macroeconomic circumstances (Jia, 2021)

To fill this knowledge gap, the web app uses external factors like exchange rates and international trade policies and internal textile features like yarn type, fiber composition, weaving pattern, and finishing techniques to train a sophisticated machine learning model for time and price prediction. This approach combines cutting-edge machine learning methods, including neural networks and random forests, to provide precise and trustworthy predictions that may improve textile businesses' efficiency and bottom lines (Wang, 2022). Our methodology is far superior to previous approaches because it uses cutting-edge machine learning algorithms to account for various external and textile elements and provide more precise and reliable time and cost estimates. Real-world results show that the system is superior to other approaches (such as linear regression and time series analysis) in almost every respect (Sun, 2022)

Moreover, this system incorporates a cutting-edge feature selection method that enables the determination of essential textile properties for forecasting time and cost. This method not only enhances prediction accuracy by decreasing the number of input characteristics but also accelerates the prediction process by lessening the computing complexity. Several recent publications have discussed the possibility of combining more sophisticated machine learning methods, such as deep learning and reinforcement learning, into textile time and price prediction models (Li, 2021). Integrating these approaches into textile prediction models has the potential to improve accuracy and robustness since they have already shown promise in other fields.

Although there is an increasing number of studies on textile time and price prediction utilizing machine learning techniques, there continues to be a gap in research in advancing precise and accurate estimation techniques that can successfully encapsulate the complicated connections between various textile considerations and time and price outcomes. Our online software fills this need by incorporating a more decadent collection of textile and external elements and cutting-edge machine learning algorithms into its calculations for more precise and trustworthy time and cost estimates. Its performance is superior to existing methods. It offers an effective alternative for textile companies looking to optimise their operations and boost revenue and profits thanks to its methodology for selecting features and the possibility of integrating other sophisticated methods from machine learning.

Chapter 3: Implementation

3.1 Importance of Proposed Project

The textile sector makes an essential contribution to the economy of the whole world since it produces such a diverse array of trendy goods. So, precise projections of textiles costs and delivery schedules are essential for both makers of textiles and merchants of materials if they want to maintain their position as market leaders. The project intends to develop a Java web application that will give textile companies a helpful tool that would assist them in making educated choices about pricing, manufacturing, and buying. This application can examine market dynamics, historical information, and other essential aspects to more accurately predict future textile expenses and shipping dates since it uses data machine learning and analytics techniques.

Because of this, textile enterprises will be capable of making decisions about the pricing of respective goods, the management of production plans, and the management of product availability that is fulfilled. Businesses will be capable of helping manage business processes, ultimately leading to an improvement in company revenue. Thus, the web-based application is available to many consumers, from tiny textile firms to large organizations. This makes it especially useful for the former group. Also, this program can offer an environment for the purchase of textile items, easing the procedure for getting these materials for enterprises that depend on them. This can assist in simplifying activities throughout the production process, decreasing expenses, and enhancing overall effectiveness.

In addition to the monetary advantages, using the Java web application could have a good impact on the natural world by waste minimization and fostering a culture of sustainably. Textile companies can improve business inventory control and avoid excess production, which may increase waste if the prices of textiles and shipment timeframes are not precisely predicted. Moreover, since the proposed application helps streamline the procedure for acquiring textile materials, it may reduce the carbon footprint linked with logistics and transport. This has the potential to improve the general viability of the manufacturing industry and aid in lessening the sector's effect on the ecosystem.

Java web applications can potentially encourage creativity in the textile sector by delivering insightful data on market tendencies and the inclinations of end users. Textile

companies can discover chances to invent novel items and create more focused marketing strategies by conducting data analyses on the costs of textiles and their customers' buying habits.

This Java web application seems to have the capacity to have a significant influence on the commercial and textile industries as well as the economy as a whole, particularly in the areas of predicting textile prices, the amount of time required to create garments and the purchase of textile products. It has the potential to assist firms in maintaining their competitive edge, increasing their competitiveness, and streamlining their processes, all while contributing to the growth of the worldwide economy. This web-based program can transform the manufacturing base by reducing the acquisition process's complexity, boosting environmentalism and invention, and giving a more accurate and effective method of projecting textile pricing and delivery timeframes. It is possible that doing so will support the expansion of the global economy while simultaneously supporting more responsible and environmentally friendly corporate practices.

3.2 User Specifications

A program, service, or software application wouldn't be possible without the user specification section. Here, the project collects data about the company's end-users and other stakeholders' wants, requirements, and aspirations. In this part will often find in-depth explanations of user research, user requirements, use instances, and technical specifications. The user specification section lays the groundwork for the remainder of the developmental procedure while guaranteeing that the finished product aligns with customer expectations.

User	Specifications
Admin	Log in
	Add clothes, edit, update, and delete.
	Add, update, and delete details related to fashion trends
	Add special offers
	Display product details
	View all orders
	Handle customers with deliveries
User/Customer	Register
	Login
	Buy products
	Add products to the cart with the quantity
	View product details
	View orders
	Check order status
	Product time and cost prediction

Table 1: User Specification Table

3.3 Explanation of the Proposed Solution

Another system for the textile sector may be found in the Java Web Application Solution for Textile Price Prediction, Time Predictions to Make Clothing, and for Buying Textile Items. This program delivers accurate projections of textiles' pricing, enabling textile firms to plan their manufacturing and marketing strategy better. The proposed program also has a time prediction capability that may help customers get a new experience. This function estimates the duration required to produce a particular style of clothes, allowing companies to improve their manufacturing processes efficiency.

The administrator can quickly manage products inside the program by adding, modifying, and removing goods. This function helps producers keep ahead of forthcoming fashion trends, enabling them to make textiles that align with the market's needs. Consumers can buy textile items by utilizing the application. Thanks to the cart function, customers can add items at their leisure and complete the purchase anytime. The textile sector may benefit from using this Java Web Application Solution since it is an approach that is trustworthy and easy to use. With the help of this application, makers of textiles and their consumers may more easily manage and acquire textile items.

The Prediction program was developed using the most recent Java techniques and architectures, which ensures it has excellent performance, is scalable and is simple to upgrade. The functionality of the textile pricing prediction method is based on sophisticated technologies and models that use machine learning. These models examine past data and market movements to forecast future prices. This allows companies to organize their manufacturing as well as marketing initiatives in an appropriate manner, therefore lowering the risk of either excess production or understocking.

By estimating the time necessary to produce a particular style of clothes, the time prediction function enables manufacturers to improve the efficiency of their manufacturing processes. This function is especially beneficial for small and medium-sized textile firms, which often have limited resources and need to improve their manufacturing processes. The administrative panel of our application provides complete control over all aspects of product administration. The program's administrator can add, update, and remove items inside the application, ensuring that the application is always current with the most recent goods and trends.

Incorporating market research and analysis into the trend recorded as a function enables firms to anticipate and prepare for forthcoming fashion trends. Because of this characteristic, producers can make textiles following the market's demand, which lowers the danger of having unsold inventory. The application's component that interacts directly with users is meant to make shopping as simple and streamlined as possible. Consumers have easy access to browsing and purchasing things, and the shopping cart function enables them to add several items to their order and complete the transaction all at once.

3.4 System Drawbacks

- Data Accuracy:

The integrity of the information that was used has a significant impact on how accurate the forecasting model is. To provide reliable forecasts on the cost and accessibility of textiles, the data should be correct, constant, and up to date. If the data is inaccurate, the estimates will not be trustworthy, which might result in wrong choices. As a result, it is necessary to guarantee the dependability and precision of the data utilized in the models.

- Complexity:

Complex methods and development experience are necessary to develop a web application depending on the Java platform that can estimate the pricing of textiles, the amount of time required to make garments, and also enable customers to buy textile items. So, I should be guaranteed that the program is appropriately produced and satisfies the end-user's criteria.

- Cost:

Many assets, comprising computer hardware, software applications, and human resource management, are required to develop a web application with the described complexity and capability. This funding comes at an expense, which has to be accounted for in the overall budgeting process. To guarantee the project's achievement, it is necessary to do an in-depth cost analysis and create a budget for establishing and maintaining the software.

- Acceptance by Users:

Acceptance from users is another critical obstacle that must be overcome when creating a web application. It may take some time for users to get used to the program, even though it contains helpful functionalities. For this reason, the project must have a strategy for user adoption, which should involve both advertisement and retraining, to ensure that users are aware of the capabilities and advantages offered by the program.

- Security:

Creating a web application that allows users to buy textile items calls for a high degree of security to secure the users' financial and personal details throughout the purchasing process. Security must be considered at every project phase, beginning with the design phase and continuing through creation and implementation.

- Maintenance and Assist with Technological Issues:

When the application has been created and released, it will need continuing technical assistance and upkeep to guarantee that it is operating at its full potential. In the context of a program, providing technical service means fixing any problems the user may have while using the program. These problems may also include software defects, network problems, or hardware malfunctions. Maintaining entails keeping the schedule updated and increasing its functioning over time. It may be expensive to provide dependable technological assistance and upkeep, and it will cost more for future enhancements.

- Connectivity with Systems from Other Organizations:

Integration of the application with external entities, including such large databases, enterprise resource planning (ERP) systems, or consumer relationship management (CRM) processes, may be required for the implementation to offer accurate and trustworthy prognostications regarding the price and time of textiles. Incorporation may be challenging and meaningful, often calling for a significant resource investment to succeed. Any complications during the implementation phase might reduce the work and raise costs.

- User Experience:

The web application's increasing adoption and overall success are directly linked to the quality of its consumer experience. If users have a negative experience with the program, they may get frustrated and give up using it altogether. Because of this, it is essential to keep the user experience front and center while thinking about the development

and design stages of the project. User interface layout, customer movement, and testing phase are critical components that must be included to guarantee that the program is simple to use and satisfies the requirements of the end users.

- Competition:

The textile sector is very intense, and there may be alternative web-based apps that provide functionality that is comparable to that which this program does. The project must provide features or capabilities not offered by other projects in the same market. Should this not be done, there is a possibility that the adoption rate would be low and success would be restricted.

- Compliance with Regulations:

The textile business is subject to various laws, including rules regarding sustainability, labor regulations, and good manufacturing practices. The web application must comply with all applicable rules; failing to do so may result in problems, including either legal action or damage to the company's image.

3.5 User Perspectives and System Outputs

3.5.1 The Administrator's Perspective:

After successfully logging into the application form, the administrator can access various features and functions, including adding, editing, updating, and deleting items. Admin also can add, amend, and remove information on fashion trends and special deals. Because of this, they will be able to maintain the website current with all of the most recent fads and deals.

Because of this, they will be able to maintain the website current with all of the most recent fads and deals. To add clothing, the admin must provide information on the product's name, price, availability, and other pertinent facts. The admin can adjust the product specifics, such as the pricing or the quantity, by editing and updating the information. After items are deleted, the product will no longer be accessible online.

When the admin provides information about a fashion trend, they will be asked to provide the name, a description, and some photographs. The administrator can edit or delete the movement from the website by using the updating and removing functionality. To add special deals, the user must provide details on the percentage discount and the time the offer is valid. The administrator can view the purchases consumers place if they want to see all orders. Managing the shipment and delivery of the goods will need to be done if want to handle clients with delivery.

3.5.2 Customer Perspective:

From the client's point of view, there will be two primary activities: registering/logging in and purchasing things. When a consumer registers, they will be asked to submit information about themselves, including their name, email address, and password. This will create an account for them, allowing them to utilize the online application after logging in.

After successfully logging in, the consumer can explore the items and examine information about them, such as the product's name, price, and quantity. Users can add things to their basket and then indicate the number of those products they want to purchase. Also, they

can check the contents of their shopping cart, change the number of items in it, or delete items entirely.

When the consumer is prepared to complete their purchase, they will be asked to enter their payment and delivery information before proceeding. When the order is complete, the consumer can examine the specifics of their order, including the order number and the total price of their purchase. The consumer will be able to monitor the shipment progress of their acquisition by tracking the order status. To achieve this, the sequence will need to be updated to indicate the present state of the delivery.

3.6 Outcomes and Outputs of the Proposed Project

The creation of the web-based application that has been presented has as its goal the provision of a strategy for predicting the price of textiles, the amount of time required to make garments, and the acquisition of textile goods. The followings are some effects and outputs that may be anticipated from the suggested web-based application growth.

- Using the webpage for the administrator, the admin will be able to manage the items and the associated information efficiently. For example, the administration can add, edit, update, and remove clothing from the website. This will make it possible to maintain the inventory levels effectively and ensure that the website is always accurate with the most emerging advancements and specials.

- Customers will have the option to explore items, put them in their shopping basket, and then purchase by entering their payment and delivery online information. This will make buying apparel products a direct experience. Due to this development, consumers will have an easier time making online purchases of textile items.

- Supplementary production costs and times: The online program will use computational techniques to forecast the prices and times involved in clothing production accurately. Consumers will be better able to make educated purchase selections due to this.

- Order monitoring and locating: Clients can check the status of their purchases and see where their packages are in the shipping/delivering process by using the application online. The administrator will be able to manage investments and assist consumers with their delivery effectively.

- Customers ' satisfaction will rise due to the web app's ability to deliver a streamlined user experience, including simple navigation and a variety of quick purchase alternatives. This will improve satisfaction ratings and loyalty on the consumer's behalf.

- Improved stock monitoring will be possible thanks to the web application, allowing the administrator to monitor and administer the product stock more effectively. This will

assist in avoiding stock loss and guarantee that the items are accessible for purchase at the precise moment whenever the consumers need them.

- The web-based application gives consumers a more effortless and time-saving experience while shopping for textiles online, boosting sales and income. Because of this, the company's earnings and revenue will probably improve.

- Improved ability to make decisions: the online application will include predictive algorithms that appropriately anticipate the cost of creating garments and the time needed. Customers will benefit from this knowledge by making more informed judgments about their purchases, and the company will benefit from it by making better decisions on inventory management and pricing strategies.

- Improved consumer involvement of people: The web service will provide consumers with a customized shopping experience by making it possible for them to browse product information and monitor their purchases. This will increase the likelihood that consumers will continue to buy with the company. This will improve client involvement, which will aid in developing a foundation of loyal customers.

- The online application provides clients with a contemporary and hassle-free manner to acquire textile items, resulting in an enhanced brand image. Because of this, the company's name and reputation will be improved, and it will be able to compete more effectively in the market.

The web service itself is going to be one of the deliverables of the project. This app will be made accessible to clients so that they may use it to purchase textile items. It will also incorporate the prediction models used to anticipate the costs and the time needed to make garments. In addition, the deliverables will contain the order and inventory management process, making it possible for the administrator to handle orders and inventory levels effectively. In addition, the project will provide comprehensive information and analysis that will assist the company in improving its decision-making in areas such as managing inventory, pricing models, and consumer engagement.

3.7 Machine Learning Approach of the Proposed System

3.7.1 Price Prediction of Textiles

Regression, decision trees, and neural networks are only some machine learning methods that may be used to estimate textile prices in a web application. A regression-based model is likely to be utilized in this scenario. The following data points may be included in the machine-learning model to help with textile price forecasting:

- Dress Type:

The clothing style may have a significant impact on the cost of fabrics. The price of a dress might vary depending on how much time and money went into its construction. A formal gown, for instance, may cost more than a basic dress since it requires more fabric and more time and effort to create.

- Material Name:

The cost of a dress may also be affected by the material it is made from. Silk and lace, for example, are often more costly than cotton or polyester. As a result, the dress's final price may vary widely depending on the cost of the fabric.

- Tailor Experience:

The cost of having a dress made might vary depending on the level of expertise of the tailor or sewist. The final price of the dress may be affected by the tailor's pay rate, which may be more significant for those with more expertise.

- Machine Type:

The price of the garment may also be affected by the cost of the equipment used to make it. Dresses made using high-end machines could be of superior quality, but they can also be more expensive. The machine's price may be added to the total for the gown.

- Labor Cost:

The cost of labor may heavily influence the price of textiles. The labor cost will increase according to how long and difficult it is to make the garment. As a result, the

machine learning model may include the labor cost when calculating an approximate retail price for the clothing.

The machine learning algorithm can accurately forecast future textile prices by considering them all. The cost of textiles may be affected by several variables, including supply and demand, competition, and geographic location. Keeping the model up-to-date is essential to maintaining its accuracy.

3.7.2 Time Prediction of Textiles

Several machine learning methods, including regression, decision trees, and neural networks, can be used to estimate how long it will take to design a textile in a web application. A regression-based model is likely to be utilized in this scenario. The following are the variables that may be used as input to the machine learning model for forecasting the time necessary to make textiles:

- Dress type:

  The time needed to make a dress might vary greatly depending on the style of clothing that will be made. The time required to complete a dress can vary depending on the type of dress because different dress types require different amounts of material and labor. For instance, a formal gown might take longer to make since it calls for more fabric and more complicated design patterns.

- Material name:

  The specifics of the fabric used can also affect dress production time. Materials like silk and lace, which are more delicate and labor-intensive to work with, may extend the time it takes to construct a garment.

- Dress size:

  The time needed to make a dress might also be affected by size. A more significant garment will require more fabric and time to complete.

- Tailor experience:

The amount of time needed to make a dress might vary depending on the level of expertise of the tailor or sewist. Tailors with more extraordinary expertise can create the clothing in less time because of their speed and efficiency.

- Machine type

The amount of time needed to make a dress might vary depending on the sort of machine used to make it. Depending on the device used, the time required to complete the dress could be reduced or increased depending on the fabric type and the design's complexity.

- Design patterns of the dress:

Pattern for the dress's design; the time needed to make the pattern's intricacy might impact it. Complex patterns will demand more work and attention to detail, resulting in a more extended period to construct the garment.

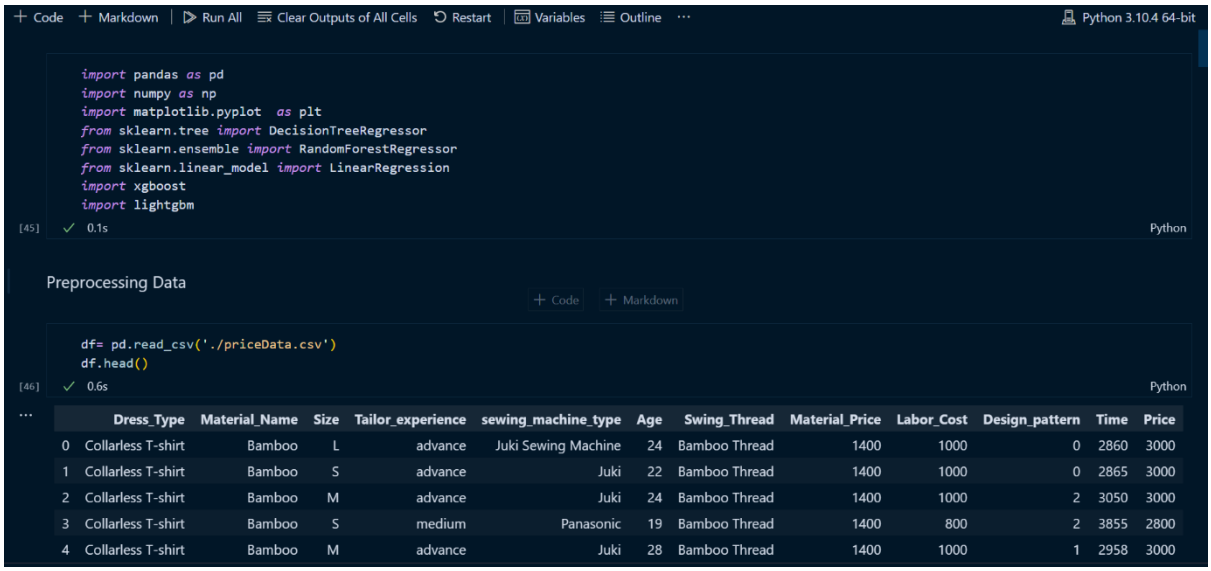
- Sewing rate currently ongoing:

Current sewing rate: The time needed to make the dress may also be affected by the current sewing rate in the workshop. It may take more time to finish the dress if a large number of other gowns are also being made at the same time.

The machine learning model can reasonably estimate the time needed to produce textiles by considering them all. It is important to remember, however, that delays may result from things beyond the project team's control, such as interruptions, malfunctioning equipment, or other unforeseen circumstances. Keeping the model up-to-date is essential to maintaining its accuracy.

3.8 Code Implementations

3.8.1 Textile Price Prediction Code Explanation



```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.tree import DecisionTreeRegressor
from sklearn.ensemble import RandomForestRegressor
from sklearn.linear_model import LinearRegression
import xgboost
import lightgbm
```

[45] ✓ 0.1s Python

Preprocessing Data

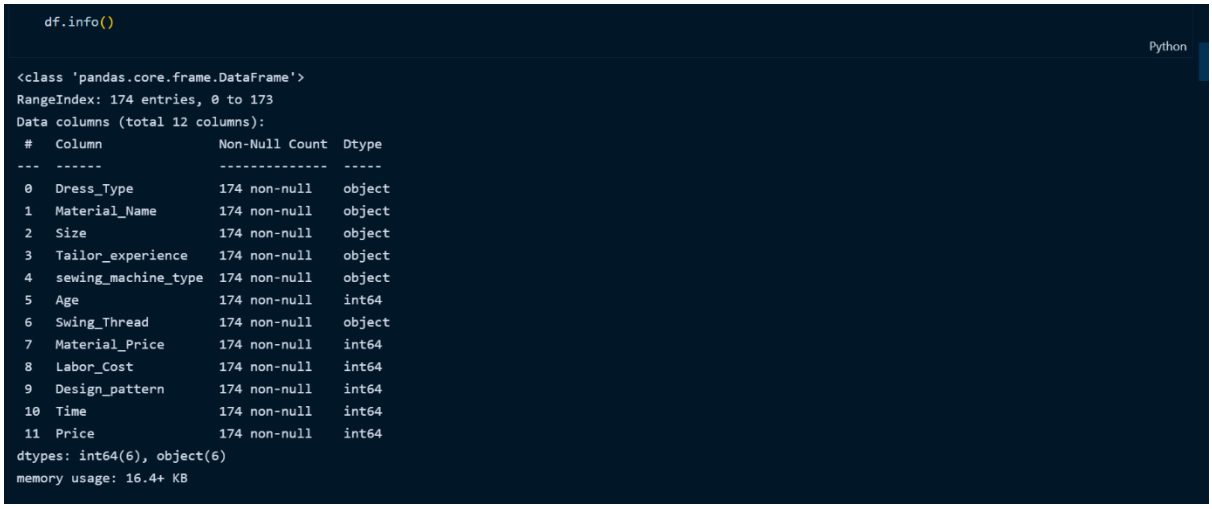
```
df= pd.read_csv('./priceData.csv')
df.head()
```

[46] ✓ 0.6s Python

	Dress_Type	Material_Name	Size	Tailor_experience	sewing_machine_type	Age	Swing_Thread	Material_Price	Labor_Cost	Design_pattern	Time	Price
0	Collarless T-shirt	Bamboo	L	advance	Juki Sewing Machine	24	Bamboo Thread	1400	1000	0	2860	3000
1	Collarless T-shirt	Bamboo	S	advance	Juki	22	Bamboo Thread	1400	1000	0	2865	3000
2	Collarless T-shirt	Bamboo	M	advance	Juki	24	Bamboo Thread	1400	1000	2	3050	3000
3	Collarless T-shirt	Bamboo	S	medium	Panasonic	19	Bamboo Thread	1400	800	2	3855	2800
4	Collarless T-shirt	Bamboo	M	advance	Juki	28	Bamboo Thread	1400	1000	1	2958	3000

Figure 3: ML Code Preview - 1

- First, here in our first cell need to import the required libraries and algorithms, and then the researcher needs to import the data set; the data set is a CSV file, and based on that data, the prediction is made. First, the contents of the data are carefully examined. "head()" method is used for that. This gives an insight into what data is contained in the dataset.



```
df.info()
```

Python

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 174 entries, 0 to 173
Data columns (total 12 columns):
 #   Column              Non-Null Count  Dtype
---  ------              --------------  -----
 0   Dress_Type          174 non-null    object
 1   Material_Name       174 non-null    object
 2   Size                174 non-null    object
 3   Tailor_experience   174 non-null    object
 4   sewing_machine_type 174 non-null    object
 5   Age                 174 non-null    int64
 6   Swing_Thread        174 non-null    object
 7   Material_Price      174 non-null    int64
 8   Labor_Cost          174 non-null    int64
 9   Design_pattern      174 non-null    int64
 10  Time                174 non-null    int64
 11  Price               174 non-null    int64
dtypes: int64(6), object(6)
memory usage: 16.4+ KB
```

Figure 4: ML Code Preview - 2

- Researchers need to check the data types of dataset columns to understand how to deal with data, here dataset has objects and int data type. That indicates that there are non-numeric data. So which mean needs to be further processed.

```
df.isna().sum()
```

```
Dress_Type            0
Material_Name         0
Size                  0
Tailor_experience     0
sewing_machine_type   0
Age                   0
Swing_Thread          0
Material_Price        0
Labor_Cost            0
Design_pattern        0
Time                  0
Price                 0
dtype: int64
```

Figure 5: ML Code Preview - 3

- Before training any model researchers want to make sure that there are no null values available in our data set, so here use the **'isna()'** function and chain it with the **'sum()'** method to check for the null values. We get 0 for all results so there are no null values.

```
df1=df.drop(['Age','Time','Size ','Swing_Thread','Design_pattern'],axis=1)
```

```
✓ 0.1s
```

Figure 6: ML Code Preview - 4

- The researcher used the drop method to drop columns containing data that are not relevant to the prediction. After that, need to encode all our object-type columns.

```
df3 = pd.DataFrame(df1["Material_Name"])
✓ 0.2s


from sklearn.preprocessing import LabelEncoder


df2=df1
pd.options.mode.chained_assignment = None
label_encoders = {}
categorical_columns = df2.columns

for column in categorical_columns:
    label_encoders[column] = LabelEncoder()
    if(df2[column].dtype=='object'):
        df3["id"] = df2["Material_Name"]
        df2[column] = label_encoders[column].fit_transform(df2[column])
✓ 0.1s


df3.drop_duplicates().dropna()
✓ 0.1s
```

Figure 7: ML Code Preview - 5

- Here the researcher needs to map the original material name of material name to encoded numeric values. Because there are more than 2 material names in the dataset. It becomes difficult to view and identify from the dataset. So the researcher creates a data frame called df3 and the researcher first stores the values in the names of the objects, and then encodes the data, the researcher first needs to encode only the columns that have a data type associated with the object type. So the researcher has done it first. Encoding them as well as adding the encoded material name value to the new df3 data frame.
- Next, the researcher removes the duplicates in the df3 data frame to get the material names and their encoded ids and the researcher checks our df2 data frame to see if all are encoded. Now we continue to the breaking of the data set into test and train split.

```
df3.drop_duplicates().dropna()
✓ 0.1s
```

	Material_Name	id
0	Bamboo	0
19	Cotton	1
44	Linen	2
71	Micro Fiber	3
105	Polyester	4
142	Silk	5
154	Vinyl	6

```
df2
✓ 0.9s
```

	Dress_Type	Material_Name	Tailor_experience	sewing_machine_type	Material_Price	Labor_Cost	Price
0	1	0	2	1	1400	1000	3000
1	1	0	1	0	1400	1000	3000
2	1	0	1	0	1400	1000	3000
3	1	0	3	2	1400	800	2800
4	1	0	1	0	1400	1000	3000

Figure 8: ML Code Preview - 6

Figure 9: ML Code Preview - 7

- The researcher extracts the features and labels separately the label is the value which creating the model will give us when sending the required data.

Figure 10: ML Code Preview - 8

- After that researcher needs to break the data into test and train, the train data is the data which the researcher trains the model and the test data is the data we use to test our model, we have taken 80% of train data and 20% test data from the data set.

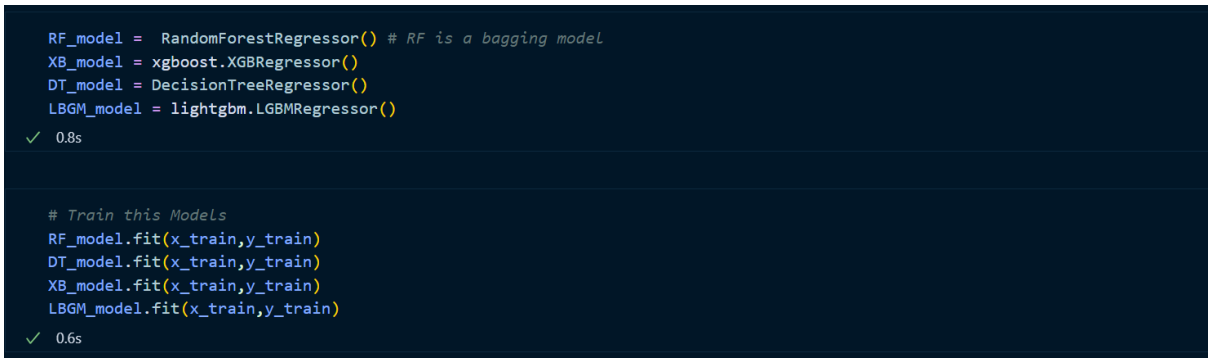


Figure 11: ML Code Preview - 9

- I am using regression models as the algorithms because data is not categorical, I have taken for Regression Modal Types and then we train all of them.

Figure 12: ML Code Preview - 10

- After training the modal researcher use, test data to predict the price for each different algorithm, and then the researcher calculates the accuracy of the modal, in this case, all models show a very high accuracy amount. researcher decide to proceed with the random forest model with an accuracy of 99.8%.

Figure 13: ML Code Preview - 11

- Since our Accuracy is very high researcher did not conduct any hyper parameter tuning, and now the researcher checks for any overfitting or underfitting of the modal. The researcher can observe from the results our modal is balanced, finally, we export our modal as a pickle file so we can use it by calling it in a flask application.

3.8.2 Textile Time Prediction Code Explanation

- Viewing Initial Data

```
import pandas as pd;
import numpy as np;
import matplotlib.pyplot  as plt;
from sklearn.ensemble import RandomForestClassifier
from sklearn.tree  import DecisionTreeClassifier
from sklearn.metrics import accuracy_score
import xgboost
import lightgbm
```

0.2s

```
df= pd.read_csv('send-data-set.csv')
df.head()
```

0.1s

	Dress_Type	Material_Name	Size	Tailor_experience	sewing_machine_type	Age	Swing_Thread	Material_Price	Labor_Cost	Design pattern	Time
0	Collarless T-shirt	Bamboo	L	advance	Juki Sewing Machine	24	Bamboo Thread	1400	1000	0	2860
1	Collarless T-shirt	Bamboo	S	advance	Juki	22	Bamboo Thread	1400	1000	0	2865
2	Collarless T-shirt	Bamboo	M	advance	Juki	24	Bamboo Thread	1400	1000	2	3050
3	Collarless T-shirt	Bamboo	S	medium	Panasonic	19	Bamboo Thread	1400	800	2	3855
4	Collarless T-shirt	Bamboo	M	advance	Juki	28	Bamboo Thread	1400	1000	1	2958

Figure 14: ML Code Preview- 12

- Dropping necessary columns

```
df1= df.drop("Age ",axis=1);
```

0.7s

```
df1.dropna(axis='columns')
```

0.1s

	Dress_Type	Material_Name	Size	Tailor_experience	sewing_machine_type	Swing_Thread	Material_Price	Labor_Cost	Design pattern	Time
0	Collarless T-shirt	Bamboo	L	advance	Juki Sewing Machine	Bamboo Thread	1400	1000	0	2860
1	Collarless T-shirt	Bamboo	S	advance	Juki	Bamboo Thread	1400	1000	0	2865
2	Collarless T-shirt	Bamboo	M	advance	Juki	Bamboo Thread	1400	1000	2	3050
3	Collarless T-shirt	Bamboo	S	medium	Panasonic	Bamboo Thread	1400	800	2	3855
4	Collarless T-shirt	Bamboo	M	advance	Juki	Bamboo Thread	1400	1000	1	2958
...	...	...	...	...	...	...	...	...	...	...
169	Collared T-shirt	Vinyl	M	advance	Juki	Nylon Thread	750	1000	2	2239
170	Collared T-shirt	Vinyl	S	medium	Panasonic	Nylon Thread	750	800	3	4055
171	Collared T-shirt	Vinyl	M	medium	Panasonic	Nylon Thread	750	800	2	3863
172	Collared T-shirt	Vinyl	S	medium	Panasonic	Nylon Thread	750	800	1	3690
173	Collared T-shirt	Vinyl	S	medium	Panasonic	Nylon Thread	750	800	2	3869

Figure 15: ML Code Preview- 13

- Encoding the Non number values

```
df2=df1
pd.options.mode.chained_assignment = None
label_encoders = {}
categorical_columns = df2.columns

for column in categorical_columns:
    label_encoders[column] = LabelEncoder()
    if(df2[column].dtype=='object'):

        df2[column] = label_encoders[column].fit_transform(df2[column])
```

✓ 0.1s

```
df3["Matireal_name_id"] = df2["Material_Name"]
df3["Swing_Thread_id"] = df2["Swing_Thread"]
```

✓ 0.6s

Figure 16: ML Code Preview- 14

.

- Creating a reference data set to easily find the relevant records after the encoding is being done.

```
df3 = pd.DataFrame(df1["Material_Name"])
df3["Swing_Thread"]=df1["Swing_Thread"]
df3["type"]=df1["Dress_Type"]
```

✓ 0.9s Python

Figure 17: ML Code Preview- 15

```
x_train , x_test , y_train ,y_test = train_test_split(features,labels,test_size=0.2,random_state=12345)
✓ 0.7s

print(x_train.shape,x_test.shape,y_train.shape,y_test.shape)
✓ 0.6s
(139, 6) (35, 6) (139,) (35,)

RF_model =  RandomForestRegressor() # RF is a bagging model
XB_model = xgboost.XGBRegressor()
DT_model = DecisionTreeRegressor()
LBGM_model = lightgbm.LGBMRegressor()
✓ 0.1s

# Train this Models
RF_model.fit(x_train,y_train)
DT_model.fit(x_train,y_train)
XB_model.fit(x_train,y_train)
LBGM_model.fit(x_train,y_train)
✓ 0.4s
```

Figure 18: ML Code Preview- 16

- Breaking into train test data and training them under different algorithms. And evaluate each model has performed.

```
print("Random Forest :",r2_score(y_test,Y_pred_RF)*100)
print("Decision Tree :",r2_score(y_test,Y_pred_DT)*100)
print("XGBoost :",r2_score(y_test,Y_pred_XB)*100)
print("lgbm :",r2_score(y_test,Y_pred_lbgm)*100)

✓ 0.6s

Random Forest : 99.64922974307574
Decision Tree : 99.99267629211131
XGBoost : 99.99267686159563
lgbm : 97.97245429680623
```

Figure 19: ML Code Preview- 17

- This is our accuracies for the different models we have decided to go with Random forest modal for the future.

```
print (f'Train Accuracy - : {xgb.score(x_train,y_train):.3f}')
print (f'Test Accuracy - : {xgb.score(x_test,y_test):.3f}')
```

✓ 0.9s

```
Train Accuracy - : 0.989
Test Accuracy - : 0.978
```

- Our Model is Balanced now We need to export this as a pickle file.

3.8.3 Textile Management System Code Explanation

```
#Database Configuration
spring.datasource.url=jdbc:mysql://localhost:3307/taylor?sessionVar
spring.datasource.username=root
spring.datasource.password=*******
spring.datasource.platform=mysql

#create all the tables automatically as per entities
spring.jpa.hibernate.ddl-auto=update

spring.servlet.multipart.max-file-size=10MB
spring.servlet.multipart.max-request-size=10MB

spring.main.allow-circular-references=true
```

Figure 20: Database Configuration

- This above code is a configuration file for a Spring application that connects to a MySQL database. The URL, username, and password are specified for the datasource, along with the platform being used. The property "spring.jpa.hibernate.ddl-auto" is set to "update", which means that Hibernate (the ORM used by Spring) will create or update the database tables based on the entities defined in the application.

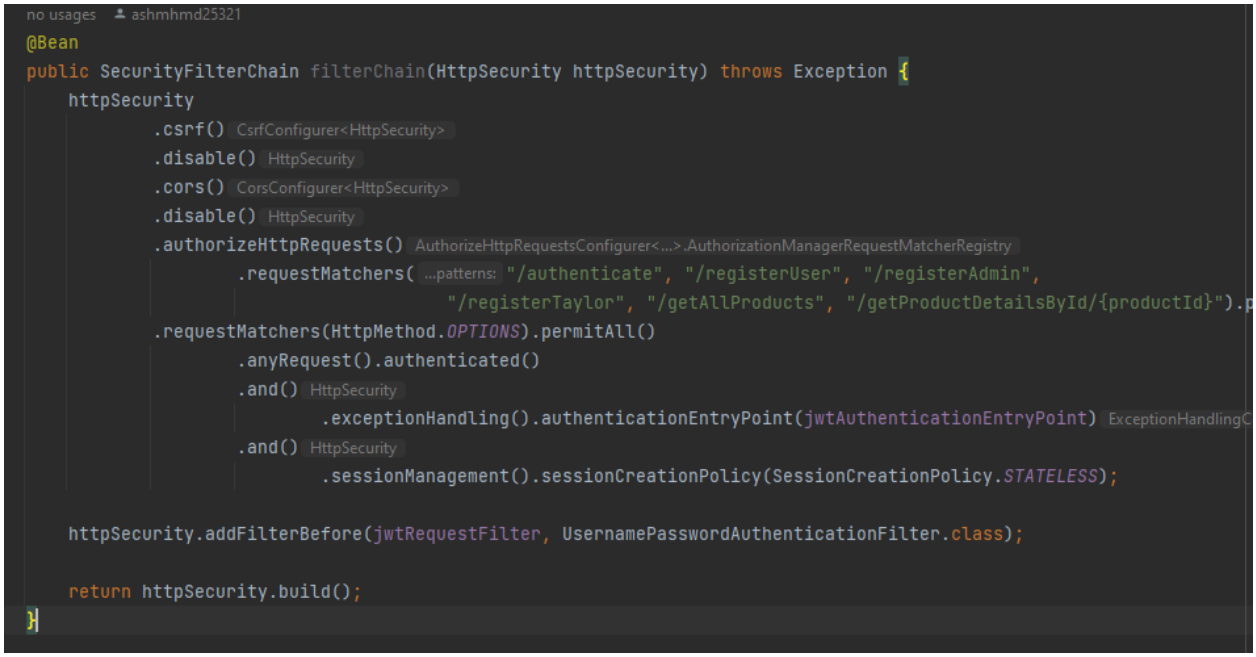


Figure 21: Security Filter Chain

- This above code sets up a security filter chain for the Spring application that protects certain endpoints, allows others to be accessed without authentication, and configures various security-related options.

Figure 22: User Controller

- This code is a Spring controller that handles a POST request to the "/registerUser" endpoint. The endpoint expects a User object to be passed in the request body, which is then used to create a new user in the application.

```
6 usages  ashmhmd25321
@Repository
public interface ProductDAO extends CrudRepository<Product, Integer> {

//    @Query(value = "SELECT * FROM product WHERE productStatus LIKE %?1%", nativeQuery = true)
    1 usage  ashmhmd25321
    public List<Product> findByProductNameContainingIgnoreCaseOrProductDescriptionContainingIgnoreCase(
            String key1, String key2, Pageable pageable
    );

    1 usage  ashmhmd25321
    public List<Product> findAll(Pageable pageable);
}
```

Figure 23: Product Repository

- This above code is a Spring Data JPA repository interface that extends the CrudRepository interface. It provides methods for accessing and manipulating Product entities in the database.

```
    public void deleteProductDetails(Integer productId) { productDAO.deleteById(productId); }

    1 usage  ashmhmd25321
    public Product getProductDetailsById(Integer productId) { return productDAO.findById(productId).get(); }

    1 usage  ashmhmd25321
    public List<Product> getProductDetails(boolean isSingleProductCheckout, Integer productId) {
        if (isSingleProductCheckout && productId != 0) {
            List<Product> list = new ArrayList<>();
            Product product = productDAO.findById(productId).get();
            list.add(product);
            return list;
        } else {
            String username = JwtRequestFilter.CURRENT_USER;
            User user = userDAO.findById(username).get();
            List<Cart> carts = cartDAO.findByUser(user);

            return carts.stream().map(x -> x.getProduct()).collect(Collectors.toList());
        }
```

Figure 24: Product Crud

- The above figure shows a Spring service class with four methods that provide CRUD functionality related to the Product entity in the application.

```xml
<dependencies>
    <dependency>
        <groupId>org.springframework.boot</groupId>
        <artifactId>spring-boot-starter</artifactId>
    </dependency>

    <dependency>
        <groupId>org.springframework.boot</groupId>
        <artifactId>spring-boot-starter-test</artifactId>
        <scope>test</scope>
    </dependency>

    <dependency>
        <groupId>org.springframework.boot</groupId>
        <artifactId>spring-boot-starter-data-jpa</artifactId>
    </dependency>

    <dependency>
        <groupId>org.projectlombok</groupId>
        <artifactId>lombok</artifactId>
    </dependency>

    <dependency>
        <groupId>org.apache.httpcomponents</groupId>
        <artifactId>httpclient</artifactId>
        <scope>test</scope>
    </dependency>

    <dependency>
        <groupId>javax.xml.bind</groupId>
        <artifactId>jaxb-api</artifactId>
        <version>2.3.0</version>
```

Figure 25: Used Dependencies

- This is a Maven POM file that declares the dependencies required for a Spring Boot project. It includes the spring-boot-starter dependency for the core Spring Boot

functionality, the spring-boot-starter-test dependency for testing, and the spring-boot-starter-data-jpa dependency for working with JPA databases. It also includes the Lombok library for reducing boilerplate code, the httpclient dependency for testing HTTP requests, and the jaxb-api dependency for working with Java architecture for XML binding (JAXB). Overall, this POM file sets up the necessary dependencies for building a Spring Boot web application with database access and testing capabilities.

Chapter 4: Design

4.1 Requirement Gathering

4.1.1 Introduction to Requirement Gathering

An application development program's requirements are gathered via discovery, analysis, and documentation. This phase of software creation is essential since it sets the tone for the rest of the project and, if done incorrectly, may create significant setbacks in terms of time, money, and quality. Consumers, end-users, industry experts, programmers, and anybody else who has a vested interest in the project are the key targets of demand collection. Consumers need to be identified, their needs analyzed, prioritized, and then documented in a style that is easy to comprehend.

Gathering requirements is essential for a software development project for several reasons.

- Gaining a more apparent knowledge of project expectations may provide better software by first gaining a thorough grasp of those expectations via the requirements collecting process. This insight is invaluable to me in producing software that will delight consumers.

- Both expenses and dangers are reduced because of the early identification of possible hazards and restrictions via requirement collection. If these dangers are spotted early, the time and money needed to create the program may be significantly reduced.

- To aid with prioritization, I may use the information gathered during the requirement-collecting phase to rank the relevance of each demand and choose which ones should be built first. This prioritizes the needs of the stakeholders and guarantees that the software will satisfy their most pressing demands.

- Requirements gathering helps me and stakeholders have more fruitful discussions. The goals and expectations of the project may then be communicated and understood by those involved. If everyone involved in a project can communicate more effectively, fewer misunderstandings and disagreements will develop.

- Requirements elicitation is an essential part of any software development process. Before beginning implementation, I can find any missing or inconsistent specifications and fill them in.

4.1.2 Requirement Gathering Techniques

4.1.2.1 Interviews

A software project's development process isn't complete until the requirements have been gathered. As the web app developer, it's my responsibility to learn about and consider the perspectives of all relevant parties to provide a solution that satisfies everyone involved. Interviewing stakeholders to glean their needs is a method I'll go through in detail here.

- A web app developer knows that gathering requirements are the first stage in creating any web app. The textile sector's requirements for a web app will be intricate and particular. To obtain requirements, it is possible to conduct interviews with relevant parties.

- Initially, I interviewed textile industry professionals, such as manufacturers and store owners. Stakeholders with such an in-depth acquaintance with the field would prove invaluable for determining the evolution of the web app.

- I prepared a set of questions to ask during the interviews tailored to the web app's aims. Current methods, difficulties, and potential for advancement within the textile business are all perfectly acceptable for the queries.

- During the interviews, I planned to prompt participants to talk about their thoughts on the textile sector and their experiences with online purchasing. I would also poll them on what they think the web app's features and functions should be to meet the difficulties of the business world. It could help determine the web app's most essential features and ensure it meets market demands. I also collect comments on the system's ability to anticipate costs and accurately provide enrollment instructions.

- I also interviewed people in the textile business, academics who study that field, and the stakeholders. My knowledge of the market and ability to identify emerging trends, price prediction contexts, and enabling technology would improve with their involvement.

- I conduct interviews with the stakeholders to collect requirements, but the process would be a team effort since I would collaborate to ensure the web app is precisely what they need. The interview knowledge would be written down and referred to when building the web app to ensure it meets its target audience's needs and aims.

4.1.2.2 Questionnaire

Before putting a questionnaire into action, I prepare a list of consumers I consider stakeholders in this questionnaire. When the stakeholders have been determined, a survey should be developed to collect their needs for the online application. The questionnaire must be created to collect information on the stakeholders' requirements, wishes, and expectations for the web application.

The questionnaire ought to be presented to the stakeholders, and a fair amount of time should be provided for them to answer it. After that, the replies need to be examined so that recurring topics and prerequisites may be found.

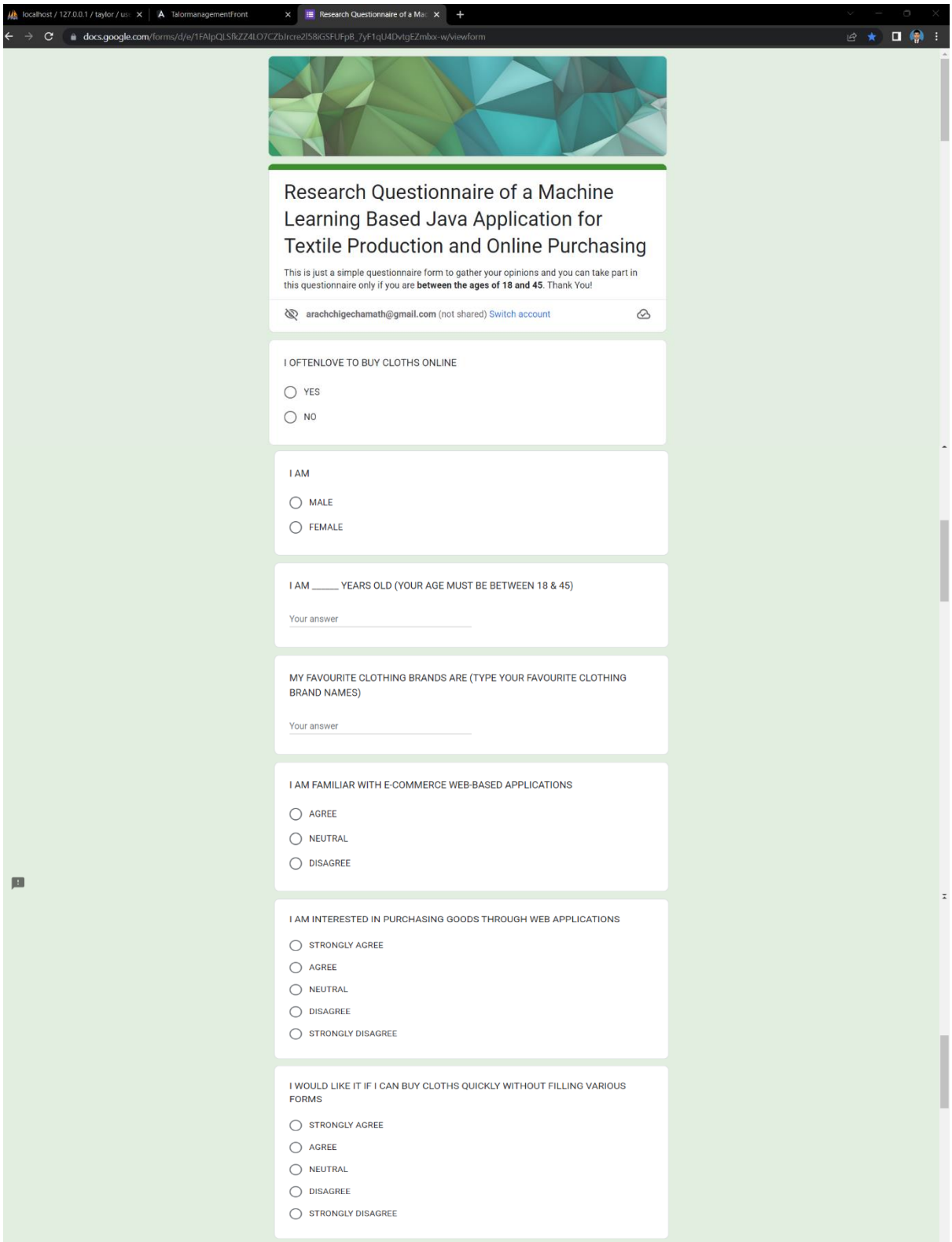
After all the needs have been compiled, the next step is sorting them into different groups according to their importance and feasibility. This will assist in prioritizing the needs and guarantee that the requirements that are the most critical and the most possible are handled first.

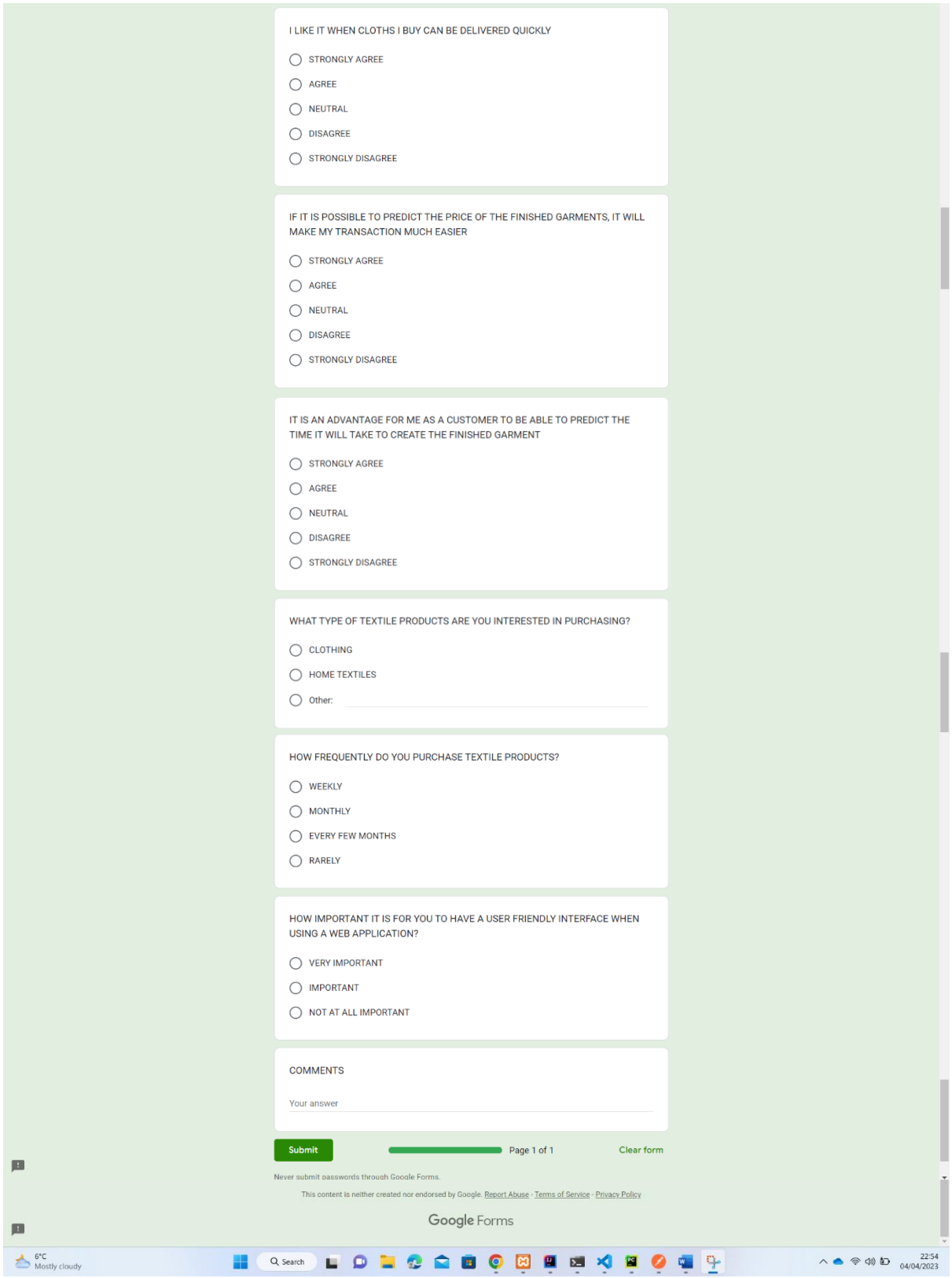
After that, the needs ought to be stated in a requirements document, which ought to be subjected to the scrutiny and approval of the stakeholders. The section outlining the conditions has to comprehensively explain each stipulation and any pertinent details about how the web application would accommodate its fulfillment.

In conclusion, the process of collecting requirements is an essential component in the development of a productive online application. When I use questionnaires to gather requirements from stakeholders, I can guarantee that they satisfy the requirements and expectations of the textile sector by ensuring that they fulfill those needs and expectations.

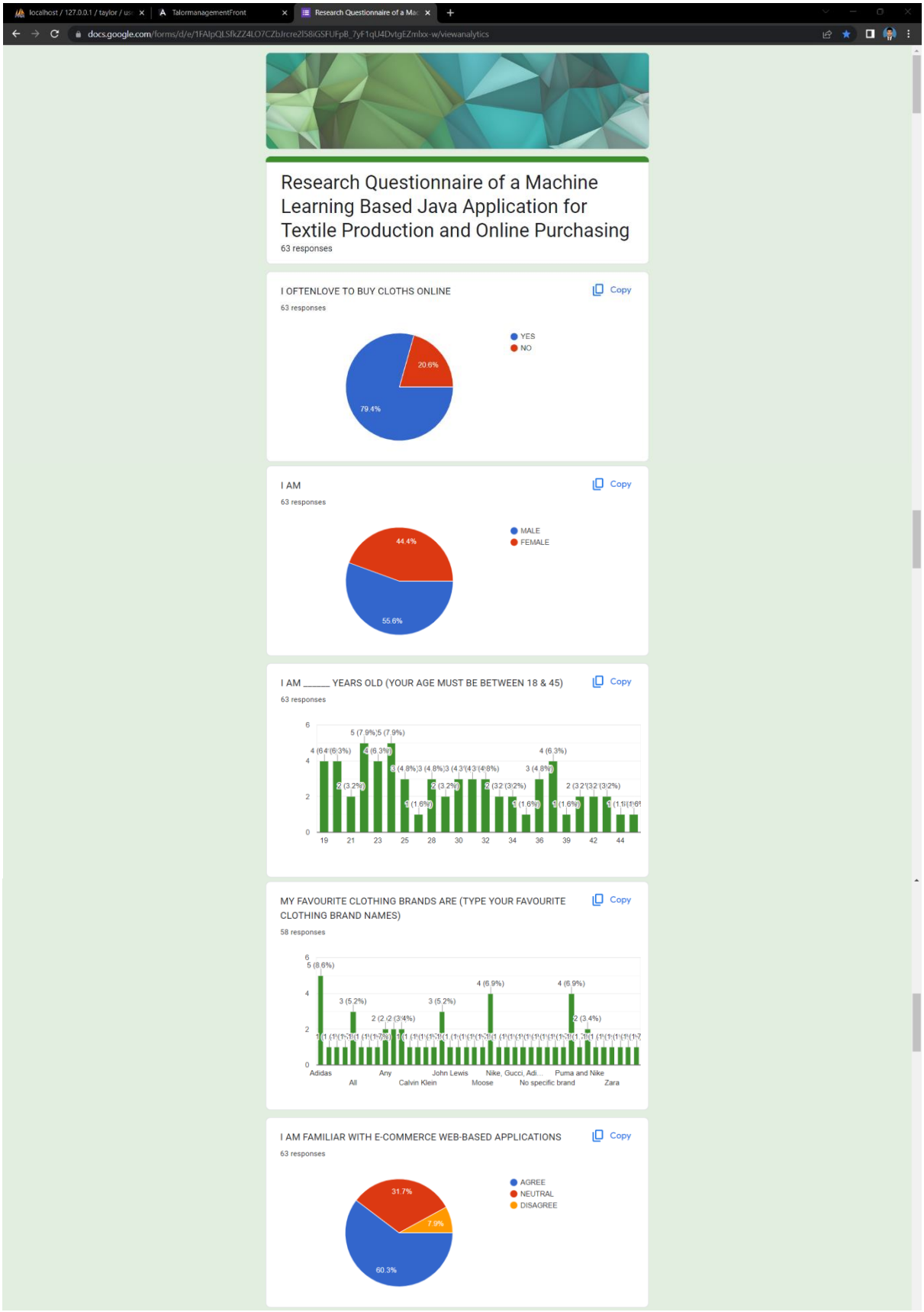
Listening to the various stakeholders and documenting their needs clearly and concisely is essential to collecting requirements.

Evidence of the Questionaires Used:




I LIKE IT WHEN CLOTHS I BUY CAN BE DELIVERED QUICKLY
STRONGLY AGREE
AGREE
NEUTRAL
DISAGREE
STRONGLY DISAGREE
IF IT IS POSSIBLE TO PREDICT THE PRICE OF THE FINISHED GARMENTS, IT WILL MAKE MY TRANSACTION MUCH EASIER
STRONGLY AGREE
AGREE
NEUTRAL
DISAGREE
STRONGLY DISAGREE
IT IS AN ADVANTAGE FOR ME AS A CUSTOMER TO BE ABLE TO PREDICT THE TIME IT WILL TAKE TO CREATE THE FINISHED GARMENT
STRONGLY AGREE
AGREE
NEUTRAL
DISAGREE
STRONGLY DISAGREE
WHAT TYPE OF TEXTILE PRODUCTS ARE YOU INTERESTED IN PURCHASING?
CLOTHING
HOME TEXTILES
Other:
HOW FREQUENTLY DO YOU PURCHASE TEXTILE PRODUCTS?
WEEKLY
MONTHLY
EVERY FEW MONTHS
RARELY
HOW IMPORTANT IT IS FOR YOU TO HAVE A USER FRIENDLY INTERFACE WHEN USING A WEB APPLICATION?
VERY IMPORTANT
IMPORTANT
NOT AT ALL IMPORTANT
COMMENTS
Your answer
Submit
Page 1 of 1
Clear form
Never submit passwords through Google Forms.
This content is neither created nor endorsed by Google. Report Abuse - Terms of Service - Privacy Policy
Google Forms
6°C
Mostly cloudy
Search
22:54
04/04/2023

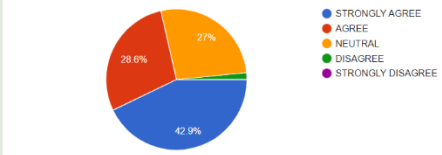
Results of the Questionaires Used:



I AM INTERESTED IN PURCHASING GOODS THROUGH WEB APPLICATIONS

Copy

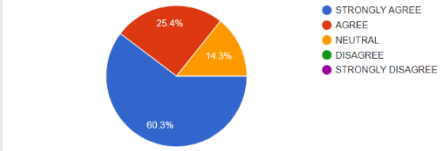
63 responses



I WOULD LIKE IT IF I CAN BUY CLOTHS QUICKLY WITHOUT FILLING VARIOUS FORMS

Copy

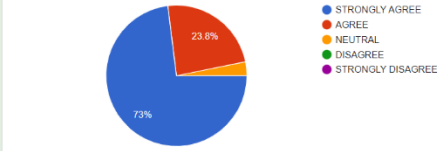
63 responses



I LIKE IT WHEN CLOTHS I BUY CAN BE DELIVERED QUICKLY

Copy

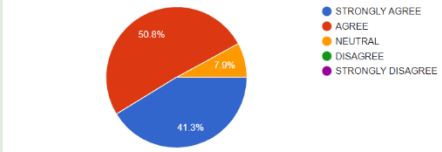
63 responses



IF IT IS POSSIBLE TO PREDICT THE PRICE OF THE FINISHED GARMENTS, IT WILL MAKE MY TRANSACTION MUCH EASIER

Copy

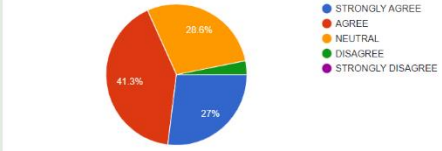
63 responses



IT IS AN ADVANTAGE FOR ME AS A CUSTOMER TO BE ABLE TO PREDICT THE TIME IT WILL TAKE TO CREATE THE FINISHED GARMENT

Copy

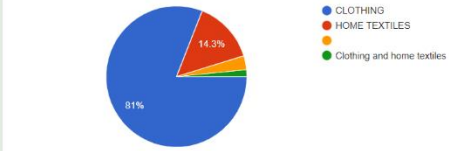
63 responses



WHAT TYPE OF TEXTILE PRODUCTS ARE YOU INTERESTED IN PURCHASING?

Copy

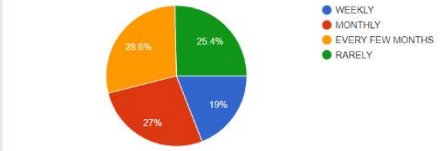
63 responses



HOW FREQUENTLY DO YOU PURCHASE TEXTILE PRODUCTS?

Copy

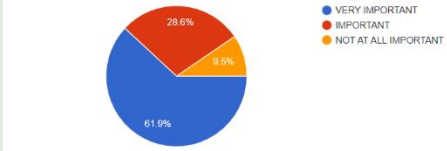
63 responses



HOW IMPORTANT IT IS FOR YOU TO HAVE A USER FRIENDLY INTERFACE WHEN USING A WEB APPLICATION?

Copy

63 responses



COMMENTS

7 responses

- It's better if they deliver the exact original products instead of fake ones
- I love shopping online
- Improve the security of the payments done via online
- This project sounds a good one to be in the market
- Adding a review section of the relevant product
- Security and privacy must be improved
- Security of online transactions must be improved

4.2 Feasibility Study

This project should undertake a feasibility study before starting development on a Java web app solution for predicting the cost of textiles, the length of time it will take to make clothing, and the process of buying textile items.

- Mitigating Danger:

To foresee and prepare for any problems that may occur during the project's creation and execution, a feasibility study is carried out. Possible consequences may be identified and methods developed to lessen their effect by analyzing the detailed overall, economical, regulatory, and operating viability.

- Expense Reduction:

A web app's development expenses may be estimated and ways to reduce those costs can be found with the aid of a feasibility study. An accurate budget for the project may be created when the expenses of hardware, software, and human resources have been calculated.

- Constituent Involvement:

Stakeholders' needs and desires may be better met thanks to the information gleaned from a feasibility analysis, which encourages their participation in the project's early stages. Incorporating the needs and desires of participants into the development design is made easier when they are consulted throughout the feasibility report.

4.2.1 Technical Feasibility

4.2.1.1 Technical Requirements:

I will first evaluate the necessary technical prerequisites to design the web application. The following are some of the technical requirements for the project:

- Language for Coding: Due to the object-oriented structure of Java as well as its numerous modules and frameworks, this project would benefit from using Java as its language for programming.
- Database System: To safely store and handle data, a database system that is both dependable and scalable is required. MySQL Workbench and other similar options could be good fits for the project.
- I will need a web server that is up to hosting the web application. Apache is one choice that could be appropriate.

4.2.1.2 Choosing the Appropriate Technology:

It is crucial to make sure that the web application can be scaled, that it is safe, and that it performs properly by selecting the suitable technology stack for the project. The following are some of the technological options that were considered for the project:

- Web Development Framework: The Spring Boot framework is an option that should be considered for the project owing to the vast libraries, modularity, and safety characteristics that it has.
- Front-end Technologies: Tasked with developing the user interface of an online application, Angular may be the front-end technology that best suits for needs.

4.2.1.3 The Availability of Resources:

To ensure the effective development of the web application, it is crucial to ensure that the appropriate technical resources are accessible. The following are examples of resources that are necessary for the project:

- Developers: This project was completed by me using web development experience and knowledge gathered.
- Hardware: I want dependable hardware, such as storage devices, to host the web application.
- Software Licenses: I will need to ensure that the database management system, web development framework, and any other necessary tools have the relevant software licensing.

4.2.2 Economical Feasibility

While developing web applications, need to take into consideration the whole cost of the project. The following are some of the expenses involved with the project:

- Expenses Related to Hardware: To host the web service, I must buy or rent server, storage systems, and any other essential gear. The prices are susceptible to change based on factors such as the needed amount and quality of equipment.

- Expenses Relating to Software: Certain software tools, including a database management system, website development frameworks, and other essential tools, must be purchased or licensed. The price may change based on the kind of license and the number of copies that are needed.

4.3 Project Requirement Determination

4.3.1 Resource Identification

4.3.1.1 Hardware

Hardware Component	Specification
Processor	Intel Core i3-8th gen or later
Operating System	Microsoft Windows 10 or later
Mother Board	Asus Pro H610M-C-CSM
Memory (RAM)	8 GB of RAM
Storage	WD Blue SN570 NVMe™ SSD 250GB
Video/Graphics	Intel® UHD Graphics 620
Monitor	27" ViewFinity S61B QHD IPS 75Hz AMD FreeSync Monitor
Backup device:	SanDisk Extreme PRO Portable SSD V2 500GB

Table 2: Hardware Resource Identification Table

4.3.1.2 Software

Software

- VS code
- Java
- IntelliJ
- MySQL Workbench

Technology

- User Interface : Angular
- Web application code : Java
- Machine Learning code : Python, Flask
- Local host : XAMPP
- Database : MySQL

4.3.2 Software Process Model for Proposed System

4.3.2.1 Agile Scrum Methodology

My most recent contribution to this project as a developer was the creation of a web application for the textile industry that forecasts the amount of time and money required for textile production. I used the agile Scrum technique to manage this project, which enabled me to do it successfully while being the lone developer. The Agile Scrum project management method is an iterative methodology that emphasizes adaptation, flexibility, and cooperation. A project is broken up into a series of smaller, more manageable jobs that may be finished relatively quickly using this process.

Because I was the sole person working on the project, my responsibilities included those of the product owner, scrum master, and developer. I started by figuring out what needed to be done for the project and then breaking it down into manageable chunks that could be finished in two to four weeks. A product backlog is a prioritized list of activities that need to be completed, and I made one for our company. I scheduled the sprints, which are the iterations in the software development process, using the Scrum approach. After selecting the items with the most significant priority from the product backlog, I generated a sprint backlog for each project iteration. I determined how much time was required to do each activity and established a target for the sprint.

For the sprint, I worked on the items listed in the sprint backlog and kept everyone up to speed on my progress at the scrum meetings. In addition, I performed consistent quality assurance testing on the product to validate that it lived up to the expectations of the project and worked appropriately.

After each iteration, I carried out a review, during which I appraised the development of the product and gave myself a personal demonstration of the tasks that had been finished. In addition, I carried out a retrospective analysis of the development process to identify any potential weak spots. As a sole developer, I successfully and quickly finished the project by adhering to the agile scrum process. Because of the process, I could divide the project into more manageable tasks and rank them in order of importance, enabling me to finish the job within the allotted time.

When it came to finishing the web development project, I was working on linked to the textile sector, and the agile Scrum approach proved to be a beneficial tool. That enabled me to handle the project efficiently, ensuring it fulfilled the criteria and was completed on schedule.

4.3.2.2 Benefits of Agile Scrum Methodology

- The Agile Scrum technique allows for the requirements and priorities to be adjusted as needed all through the development phase. This may let a single developer on a Java web application project respond to changing needs while guaranteeing that the final output is satisfactory to all parties involved.

- Getting products to market sooner is possible with the help of the Agile Scrum process. This might be helpful for a single developer in terms of getting value to stakeholders and feedback out to them as soon as possible.

- The Agile and Scrum methodologies place a premium on constant testing and feedback, which ultimately results in a better product. This may help a single developer make sure their Java web software is robust, user-friendly, and up to par with industry standards.

4.3.2.3 Drawbacks of Agile Scrum Methodology

- The regular meetings, sprints, and reviews required by the Agile Scrum process may add up quickly. This may be a huge burden and extra work for a single developer like me who works on the Java web application project.

- The Agile Scrum technique is dependent on regular input and participation from all relevant parties. This might put the only developer at the mercy of stakeholders who are slow to respond or aren't always accessible.

- The Agile Scrum process has a lot of moving parts, including a wide variety of people's responsibilities, rituals, and even tools. The intricacy of the process may be too much for a single developer to handle without extra study and practice.

4.4 Design of the Proposed System

4.4.1 Use Case Diagram

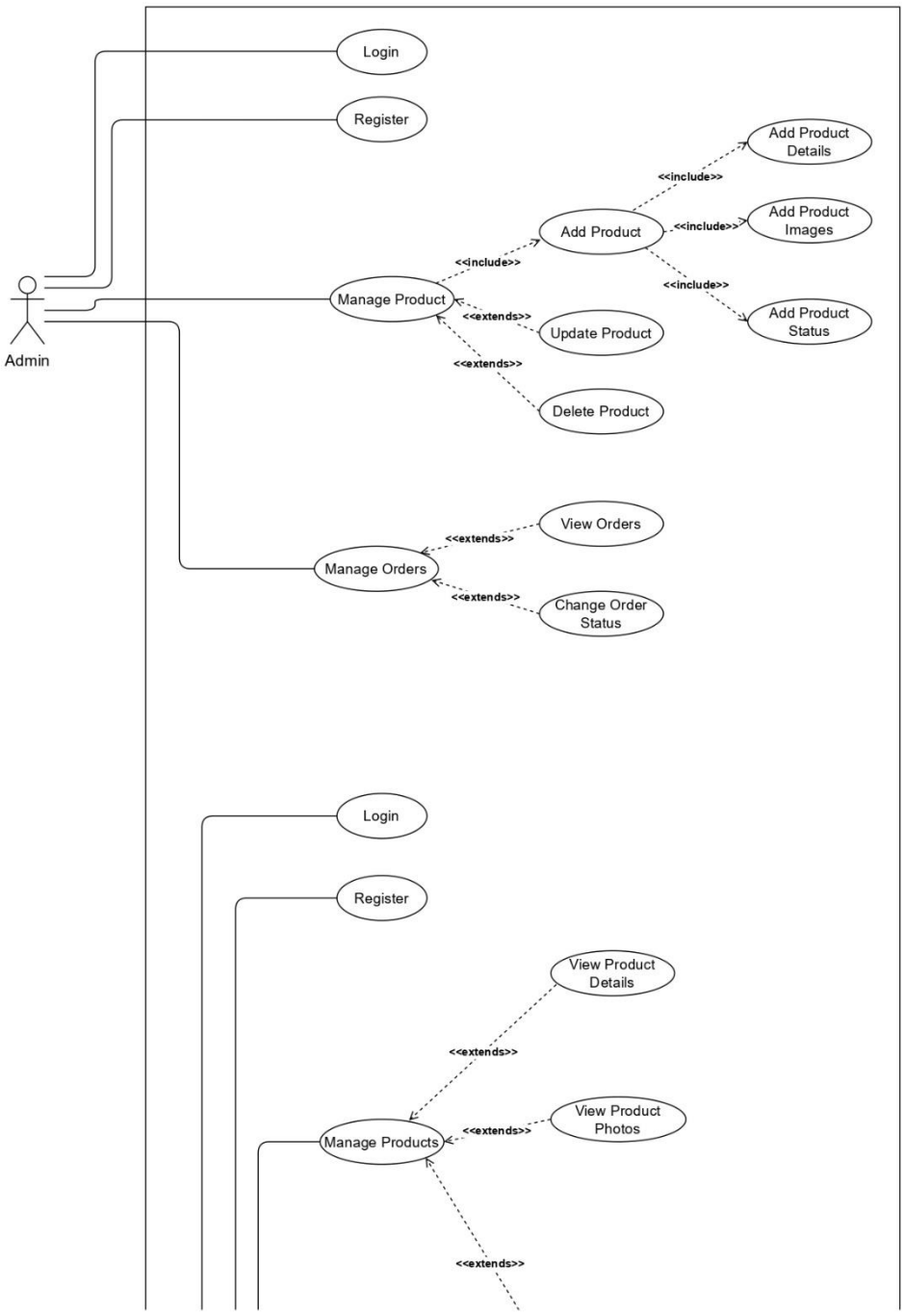


Figure 26: Use case Diagram-1

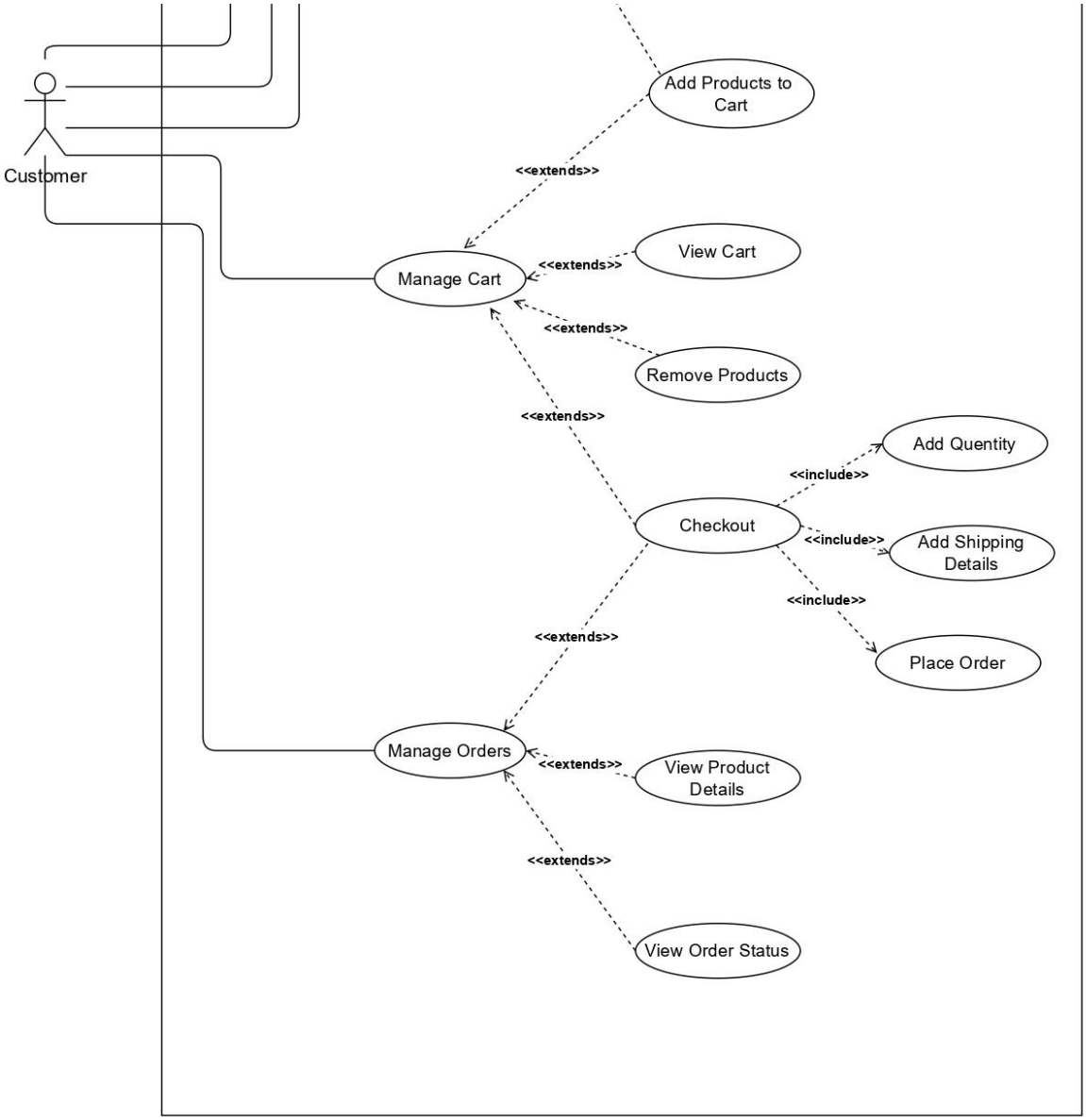


Figure 27: Use Case Diagram-2

4.4.2 Class Diagram

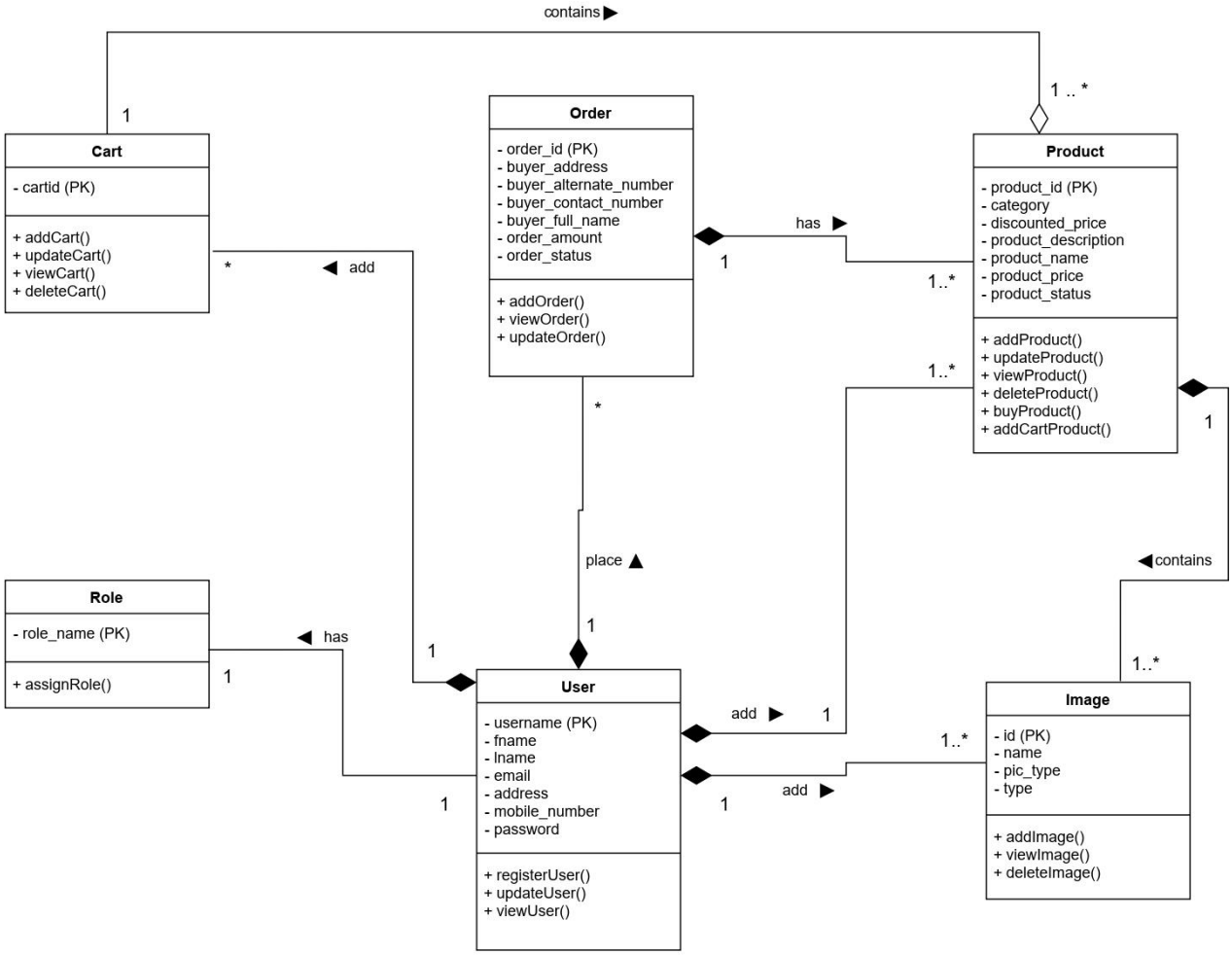


Figure 28: Class Diagram

4.4.3 Sequence Diagram

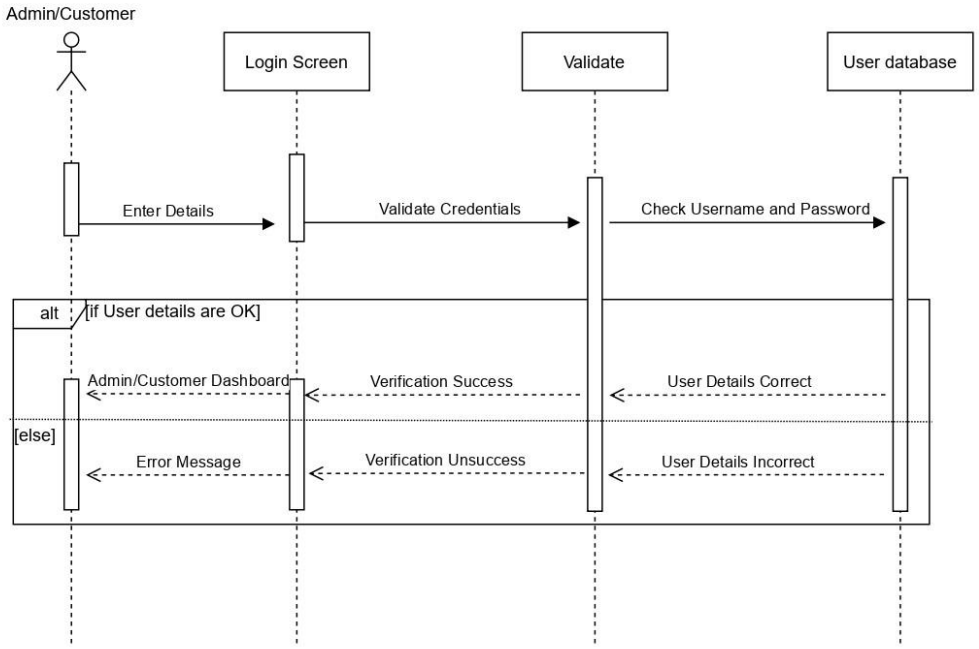


Figure 30: Sequesnce Diagram for User Login

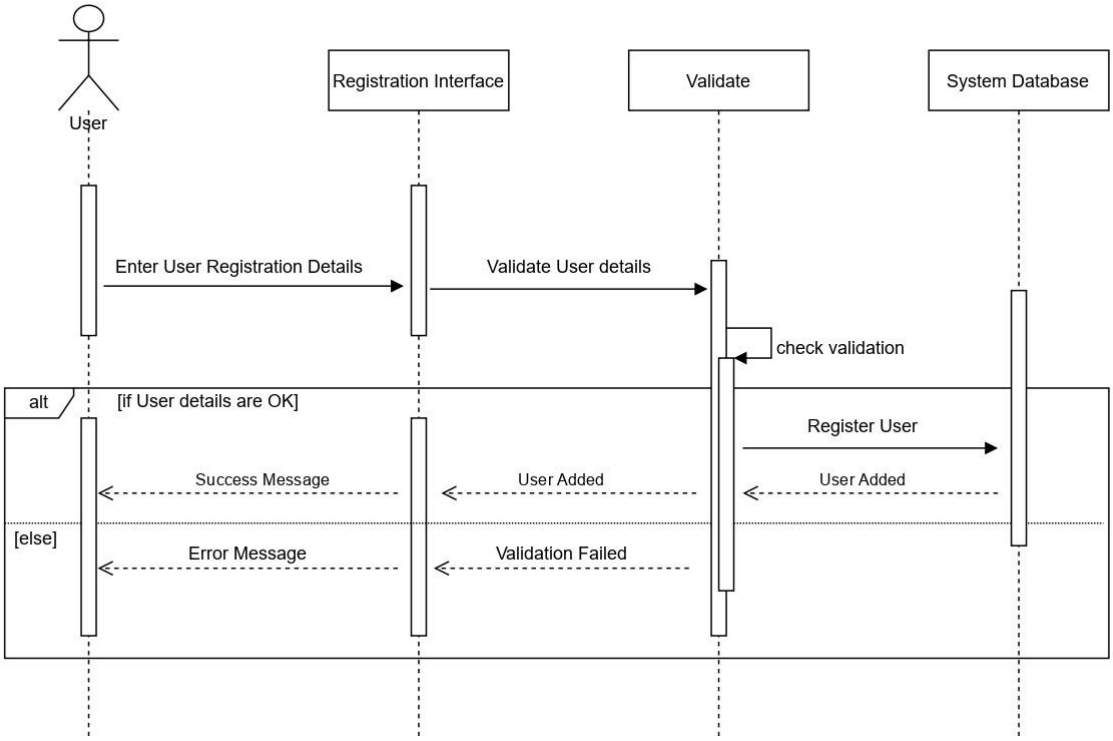


Figure 29: Sequence Diagram for User Registration

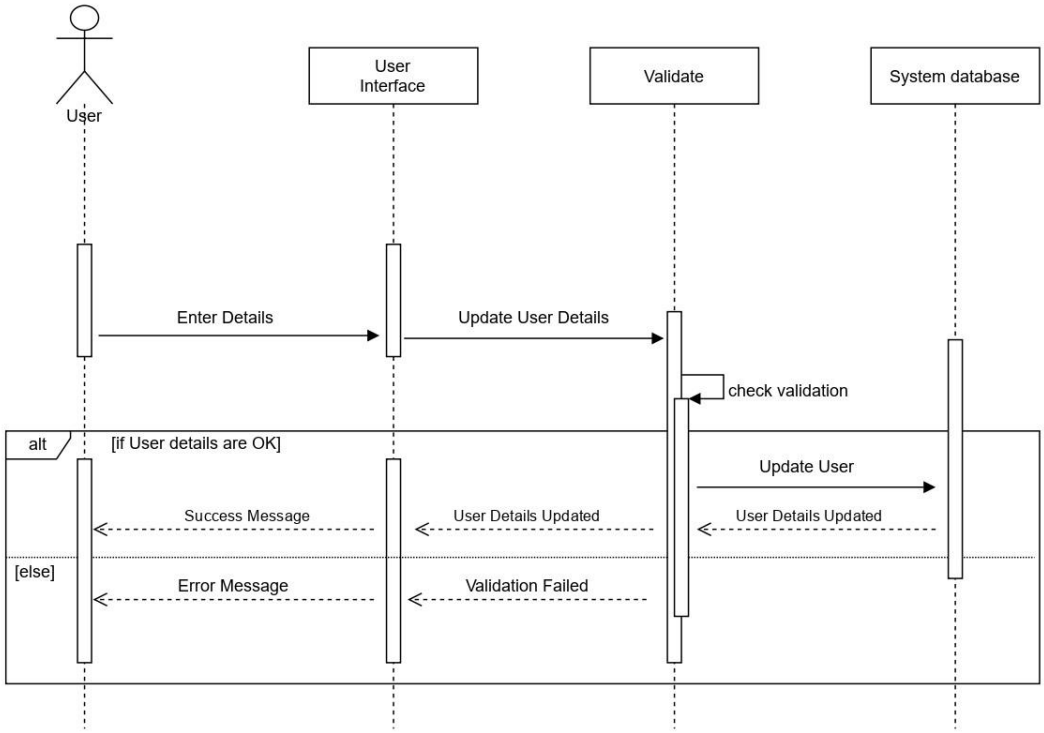


Figure 32: Sequence Diagram for User Update

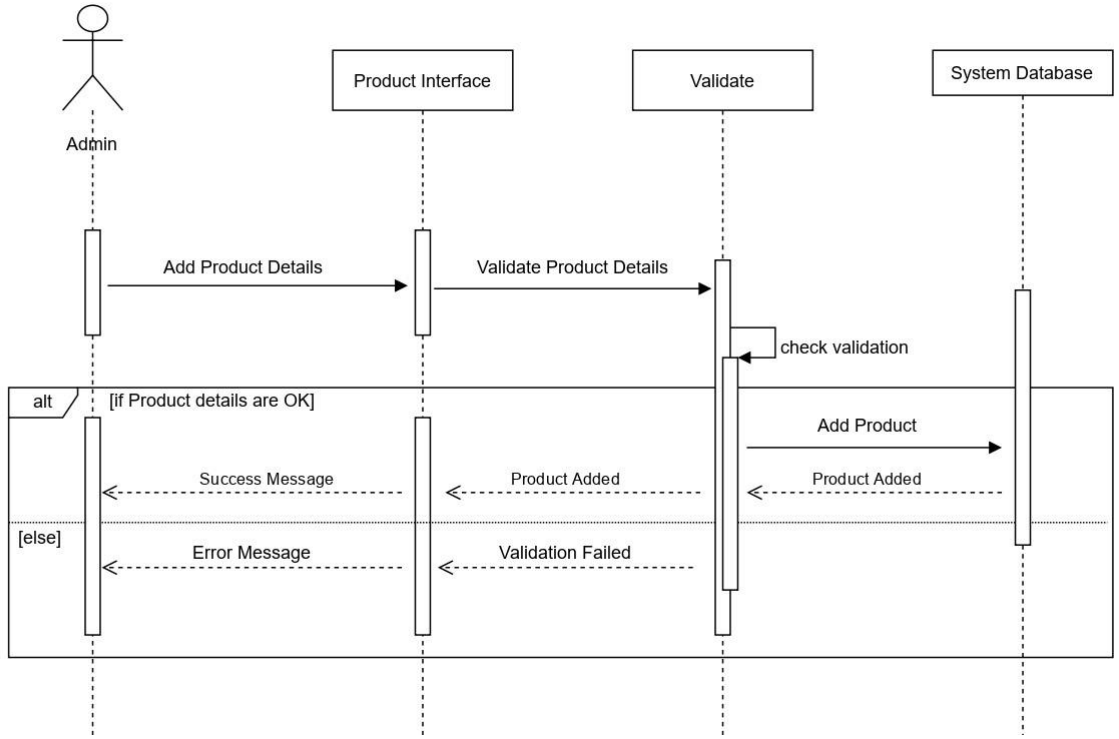


Figure 31: Sequence Diagram for Add Product

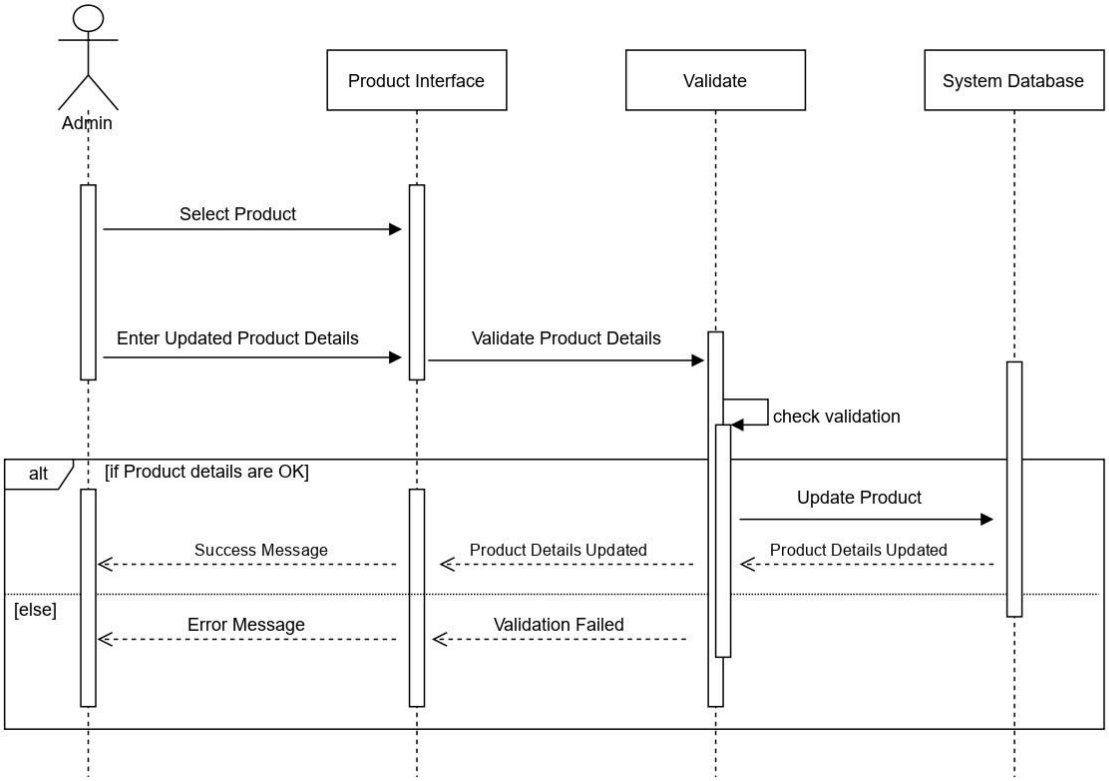


Figure 33: Sequence Diagram for Update Product

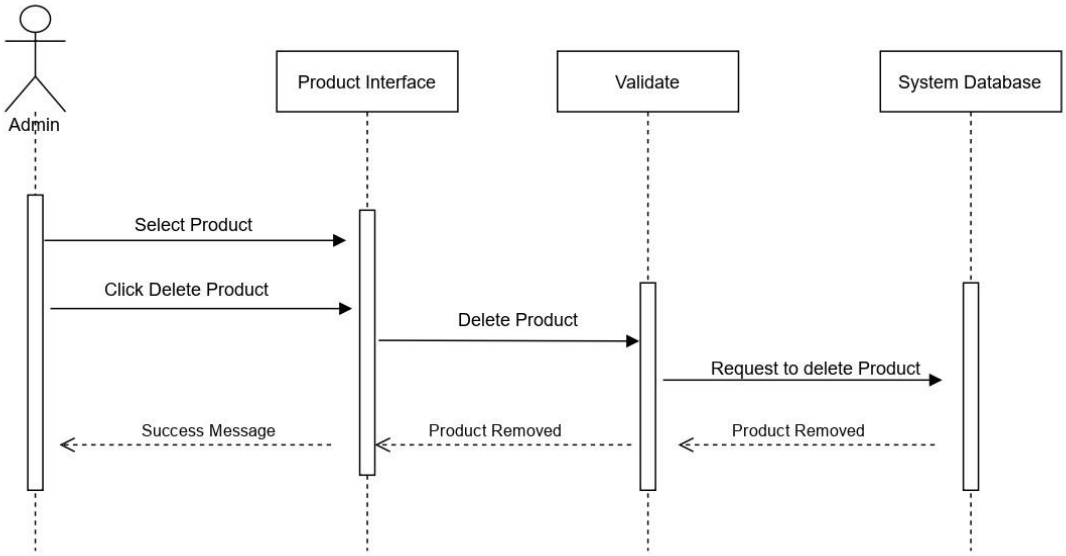


Figure 34: Sequence Diagram for Delete Product

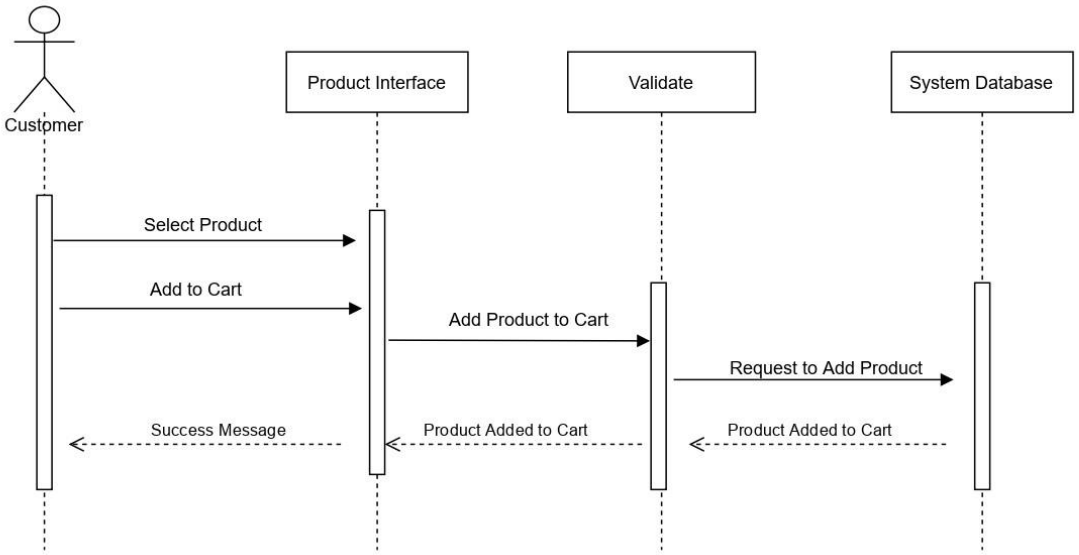


Figure 35: Sequence Diagram for Add Products to cart

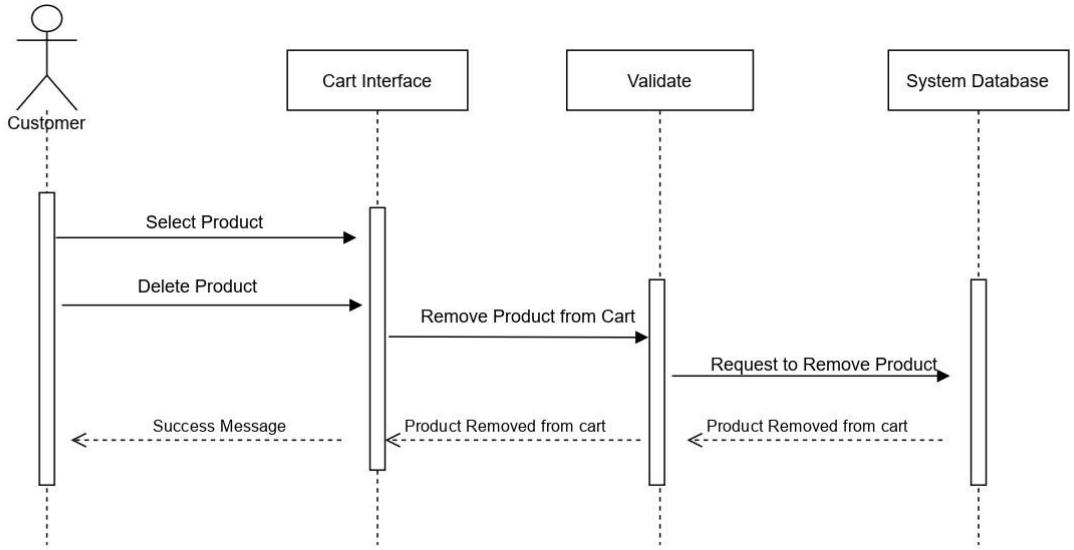


Figure 36: Sequence Diagram for Remove Products from cart

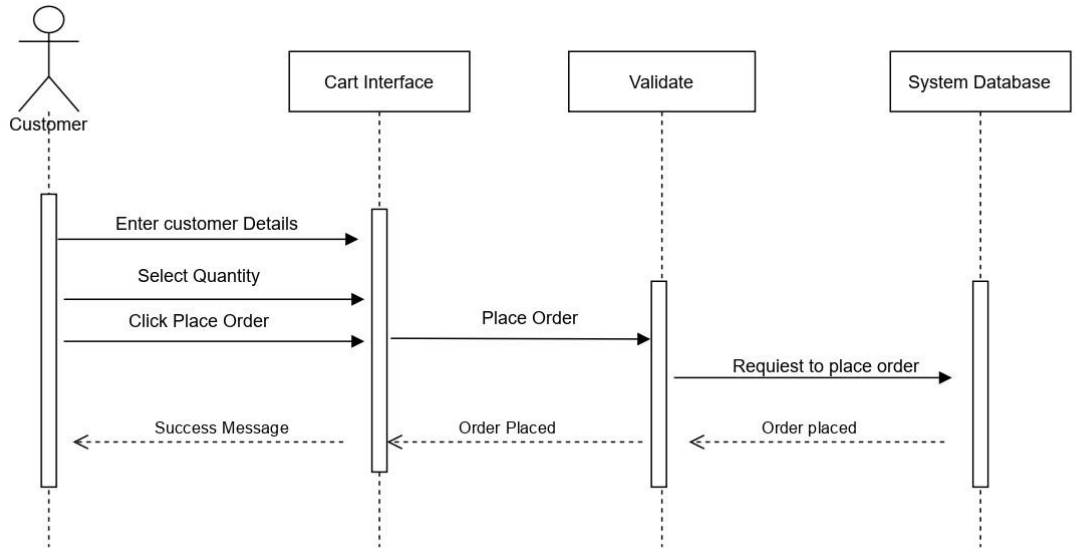


Figure 37: Sequence Diagram for Place Order

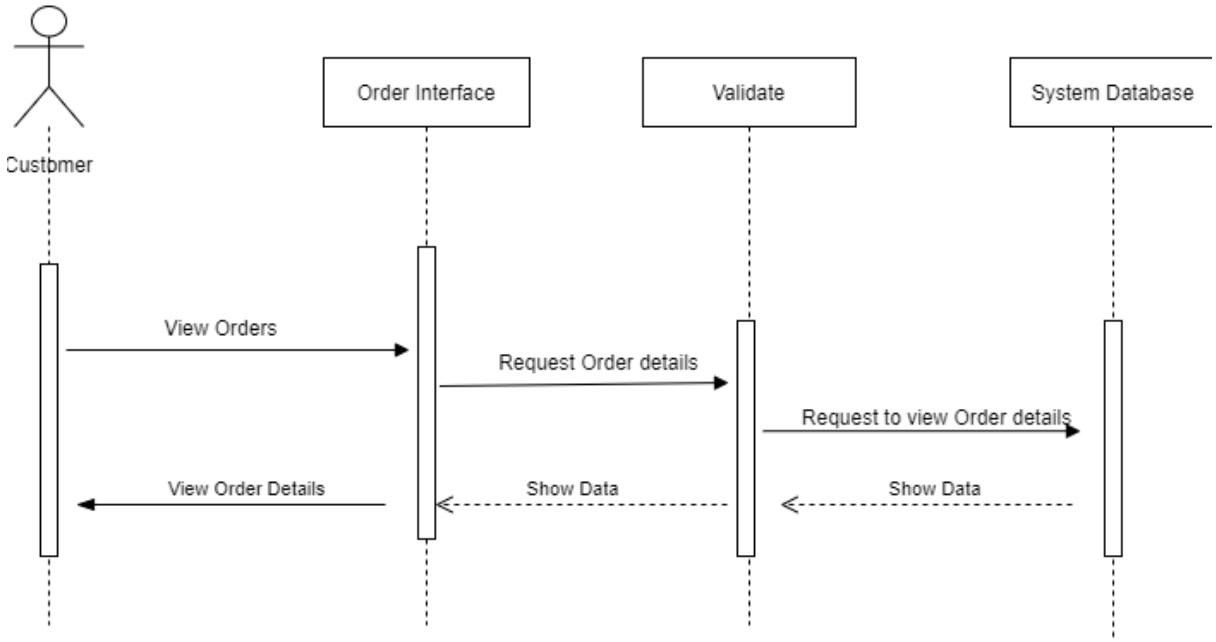


Figure 38: Sequence Diagram for View Order

4.5 Database Design

4.5.1 Entity Relationship Diagram

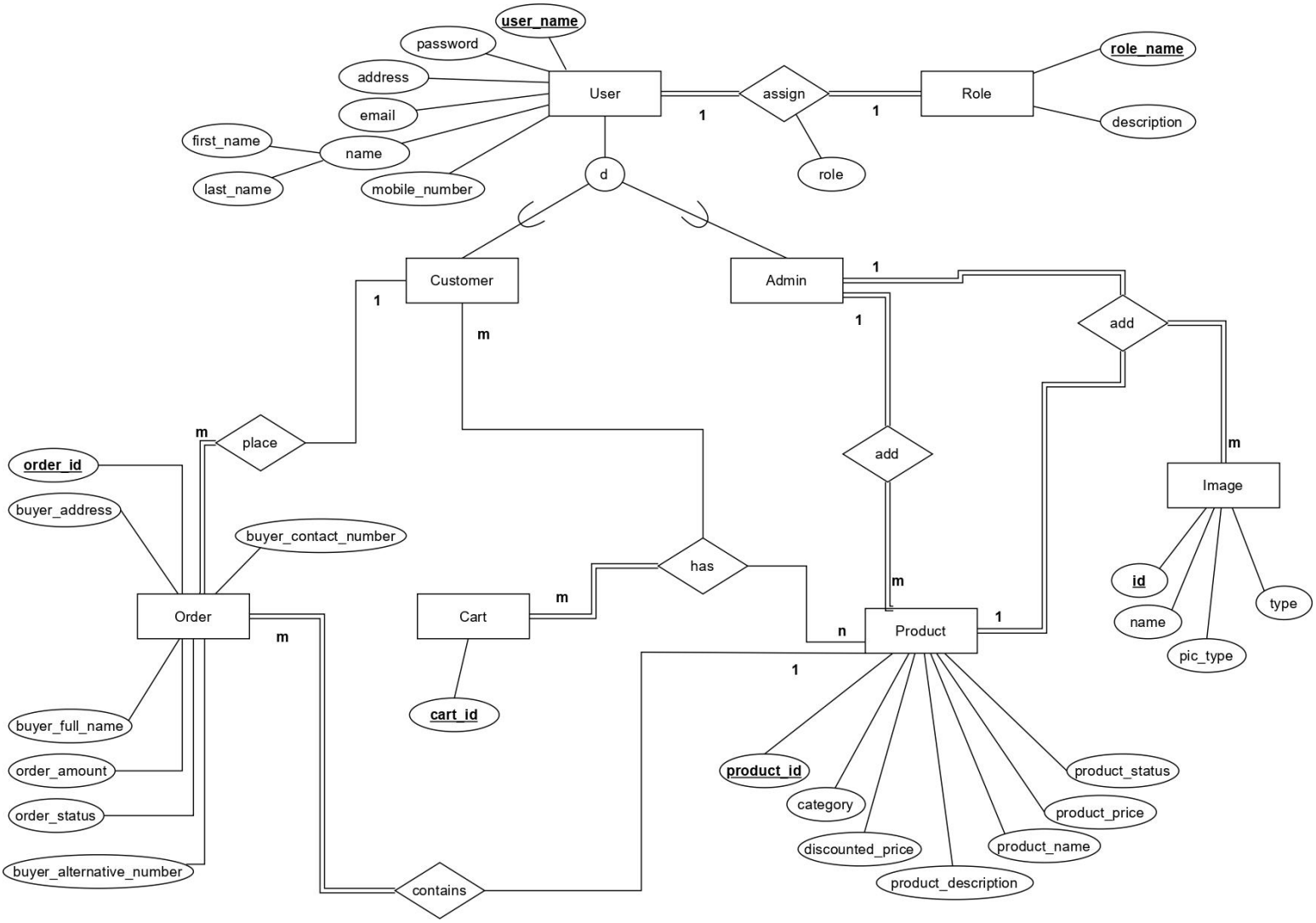


Figure 39: ER Diagram

4.5.2 Normalized Relational Schema

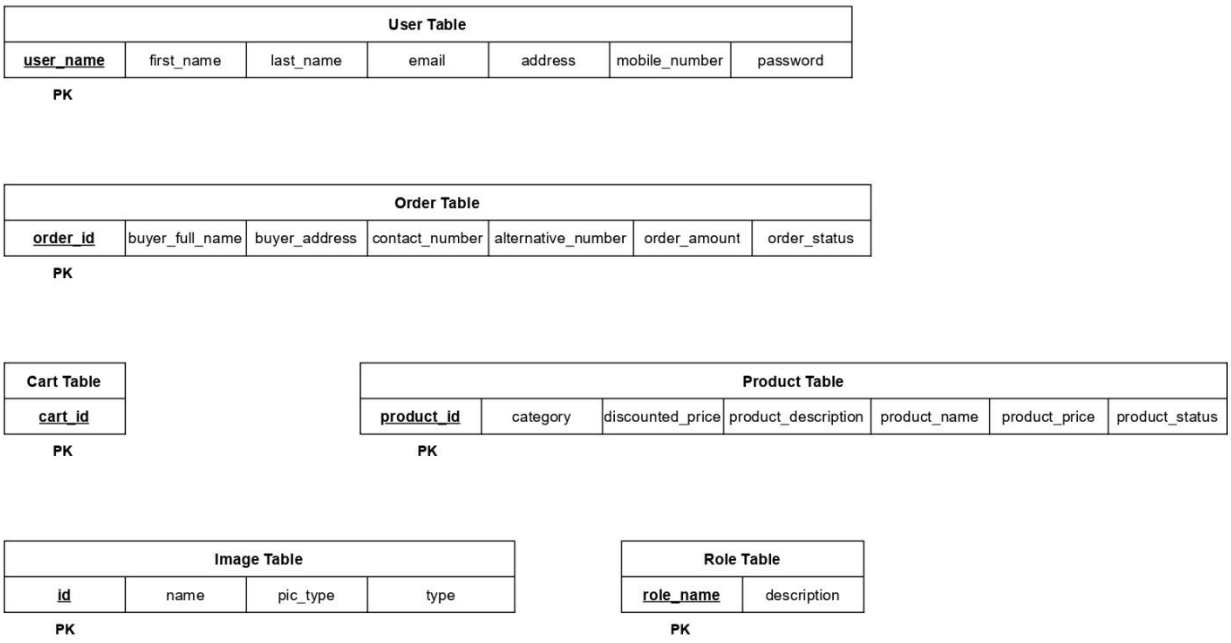


Figure 40: Schema Mapping Step 01 - Map Primary Keys

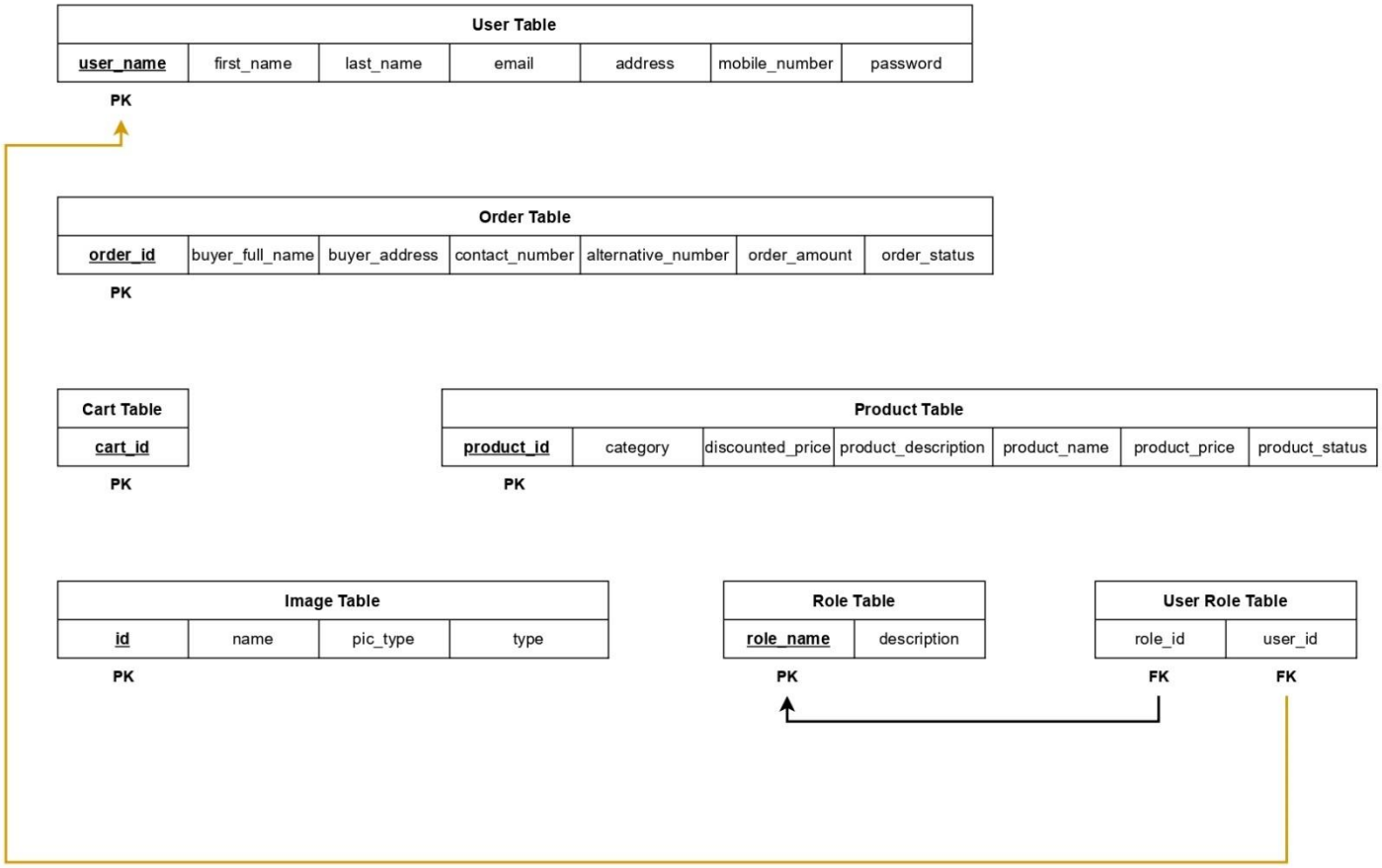


Figure 41: Schema Mapping- Map 1 to 1 relationships

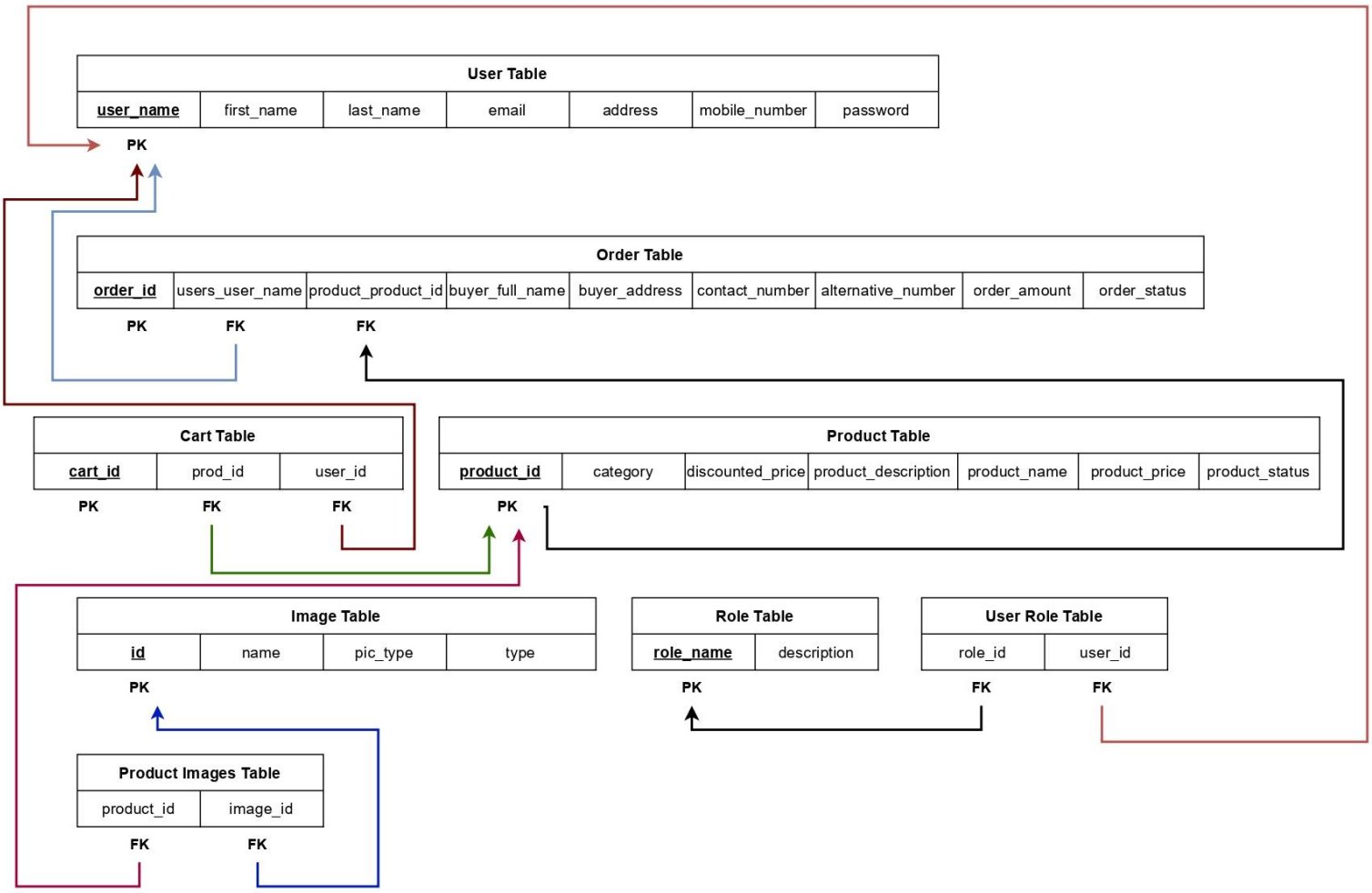


Figure 42: Schema Mapping : Map 1 to many relationships

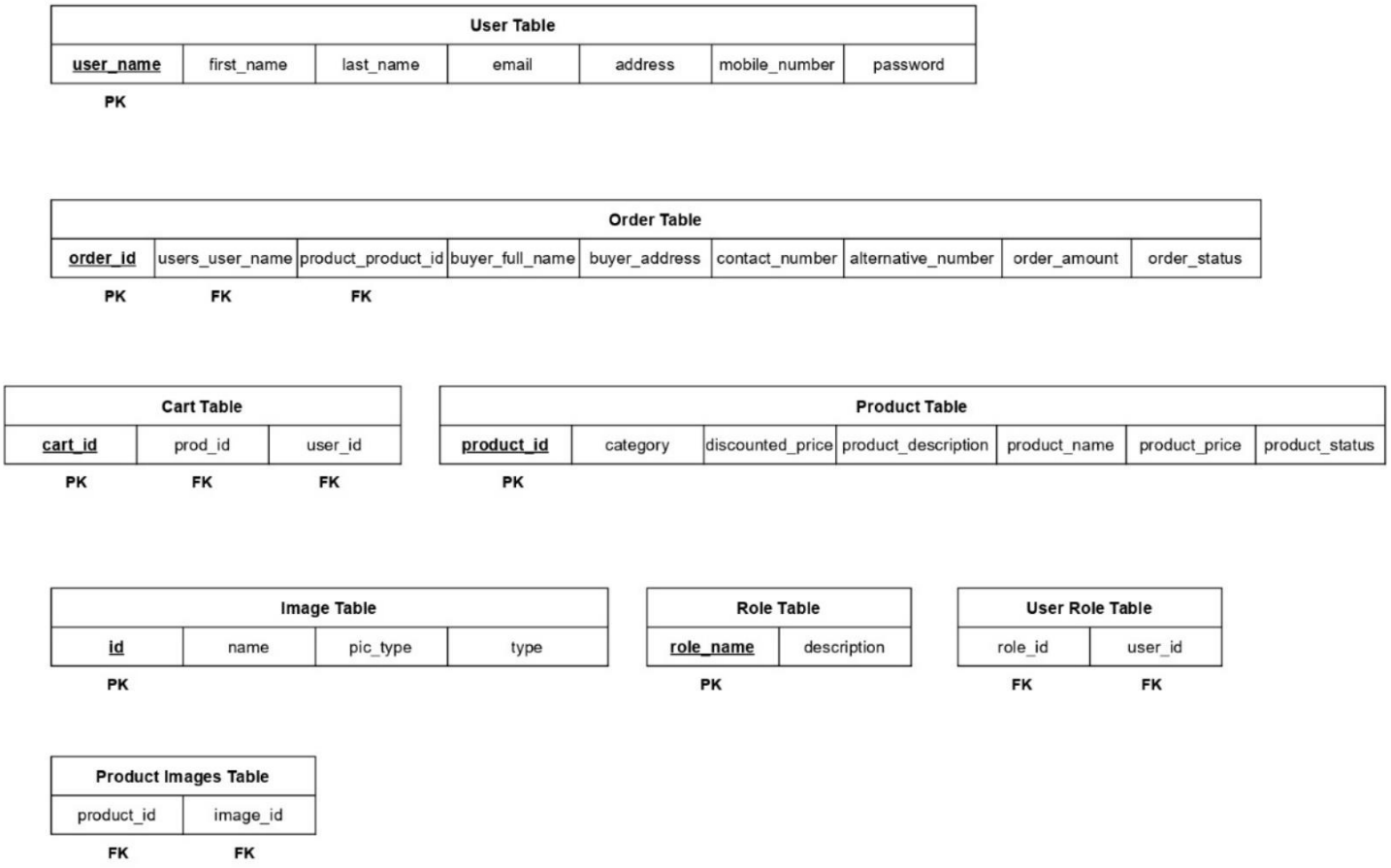


Figure 43: Schema Mapping : Normalized Relational Schema

Chapter 5: Analysis and Evolution

5.1 Implementation Overview

- Requirement Gathering:

Before starting work on this, I've been compiling a list of features that will be needed in the web app that will be used to anticipate the cost and availability of textiles. This would require consulting with interested parties to ascertain their needs.

- Designing:

It was making a plan for the web app's overall structure that considers the needs discovered. This included building the database schema in MySQL Workbench and choosing the proper Java and Angular frameworks and packages.

- Coding:

To create the web app, I used Java and Angular. Specifically, this meant making the parts, pieces, modules, and services that the architectural design had determined were essential to keeping track of modifications and checking for code bugs via a version control system like Github.

- Database Implementation:

Putting into action the database structure (tables, relationships, and indexes) created in MySQL Workbench. Make that the database is functioning correctly by populating it with sample data.

- Testing:

Doing extensive tests on the web app to guarantee it works as intended and satisfies all criteria. Participation in the unit test, the integration test, and the user acceptance test.

- Deployment:

Put the web app into production using security and scalability best practices. Automate the deployment process and guarantee environment-wide consistency using configuration management and deploying solutions.

5.2 Interfaces

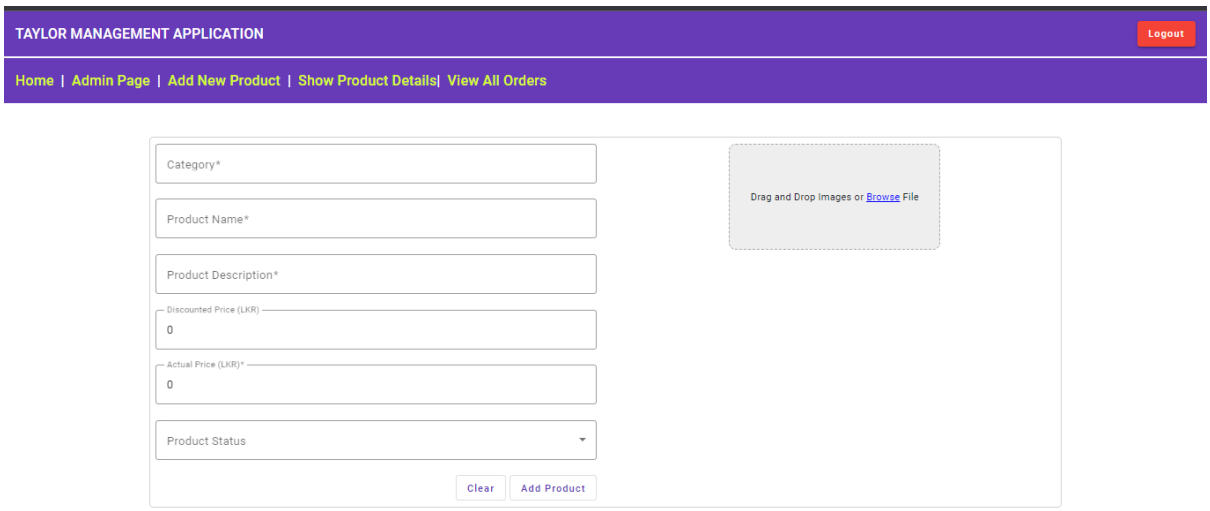


Figure 44: Admin adding new products interface

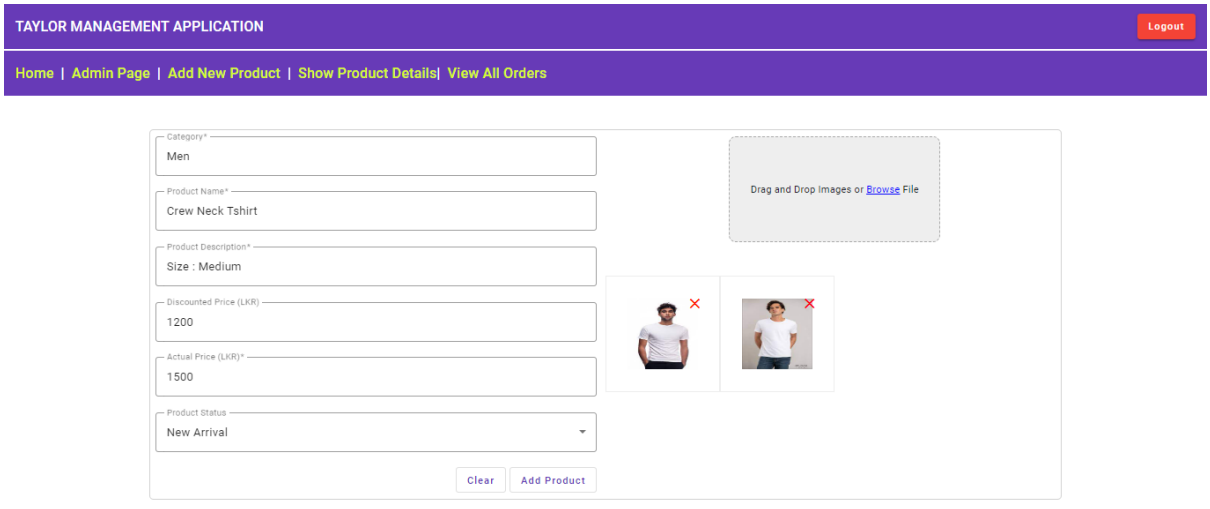


Figure 45: Admin adding roduct details interface

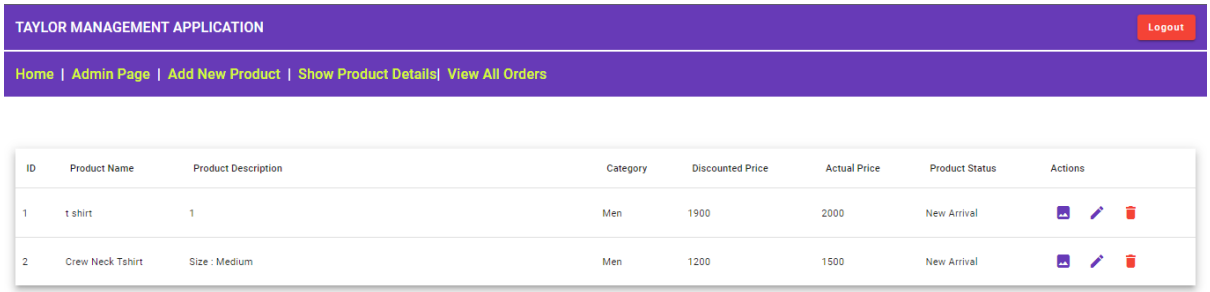


Figure 46: Admin show product details interface

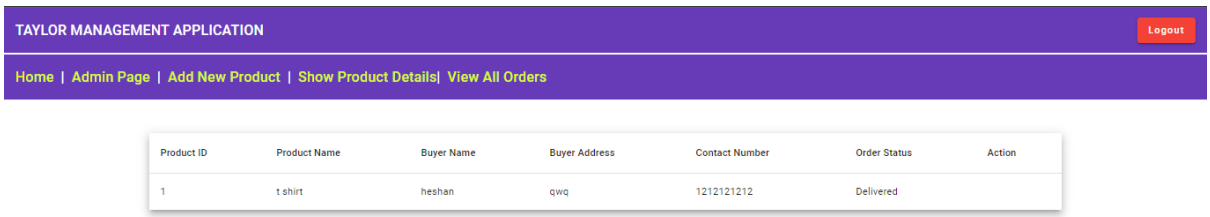


Figure 47: Admin view all orders

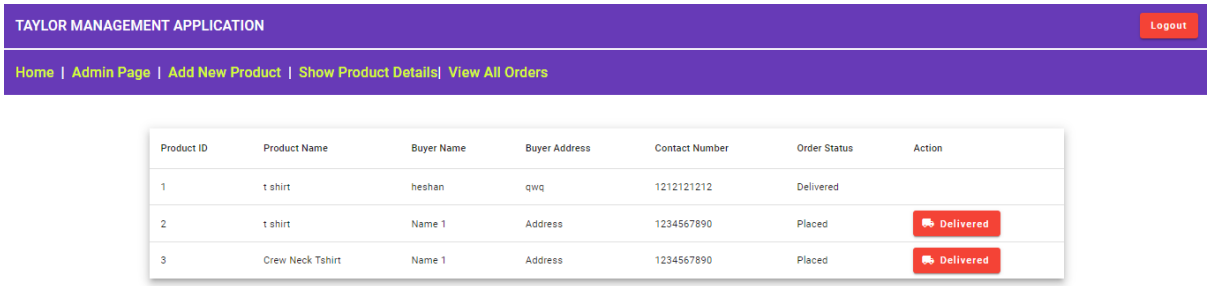


Figure 48: Admin order receive interface

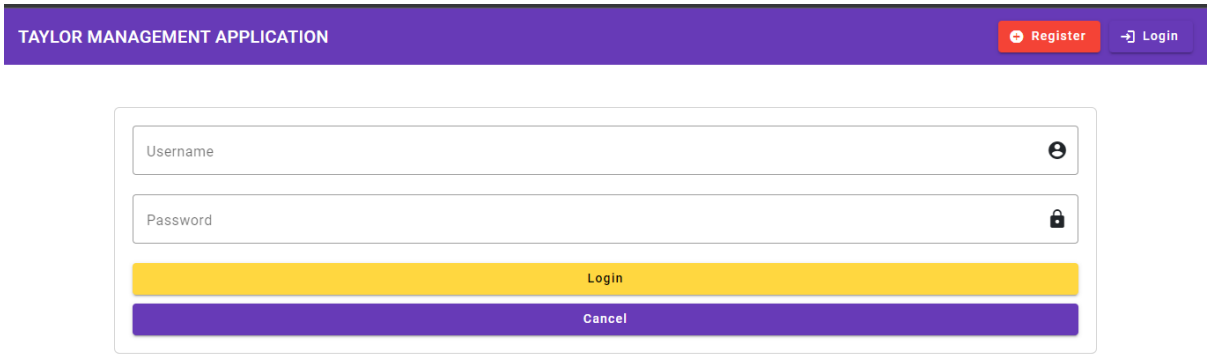


Figure 49: User log in interface

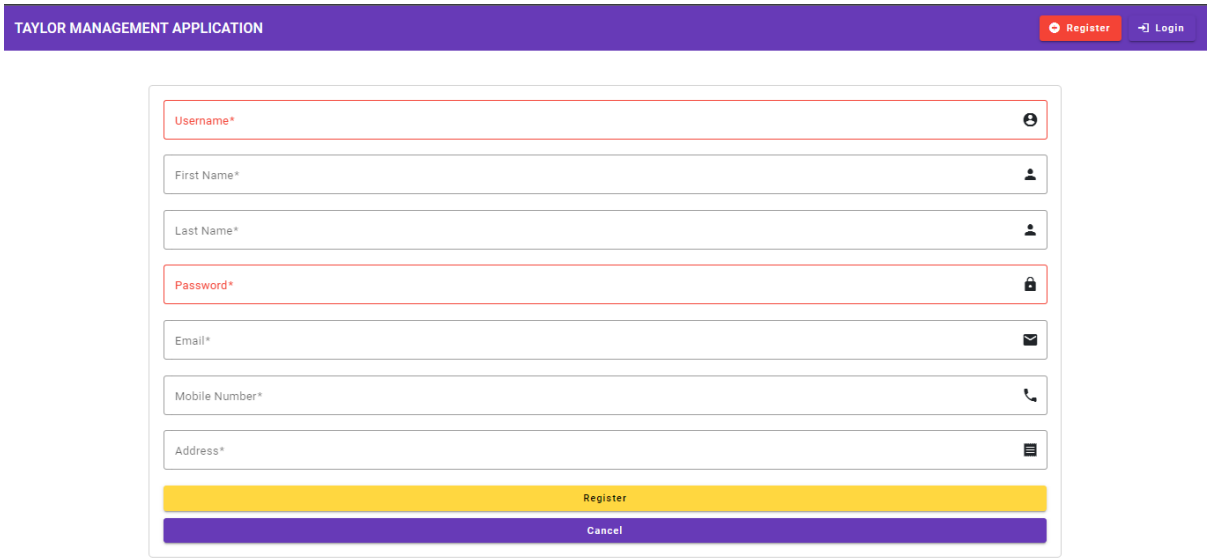


Figure 50: User register interface

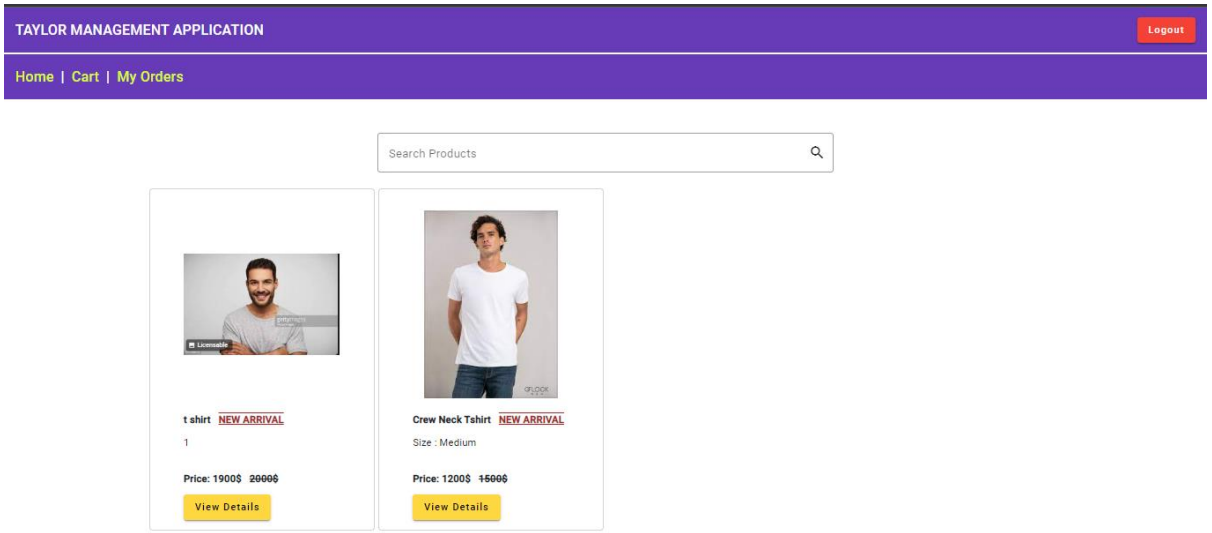


Figure 51: Customer dashboard interface

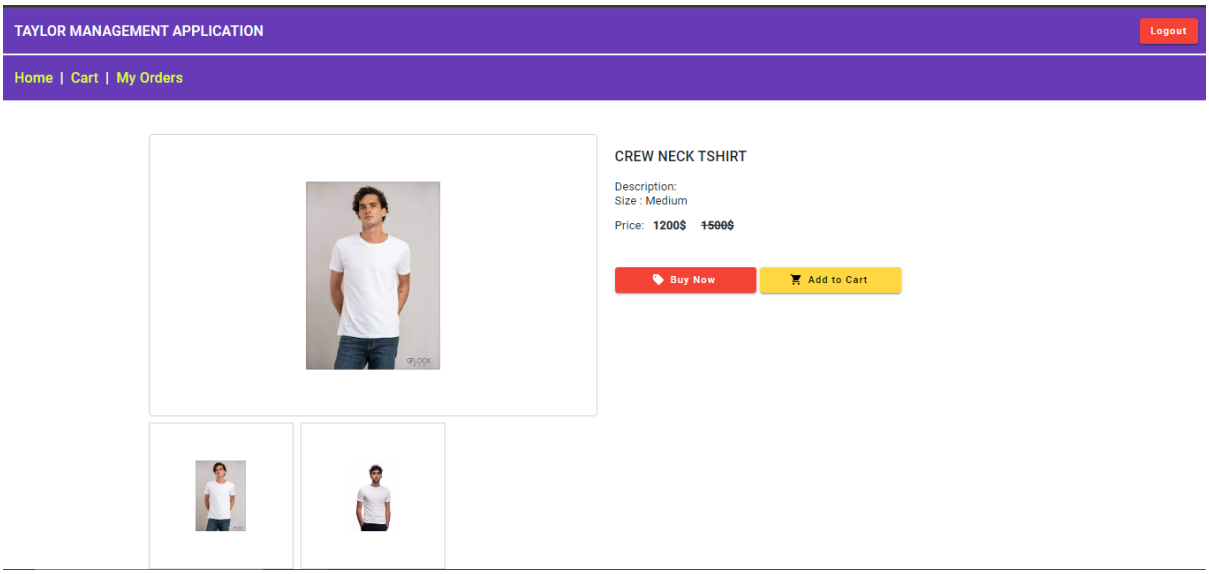


Figure 52: Customer view each product details interface

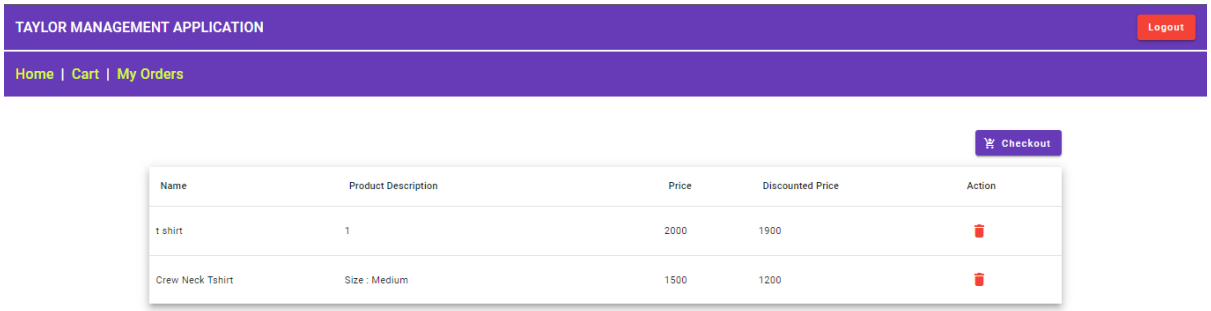


Figure 53: Customer view cart interface

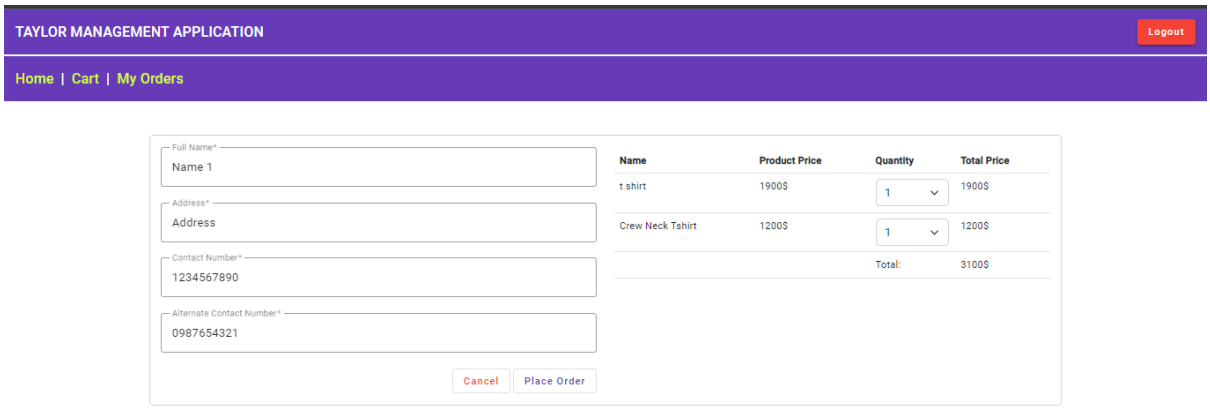


Figure 54: Customer order checkout interface

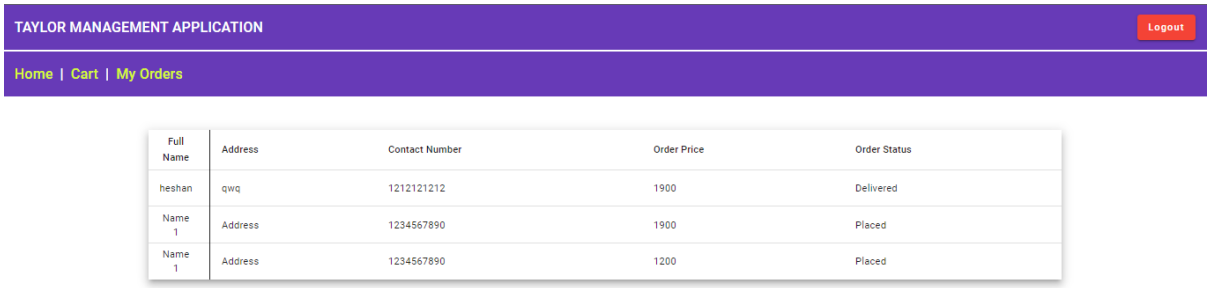


Figure 55: Customer view orders interface

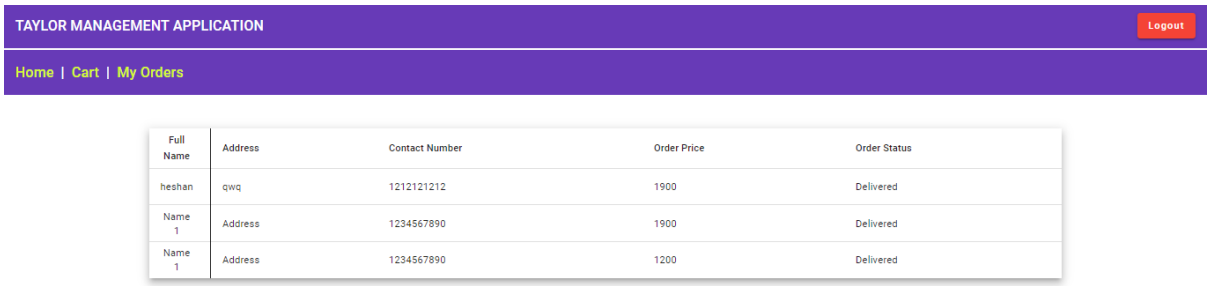


Figure 57: After updating the order status

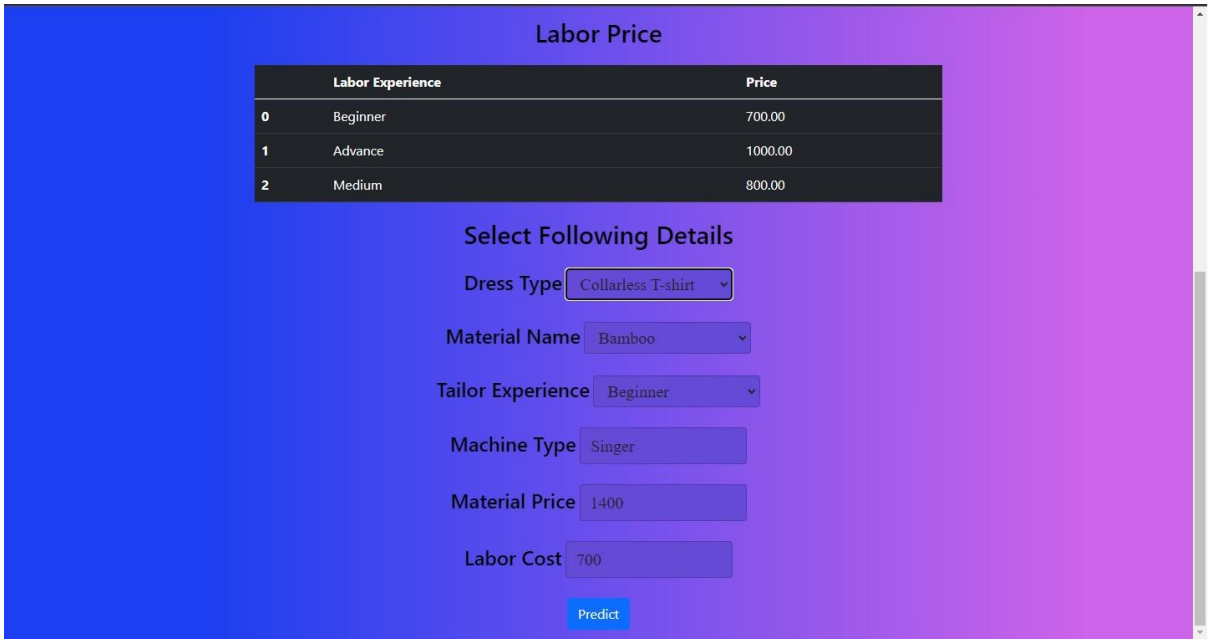


Figure 56: Price Prediction Interface 1

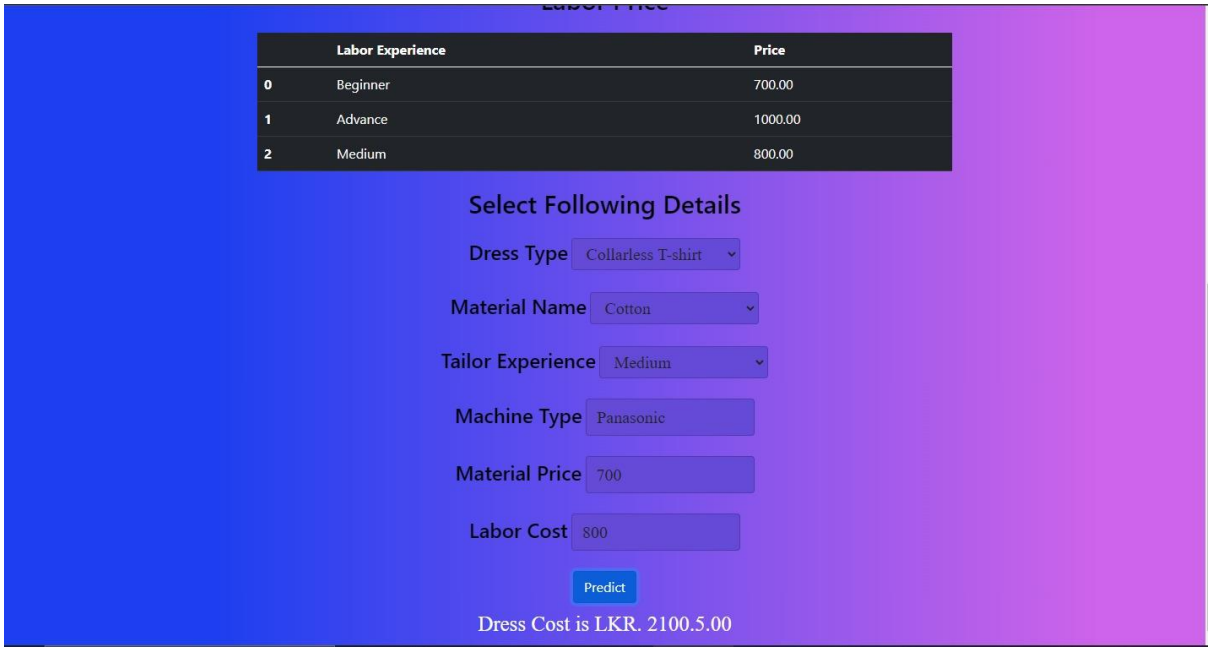


Figure 58: Price Prediction Interface - 2

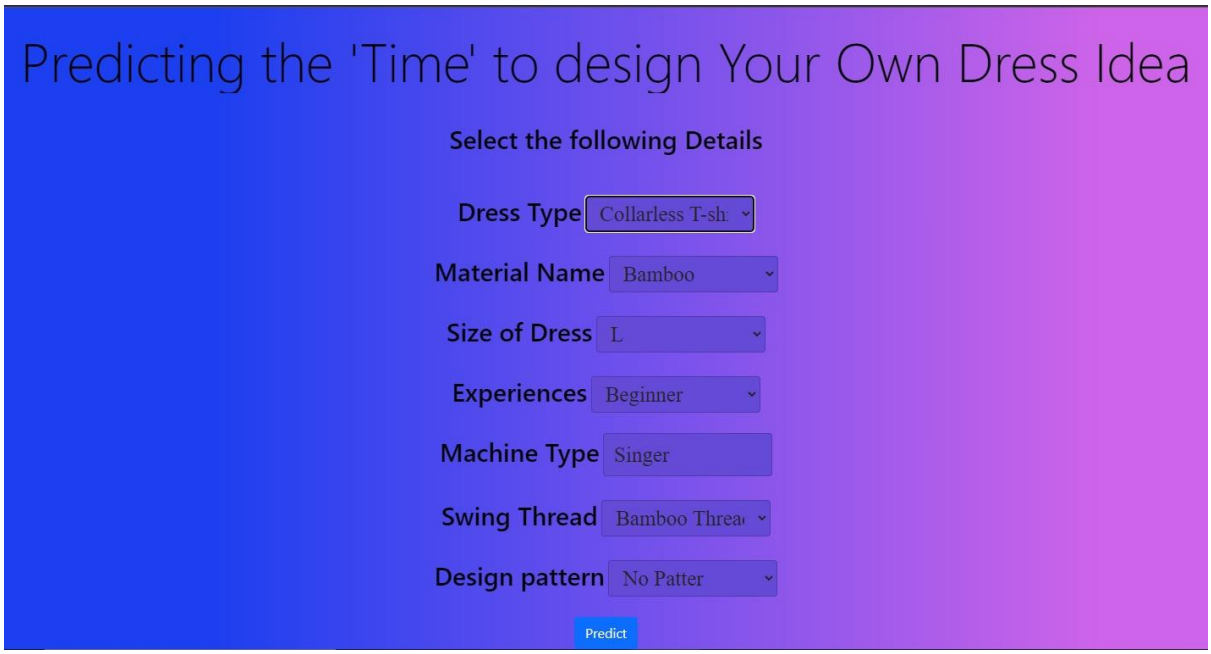


Figure 59: Time Prediction Interface

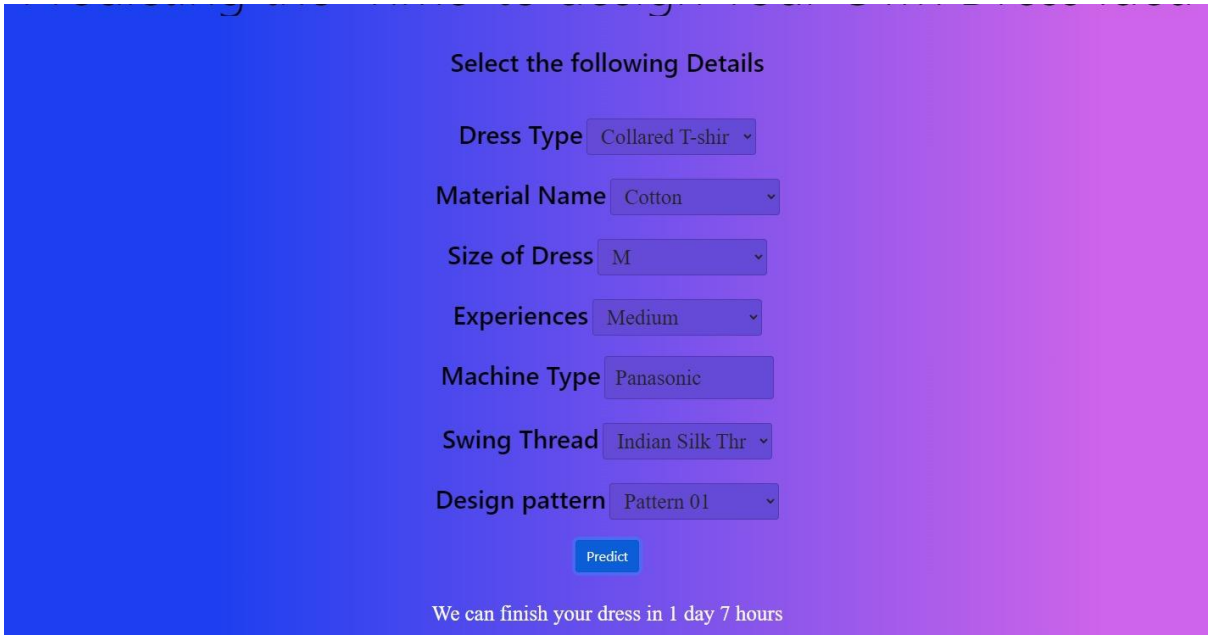


Figure 60: Time Prediction Interface - 2

5.3 Testing

5.3.1 Testing Overview

The application development process cannot be considered complete without testing being an integral part. It entails analyzing software to see whether or not it satisfies the requirements set out for its quality standards, usability, and scalability. Testing is an essential part of the development process since it assists in the detection of mistakes, faults, and bugs that have the potential to result in programming errors or to alter the experiences that a user has.

Testing may occur at various stages while developing software, from discrete software components to testing the complete system from beginning to finish. Testing is done to verify that a piece of software satisfies all the criteria and standards set out for it and functions as intended when tested in various real-world circumstances.

There are several reasons why testing is essential. It is helpful to discover flaws and errors at an earlier stage in the development process since this makes correcting them more straightforward and less expensive. This may result in considerable cost savings for software development projects since flaws found later in the development process can be significantly more costly and time-consuming to rectify. This can lead to significant cost reductions for software development projects.

5.3.2 Unit Testing

First, determine the various components that make up the program being tested. Then many methods may be used to estimate the time and money required for producing textile items. When determining which components make up the whole, the next step is drafting test cases that determine whether or not each part functions appropriately. For instance, compose a test case to determine whether the formula for estimating the passage of time accurately applies to a specific category of textile item.

Carry out the tests: Now, those test cases and testing environments are set up that can carry out the tests to determine whether or not each unit operates as anticipated. If a test fails,

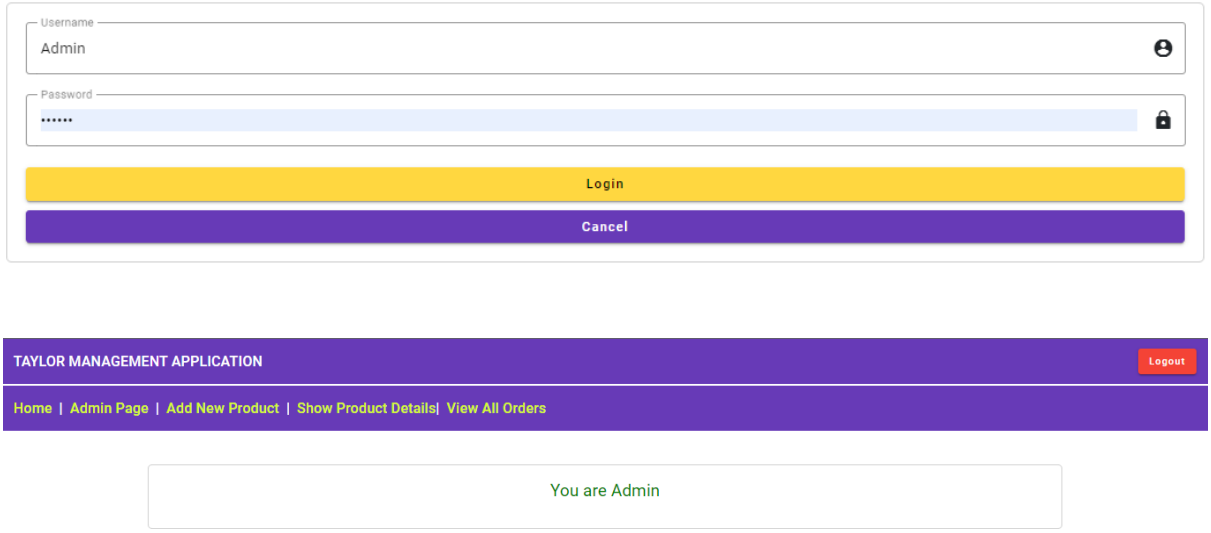
I do more investigation and troubleshooting before continuing. It is essential to remember that unit testing is just one component of testing. It should be supplemented by other forms of testing, such as integration and acceptability testing, to guarantee that the program functions appropriately.

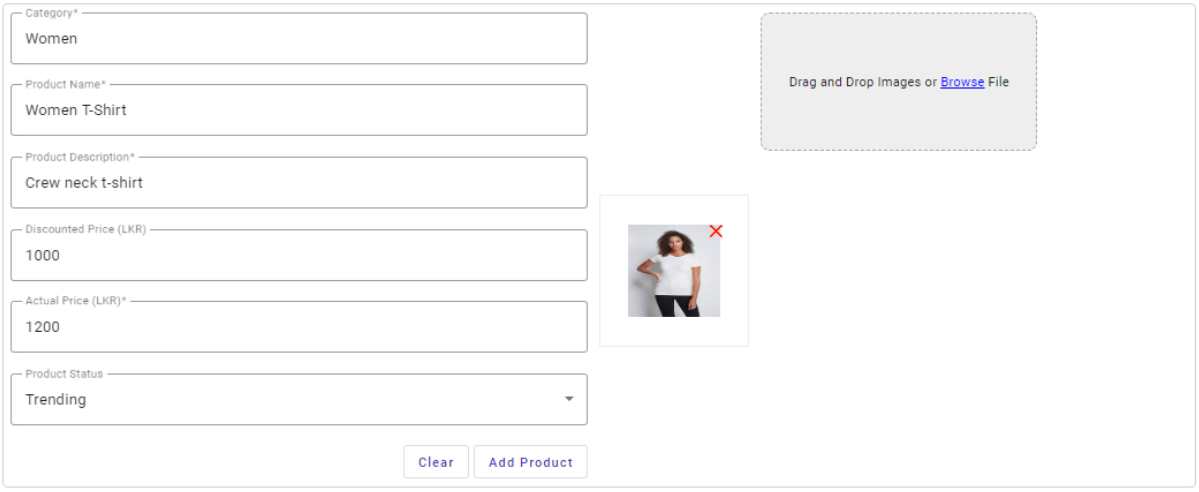
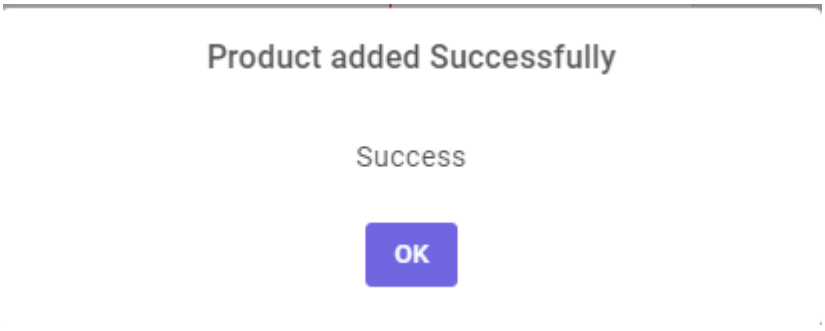
5.3.3 Manual Testing

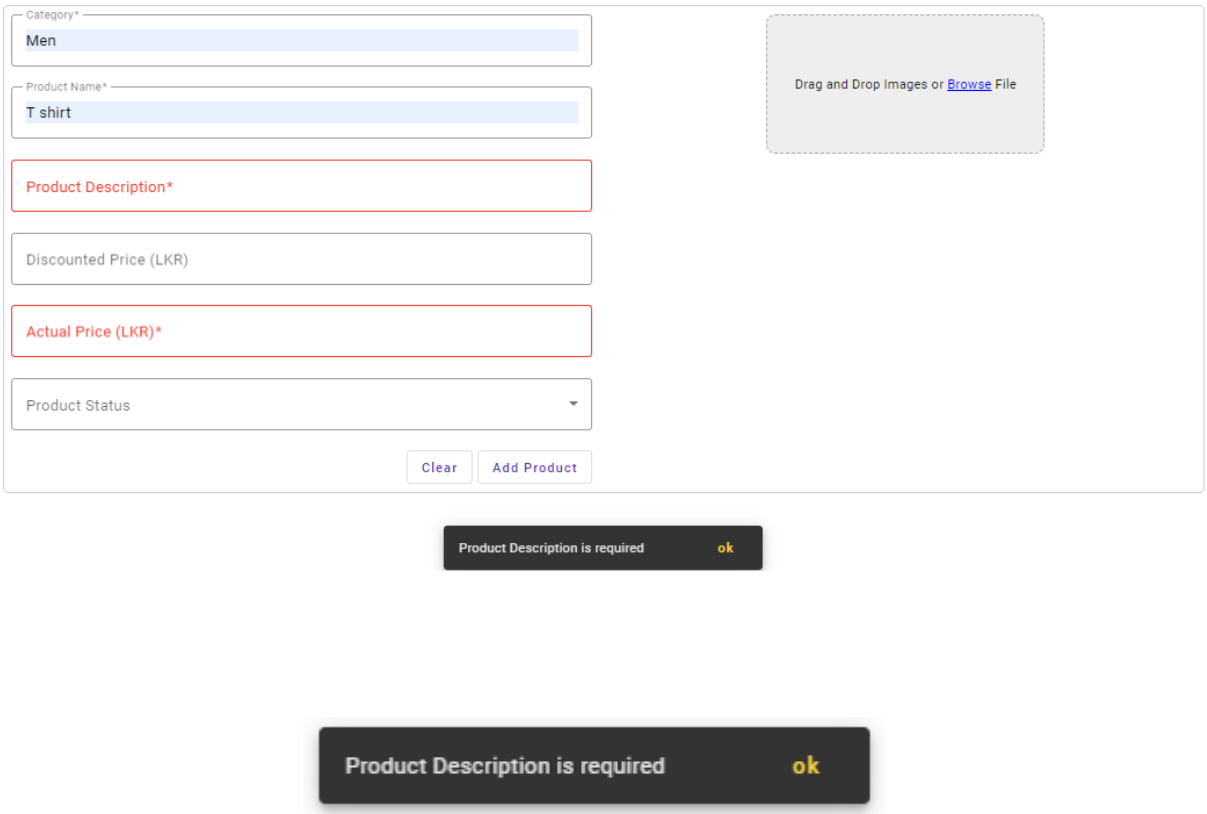
5.3.3.1 Test Case

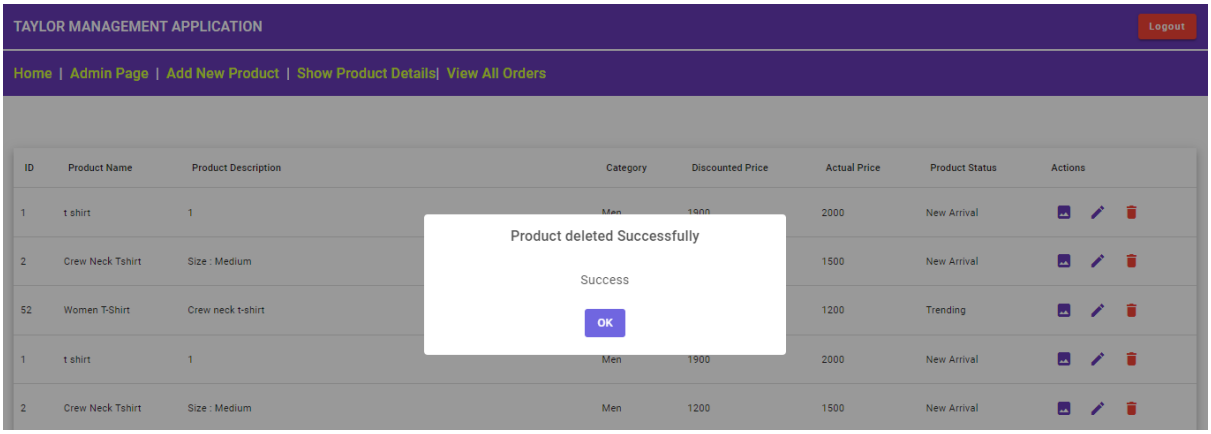
Test Plan ID	Test Case Name	Scenario	Expected Results
001	User Log in	Enter log in details	View user main screen
002	Add product	Enter correct product details	View success message
003	Add product	Enter incorrect product details	View error message
004	Delete products from cart	Select delete on each product	Success message
005	Add products to cart	Select add to cart option in the product details	Success message
006	Checkout Products	Add checkout details correctly	Success message
007	Checkout Products	Enter incorrect checkout details	Error message

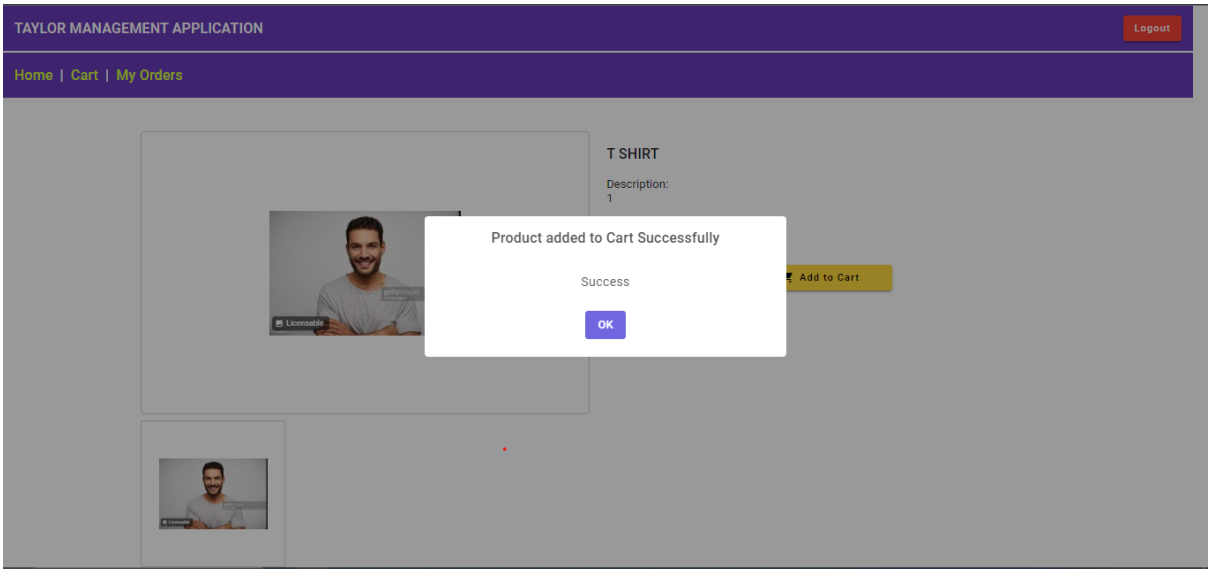
5.3.3.2 Test Plan

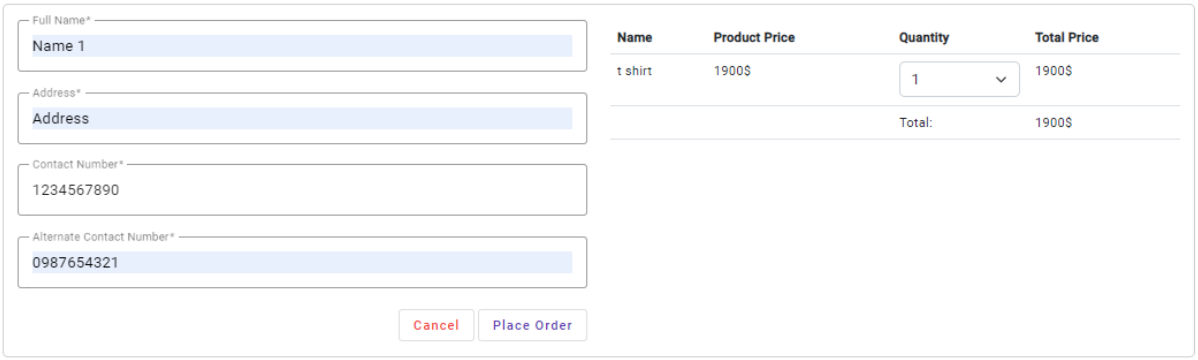
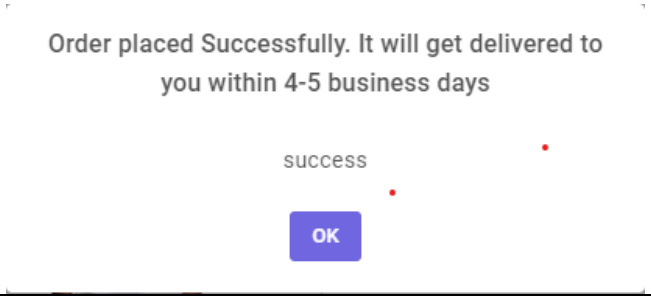
Test case ID	001
Test Objective	User Log in
Test Data	Username – "Admin1" Password – "123456"
Result	Admin/Customer login successful
Screenshot	

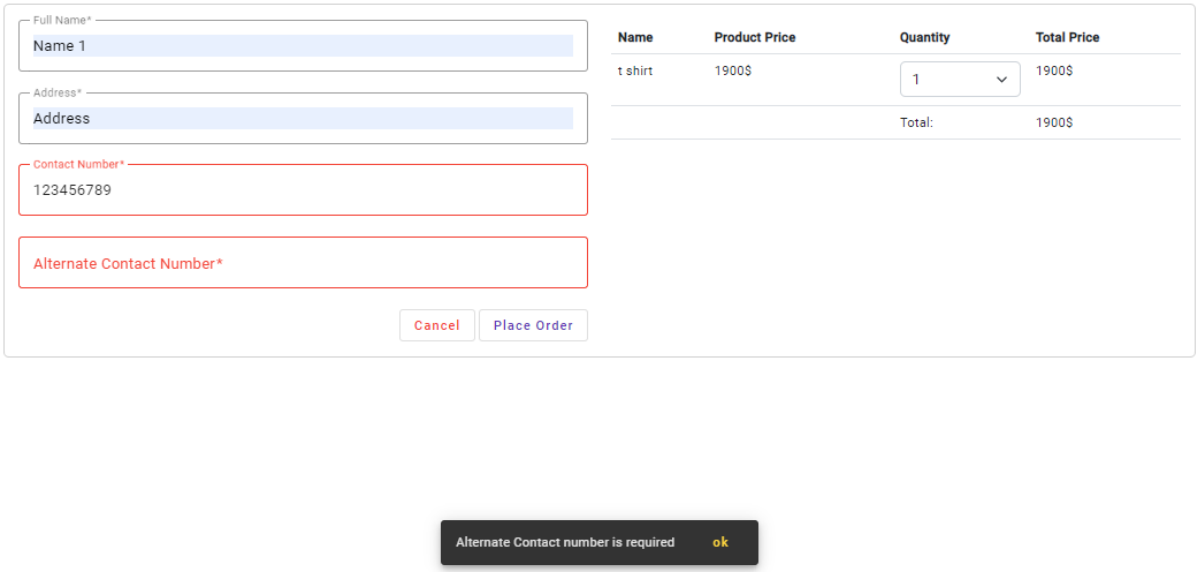
Test case ID	002
Test Objective	Add product
Test Data	Add suitable details
Result	Admin/Customer login unsuccessful.
Screenshot	 

Test case ID	003
Test Objective	Add product
Test Data	Didn’t fill Product Description
Result	“Product Description is required” message shown
Screenshot	

Test case ID	004
Test Objective	Delete product from cart
Test Data	Select delete icon on the cart
Result	“Product deleted successfully” message shown
Screenshot	

Test case ID	005
Test Objective	Add products to cart
Test Data	Click add to cart on products details
Result	“Product added to cart successfully” message shown
Screenshot	

Test case ID	006
Test Objective	Checkout Products
Test Data	Provide relevant customer details for the checkout section
Result	Success message
Screenshot	 

Test case ID	007
Test Objective	Checkout Products
Test Data	Provide incorrect checkout details
Result	Error message
Screenshot	

5.4 Maintenance

Keeping an eye on the machine learning models is the first thing I should do when maintaining this web application. These machine-learning models anticipate the amount of time and money needed for fabric. I should establish a routine to examine the precision of the models regularly and retrain them whenever it seems appropriate to guarantee that they are always up-to-date and precise.

Keeping the program up to date is essential since, over time, the software and hardware on which the website application depends may become obsolete or susceptible to security flaws. Maintaining the application requires routinely upgrading the program and any prerequisites it uses. This will guarantee that the software and requirements will meet the application's needs and protect the data.

Data should be backed up periodically. To guarantee the continued safety and security of the web application should routinely back up all of the data linked with the application. This includes the models generated by machine learning and the testing dataset. I will be able to recover from any catastrophes or system failures more efficiently as a result of doing this.

Carry out security checks. It is essential that carry out security checks frequently to ensure the safety of the web application. These tests should look for any faults or weak areas. This might entail code reviews, vulnerability assessments, or penetration testing.

As a last step, to maintain the web service's usefulness, I should routinely check and work to enhance the program's effectiveness. This may entail improving the code, caching the data, or adjusting the settings on the server.

Following these procedures can guarantee that the web application developed for the textile sector will stay accurate, trustworthy, secure, and valuable over time. In addition, it is essential to keep up to speed with the industry trends, developments, and best practices to guarantee that the web application will continue to be relevant and competitive in the textile business, which is constantly growing.

5.5 Deployment

Before launching the web application, I must ensure to have the required infrastructure to enable it. This might contain servers, databases, and several other pieces of hardware and software.

It was tasked with determining what deployment plan would effectively serve the application's needs. This might entail deployment to a single server, using a load balancer to disperse traffic over numerous servers, or using a cloud service such as Amazon Web Services or Microsoft Azure.

To maintain the integrity of the web application across various contexts, that will need to carefully manage the environment in which the web application is developed, tested, and used in production. This may entail using technologies such as Docker to construct containerized environments or configuration management tools to automate setting up a domain.

Launch the web application to take precautions to guarantee that its security is not compromised. This may entail using encryption to safeguard data while it is in transit, putting in place access restrictions to restrict users' ability to use the program, and utilizing firewalls and other security measures to defend against intrusion attempts.

The ability to manage the quantity and complexity of the models generated by machine learning, guaranteeing that now the features excellency and up-to-date, and dealing with the computational complexity prerequisites of the modeling techniques are just a few of the challenges that may be faced when deploying a web application that uses concepts from machine learning. Other challenges include ensuring that the models remain accurate and up-to-date. In addition, that may need to collaborate closely with data scientists and machine learning specialists to guarantee that the models will be correctly incorporated into the web application.

5.6 Risk Management

- Technical Risks:

Technical risk is one of the most significant concerns when managing a web application that uses machine learning. These may involve problems with the data quality, the algorithms' accuracy, and the system's performance. That may need to communicate and cooperate with data analysts and machine learning specialists to properly train, verify, and test the models to mitigate the technological risks associated with businesses.

- Security Risks:

While operating a web application, security is another significant risk that must be considered. These might involve risks associated with data breaches, illegal access, and denial-of-service attacks, among other potential threats. I should adopt stringent security measures like encryption, access restrictions, and firewalls to handle any security concerns effectively. In addition, I should do frequent security checks on the application and always be ready to take prompt action in response to any problems that may arise.

- Financial Risks:

The management of a web application may also include financial risks, such as the expense of purchasing hardware, software, and many other resources. I should adequately budget the project and follow its spending meticulously to control its financial risks. I should also consider leveraging cloud services, such as Amazon Web Services or Microsoft Azure, to lessen the requirement for hardware and software that is kept on-premises.

- Laws:

The textile industry online application may expose regulatory concerns linked to data protection, proprietary information, and other legal obligations; however, this will vary depending on the scope of the application. For this, I should do in-depth research on the relevant laws that pertain to the program and check that it's in complete compliance with any rules that may be relevant to manage regulatory risks effectively.

Chapter 6: Conclusion

6.1 Future Work Process

- Automatic reordering of low-stock items is another valuable feature of an inventory management system. As a result, time and productivity are saved since orders may be issued automatically and only when necessary rather than requiring human oversight. Avoiding stock-outs, which may result in lost sales, is another benefit.

- Enhancing the customer experience and driving more sales with customized suggestions. Products a consumer is most likely interested in may be recommended based on their browsing history and other data collected by machine learning algorithms. Customers may save time and find things they would not have discovered otherwise.

- Customers' satisfaction and loyalty may be increased by allowing them to alter the appearance of the textiles they buy. In this way, consumers may choose a fabric, color, and design that is ideal for them. Also, this might help the company stand out from the crowd and attract buyers searching for specialized goods.

- Control of the flow of goods and information between suppliers, manufacturers, and distributors, as well as between distributors and retailers, is known as supply chain management. This can enhance productivity, cut down on waste, and boost buyer satisfaction by facilitating on-time product shipping.

- Integrating a chatbot into the business means giving the customers assistance whenever they need it, any day of the week. This has the potential to lessen the stress of supporting customers while also enhancing their satisfaction of customers.

- Predictive maintenance boosts output and productivity by anticipating when a machine may break down. Downtime may be avoided, and repair costs minimized using this maintenance planning. As a bonus, predictive maintenance may increase production dependability and decrease product fault rates.

- When the app is connected to the most well-known social media sites, it may assist in spreading awareness of the company and encourage more user interaction. Sharing purchases and offering comments allows customers to supply vital information that the company can use to enhance its goods and services. Using social media with the marketing strategy may do wonders for brand's exposure and popularity.

6.2 Lessons Learned Report

Introduction

Companies need to consistently enhance their internal procedures to keep up with the competition in today's fast-paced business world. Documenting the lessons gained from completed initiatives is one of the most valuable techniques for achieving this goal. A report detailing the lessons gained may be helpful in these situations. For that, use a web app as an example to discuss the value of lessons learned reports and how they can be used to better future projects.

Key Achievements

Developing a web application may be difficult and time-consuming, but the rewards for a good outcome can be substantial. Initially, the lessons learned report should highlight the project's significant successes. In this context, success might be defined as achieving or surpassing project timelines, providing all requested features, and satisfying or exceeding client expectations. By publicly acknowledging the efforts, I may boost morale and encourage them to continue working together on future endeavors.

Challenges and Lessons Learned

Despite the project's success, new difficulties are to be expected, and previous mistakes should serve as valuable lessons. These difficulties and the lessons gained from them should be detailed in the lessons learned report. Project management, technology, or communication problems might fall under this category. Organizations may know where to make improvements and how to prevent similar issues in future initiatives if they keep track of these lessons.

Best Practices

In addition to detailing the problems encountered, the lessons learned report should emphasize the most effective methods used during the project's duration. Methods of project

management, forms of communication, and technological solutions that allowed for the successful completion of the project or its betterment may all fall under this category. Organizations might benefit from documenting their best practices since it will enable them to share helpful knowledge with other teams and gradually enhance their procedures.

Future Project Recommendations

The report should include future project suggestions based on the lessons gained. Some examples of such feedback may include proposed changes to how the project is managed, how people interact, or how technical problems are solved. Success in future initiatives may be increased by using these suggestions.

Conclusion

In summary, a lessons-learned report is an effective method for analyzing past initiatives and making adjustments for the future. An organization may better prepare for future initiatives by recording previous endeavors' successes, failures, and lessons. Organizations may improve their chances of delivering effective solutions in today's fast-paced business climate by implementing best practices and suggestions into future initiatives.

6.3 Conclusion

In conclusion, adopting a software program designed specifically for the textile sector can bring about a paradigm shift in the manner of sales of which textile goods. The opportunity to browse for textile items online makes the process more comfortable and approachable. Integrating machine learning algorithms that forecast the price and time of textiles delivers valuable insights to customers. This project has the potential to increase the textile sector's effectiveness and the quality of the experience provided to customers. The fact that it was able to be successfully implemented is evidence of the ability of technology to propel innovation and forward movement. This project has the potential to be a huge success and pave the way for future improvements in the textile industry if it is given the resources and support necessary to achieve those goals.

Chapter 7: References

Alkassar, H. S. A. &. A. H., 2019. A deep learning approach for time prediction in garment production. *IEEE Access,* Volume 7, pp. 105759-105770.

Chakraborty, S. D. S. &. B. D. K., 2019. Price prediction of textile products using machine learning techniques.. *International Journal of Industrial Electronics and Electrical Engineering,* 7(8), pp. 60-64.

Chen, J. M. J. &. W. Y., 2018. Machine learning-based approach for predicting the customer satisfaction of textile products. *Journal of Textile Science and Technology,* 4(3), pp. 48-55.

Choudhary, A. J. A. &. S. N., 2020. Java web application for textile price prediction. *International Journal of Computer Science and Mobile Computing,* 9(7), pp. 73-79.

Gopalakrishnan, S. R. S. &. S. R., 2018. Predicting demand for textile products using machine learning techniques. *Journal of Manufacturing Technology Management,* 29(6), pp. 977-995.

Gupta, P. K. P. &. K. M., 2019. Deep learning-based approach for time prediction in garment production using sensor data. *Journal of Manufacturing Systems,* Volume 51, pp. 77-89.

Han, Y. Z. Y. &. Z. H., 2018. Time prediction model for purchasing textile products based on deep learning. *Journal of Physics: Conference Series,* Volume 1, p. 1069.

Hossain, M. A. A.-A. M. A. &. A. M. T., 2020. A Java web application for time prediction in garment production. *International Journal of Computer Science and Mobile Computing,* 9(2), pp. 45-52.

Jia, J., 2021. Research on the prediction model of textile raw material prices based on machine learning. *Modern Textile Technology,* 49(3), pp. 62-65.

Kavitha, K. R. G. &. S. S., 2021. Web-based system for predicting the price of textile products using machine learning techniques. *International Journal of Advanced Science and Technology,* 30(1), pp. 1277-1282.

Kim, S. K. J. &. K. Y., 2018. Machine learning-based approach for predicting the quality of textile products. *Journal of Textile Science and Technology,* 4(2), pp. 24-32.

Kumar, V. M. A. &. S. R., 2020. Java-based web application for textile price prediction using time series analysis. *International Journal of Computer Science and Mobile Computing,* 9(4), pp. 147-152.

Lee, S. K. H. &. L. K., 2019. Java-based web application for predicting the demand for textile products using social media data. *Journal of Computational Science,* pp. 1-9.

Li, H., 2021. Research on textile quality prediction based on deep learning. *Journal of Textile Research,* 42(2), pp. 95-103.

Li, X. X. W. &. C. H., 2020. Web-based system for time prediction in purchasing textile products using machine learning techniques. *Journal of Physics: Conference Series.*

Moon, S. K. S. &. L. S., 2020. Deep learning-based approach for time prediction in purchasing textile products using image recognition. *Journal of Industrial and Production Engineering,* 37(2), pp. 142-153.

Ng, K. W. J. &. C. T., 2019. Java-based web application for predicting the price of textile products using sentiment analysis. *Journal of Industrial Engineering and Management,* 12(4), pp. 759-770.

Rahman, M. A. A. M. H. &. T. A. K., 2021. Web-based system for time prediction in garment production using deep learning techniques. *Journal of Computational Science,* Volume 50, pp. 1-13.

Sharma, S. R. S. &. R. S., 2021. ava web application for predicting the price of textile products using deep learning. *International Journal of Advanced Research in Computer Science and Software Engineering,* 11(2), pp. 411-417.

Sun, Y., 2022. Time and price prediction of textile products based on machine learning. *Journal of Textile Research,* 43(1), pp. 54-62.

Wang, J., 2022. Prediction of textile product prices based on machine learning algorithm. *ournal of Textile Science and Technology,* 28(1), pp. 68-73.

Yang, J., 2019. Textile demand prediction based on machine learning. *The Journal of The Textile Institute,* 110(3), pp. 378-386.

Zhang, 2020. An intelligent textile defect detection system based on machine learning. *Journal of Textile Research,* 41(10), pp. 72-78.

Zhang, Y. W. L. &. H. Y., 2019. Java-based web application for time prediction in purchasing textile products. *Journal of Physics: Conference Series.*

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LINK to Final Project:

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