

3 Dot solution: Smart Support Management System

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This report was presented in partial fulfillments of the Requirements for the Degree of Bachelor of Computing and Information System (Major AI in IoT)

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Approval

This Project titled “3 DoT: Smart Support Management System”, Submitted by S A Farhan Sourov, ID No: 211-16-557 to the Department of Computing and Information Systems, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computing & Information Systems and approved as to its style and contents. The presentation has been held on 12-01-2025.

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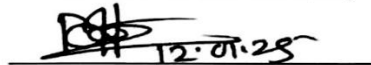
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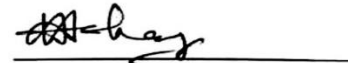
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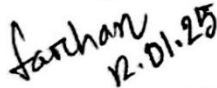
I hereby declare that; this project has been done by me under supervision of **Md.Nasimul Kader, Assistant Professor**, department of Computing and Information System (CIS) of Daffodil International University. I am also declaring that this project or any part of there has never been submitted anywhere else for the award of any educational degree like, B.Sc., M.Sc., Diploma or other qualifications.

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Abstract

3 Dot Solutions is a state-of-the-art e-business firm specializing in the selling of electronics items such as laptop hardware and other related gadgets. Listing out the features which benefit the users, for instance, the incorporate of the AI customer support truck that assists users in their inquiries by enabling an effective communication system which makes many users engage with the platform. Consumers and sellers have control spaces where they can purchase and list products; each person has his/her own portfolio. The warranty countdown stands as the cutting-edge element of the platform, it assists the buyer with keeping the tabs on the warranty terms of the received products and talk to the seller about the service or a replacement when the term is expiring. Furthermore, the platform integrates a ticket booking system that allows the users to raise problems/queries or report any technical hitch to be resolved. Utilizing modern technologies, 3Dot Solutions is developed with a front-end Micro-frontend architecture with the following technologies: Tailwind CSS, React, and Vite for a responsive and dynamic user interface. On the back end, Node.js handles the execution of the part of the application responsible for rapid operation and scalability. For data management, the platform works with MongoDB to store product categories for listed products, users' data, and transactions By doing this, 3Dot Solutions strives to build a secure and efficient electronic accessory trading platform with richer value-added services than other similar platforms in the market.

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Chapter 1: Introduction

1.1. Introduction:

To ensure effective organization of the several accompanying electronic devices, as well as their accessories, has now become quite a challenge in today's world. They bought the right product but getting it to work for them is a problem they encounter frequently, and again even when the product is working, they get stuck on when to get it for maintenance. Step in 3dot Solutions – Your source for all e-Store needs specializing in Electronics gadgets and Laptop strains. Ensuring that the passionate technologists get their worthwhile voyage of convenience with innovation instead of efficiency.

Similarly, at 3dot Solutions clients and customers have an easy time buying and selling electronic products. Whether you are trading up your laptop or just getting rid of accessories that have not been used, our system provides a convenient marketplace that effectively matches buyers with sellers. Other useful features mirror the shopping experience because they help users avoid worrying about important warranty dates – our Warranty Countdown feature solves this problem.

What makes 3dot Solutions unique is its presence of an artificial intelligence empowered firm. The integrated AI Chat assistant enables a user to get assistance for either finding out the right product, solutions, or directly booking service tickets in the program. Furthermore, the platform encompasses the user portfolio function, which comprises owned products, buyouts, and serviced records.

Benefitting from advanced technologies such as the Front-end using React.js, CSS using Tailwind CSS, the back end using Node.js and having MongoDB database support, 3dot Solutions is fast, secure and easy to use. It also means integration of Vite which will ensure that page's load very fast hence the user interface is very smooth across devices.

You may be a buyer who needs a warranty management application that is easy to use, or a seller trying to find the right niche for your products, 3dot Solutions is ready to change the game for you. Steal a look into the realm where innovation and simplicity coexist and leave the rest of your electronic accessory shopping to us at 3dot Solutions. Here comes the e-commerce of the future.

1.2. Purpose of Project:

The rationale for 3dot Solutions is for it to provide a one stop solution to shopping for electronics and laptop parts and servicing. In eliminating most of the issues most tech users encounter, convenience and functionality are once again brought together in the project. Key objectives of the project include:

Streamlining Transactions:

Allow consumers to make a purchase or make a sale of electronic gadgets without a hitch in a reliable, efficient and secure market.

Enhancing User Support:

See page 17: Incorporate an artificial intelligence based chatbot for consultation; to keep the users informed 24/7 so they can make correct decisions.

Simplifying Warranty Management:

Introduce a Warranty Countdown which, besides providing clients with precise information as to when their warranty is expiring or has already expired, frees them of the concern of forgetting about the said warranties.

Centralizing User Information:

Provide the User portfolio where people can review the owned products, past purchases, and service tickets simultaneously.

Streamlining Issue Resolution:

Establish a Ticket Booking System that will enable the users to report problems, book a ticket for maintenance or course a problem without stress.

Leveraging Technology for Efficiency:

Use technical tools such as React.js, Node.js and MongoDB to create a fast, secure and scalable platform.

Chapter 2: Initial Study

2.1. Project Proposal:

Overview:

There is a lot of potential in electronics accessories and laptop hardware market, and 3dot Solutions' goal is to turn it into an innovative and convenient online store. It will make it easy for users to purchase or sell its associated e-products, work on product warranty) with Warranty Countdown) and solve problems with Ticket Booking System. 3dot Solutions will provide an easily navigable platform for tech enthusiasts, working professionals, and entrepreneurs with an AI-driven Chat Assistant and a User Portfolio.

Implementation:

To bring the plans into reality, the platform will be developed using the React.js, the frontend styling will employ Tailwind CSS, while Vite will be used as the frontend framework, the backend will be developed in Node.js, and the database will be provided by MongoDB for scalability and data security; respectively. Painkiller solutions such as real time warranty tracking and an AI Bot to support the customers will differentiate 3dot Solutions amidst potent e-commerce competition. The e-commerce platform envisioned in this proposal is 3dot Solutions, a brand that demands users' trust both as a transactional marketplace and as a tool that would help them optimize their relationships with technology – proposing a new way to look at the current electronic accessories market.

2.2. Project Scope:

1. Platform Development:

The project will therefore aim at using a proper e-commerce platform where the buying of electronic accessories and laptop hardware is done. In the development, it shall have a user interface that is created using React.js and it shall have styling by Tailwind CSS, and it shall be accomplished with the use of Vite for the responsiveness and a smooth experience to the user. To safeguard the data, and scale up the application, the backend implementation will be in Node.js connected to MongoDB databases.

2. Core Features:

Some of them are the Buy and Sell Marketplace, in which users can make purchasing decisions, and post products for sale; the Ticket Booking System that is used to report issues and make service requests. Among updates, the Warranty Countdown feature will help users monitor warranty conditions in real-time and act quickly on necessary repairs or equipment replacement. Furthermore, the platform will have a 'User Portfolio', which is a place where users can track all the products they had purchased, their warranties and other details about the products.

3. AI Integration:

A new feature called AI Chat Assistant for improving customer relations and interaction will be built. This feature will help users to guide them through the application to help them answer their questions, among them, other assistance and finding, recommending buying products or services that they may be interested in.

4. Scalability and Security:

Visitors are expected in thousands per day, and it will cater for various demands from the masses thus designing and developing a scalable platform. Attachments to the application will be put in place to prevent unauthorized users from accessing a user's data, satisfying the data protection and privacy policies of the application.

5. Deployment and Maintenance:

As part of the project scope, it means hosting on a secure and dependable server as well as constant tweaking of the platform. That's why constant releases will follow, adding new features, updating and refining due to bugs and feedback received.

This broad agenda guarantees 3dot Solutions covers all its target audience needs and at the same time presents itself as a trusted and progressive e-commerce solution.

2.3. Background of the project

Looking at the world of technology it has come to a point where electronic accessories and part of the laptop and computers is almost a necessity. But the market does not have one single marketplace which supports a single need of the users but also includes the process of buying selling along with other needs such as warranty services, problem solving, and user customized services. Noticing these holes, 3dot Solutions was designed to be a full-service e-commerce platform that improves the overall usability of products in this industry.

The seeds of 3dot Solutions were sown by the increasing need for the concept of a website that has a greater scope than simple Internet shopping. The majority of current platforms mainly exist to facilitate transactions while providing few complementary aspects such as real-time warranty tracking, an incorporated issue resolution system and direct engagement tools for users confronted with recurrent issues. This is why this project is to fill the gap using the Warranty Countdown features such as an AI Chat Assistant and the User Portfolio as well as other unique concepts.

Utilizing sophisticated tools like React.js, Node.js and MongoDB, 3dot Solutions is keen to deliver a platform that is fast, secure and friendly. The development of this particular feature is best understood in view of the growing dependence on gadgetry for organizing the digital part of our lives. 3dot Solutions' goals seek to establish it as a dominant player in the electronic accessories e-commerce space by developing a marketplace that is tailored to the end-user requirements and provides smooth and highly integrated, with additional functions' features.

This venture can be seen as a mission to change the users' approach to using their devices and optimizing the usage of their technology assets.

2.4. Objective

Hence, the main goal of 3dot Solutions is to design and provide a convenient and modern means of purchasing, selling, and organizing electronics related accessories and laptop parts. The platform aims to solve those specific issues of necessity of tech users, as well as create an effective union.

Key objectives include:**Streamline Transactions:**

The major aim is to act as a reliable marketplace whereby people can come in and purchase or sell their electronic products.

Design to be simple but equally complex enough to fit the needs of the amateur as well as the professional.

Enhance User Experience:

Implement an Artificial Intelligence Chat Bot to empower a live chat functionality with mutual counseling.

Provide the customer with a Customer Portfolio in the form of one-stop-shop for the product ownership, warranty, and purchase history.

Simplify Warranty Management:

Add a Warranty Countdown tool so that there is a way to remember important due dates for maintenance or service of certain parts or entire systems.

Facilitate Issue Resolution:

Use a Ticket Booking System to have users report problems or seek certain services and solutions in the shortest time possible.

Leverage Advanced Technology:

Develop application that will be able to scale at a fast rate with high security and performance using new technologies such as React.js, Node.js and MongoDB.

Keep good user experience and clear performance across devices through the improved front-end engineering supported by Vite and Tailwind CSS.

Foster Trust and Reliability:

Make 3dot Solutions well recognized by focusing on client's needs, their data and the company's transparency.

Chapter 3: Literature Review

3.1. Problem domain discussion based on accessible solutions

The problem domain of 3dot Solutions concern relate to difficulties of customers in purchasing and selling electronics accessories and laptop hardware as well as tracking warranties and solving technical problems. Modern e-business solutions are aimed at the exchange of goods or services but lack the ability to handle a client's need after purchasing a product or using a service. Customers suffer from the absence of service guarantees, long response time for customer service, and poor organization of the interface. Typical solutions available in the market provide only fundamental features of establishing a digital marketplace and customer service including listing service and response through email/phone but do not enforce uniqueness by providing extra options including AI-enabled chatbot and warranty counter as well as efficient ticket booking system for resolving the issues. With the help of technologies like React.js, Node.js, and MongoDB, 3dot Solutions is aimed to deliver a result which will be more safe, efficient and convenient in terms of usage in contrast to current divided system of PIM and customer support systems; all necessary operations can be completed in one unified space.

3.2. Discussion on problem solution based on available solution

This problem solution of the strategic e-commerce venture, 3dot Solutions, is formulated based on the realization that current e-commerce platforms are lacking in explicit areas when it comes to the domain of electronic accessories and laptop hardware. Most applications in use today fail to include basic post-purchase operational requirements such as customer support or warranty tracking, thereby making the customers jump from one application to another. Currently, many platforms focus on the simplest trading capabilities, but they cannot include additional features that would also increase the value of the platform after the purchase or sale operation had been completed.

3dot Solutions provides a more integrated solution compared to its competitors as it includes more complex functionalities within one system. The first leaves a positive impact since the Buy and Sell Marketplace enables the users to transact without a lot of confusion. The Warranty Countdown feature solves one of the most complained about problems, that of forgetting the warranty expiry date, a problem that other forums have failed to solve. There is also real-time tracking of warranty thus users do not have to miss critical deadlines for either repair or replacement of their products.

Moreover, 3dot Solutions has an AI-chat Assistant that is not limited only to customer support like most firms nowadays. This assistant can provide specific suggestions, help with choosing a product, and solve numerous problems on the spot excluding reliance on some customer-oriented services. The

Ticket Booking System is another solution that blown straight at the issue of poor customer support. They enable people to create service tickets and also solve problems with the product without involving intermediary steps.

3.3. Recommended Approach

AI For 3dot Solutions to succeed, a strategic plan should be adopted that will involve centric designs, integrated design features, and scalable technology. The first principle that should be adopted is the usability of user interfaces, which are easy to learn and easy to navigate. For dynamic and fast loading of the pages, the platform should be built on top of React.js to achieve rapid loading of displayed web pages while the Tailwind CSS will enhance the page design to be responsive to the actual device in use. To encapsulate, integrating Vite will add to its optimal loading times hence underlining improved customer experience. Thus, the next priority should be the introduction of an AI-powered Chat Assistant to be able to support users in real-time while guiding them through the application and making the necessary choices as well as responding to general customer service inquiries, thereby sparing Application users from having to contact a manager.

By the same token, it is equally important that 3dot Solutions should embark on establishing scalability, using Node.js, MongoDB, and provide adequate protection from hackers against any form of privacy invasion on users' details. It means that the latter should contain options for other intricate elements of the project such as the Warranty Countdown, which updates warranty time for each product, and the Ticket Booking System that must provide an effective solution for client's requests. Using microservices is a way by which the platform will be guaranteed of the fact that each of the feature implemented is to be implemented as a micro-service, and therefore, as the usage increases, individual services can be scaled up, or even separately optimized. Security measures should be included at every level to enhance user data, transaction and other information security. Using this strategy, 3dot Solutions will effectively offer the clients a durable and functional product that will enable them to meet the client's demands from the time of acquisition to the time of sale.

Ai Implementation:

In 3dot Solutions AI will be deployed to strengthen the user experience with the utilization of an AI-enhanced Chat Assistant and with providing AI-based interactions across the solution. This AI assistant will also incorporate NLP to interpret user queries and ultimately reply suitably in real time. It will allow the user to orient in platform, obtain recommendations for goods and service according to previous choice, etc., and address frequently asked questions without involving the administrator. Also, in the aspect of Ticket Booking, the classification and sorting of user service tickets will also be facilitated by the AI to easily prioritize and to solve the issues accordingly. To add more, machine learning can enrich AI by making certain assumptions involving the user to produce better recommendations and expectations in the future. It will help make sure that users get the required timely and precise attendant and assistance that is in line with the perception of their requirements and thus will motivate the customer to stay and engage on the platform.

Chapter 4: Methodology

The approach used by 3dot Solutions is structured in an Agile development process that progressively advances with feedback on each stage. Here we will focus on the users and such functions as artificial intelligence-based chat, warranty, and tickets. The platform, as well as integrating the latest technologies to make the system scalable and secure, React.js, Node.js, and MongoDB will be used.

What to use

In the case of 3dot Solutions, new and innovative web development technologies and sophisticated artificial intelligent systems will be incorporated to develop a more effective, flexible and easy to use platform. For the frontend part and to create dynamic interfaces there will be using React.js; for the styling part – Tailwind CSS; for the fast development and optimized build's part – Vite. A Node.js framework will be the backbone of the backend to advance expeditious server-side functions, while MongoDB will be the flexible and safe data management system. Introducing AI capabilities for the Chat Assistant, Natural Language Processing (NLP) methods will be included for live customer communication. With such technologies working in concert, e-commerce models will be scalable integrated.

Agile Model:

In creating 3dot solutions, the Agile model will be used because it enhances flexibility, speed and continuous improvement from the model's development to completion. Agile development can be described as an iterative approach to development; the Working software is developed in small cycles called sprints. A sprint will always have a certain length of time (common to be from one to two weeks) and it will be, in particular, devoted to the development, testing and review of specific features or components.

Sprints 1 and 2 will mainly focus on refining the project based on the feedback from developers, designers as well as the stakeholders to get a better result. Key stages of the Agile process for 3dot Solutions include:

Planning: Each spring the specific activity of the team is determined based on what has been noted by users and what needs to be done from where the work plan is developed based on features to be implemented.

Design and Development: The front-end and back-end systems will have their further development integrated and tested at the same time. The design element such as the AI-ChatBot and Warranty Countdown will be enhanced systematically to accommodate observations of their utility in the initial phase.

Testing: For the purpose of this approach, all of the features will include testing that is to be conducted throughout the sprint to eliminate the possibility of hidden bugs getting through during deployment. As for cross-functional tasks, repetitive testing will be conducted automatically for increasing performance.

Deployment and Iteration: The platform will be gradually implemented so that features can be released early, but the system will also be flexible because of its modular structure considering user feedback.

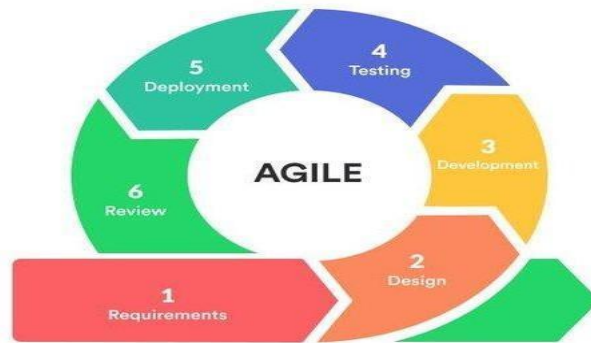


Figure 4.1: Agile Model

Scrum Model:

To provide for collaboration, flexibility and iteration during the development of 3dot Solutions, the Scrum Model will be utilized. That is why Scrum is included in the Agile family, where work is divided into small sets of functionalities that are delivered in chunks known as sprints. The sprints usually will last for about 1-2 weeks and the goal here is to have working features by the end of each of the sprints.

Scrum Model is one of the most popular frameworks of agile and can be used in order to understand and bring through to completion complex work. Concentration is laid on gradual work, which is divided into different categories known as sprints, usually having the period of two to four weeks. The goal of each team's cross-functional members in the Scrum model is to produce more value at the conclusion of each cycle, or sprint. These include the Product Owner, who is in charge of the project and the product backlog, the Scrum Master, who supervises the removal of obstacles, and the Development Team, who work to produce a finished and "shippable" product at the conclusion of the sprint. Scrum encourages the use of meetings, which might include sprint **planning, sprint retrospectives, and daily scrum meetings.**

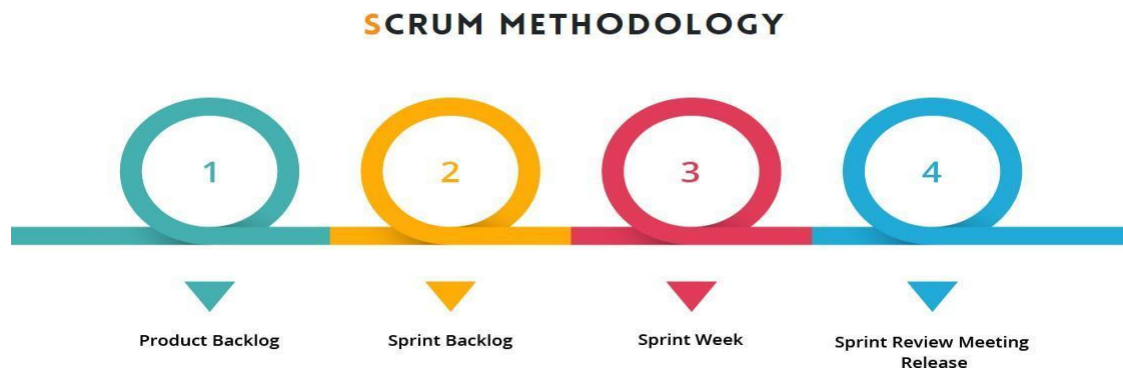


Figure 4.2: Scrum Methodology

Why to use

The Scrum Model is very useful for advancing 3dot Solutions as it provides the goals of flexibility, the quick launch of the product, and the constant enhancement of the product. The team also understands work in small portions over shorter periods, allowing the alteration of the platform according to customers' responses and new requirements. These daily scrums, sprint review, and sprint retrospectives create a line of sight with the team, stakeholders, and PO that minimizes misunderstandings and delays when it comes to problem-solving. It also makes delivery more frequent to allow 3dot Solutions to provide important functionalities early on while iterating the platform consistently.

Sections of Methodology

The structure of Methodology for 3dot Solutions is divided into the following sections that allow providing the structured and effective development. First, Planning and Analysis means identifying necessary information, understanding the purpose and scope of the project, and estimating the priority of the project objectives together with stakeholders. Design and Prototyping is mainly concerned with defining concepts and wireframes that will make the layouts for the concept have a pleasing interface. The Development Phase is conducted with an Agile or Scrum framework where the platform is gradually created in sprints – the AI Chat Assistant and the Warranty Countdown are created in each cycle as well. Testing reduces the presence of bugs in the platform since there is unit testing integration testing and user testing. In the last, Deployment is the process of introducing the platform, and Maintenance refers to the process of constantly observing the performance and improving them depending on users' feedback and emerging trends. And each section Affordability guarantees the project remains on track, while generating value from the beginning off; Flexibility enables someone to adapt to future changes.

Implementation Plan

In addressing the gaps in amending the current strategy, the Implementation Plan for 3dot Solutions will be designed in phases with the primary phase being the requirement gathering and system design phases. The first part will be to create the front part of the specific webpage with the use of React.js to attain the best and user-friendly results when opening the Software and the use of the Tailwind CSS to enable responsiveness of the Software. At the same time the back end is going to be realized using Node.js as the programming language and MongoDB for database. Key features, such as the Chat Assistant based on AI and Warranty Countdown will not be implemented at once but will be deployed in agile sprints to receive first end-users' feedback. After development the product will go through rigorous testing from functionality, security to even how easy it is for users to go through the process. After that, the platform will be run in the staging environment and then continue to be released to the production environment. After that, the maintenance stage will guarantee that the platform is developing steadily and meeting customers' requirements as well as being optimized for expansion. As mentioned, during crafting of the solution, there will be engagement of the stakeholders and receiving their feedback to ensure that it responds to both the business and user needs

Chapter 5: Project Plan

5.1. Work Break Down structure

Because the project work is divided into manageable chunks, this hierarchical project decomposition structure does just that. It also provides an example of the scope, outcomes, and connections between various work components of a project. We have broken down our project into its component components, meticulously planned out the major body of the project, and determined which part will receive what amount of time. It helps us keep track of the entire project at a specific point in time on a schedule.

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

Table 5.1: Break Down structure

5.2. Resource Allocation

Resource management is the act and capacity of planning, acquiring and deploying resources with maximum efficiency in the completion of project tasks and achievement of project goals. However, in order for the project to be considered successful, we also need to make sure that the proper team is given the right tasks and that we use resources appropriately. The resource distribution for our project is shown here, and all stakeholders, from users to project managers—have been recognized at every level.

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

Table 5.2: Resource Allocation

5.3. Time Boxing

In project management, time boxing refers to the assignment of strictly limited time frames named time boxes to individual tasks or activities. It helps you set objectives and targets for your personal job by reminding you of time limits, or deadlines. The time boxing schedule for our project is provided below.

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

Figure 5.1: Time Boxing

Gantt chart

Tasks, milestones, and project schedule data are shown in a timeline manner on a Gantt chart, a visual project management tool. Better planning, coordination, and progress monitoring are made possible by its graphical depiction of project activities, their durations, and their dependencies.

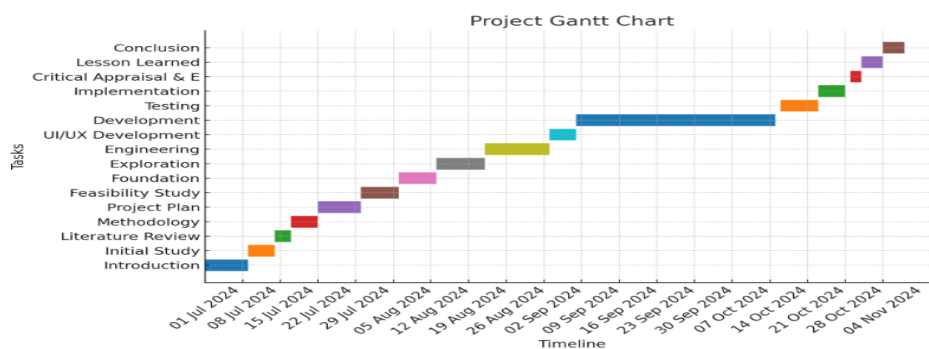


Figure 5.2: Gantt chart

Chapter 6: Feasibility Study

6.1. All possible types of feasibility study:

A feasibility study assesses the practicality of a project and is typically categorized into several types: Technical Feasibility assesses whether the required technology and technology tools and resource skills to support the project exist. Economic Viability looks at the economic planning of the project in terms of estimating cost and benefits of the project. Legal Feasibility checks whether the project is legal and above the set legal requirements as stipulated in the laws, regulations and contract amongst others. Operational Feasibility looks at the fitting of the proposed project in relation to the organization and the compatibility of the project with the organizational requirements. Finally, Schedule Feasibility checks whether the can be done within the expected period of time. In combination, those studies allow evaluating the feasibility of a given project before major investments are made.

6.2. Technical Feasibility:

Technical Feasibility focuses on the appliance and sufficiency of technical tools, human resources, and other techniques available to support the project that is being undertaken. This includes evaluation of existing tools – hardware, software, and infrastructure required for development and running of the product. For 3dot Solutions, it means asking questions like whether tools such as React.js, Node.js, MongoDB, and AI tools for the Chat Assistant can be effectively used and incorporated. Another point is whether the members of the development team possess the adequate level of technical qualification to accomplish the task and if they need more training or equipment/tools to do it. Consequently, positive technical feasibility means that the project is capable of being implemented based on the existing technologies.

- Hardware : Laptop & Desktop, Wi-Fi-router
- Software: MS word , VS code, Mongo dB,, Google chrome, Mozilla Firefox, windows 11
- Database: No SQL (mongo dB)
- Client-side technology: HTML, CSS, React,, Vite, Tailwind CSS, JavaScript.
- Server-side technology: Node.js , OpenAI api, express.js.

6.3. Economic Feasibility:

Economic Viability evaluates the capability of the project to generate funds by equating it to the estimated costs. For 3dot Solutions, this means estimating the cost of development of the platform, covering technology, infrastructure and human capital against potential revenues or means of monetizing the platform. Return on investment (ROI), cost-benefit analysis, and break-even thresholds are examined by organization and cost control. It also includes the continually recurring costs of

maintenance and other similar operational costs in the evaluation of the building's feasibility. A positive economic feasibility makes certain that the cost in the project does not overshoot the benefits and that it will be sustainable in the future more so as far as delivering value to the stakeholders are concerned.

6.4. Operational Feasibility:

Operational Feasibility focuses on whether in an organization context a given project is attainable or not and if it can be implemented within the organization framework or mode of operation. For 3dot Solutions, this entails evaluating if elements including the AI-Incorporated Chat Assistant, Warranty Countdown, and the Ticket Booking System provide a solution to the need of the users and improve their experience. It also assesses the compatibility of the solution with today's operations and how much it disrupts or interferes with operations. The outcome of the type of study under evaluation is a validation of the fact that the project is possible in the areas of operation and is designed to address the needs of the users, as well as be advantageous to each and every project participant.

6.5 Legal & Compliance Feasibility:

Legal and Compliance Feasibility determines if a given project is legal and if it complies with all the rules and main guidelines that exist within a given society. For 3dot Solutions, they get to follow the e-commerce laws and policies in the country, data privacy laws such as GDPR or CCPA, and the rights of intellectual property, among other consumer protection laws. It also encompasses the confirmation of compliance with the terms of a contract with a vendor, a partner or a third party. This means that anticipations of certain legal issues ensure that the project is legally workable from the onset and does not incur undue fines or legal suits or even tarnish its reputation.

Chapter 7: Foundation

7.1. The problem area identification:

The increased adoption of e-commerce has revolutionized the consumer electronics buying and selling business, but several issues exist in the market. Some platforms fail to provide a more complete service coverage for buyers and sellers, and they often spank in inefficiency and presumed buyer dissatisfaction. Customers have challenges in authenticating the products, identifying their warranties and also receiving appropriate customer care support after they have bought the product. Problems that sellers experience include low visibility, high competition, and lack of efficient relationship with the consumers. Also, to solve any technical problems or matters of concern or dispute proves to be complicated and therefore, the users are not satisfied at all.

There is no single portal that would encompass all the features which include AI support system, services, and complaints handling system. Many conventional B2C sites either lack real-time support or offer limited access to help wherein users may have to go through various interfaces or await customer support. Likewise, platforms rarely innovate in the way that Warranty Countdown innovation may potentially add utility for following warranty intervals, making platforms more valuable to users.

From a technical point of few, the major problems with many e-commerce sites are the issues of scalability and security. The tendency to use it increases and user expectations rise, which results in slow response, downtimes, and susceptibility to hackers. Such problems defame and devalue user trust and indeed discourage buyers and sellers from participating in such platforms.

However, few operational capabilities, for example, weak ticketing processes for addressing technical problems or weak portfolio management for sellers mean missed possibilities to optimize users' experience. All of these challenges suggest the need for a solution that fulfils the usability of e-commerce sites and at the same time offers more enhanced features satisfying the demand of the users.

3dot Solutions seeks to eliminate these drawbacks by offering an innovative marketplace which employs the use of the following technological solutions: artificial intelligence assistance as well as warranty handling and problem-solving systems that would make both the purchaser and the seller happy and satisfied with the services offered by 3dot Solution. What this approach does is fill the gaps that currently exist and guarantee customers and market challenges.

7.2. Interview:

To capture the user requirements and make improvements on 3dot Solutions, User interviews from the various categories of buyers, sellers and technical persons were carried out. During the interviews, the participants were asked about typical e-commerce pain areas including product authenticity, warranty identification and slow customer service. Sellers described issues with the marketplace to customers and customer relationship while buyers focused to fast support in real time and efficient complaints handling. Participants also showed their keenness on such kind of extras as AI Bot, which would be able, for example, to arrange a chat with the participant, and Warranty Countdown option. Sains from these interviews substantiated the importance for a platform that combines progressive tools and interfaces for the users. These insights informed the development of the functions that define the project where 3dot Solutions is solving real-world issues that make the platform useful and credible for all stakeholders.

7.3. Questionnaire:

1. What challenges do you face while buying or selling electronic accessories online?
2. How important is real-time assistance, such as an AI-powered chat, in enhancing your e-commerce experience?
3. Would a feature like a Warranty Countdown be useful for tracking product warranties?
4. What issues have you encountered with ticketing systems for resolving technical problems or disputes?
5. How likely are you to use a platform that integrates advanced features like personalized user portfolios and streamlined issue resolution?

7.4. Requirement Specification:

1. Functional Requirements:

User Registration and Authentication: Registration/authorization for buyers and sellers must be secure.

Product Management: Considering the success of the facilitation of ecommerce, the following are specific objectives; The flexibility in listing electronic accessories for sell and updating the list.

AI-Powered Chat Assistant: Offer live support for concern and queries regarding selection of products and issue resolution.

Warranty Countdown System: Feature to track and inform the clients about the period of validity of the product warranty.

Ticket Booking System: An effective means to address technical concerns and / or problems or quarrels.

User Portfolio Management: Individual selling interfaces for sellers and buying interfaces for buyers.

2. Non-Functional Requirements:

Performance: The load must not exceed at least one thousand concurrent users in order to be effectively run.

Scalability: To accommodate new functionalities in future or when user traffic is too high in the future.

Security: Data encryption, payments make use of proper payment gateways, as well as the GDPR and CCPA rules and regulations.

Usability: Easy to navigate and screen responsive layout allowing easy access across the devices.

Reliability: Make sure that your product guarantees 99.9% availability courtesy of reliable error control measures.

3. Technical Requirements:

Frontend: Created with the React-framework, and the use of the Tailwind CSS for the responsive design.

Backend: node for server-side logic.

Database: MongoDB for optimal performance on data management.

AI Integration: Oblige AI frameworks for instantaneous chat support and individualized suggestion.

Hosting: The use of web-hosting services with cloud elasticity for expansible housing.

4. Business Requirements:

Revenue Model: For example, through paid seller subscriptions, transaction fees and placing your listings to appear at the top.

Compliance: E commercial laws, data security and consumer protection laws have to be followed.

7.5. Full Activity Diagram:

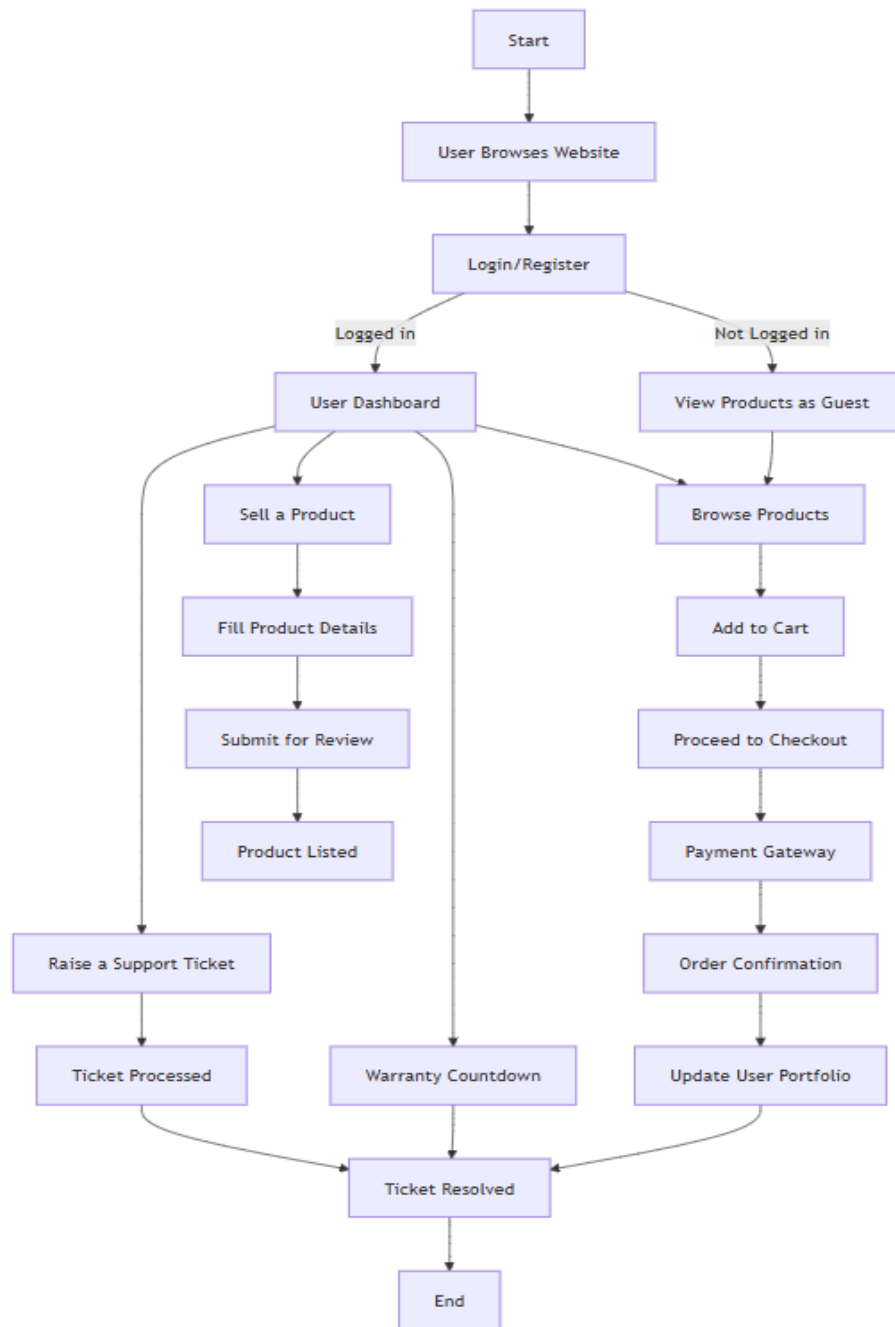


Figure 7.1: Activity Diagram of the full system.

7.6. Use case of Dashboard:

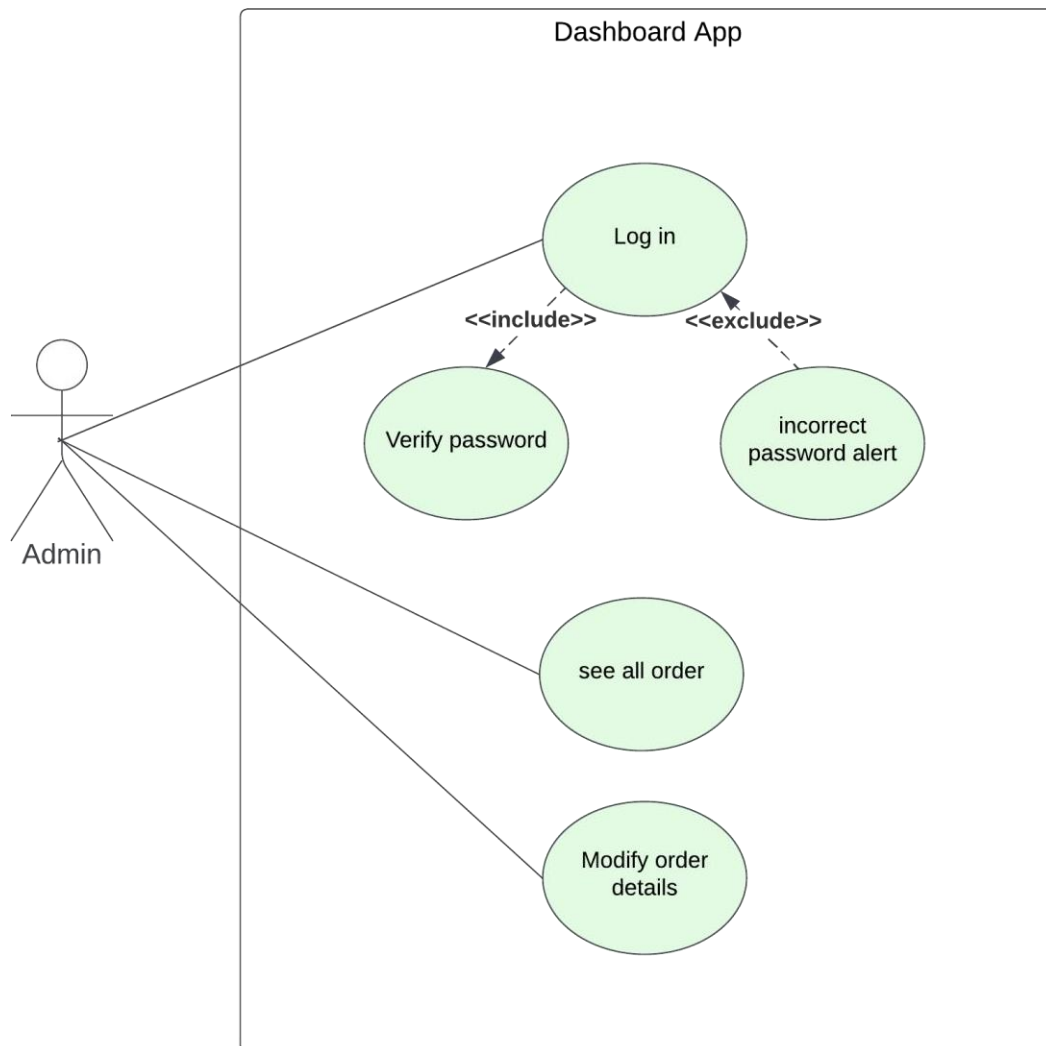


Figure 7.2: Use case of Dashboard

Chapter 8: Exploration

8.1. Activity diagram:

Activity diagrams are very helpful for describing how a system or process is operated, documenting necessary activities, and identifying and analyzing potential performance issues. Because they show how events are connected, they aid stakeholders in understanding the big picture of complex systems. We divided the entire activity into two sections so that the workflow could be understood: the customizing activity diagram is the first section, and the order process is the second. We have included the complete activity diagram in the letter.

8.1.1 Full Activity Diagram:

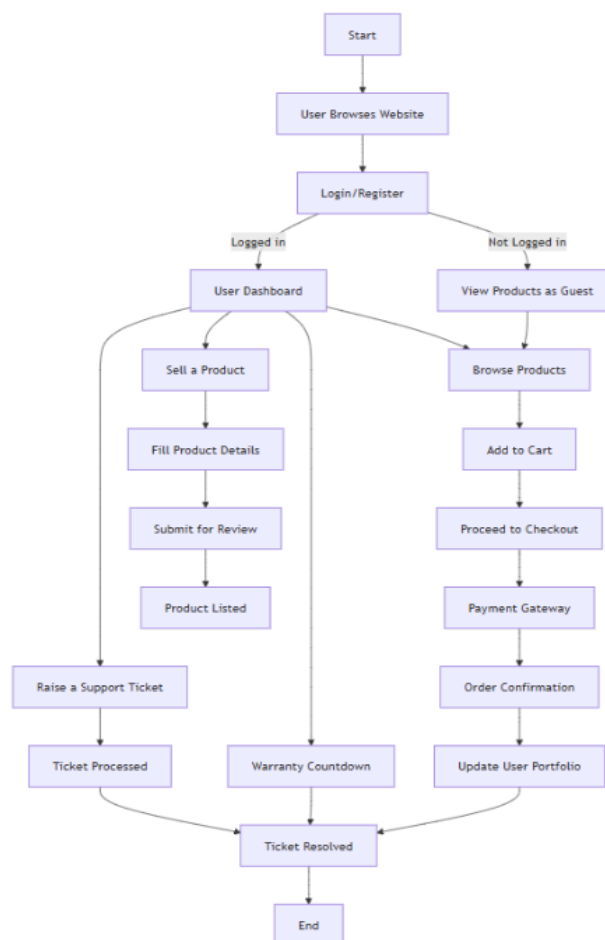


Figure 8.1: Use case of Dashboard

Chapter 9: Exploration

9.1. System Module:

Serial of Action	User Action	System Interaction
1	User visits the website	System loads homepage and displays featured products.
2	User searches for a product	System fetches and displays relevant product results.
3	User selects a product	System shows product details, warranty countdown, and options.
4	User adds a product to the cart	System updates the cart and calculates the total.
5	User registers/login to the site	System authenticates and creates/manages user profile.
6	User buys a product	System processes payment and generates an order confirmation.
7	User raises a ticket for an issue	System logs the ticket and assigns it to support.
8	User checks warranty status	System retrieves and displays the warranty countdown.
9	User lists an item for sale	System captures details and lists the item in the marketplace.
10	User interacts with AI chat	System provides AI-powered responses and suggestions.

Table 9.1: System of the Module Table

9.2. Class diagram of the system:

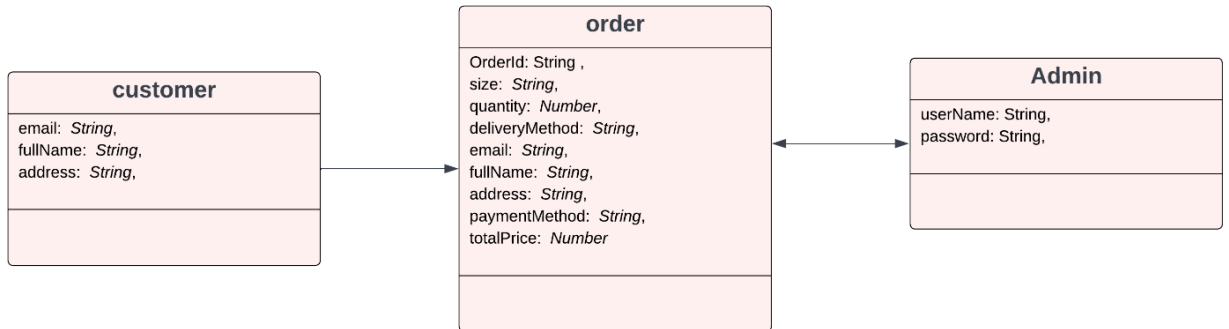


Figure 9.1: The Class Diagram

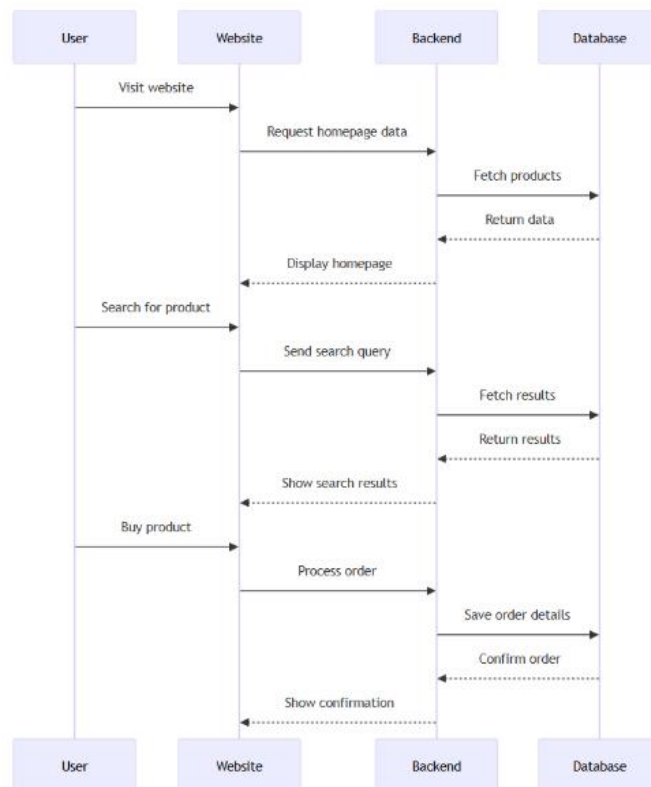


Figure 9.2: Sequence Diagram

9.3. Low-fidelity prototype of the system:

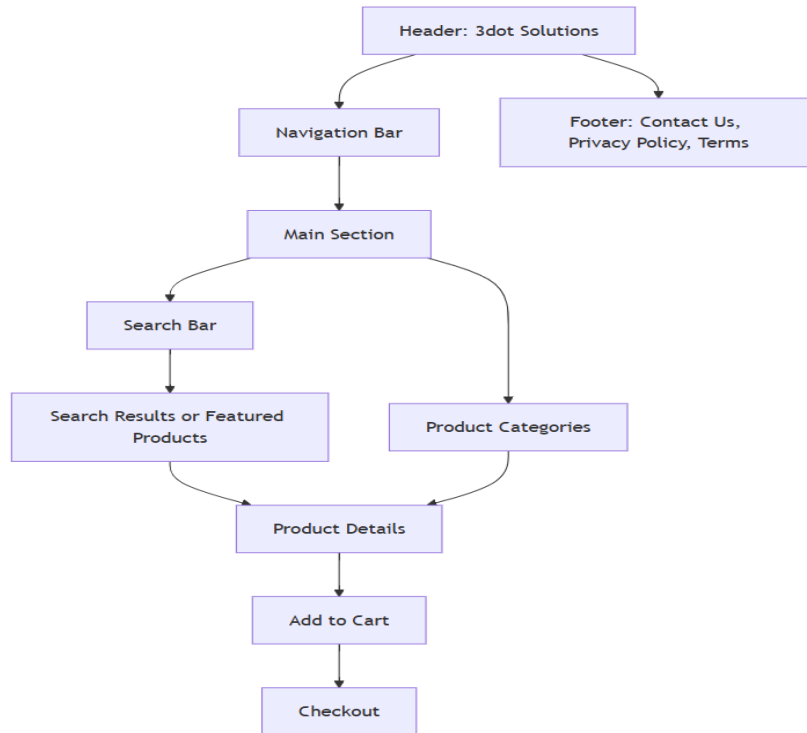


Figure 9.3: Low fidelity prototype (home page)

9.4. High-fidelity prototype of the system:

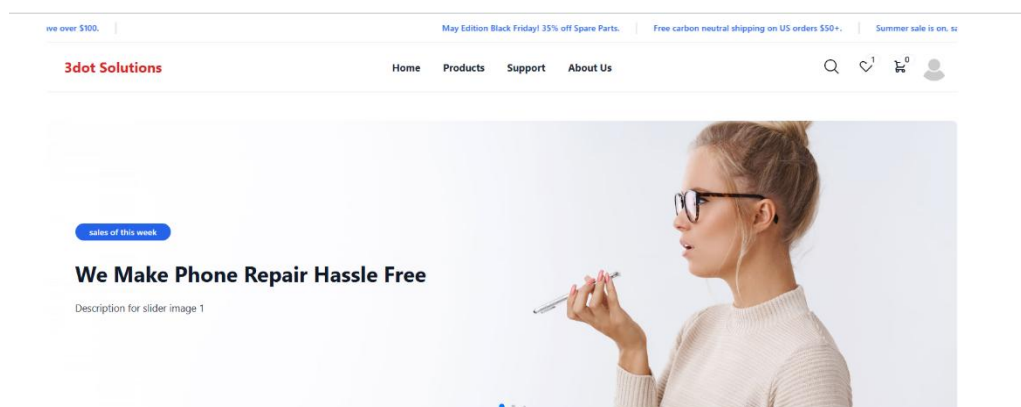


Figure 9.4 High Fidelity prototype (Home page)

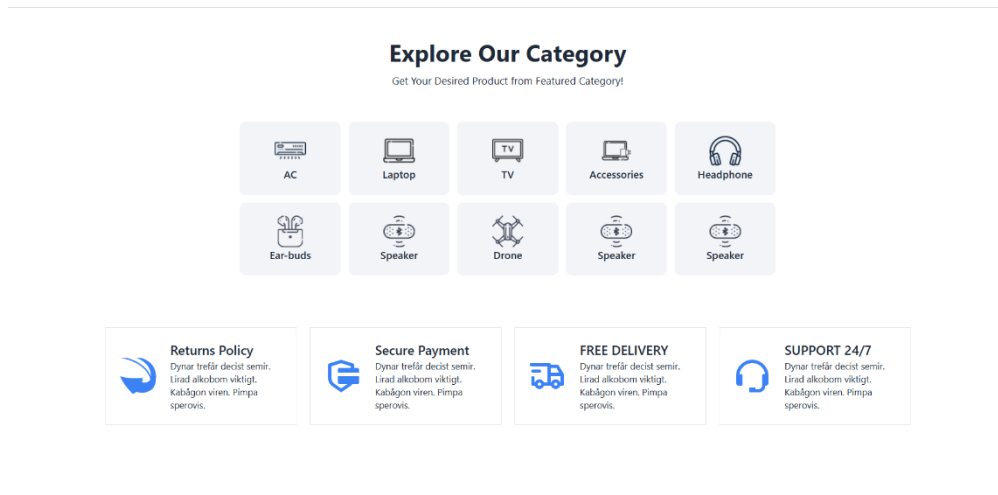


Figure 9.5: High fidelity prototype (Home page)

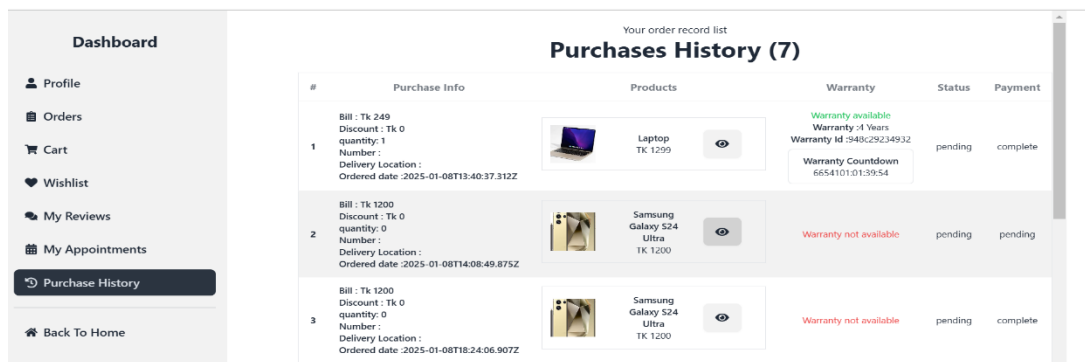


Figure 9.6: High fidelity prototype (Purchase Page)

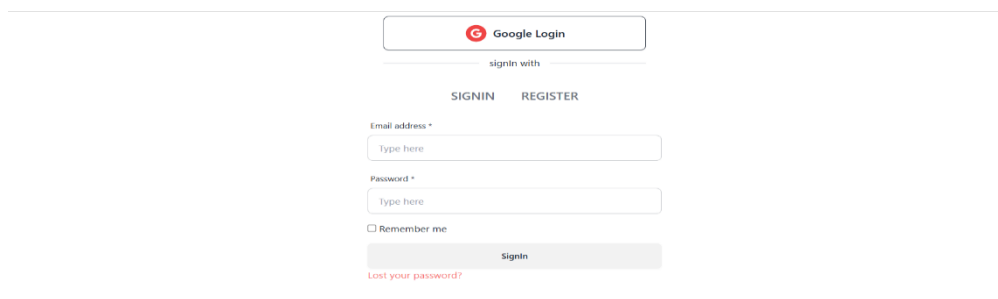


Figure 9.7: High fidelity prototype (Login page)

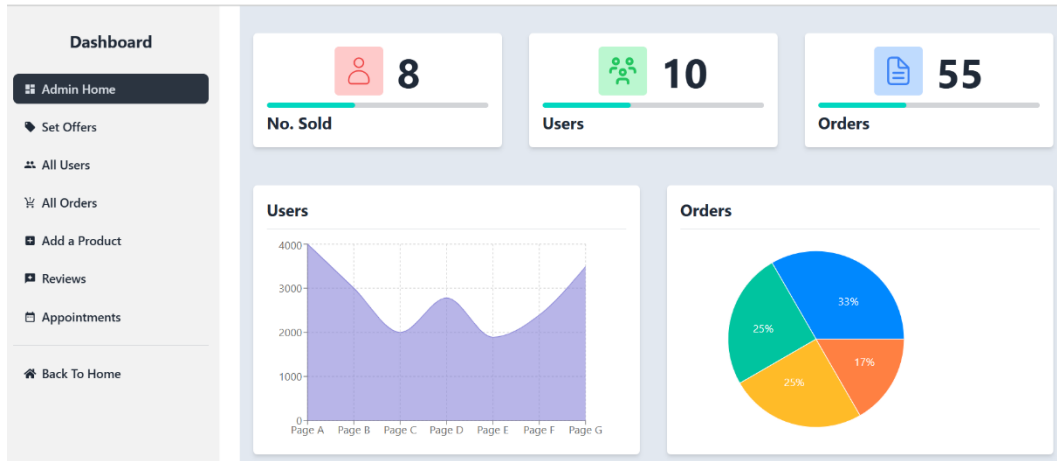


Figure 9.8: High fidelity prototype (dashboard page)

Chapter 10: Development

10.1 Folder structure of the system:

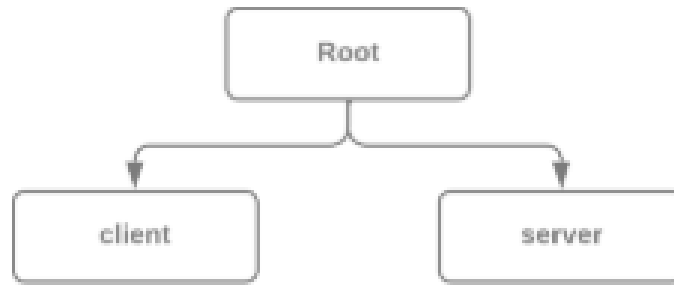


Figure 10.1: Root Folder

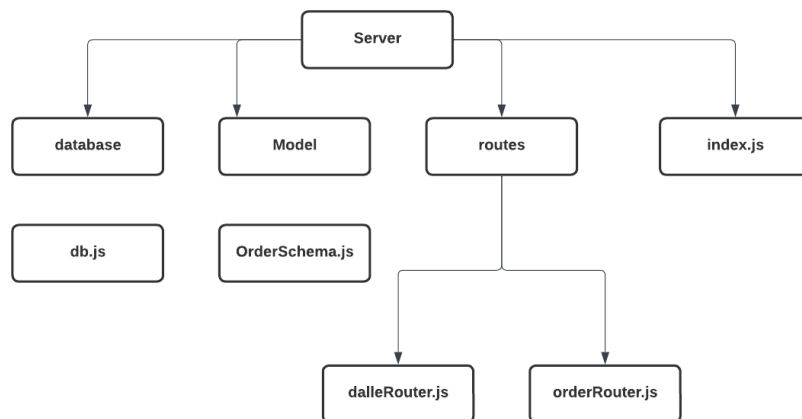


Figure 10.2: Server-side folder structure

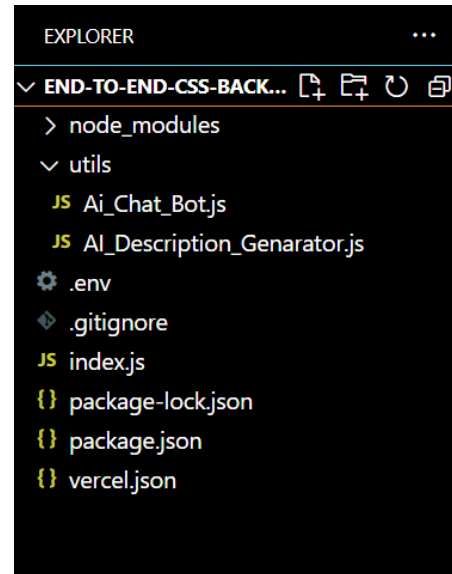
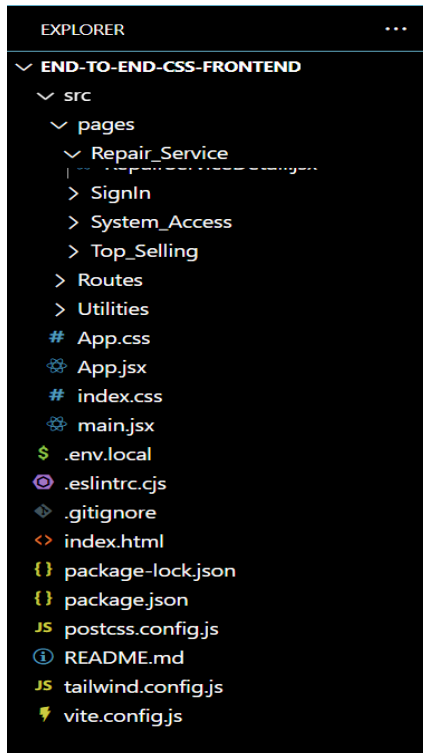


Figure 10.3: Actual folder Structure

Core module output sample:

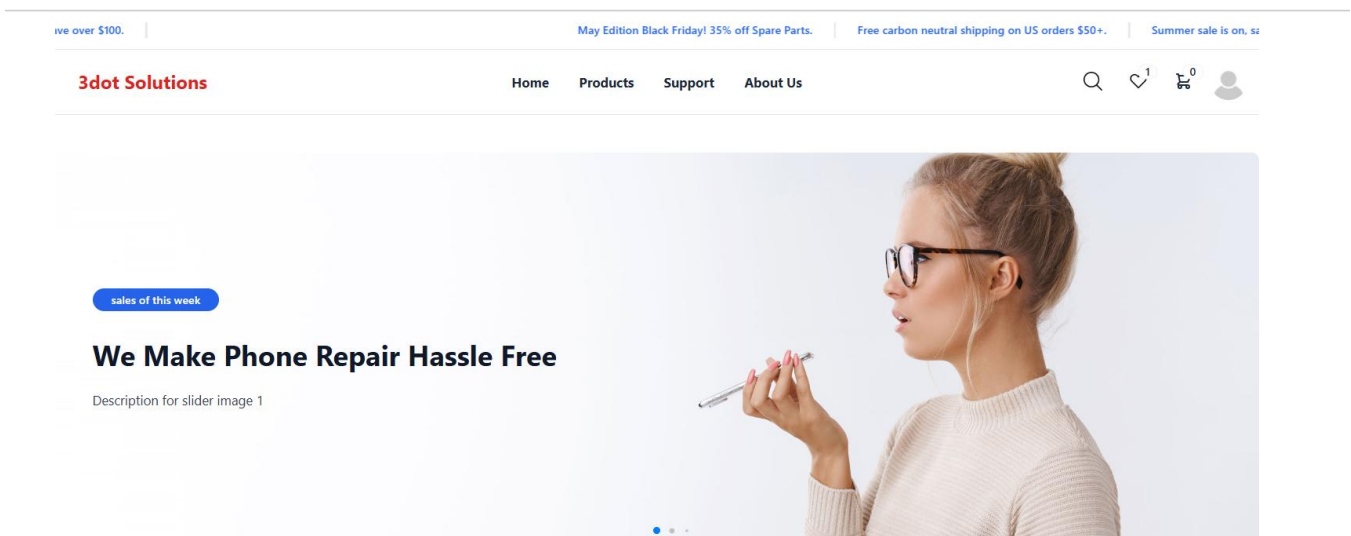


Figure 10.4: Actual folder Structure

Explore Our Category

Get Your Desired Product from Featured Category!



Figure 10.5: Output of Home page

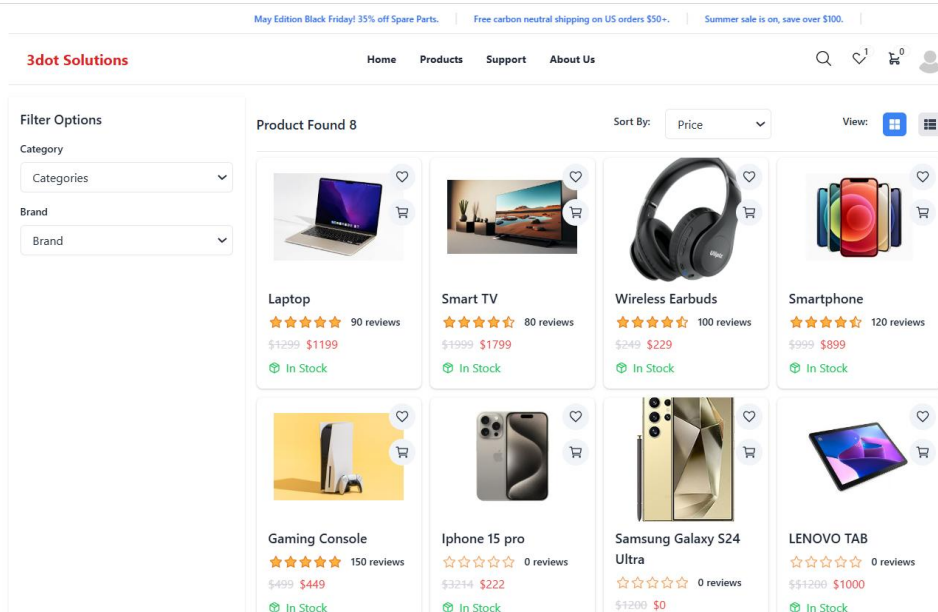


Figure 10.6: Output of Product Page

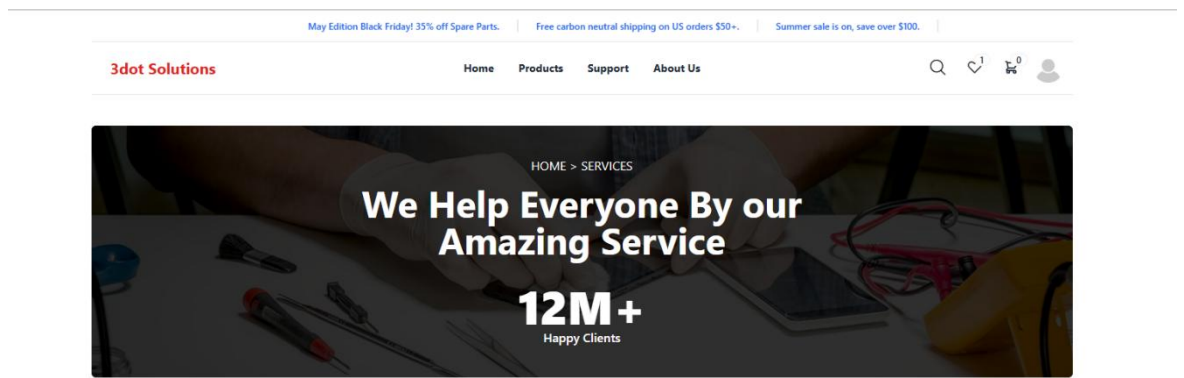


Figure 10.7: Output of Support Page

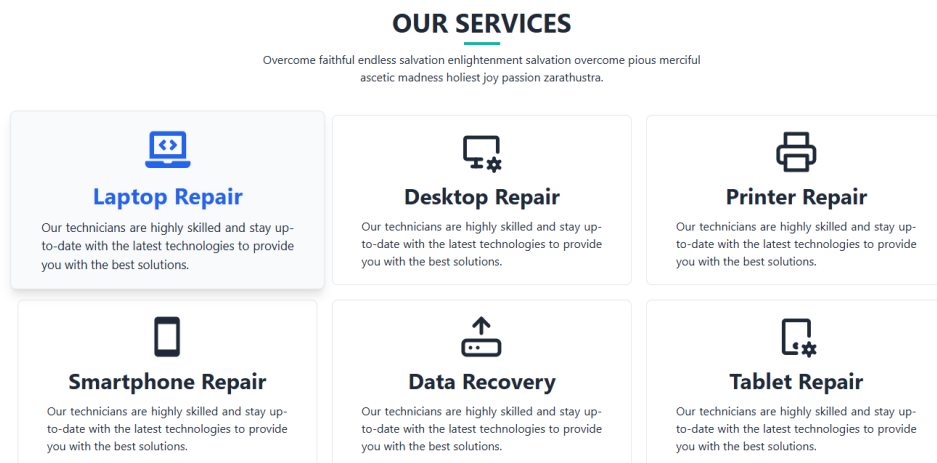


Figure 10.8: Output of Support Page

Book a Schedule



Name	<input type="text" value="your name"/>	Email	<input type="text" value="farhansourav19@gmail.cc"/>
Phone	<input type="text" value="phone"/>	Laptop/Phone/Tablet	<input type="text" value="Select a Category"/>
Select An Image	<input type="button" value="Upload Image"/>		
		Booking date	<input type="text" value="01/10/2025"/>
		Category	<input type="text" value="Laptop Repair"/>
Description			
<input type="text" value="your description here"/>			
<input type="button" value="Book a Appointment"/>			

Figure 10.9: Output of Ticket Generate section

Book a Schedule

Ai Chat

You
11:17:18 PM

Laptop charger not working? what should i do

Delivered

AI Assistant
11:17:18 PM

Let's troubleshoot your laptop charger. We'll go through steps from simplest to more complex. 1. The Obvious Checks: * Check the power outlet: Try plugging your charger into a different outlet. Make sure the outlet is working by plugging something else in (a lamp, phone charger, etc.). A tripped breaker or a faulty outlet is a common culprit. * Examine the charger cable: Look for any visible damage to the power cable (the part that plugs into the wall) and the charging cable (the part that plugs into your laptop). Check for cracks, bends, or frayed wires, especially near the connectors. If you see any damage, it needs to be replaced. * Check the connections: Make sure both ends of the power cable are securely plugged into the charger brick and the wall outlet. Sometimes a loose connection is all it takes. Try gently wiggling them to ensure a solid connection. * Check the laptop's power port: Inspect the power port on your laptop for any dust, debris, or damage. Gently clean it with a compressed air canister if necessary. 2. More Advanced Troubleshooting: * Try a different charger (if possible): If you have access to another charger of the "exact same" specifications (voltage and amperage – these are usually printed on the charger itself), try that to rule out a problem with your charger. Using the wrong charger can damage your laptop. * Check the charger brick: The "brick" itself might be faulty. Look for any visible damage, overheating, or unusual smells. If you feel it's unusually hot even after a short period of use, that's a serious issue and you should *not* continue using it. * Check the laptop's power settings: Ensure your laptop isn't in sleep mode or hibernation. Try restarting your laptop. 3. If Nothing Works: * Contact your laptop manufacturer: If you've exhausted all troubleshooting steps, your charger is likely faulty. Contacting the manufacturer or a reputable repair shop is your best bet. They can advise on repair or replacement options. They might also be able to diagnose other issues preventing your laptop from charging, such as a faulty charging port on the laptop itself. * Consider a professional repair: A qualified technician can diagnose the problem definitively and repair or replace the necessary components. Important Safety Note: Never attempt to open or repair the charger brick yourself unless you are experienced with electronics repair and understand the risks involved. Damaged chargers can pose a fire or electric shock hazard. By systematically going through these steps, you'll likely identify the cause of the problem and get your laptop charging again. Remember safety first!

AI Response

Figure 10.10: Output of AI Chat Section

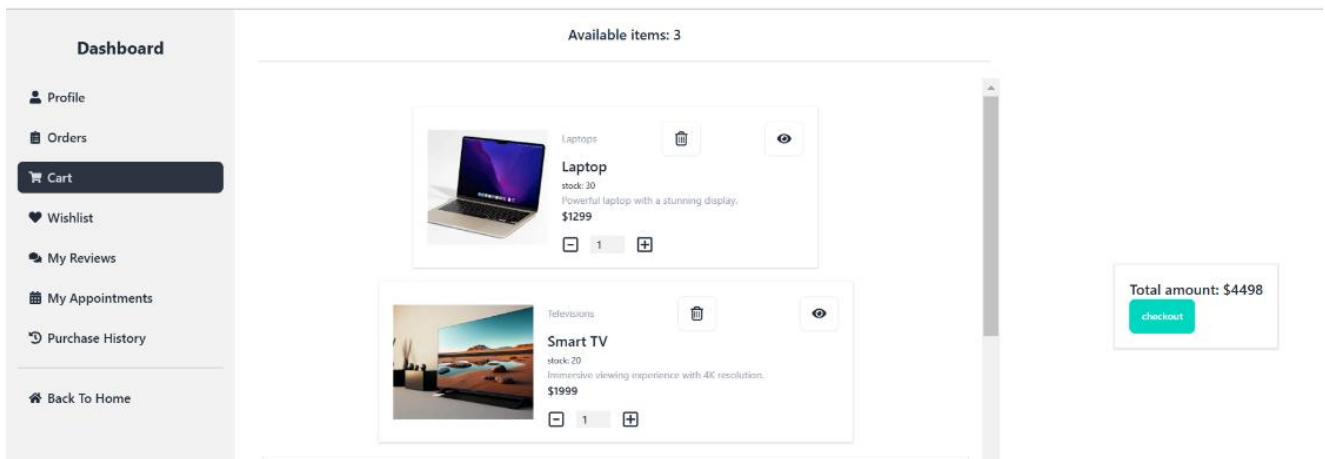


Figure 10.11: Output of Cart Section

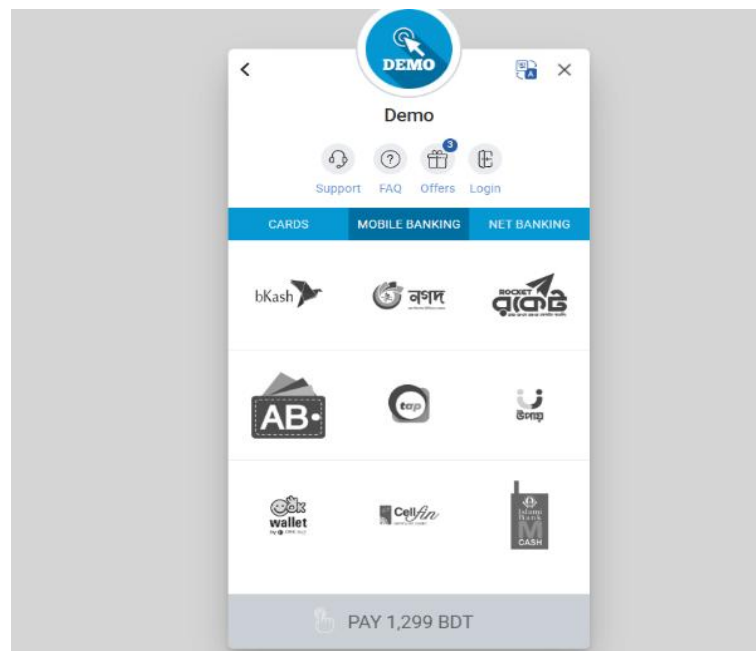


Figure 10.12: Output of Payment System

OTP Page

Do not press browser back or forward button while you are in payment page

Payment Summary	
Please review the following detail for this transaction:	
Amount:	1299.00
Invoice number:	2501102325531kBneL1jjuPYTD
Description:	Products

Enter Card Information

OTP:

Success
Failed

Success with risk

Your entered card information could not be corrupted or become known to the third party, as all transmitted data is encrypted by the SSL protocol.

Note

1. For VISA and MC, look at the back side of your Card to find 3-digit CVV2/ CVC2. For AMEX, look at the upper right corner of the front side of your Card to find 4-digit CSC.
2. The cardholder's name should be entered just as it's written on the card.

SSLCOMMERZ TESTBOX GATEWAY (NO CARD INFORMATION WILL BE SAVED AND DUMMY)

Figure 10.13: Output of OTP Page

Dashboard

- Profile
- Orders
- Cart
- Wishlist
- My Reviews
- My Appointments
- Purchase History

- Back To Home

My Profile

Current Profile

Name:

Email:

Phone Number:

Address:

Update Profile

Figure 10.14: Output of User Dashboard

Dashboard

- [Profile](#)
- [Orders](#)
- [Cart](#)
- [Wishlist](#)
- [My Reviews](#)
- [My Appointments](#)
- [Purchase History](#)

[Back To Home](#)

All Orders

Starting date

Ending date

[Filter](#)

Name	Phone	Requested Delivery Date	Booking Date	Delivery Location	Cost	Action
1	Farhan	farhansourav19@gmail.com	2025-01-08	Dhaka	249	pending
2	Farhan	farhansourav19@gmail.com	2025-01-08	Dhaka	1200	pending
3	Farhan	farhansourav19@gmail.com	2025-01-08	Dhaka	1200	pending
4	Farhan	farhansourav19@gmail.com	2025-01-09	Dhaka	1200	pending
5	Farhan	farhansourav19@gmail.com	2025-01-09	Dhaka	1200	pending
6	Farhan	farhansourav19@gmail.com	2025-01-09	Dattapara		pending
7	Farhan	farhansourav19@gmail.com	2025-01-09	Dattapara	1299	pending
8	Farhan	farhansourav19@gmail.com	2025-01-10	Dattapara	4498	pending
9	Farhan	farhansourav19@gmail.com	2025-01-10	Dattapara	1299	pending

Figure 10.15: Output of User Oder list

Dashboard

- [Profile](#)
- [Orders](#)
- [Cart](#)
- [Wishlist](#)
- [My Reviews](#)
- [My Appointments](#)
- [Purchase History](#)

[Back To Home](#)

Your order record list Purchases History (9)

#	Purchase Info	Products	Warranty	Status	Payment
1	Bill : Tk 249 Discount : Tk 0 quantity: 1 Number : Delivery Location : Ordered date :2025-01-08T13:40:37.312Z	Laptop TK 1299	Warranty available Warranty :4 Years Warranty Id :948c29234932 <div style="border: 1px solid #ccc; padding: 2px; margin-top: 5px;"> Warranty Countdown 6654101:00:11:13 </div>	pending	complete
2	Bill : Tk 1200 Discount : Tk 0 quantity: 0 Number : Delivery Location : Ordered date :2025-01-08T14:08:49.875Z	Samsung Galaxy S24 Ultra TK 1200	Warranty not available	pending	pending
3	Bill : Tk 1200 Discount : Tk 0 quantity: 0 Number : Delivery Location : Ordered date :2025-01-08T18:24:06.907Z	Samsung Galaxy S24 Ultra TK 1200	Warranty not available	pending	complete

Figure 10.16: Output of User Purchase Page



#	Purchase Info	Products	Warranty	Status	Payment
1	Bill : Tk 249 Discount : Tk 0 quantity: 1 Number : Delivery Location : Ordered date :2025-01-08T13:40:37.312Z	 Laptop TK 1299 	Warranty available Warranty :4 Years Warranty Id :948c29234932 Warranty Countdown 6654101:00:08:03	pending	complete

Figure 10.17: Output of User Appointment page

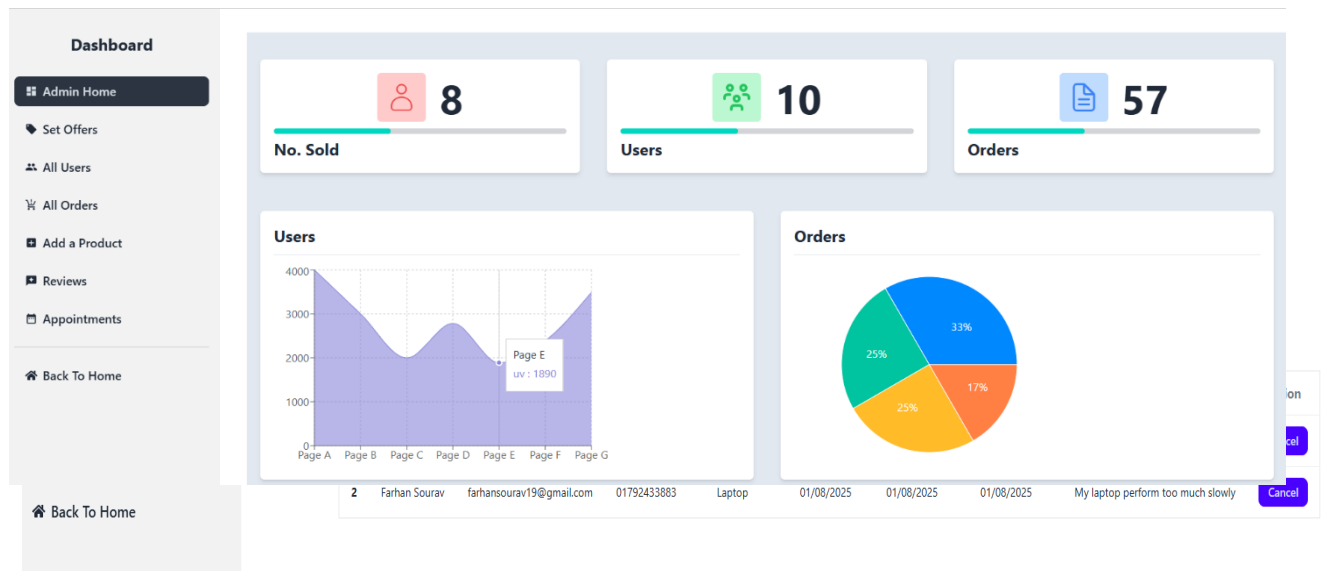


Figure 10.18: Output of User Appointment page

Dashboard

- Admin Home
- Set Offers
- All Users**
- All Orders
- Add a Product
- Reviews
- Appointments

- Back To Home

How Many??
Manage all users

Total Users: 10

#	Name	Email	Phone	Number of Orders	Total Spent Amount	Role	Actions
1	Hasan	hasan@g.com	+8801xxxxxxx	0	0	user	Make Admin Delete
2	Orn	darkwed72378@gmail.com	+8801xxxxxxx	0	0	user	Make Admin Delete
3	mr_zero	a@b.com	+8801xxxxxxx	0	0	user	Make Admin Delete
4	mr_zero	aka883207@gmail.com	+8801xxxxxxx	0	0	user	Make Admin Delete
5	mr_zero	ass@bus.com	+8801xxxxxxx	0	0	user	Make Admin Delete
6	vidq 911	vidq911@gmail.com	+8801xxxxxxx	0	0	user	Make Admin Delete
7	MEHEDI's Tech	mh67705251@gmail.com	+8801xxxxxxx	0	0	user	Make Admin Delete
8	Farhan Surov	surov16-557@diu.edu.bd	+8801xxxxxxx	0	0	admin	Make Admin Delete
9	Farhan	farhansourav19@gmail.com	+8801xxxxxxx	0	0	user	Make Admin Delete

Figure 10.19: Output of User Management

Dashboard

- Admin Home
- Set Offers
- All Users
- All Orders
- Add a Product
- Reviews
- Appointments
- Back To Home

All Orders

Starting date

Ending date

Filter

Name	Phone	Requested Delivery Date	Booking Date	Delivery Location	Cost	Action
1	Mehedil Hasan	mhytube4@gmail.com	2024-05-05	Dhaka	2298	pending
2	Mehedil Hasan	mhytube4@gmail.com	2024-05-05	Dhaka	1299	pending
3	MEHEDI Hasan	hasan67705251@gmail.com	2024-05-07	Dhaka	3214	pending
4	MEHEDI Hasan	hasan67705251@gmail.com	2024-05-07	Dhaka	3214	pending
5	Squad	squad.aam@gmail.com	2024-05-07	Dhaka	999	pending
6	Squad	squad.aam@gmail.com	2024-05-07	Dhaka	999	pending
7	Squad	squad.aam@gmail.com	2024-05-07	Dhaka	1248	pending
8	Squad	squad.aam@gmail.com	2024-05-07	Dhaka	1248	pending
9	Squad	squad.aam@gmail.com	2024-05-07	Dhaka	1248	pending
10	Squad	squad.aam@gmail.com	2024-05-07	Dhaka	1248	pending
11	Squad	squad.aam@gmail.com	2024-05-07	Dhaka	1248	pending
12	Squad	squad.aam@gmail.com	2024-05-07	Dhaka	1248	pending

Figure 10.20: Output of All Order

Dashboard

- Admin Home
- Set Offers
- All Users
- All Orders
- Add a Product
- Reviews
- Appointments
- Back To Home

Add a new product

Product name:

Category

Brand

Tag

Select Product Image

 No file chosen

Price

Discount price

In Stock

Warranty

Warranty Duration

Description

Figure 10.21: Output of Add Product Page

Dashboard

- [Admin Home](#)
- [Set Offers](#)
- [All Users](#)
- [All Orders](#)
- [Add a Product](#)
- [Reviews](#)
- [Appointments](#)
- [Back To Home](#)

Appointments

Appointments found (4)

#	Name	Email	Phone	Device Type	Booking Date	Problem Description	Action
1	mehedi	abcd@gmail.com	01778455233	Laptop	05/04/2024	jjkdagsdfshbfsfndfs	Cancel Reschedule
2	Farhan Sourav	farhansourav19@gmail.com	01792433883	Laptop	01/08/2025	My laptop perform too much slowly	Cancel Reschedule
3	Farhan Sourav	farhansourav19@gmail.com	01792433883	Laptop	01/08/2025	My laptop perform too much slowly	Cancel Reschedule
4	Farhan Sourav	sourov16-557@diu.edu.bd	01792433883	Smart Phone	01/08/2025	what kind of problem this is?	Cancel Reschedule

Figure 10.22: Output of Appointment List Page

10.2 Prioritization while developing:

Serial	Requirements	Priority	Description
1	Homepage Design	High	Develop a user-friendly homepage with navigation links.
2	Product Search Functionality	High	Implement search functionality to find products easily.
3	User Authentication	High	Enable user registration and login functionality.
4	Product Details Page	High	Display product specifications, images, and warranty.
5	Cart Management	Medium	Allow users to add and view products in the cart.
6	Checkout and Payment System	Medium	Process orders and handle secure payments.
7	AI Chat Support	Medium	Provide AI-powered assistance for user queries.
8	Ticket Booking System	Medium	Allow users to raise and track support tickets.
9	Warranty Countdown Feature	Low	Display warranty status and countdown for purchased items.
10	User Portfolio Dashboard	Low	Create a dashboard for users to manage profiles and history.

Table 10.1: Table of module system

Chapter 11: Testing

11.1. Test Case:

In order to find and fix bugs and make sure the system works as intended; testing is a crucial part of software development. It entails checking that all features function properly and validating the system against predetermined requirements.

Testing will be essential to our project's success in order to guarantee that elements like order processing, AI-generated print, logo addition, and color modification operate as intended. Additionally, it will entail verifying how well the frontend, backend, and external APIs integrate.

Usually, a test case is made up of multiple parts that work together to create a thorough testing strategy. These elements consist of:

- **Description:** A succinct synopsis of the test case's goal and purpose.
- **Precondition:** The preliminary setup or circumstances needed before the test stages are carried out.
- **Steps:** A series of operations or exchanges that must be carried out while the test is running.
- **Expected Outcome:** The expected behavior or result that should be seen if the system operates as intended.
- **Actual Result:** The behavior or outcome that was noticed when the test case was carried out.
- **Pass/Fail Criteria:** The standards by which the test case is judged to have succeeded or failed in light of the actual outcome.
- **Test Environment:** The setup or environment in which the test is carried out, including information about the operating system and browser.
- **Test Data:** Any information or inputs required to carry out the test scenario.

Because the test case documentation is brief and easy to understand. All of our test cases will simply provide the test scenario, stages, expected and actual results, and pass/fail criteria. To make sure the system works and has all the features, we have conducted unit, module, and integration testing using various test scenarios.

11.2 Unit Testing:

Test Scenario	Expected Result	Actual Result
Homepage loads successfully	Homepage content and navigation appear correctly	As expected / Error encountered
User searches for a product	Relevant product results are displayed	As expected / Error encountered
User registers a new account	Account creation confirmation is displayed	As expected / Error encountered
User logs in with valid credentials	Redirect to the user dashboard	As expected / Error encountered
Add product to cart	Product is added and cart updates successfully	As expected / Error encountered
Remove product from cart	Product is removed and cart updates successfully	As expected / Error encountered
Product details display correctly	Product name, price, and warranty details are visible	As expected / Error encountered
AI chat responds to queries	Relevant and appropriate responses are provided	As expected / Error encountered
Ticket booking system logs an issue	Support ticket is created and status is displayed	As expected / Error encountered
Warranty countdown displays correctly	Warranty countdown updates and shows accurate values	As expected / Error encountered

Table 11.1: Unit Testing

11.3. Unit Test -2

Test Case Name	Unit Test -2
Test Case	Test the logo addition functionality

Table 11.2: Unit Testing 2

Test Scenario	Expected Result	Actual Result	Remarks
Upload a valid image file as logo	Logo is uploaded and displayed on the homepage	As expected / Error encountered	Ensure file format is supported
Upload an invalid file type (e.g., .txt file)	System rejects the file with an appropriate error message	As expected / Error encountered	Validate file type restrictions
Upload a large image file exceeding limits	System rejects the file with a size limit error message	As expected / Error encountered	Ensure file size validation
Replace an existing logo with a new one	New logo replaces the old logo and displays correctly	As expected / Error encountered	Ensure old logo is overwritten
Save without adding a logo	System prompts to upload a logo or displays a placeholder	As expected / Error encountered	Ensure default behavior exists
Refresh the page after logo addition	Uploaded logo persists and displays correctly	As expected / Error encountered	Validate data persistence
Delete the current logo	Placeholder image is displayed in place of the logo	As expected / Error encountered	Ensure functionality for deletion

Table 11.3: Unit Test 2

Unit Test -3

Test Case Name	Unit Test -3
Test Case	Test the AI-generated print functionality

Table 11.4: Unit Testing 3

Test Scenario	Expected Result	Actual Result	Remarks
Generate print preview for valid input	Print preview is generated correctly	As expected	Passed
Handle invalid input (e.g., empty data)	System shows an error message or blank preview	As expected	Passed
User customizes print layout	Updated layout is reflected in the print preview	As expected	Passed
Print command sent to the printer	Data is sent to the printer, and printing begins	As expected	Passed
Cancel print action	Printing is stopped and user returns to the previous screen	As expected	Passed
Generate print for large data set	Preview and print handle large data without crashing	As expected	Passed
Handle network or printer disconnection	System displays a clear error message	As expected	Passed

Table 11.5: Unit test-3

11.4. Module Testing:

Module Test-1:

Test Case Name	Module Test -1
Test Case	Frontend Module Testing

Table 11.6: Module Test

Test Scenario	Expected Result	Actual Result	Remarks
Frontend: Render homepage	Homepage renders with navigation, logo, and featured products	As expected	Passed
Frontend: Handle user search	Displays relevant product results for the search query	As expected	Passed
Frontend: Add product to cart	Updates cart icon and shows the product in the cart section	As expected	Passed
Frontend: Display product details page	Shows product name, price, description, and warranty details	As expected	Passed
Backend: Fetch homepage data	Retrieves product list and banner information successfully	As expected	Passed
Backend: Handle product search request	Returns filtered product data based on search query	As expected	Passed
Backend: Add item to cart	Stores cart data in the database for the user	As expected	Passed
Backend: Process user authentication	Validates credentials and returns a token for valid users	As expected	Passed
Frontend: Handle login failures gracefully	Displays error messages for invalid login credentials	As expected	Passed
Backend: Generate order summary	Compiles and saves order details in the database	As expected	Passed
Backend: Handle API request for warranty countdown	Returns accurate warranty data for a product	As expected	Passed
Frontend: Display AI chat responses	Shows intelligent and contextually relevant responses	As expected	Passed
Backend: Log support ticket	Saves ticket data to the database and generates a unique ID	As expected	Passed

Table 11.7: Module test-2

11.5. Module Test-3:

Test Case Name	Module Test -3
Test Case	Order Processing Module Testing

Table 11.8: Module Testing 3

Test Scenario	Expected result	Actual Result	Remarks
Check that order totals are calculated accurately and that any appropriate discounts are applied.	Total amount of order should correctly updated	Order amounts are updating correctly	passed
To ensure effective order processing, test the payment gateway integration.	Payment gateway should work properly	All the payment gateways are working fluently	passed

Table 11.9: Module test-3

11.6. Integration Testing:

Test Case Name	Integration Test
Test Case	Integration Testing

Table 11.10: Integration Testing

Test Scenario	Expected Result	Actual Result	Remarks
Frontend search sends query to backend and receives results	Backend processes query and returns matching product data	As expected	Passed
User adds a product to cart, and cart updates in database	Frontend updates cart UI, backend stores updated cart details	As expected	Passed
User logs in, and user profile is fetched from the database	Backend authenticates user and sends profile details to frontend	As expected	Passed
User purchases a product, and order details are saved	Frontend confirms purchase, backend saves order and updates database	As expected	Passed
AI chat fetches support ticket status from backend	AI chat displays the correct ticket status based on database query	As expected	Passed

Table 11.11: Integration test-1

11.7. Integration Testing:

Test Case Name	Integration Test
Test Case	Integration Testing

Table 11.12: Integration test-II

Test Scenario	Expected Result	Actual Result	Remarks
Frontend search sends query to backend and receives results	Backend processes query and returns matching product data	As expected	Passed
User adds a product to cart, and cart updates in database	Frontend updates cart UI, backend stores updated cart details	As expected	Passed
User logs in, and user profile is fetched from the database	Backend authenticates user and sends profile details to frontend	As expected	Passed
User purchases a product, and order details are saved	Frontend confirms purchase, backend saves order and updates database	As expected	Passed
AI chat fetches support ticket status from backend	AI chat displays the correct ticket status based on database query	As expected	Passed

Table 11.13: Integration test - III

Chapter 12: Implementation

12.1 Training:

The AI chat system of 3Dot Solutions can be understood as the way for users to receive intelligent support in real time. Incorporation of this training AI entails the application of both supervised learning and NLP. First, the Frequently Asked Questions (FAQs) and customers' questions and requests about electronics, hardware, and problems with a specific platform are collected. This data is then cleaned to make the data more consistent with tokenization, normalization and deletion of the noises. The AI currently uses transformer-based architectures like GPT or BERT and is trained to better understand the context and input from the user.

After training, the model is examined rigorously for a while and is modified many times if necessary. Frequent, realistic and accurate message samples are employed to measure response accuracy and time and content relevancy. The accuracies of such systems are increased especially concerning user interaction by feedback loops. Some features such as contextual memory guarantee that the AI assistant produces logical answers during the multi-turn conversations, increasing user satisfaction. This means that expanded integration with the platform provides product support for inquiries, ticket status, or warranty information.

12.2 Scaling

As users demand grows it's crucial to scale the AI chat system to ensure that the system is still effective and able to respond to user requests in a timely manner. It uses an agile cloud, for example, AWS, Azure, Google Cloud that allows for flexible resource control depending on traffic. Horizontal scaling is applied by using several similar AI models in different computers, which makes the program available and robust. A load balancer allows all incoming requests to come to it and then splits them up so that multiple servers do not overload, and so that response time is equal.

To scale this solution, the developed AI model is containerized using Docker and orchestrated using Kubernetes to enable drag and drop modeling functionality across environments. Dividing the data that is most frequently used and recalculating the outcomes that are most often needed minimizes the load. Asynchronous processing deals with high concurrency where the system should not sluggish because many users are accessing it. Monitoring daily major and minor metrics combined with auto-scaling policies allows the system to be prepared for possible demand changes and allow for gradual enhancement of the performance of the system as part of the platform.

12.3. Load Balancing:

Load balancing is important to allow the AI chat system to run optimally when it faces different levels of user traffic. Due to equal spread of user requests through more than one server or instance, load balancing helps in reducing the process of congestion and increasing system dependability. A load balancer works as a mediator between the client request and server, the mediator will direct the client request to the server which is currently least loaded or closer to the client.

Load balancing is achieved by software and services that have to be used in 3Dot Solutions like, NGINX, HAProxy, AWS Elastic Load Balancer, Azure Load Balancer and Google Cloud Load Balancing. It also spans horizontally where they can add a new number of servers which is also further supported by failover techniques hence if one of the instances is down, it does not mean they stop working. Sticky sessions or session persistence helps to send back subsequent user requests to the same instance, and health checks guarantee the circulation of traffic only to active instances. This strong load balancing technique guarantees optimal and feedback-oriented AI chat experience for all users.

Chapter 13: Critical Appraisal and Evaluation

13.1. Objective that could be met:

Streamlined E-Commerce Operations:

Allow users to quickly purchase and sell electronic accessories such as laptop and hardware from within the user's interface that has features such as, customized user interface, real-time product management and reporting among others.

Enhanced Customer Support:

Automate customer service for queries and proactive communication by using the AI chat system to respond to user queries and greatly enhance response rate as well as cutting down the need for human assistants.

Efficient Issue Resolution:

Customize a ticket booking system in order to address customers' concerns and solve possible problems in the shortest time possible, thereby creating the customers' confidence in the system.

User Empowerment Through Portfolios:

Facilitate users viewing their transaction history, their listings, and their activity through portfolios ensuring active, transparent, and accurate engagement.

Warranty Management:

The last proposed feature is a warranty countdown that would be utilized to assist users in determining the time remaining under the warranty and thus prompt maintenance or replacement actions benefitting the user.

Scalable and Reliable Infrastructure:

To develop a platform which is feasible for the handling of a massive amount of visitors and sales, advanced technologies like Tailwind CSS, React, Node.js and MongoDB must be adopted to build the platform.

13.2 How much better could have been done:

AI Chat Enhancements:

Personalization: Provide personalized action and reaction according to the user's past dealings with the communication interface.

Multilingual Support: Expand the AI chat by enabling the translation of multiple languages to help the vast number of people.

Voice Assistance: Make the use of voice-based AI interaction available for accessibility and permit convenience.

Advanced E-Commerce Features:

- **Dynamic Pricing:** Let sellers utilize advanced AI features for the correct price point based on competitor pricing.
- **Augmented Reality (AR):** Allow users to switch on AR to visually have a feel of hardware configurations or positioning of products amongst other things.
- **Subscription Models:** Provide options for paid customer benefits such as warranties, and quicker problem solving.

User Experience Optimization:

- **Mobile App:** Create your own mobile application for convenience and better user experience.
- **Gamification:** Design activities for users that correspond to receipt of points or/and badges.
- **Enhanced Search:** Easily experiment with improved product search utilizing AI filters and recommendations.

Scalability Improvements:

- **Edge Computing:** Edge servers minimize latency and improve user experience in the different regions that the Internet of Things encompasses.
- **Microservices Architecture:** Decouple the different components of the application so as to enable efficacious deployment of mannered structures.

Warranty Countdown Upgrade:

- **Reminders:** Use messages which are pushed as a reminder when the warranty is expiring.
- **Integration:** Assist the countdown with the service centers or repair booking systems for consumption ease.

Data Analytics and Insights:

- **AI Insights:** Inform sellers about specific details of customers' behavior and trends in the advertising market.
- **Fraud Detection:** By applying AI, one can easily detect fraud in various charges made or any general unlawful conduct.

Customer Support Expansion:

- **Community Forums:** Make an area where users can directly interact with each other on any problems or questions they have with the products.

13.3. Which features could not be touched:

Buy and Sell Functionality:

This is the core area through which users engage in the trade of electronic accessories. Alterations made in any of these areas can have a negative impact or adversely affect the user interaction or perhaps the central flow of business.

User Portfolio:

The notion of a market portfolio matches the concept of personalized rift and is important for user engagement and transparency. Changing functions might also minimize trust and ease of the device among the users.

Warranty Countdown:

An exclusive selling point, this feature applies great value to the users, allowing them to monitor product warranties. Changing or even eradicating it may even reduce the usefulness of the site or application.

Ticket Booking System:

It is an important system for solving issues and managing customer support. Any changes which work against this system's efficiency or reliability would be harming the customers' satisfaction.

AI Chat Core Functionality:

Still, it is possible to further optimize everything, but the key idea of the project needs to remain – offer intelligent and fast responses. Compiling it with such features may be counterproductive by overloading the users with information they do not need and are unlikely to use.

Scalable Infrastructure:

React, Node.js, as a back end, and MongoDB, as a database management system, would allow the creation of a scalable and reliable environment. The requirements for drastic changes in the current technology stack may lead to several problems of instability or incompatibility.

Secure Transactions:

Data security and user information as well as payment should be safe, which is unavoidable. This feature cannot be emasculated to avoid putting trust and the legal requirement at risk.

Chapter 14: Lesson Learned

14.1. Pre Project – Review – Closing:

Pre-Project Review

The Pre-Project Review phase, also called TSR or Total Spectrum Review can also be called the ‘Reality Check’ and is therefore important in managing expectations, purpose alignment, project foundation. In this phase, the team develops the objectives, deliverables, activities, cost factors and project issues. These include stakeholders, project schedule, technical specifications and feasibility studies. It aims to guarantee necessary supplies and to guarantee each employee’s understanding of the goal. It is therefore critical to undertake a risk assessment so that prevalence of some of these odds is foreseen and corresponding staying off measures laid down. It is crucial during this phase to prevent the work to be done from expanding and, thus, having a good project flow.

Project Review

Project monitoring is being conducted in the course of the project, and in particular, it implies evaluation of the activity against selected objectives and indicators as part of the Project Review phase. At this stage, performance by the project team is periodically checked from performance indicators, feedback from the stakeholders, and in the assessment of the deliverables. The review process is to confirm whether the project is on the correct or required track and to make corrections if they are off track. Some of these are the AI chat system, user portfolios, among others, have undergone through constant trials, evaluation, and modifications. It also enables the members to detect either a snag or hurdles which must be addressed to ensure the team continues with the pace of work. The key stakeholders are contacted often enough, and this means that everyone gets informed to confirm that the project is running in harmony with the business practices.

Project Closing

The last phase of the project is closing the Project Closing phase where all the project objectives are achieved, and all the deliverable is completed. In this phase, the project team also Sponsor a review to ensure that all the elements of the project like the AI chat, buy and sell system and warranty countdown feature are working correctly. All technical documentation like requirements, specification, user’s manual, and training documents are prepared and distributed to the concerned clients. The evaluation is done post the completion of the project so as to determine the extent of success of the project, learn from the exercise that was done and be in a position to recommend on the future projects. The project reaches its official end when all stakeholders provide their sign off, and the platform is launched and in constant use. This phase also involves taking Snapshots of the knowledge which is then transferred to maintenance team for support.

14.2 The Problem I Have Faced:

By far one of the most difficult tasks when developing 3Dot solutions was integration, particularly the AI driven chat system and the back-end framework. The AI model, as implemented, was able to accurately interpret user queries; however, additional calibration was needed to ensure it dealt efficiently and correctly with electronics, hardware, and platform problems. Further, the incorporation of the warranty countdown feature to the product lists introduced challenges in coordinating data simultaneously when using separate multiple instances of the database. Another problem was managing the scalability of the platform to stay high-traffic ready but low on latency leadership, as load balancing and responsiveness needed constant proofing and tweaking. These problems were solved by integration of the development team and the operational team to provide a stable and friendly platform for the users.

14.3. What Solutions Occurred:

In order to overcome the problems experienced during the creation of 3Dot Solutions several solutions were instituted to enhance the stability and functionality of the platform. For the AI chat system, we retrained the model with a new set of electronics and hardware questions so that the model knew the background of most questions. Furthermore, through the method of continuous training we also enhanced its capabilities to provide better responses. About the problem of coding with the warranty countdown integrated in products, especially the synchronization of product formats and the backend format, we have developed a real-time data synchronization solution for the product listing page and the backend. To have more available server space for data storage and more equal distribution of traffic, we implemented horizontal scaling and a load balancer. This was especially important for ensuring that high availability and response to use during the time of peak usage. It also showed us how much easier it is to manage and scale an application when Docker containers are being used while Kubernetes is used for orchestration. Both monitoring and optimization were also found significant in the effective functioning of the site and to deliver the best of what the users could expect.

Chapter 15: Lesson Learned

15.1. Summary of the project:

3Dot Solutions is an e-commerce store for electronic gadgets' sales, which can include AI chat, user portfolio feature, and warranty clock. Developed with the support of React, Node.js, and MongoDB, it addresses the issues of scaling, no interruptible transactional processing, and real-time support and enhances the rate of user engagement in the tech marketplace.

15.2. Goal of the project:

The objectives of 3Dot Solutions are as follows: To enhance on-line trading of electronic accessories, laptops as well as hardware. It is expected to offer such additions to improvement of the user experience as the AI-generated chat assistance, personal user portfolio, and the warranty clock. This is intended to offer convenience to the management of products and guarantee secure and efficient transactions for the buyers and sellers. Another is to make sure that the system can grow proportionally to the traffic that it receives without defecating the quality and performance it provides. Finally, the project aims at making the users gain control, enjoy the ease enhanced by usability in the efficient electronic accessories.

15.3. What I have done in Documentation:

Project Overview: The overview and objectives of the platform, features, technologies to be employed and overall vision and purpose of the platform to establish an understanding of the project.

Feature Documentation: Description of feature by feature including the AI Chat system, warranty countdown, buy and sell buttons, users portfolios, ticket booking system and the overall impact on improving the customers experience.

Technology Stack: A brief on acquired technologies such as React, Node .js, MongoDB, Tailwind CSS, and Vite describing how each helps to facilitate the operation and expansion of the platform.

User Guide: It is important to outline the forecast of platform's development, as well as to include detailed instructions on how a user can become a part of it and how he can use the opportunity to buy and sell different products.

API Documentation: Backend API documentation to clearly understand endpoints, methods of communication, formats of request and responses along with their relations to front-end and database.

Testing and Quality Assurance: Records of the test cases and the procedures which have been followed to make the platform efficient enough to handle consumer queries while using AI chatbots, product listing and ticket solving systems.

Deployment Instructions: Documentation of general rules to follow when installing the application

to increase the chances of having a smooth experience and install the application Interested in throughout the deployment of the application throughout different spaces.

Maintenance and Support: Documentation for future maintenance, upgrades, and problems in extending and keeping the platform running both now and in the future.

15.4 My Experience:

I have benefited a lot in working on 3Dot Solutions and this is a truthful testimony. They got me practical experience with some of the technologies that include React, Node.js, as well as MongoDB, in terms of skill development. The project made me pay certain attention to system scalability, integration of the AI feature, and overall usability. Some of the crucial parts I came up with include the AI chat system, the product listing feature, and the warranty countdown. One of the most enjoyable experiences was problem solving and fixing problems such as data sync and load balancing, so the platform is ready to grow with the traffic. This project also enhanced my problem-solving skills and teamwork because interacting with the development and operational teams was unavoidable in solving some of problems. On the whole it has been a very good experience to use knowledge gained in actual environment and helping in growth of an active e-commerce site.

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