Smart E-Commerce Cross-Platform Mobile Application

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ABSTRACT

The Covid-19 epidemic has significantly increased the popularity of mobile applications. There exists a significant level of rivalry among numerous mobile application development frameworks that are now accessible in the market. The present undertaking involves the development of an online shopping system designed specifically for an established retail establishment. The primary aim of this project is to develop and deploy an online shopping application specifically designed for the Android platform. The principal objective of electronic commerce (e-commerce) is to effectively target a large consumer base during opportune moments in order to enhance sales and bolster the profitability of the enterprise. The primary functions of e-commerce encompass the facilitation of online transactions involving the purchase and sale of items, as well as the secure transmission of payments or data via the internet. The major objective of every organization is to priorities cost reduction, and E-Commerce serves as an effective means to achieve this goal. An electronic commerce application (E-Com App) serves as a platform that enables merchants operating in developing nations to promote and distribute their merchandise. This would enable rural communities to facilitate the accessibility of their products to a global audience. This project aims to extend the benefits of online shopping to patrons of a physical retail establishment. The utilization of an Android device facilitates the online purchase of things from a variety of shops throughout the internet. Therefore, the customer will have access to the convenience of online purchasing and the added benefit of home delivery from their preferred retailer. This technology has the potential to be utilized in various local shops as well as global branded retailers that operate retail outlet networks. By offering an online platform for convenient purchasing accessible from any location, companies can mitigate the risk of losing clients to popular online retailers like Flipkart or eBay. Due to its compatibility with smartphones, the programme exhibits a high degree of accessibility and perpetual availability.

Keywords: Cross-Platform, Mobile Application, E-Commerce, Web Server.

I. INTRODUCTION

In contemporary times, electronic commerce (e-commerce) has assumed a more prominent role compared to previous periods, while the advancement of mobile applications is experiencing quick growth. There exists a wide array of Integrated Development Environments (IDEs) available in the market, which facilitate the development of diverse applications on both the iOS and Android platforms [1]. These tools are user-friendly and have the capability to generate applications for both platforms. Nevertheless, novice developers sometimes encounter challenges in determining the optimal technology for developing an e-commerce application, ascertaining its superior performance and practicality. The creation of mobile applications is more complex due to the proliferation of varied platforms and associated integrated development environments (IDEs). Developers are increasingly adopting cross-platform application development tools with the aim of reducing development costs and enhancing performance. There exist numerous classifications [3] and comparisons among the various instruments. In their study, Dalmasso, Datta, and Bonnet analyses the performance metrics of CPU utilization, memory usage, and power consumption for three popular mobile development frameworks: PhoneGap, Titanium, and Sencha Touch [4]. Oberg (year) proposed a comprehensive evaluation system for the assessment of cross-platform mobile development tools. The cross-platform mobile application development tools currently available in the market are primarily based on popular technologies like as HTML5, JavaScript, and open-source libraries like jQuery and jQtouch. Therefore, developers are able to utilize a significant portion of their expertise in order to create mobile applications. Mobile-web applications are applications which use an instance of mobile web browser to run the application. These websites, such as m.yahoo.com and m.facebook.com, are specifically designed for mobile devices. The development of these applications involves the utilization of cross-platform software development kits (SDKs) and open-source libraries, including but not limited to jQuery and jQtouch. The user interface (UI) is implemented using the HTML5 markup language, while the logic of the interface is determined by the JavaScript programming language. The ultimate outcome consists of a collection of files that are capable of being stored on a web server. This enables the programme to be accessible by various web browsers, including those on PCs, Android devices, iOS devices, and Blackberry devices. Hybrid mobile applications can be defined as a fusion of the aforementioned two categories of applications [8]. These applications are designed utilizing open-source libraries while also leveraging the intrinsic functionalities of a device, such as the Camera and GPS. In straightforward terms, cross-platform mobile development refers to the creation of mobile applications that can be viewed from several mobile browsers, using HTML5 as an illustrative example. Additionally, one approach to implementing the code converter is through the development of an online examination programme. The project involves the development of an examination system application that aims to streamline the evaluation process, resulting in significantly reduced time for grading and providing instantaneous results. [9] This response system has the potential to be utilized across various subjects within any given academic term. Every student will be assigned a unique pass key to serve as their individual identification for a specific paper.

II. Related Work

The rapid advancement of technology is occurring in parallel with the progress of the human race. Ecommerce android applications are effectively streamlining and optimizing human activities, resulting in significant time and effort savings. As a result of this factor, the prevalence of physical shopping has significantly declined in contemporary

culture, offering individuals a very convenient experience. In addition to this, prominent companies such as Uber, Big Basket, and Pharmeasy are also implementing similar strategies that have gained significant influence in the contemporary era. There is a limited body of research on cross-platform mobile development that relies on data obtained through the administration of survey questionnaires and conducting interviews. Our study aims to address this information vacuum, focusing particularly on industrial viewpoints. The study conducted by Angulo and Ferre [10] stands out among the limited number of research projects that focus primarily on user experience and questionnaire-based investigations, as opposed to being predominantly centered around software engineering or serving as platforms for discussing broader subjects. However, there are significant differences between the paper being discussed and our own research. The primary objective of this study is to evaluate the user experience of mobile applications generated using various frameworks by conducting tests on a homogeneous group of professional mobile device users. The aim is to determine whether there are any notable differences in user experience across apps created through cross-platform development. Although the study's findings are of great relevance to the research and practice community, it is important to note that the study primarily focuses on end-users rather than developers. In a study conducted by Francese et al. (11), a similar focus to ours was explored. The researchers utilized an online questionnaire to examine the relationship between practitioners and mobile app development, as well as their perspectives on various technologies. The authors briefly discuss subjects pertaining to cross-platform application development, such as surveying the participants on their usage of cross-platform frameworks. However, their predetermined choices for frameworks differ from ours. The authors give significant findings that contribute to the existing body of knowledge. The insights offered by the participants in this study are of significant value for future research, particularly in relation to their preferences for development approaches and their work experience in the field of Hybrid app development. Our study diverges significantly as it centers on the participants' view of challenges pertaining to cross-platform development, in addition to expanding the inquiry into cross-platform development frameworks. While Francese et al. restrict the predetermined choices to PhoneGap, Titanium, Appcelerator, and AppMobi, we expand the range of frameworks in order to explore more trends and technologies for analysis and future investigation. Flutter is a software development kit (SDK) developed by Google that enables the creation of mobile, web, and desktop applications through the use of a portable user interface (UI) framework. The applications developed using Flutter are compiled natively, allowing for enhanced performance and efficiency. The provided system encompasses a comprehensive ecosystem consisting of a framework, widgets, and many tools. Flutter is an open-source and freely available framework, thereby enabling users to utilize it in a direct and uncomplicated manner.

Collectively, these elements enable the effective and expeditious development of applications. Flutter is a versatile framework for cross-platform application development that seamlessly facilitates interactions with many functionalities such as cameras, geolocation, networks, and storage [12]. In comparison to alternative cross-platform development technologies such as React Native and Xamarin, it exhibits superior performance. The architectural and engineering design principles employed in Flutter facilitate the development of apps that are both responsive and user-friendly. In order to address the issue of cross-platform compatibility, Google has introduced a framework called Flutter. This framework, which was released in 2017, is an open-source platform for developing interactive mobile

applications. Flutter is now ranked 34th among software solutions in this domain [13]. Native applications can be developed using a unified codebase. In essence, the primary purpose of Flutter, a software framework, is to enable developers to create mobile applications for both the Android and iOS operating systems using a single codebase. This implies that a single programming language and codebase can be utilized to develop two distinct applications, specifically for the iOS and Android platforms [14]. The only programming language utilized by the Flutter framework is commonly referred to as Dart. Dart is utilized for both back-end and front-end functionalities in order to optimize the user experience during application usage [15]. Despite being a relatively new development, flutter effectively addresses the challenge of cross-platform compatibility and offers some supplementary advantages that are advantageous for both developers and the software industry [16]. Additionally, a study conducted by Puvvala et al. [17] was located, which specifically examined the practices of interviewing and polling mobile developers. This work aims to develop a model for mobile platform selection, supported by empirical evidence obtained through the administration of questionnaires. A subset of their inquiries exhibits resemblances to the questions featured in our survey questionnaire. However, their study primarily focuses on parameters related to infrastructure costs, development environments [18], app monetization, device fragmentation, and the accessibility of software development kits (SDKs) and code examples.

III. Problem Definition

The establishment of a reputable retail outlet is a critical determinant in facilitating successful commercial transactions. During the current period and in the aftermath of the COVID-19 pandemic, individuals are transitioning from traditional brick-and-mortar markets to internet platforms. The business owner encounters a significant disparity as a result of this consumer behaviours. Transitioning to an online mode of operation offers users both convenience and time-saving benefits, particularly in the context of the ongoing COVID-19 pandemic, where it has become an essential requirement. Technology is significantly contributing to the reduction of the disparity between the market and the customer [19]. In contemporary times, there is a prevailing expectation among consumers to have a wide range of goods, including groceries and clothing, conveniently delivered to their homes. This convenience is facilitated by prominent corporate entities like as Amazon and Flipkart. The local suppliers are experiencing a decline in their consumer base. If all users have the ability to access every product, and all vendors may list their products on a shared platform that is accessible to members of the same community, it has the potential to attract a larger client base and provide advantages for business owners.

IV. Literature Survey

The Internet facilitates and expedites commercial operations. The phenomenon has resulted in alterations to the manner in which individuals engage in the rapidly expanding worldwide enterprise of online purchasing or online commerce. Online shopping is widely regarded as a highly advantageous method of purchasing things, particularly during holiday seasons and promotional periods. This platform enables clients to access and enjoy a diverse range of products, not limited to a single store, but including multiple retailers offering a vast array of commodities. Online shopping also offers customers with exceptional customer service that is also provided. In the realm of digital technology, the term "online" refers to the state or condition E-commerce software serves as a tool for effectively managing an online business, encompassing many functionalities such as product management, inventory tracking, tax

computation, and order fulfilment. There exists a plethora of online shopping platforms that provide an extensive array of products catering to the diverse shopping requirements of a substantial customer base. The online marketplaces offer a wide range of products, encompassing numerous categories, with a substantial number of listings available. The act of shopping has been widely regarded as a recreational pursuit by a significant number of individuals. The phenomenon of online shopping is also worth considering. The objective of this application is to create a web-based interface for online marketing [20]. The system's user-friendly interface facilitates a seamless shopping experience, hence enhancing user enjoyment. When engaging in offline transactions, the scope of selling products is constrained to a specific geographical area corresponding to the physical location of the business. When making a purchase, it is advisable for customers to conduct thorough research by visiting multiple websites in order to compare prices, assess product characteristics, evaluate delivery time, and determine product availability. Various electronic devices such as mobile phones, laptops, televisions, washing machines, and refrigerators have been taken into account for their potential use in commercial settings [21]. The subsequent parts will delve into the intricacies of the design and operation aspects. The proposed application's functionality is categorized into multiple sub-modules. The user discusses the presence of consumer shopping cart modules, as well as modules related to orders, payment, and products. These modules are referenced with numerical identifiers [22] and [23]. The integration of these modules results in the attainment of the intended functionality of the programme.

4.1 E-commerce

E-commerce, short for electronic commerce, refers to the buying and selling of goods and services conducted over electronic systems, primarily the internet. E-commerce refers to the conduct of commercial activities including the exchange of goods and services using electronic methods, specifically utilising the internet as a medium. E-commerce entails conducting company operations through the use of the internet and using information technology tools such as Electronic Data Interchange (EDI). E-commerce refers to the utilisation of a vendor's website on the Internet as a platform for conducting direct transactions between the vendor and the client, involving the exchange of items or services. The site employs a digital shopping cart or digital shopping basket mechanism, facilitating transactions using credit card, debit card, or EFT (Electronic fund transfer) methods of payment. A more comprehensive explanation can be provided as follows: E-commerce refers to the use of electronic communications and digital information processing technologies within commercial transactions, with the aim of generating, altering, and redefining relationships to facilitate value creation among organisations, as well as between organisations and individuals [24]. The primary classifications of electronic commerce are business-to-business (B2B), business-to-consumer (B2C), business-to-government (B2G), consumer-to-consumer (C2C), and mobile commerce (m-commerce).

V. Proposed Work

The graphic presented below depicts the structural framework of online commerce, highlighting essential components and their respective roles within the system. Evidently, it is stated that the consumer possesses the capability to purchase their desired things from any location across the globe. The user engaged with an architectural system including of a Register Process, a View Items feature, a Purchase Process (which involves transmitting user-selected items and details to an Admin server and subsequently to an Administrator), a Payment Process, and a Delivery Process. In order to utilize this application, consumers are required to register by

providing their username and secret key, as depicted in Figure 1. These types of intermittent exchanges facilitate the establishment of a link between the client and server [26]. In the event of a purchasing procedure, customer behaviours and details are transmitted to an administrative server. Subsequently, the server assesses vulnerabilities and returns the resulting results to the application during the runtime stage [27].
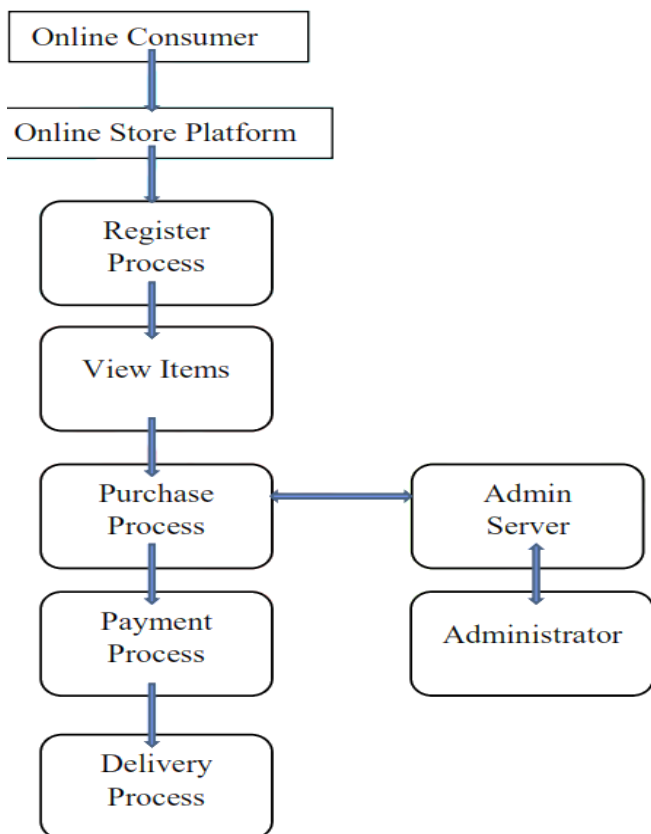

Figure 1 : Proposed System Architecture

5.1 Html/Html5

HTML, an abbreviation for Hypertext Markup Language, is a widely embraced markup language employed in the construction and structuring of web pages. This programming language is frequently utilized in the development and improvement of websites. Moreover, this programming language facilitates the creation of dynamic and flexible websites, while also providing support for various

other programming languages such as CSS, PHP, JavaScript, and others. The HTML5, as seen in figure 2, can be regarded as a revised iteration of the HTML standard [28]. The platform provides support for novel functionality, additional features, recently introduced HTML elements, broad compatibility with CSS3, video and audio capabilities, as well as 2D/3D graphics. The aforementioned characteristics enable the seamless integration and advancement of novel components within websites, hence yielding advantages for both end-users and web developers.
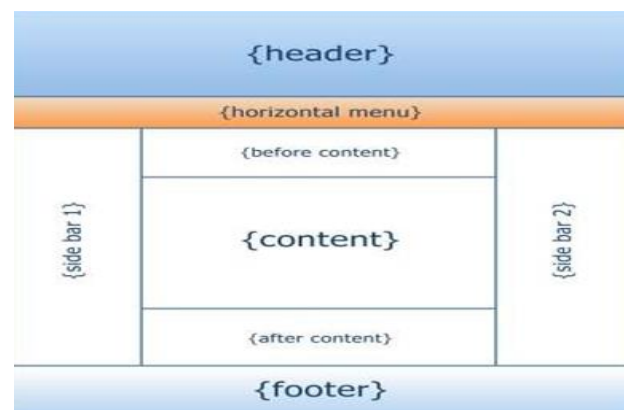

Figure 2: The structure of the Html/Html5

5.2 PHP

PHP is a widely utilized server-side programming language that is extensively applied in the development of dynamic websites. The resource is readily available in several formats at no cost. The software application has the capability to operate on numerous operating systems, including macOS, Windows, and UNIX, as well as various platforms. The execution of programme code follows the execution of the programme, as dictated by the fundamental properties of the scripting language. PHP can also be employed in the development of desktop apps. One of the rationales for selecting PHP as the programming language for our project is from its compatibility with MySQL, which has been recognized as the optimal database management system for our project. The PHP programming

language facilitates the seamless integration of photos and PDF files into HTML websites. Figure 3 illustrates the operational methods of the web server.
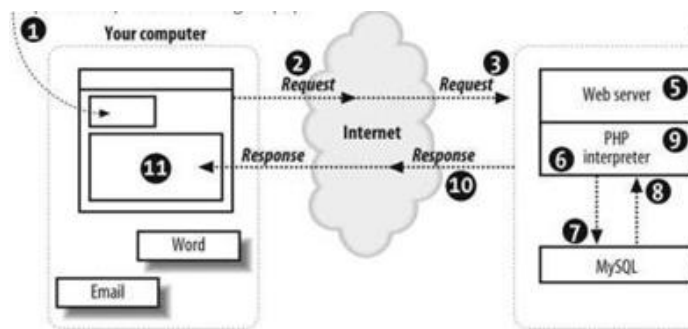

Figure 3: Demonstrating how the Web Server Operates using PHP

5.3 MySql

MySQL is an open-source database system that facilitates the cost-effective deployment of dependable, high-performing, and scalable web-based and embedded database applications. The system discussed above can be classified as a relational database management system (RDBMS). The programme exhibits exceptional performance and contains the capability to effectively scale up in order to accommodate the requirements of users and data (29). MySql is designed using the programming languages C and C++, which allows for compatibility with a wide range of internationally recognized operating systems. To effectively handle this category of data, it is essential to employ a database management system, such as MySQL, which facilitates data retrieval and supports various operations such as data addition, deletion, and modification. MySQL is classified as a relational database management system (RDBMS), wherein data is stored in separate tables rather than being consolidated into a single repository. The use of tables for the purpose of storing and organizing data has been seen to enhance the efficiency of accessing, retrieving, and manipulating data, hence leading to increased speed and flexibility in data administration.

5.4 Web Server

The primary objective of a web server is to ease the transmission of data between the client-side and server-side components of an online application. The aforementioned purpose is achieved by employing processes that encompass the storage, alteration, and transmission of web pages to the device of the end-user. The conventional process for initiating communication between a web browser and a server begins with the web browser sending an HTTP request for a particular resource. Subsequently, the server proceeds to satisfy the user's request by providing the content of the requested resource. The selection of the Apache HTTP server as the hosting platform for this project has led to its current hosting on the WAMP service. The Apache HTTP server is widely employed as web server software in diverse project undertakings.

5.5 VsCode

Visual Studio Code (VS Code) is a versatile source-code editor that supports multiple programming languages, such as Java, JavaScript, Go, Node.js, Python, and C++. The Election framework is utilized for the development of Node.js Web applications that are compatible with the Blink layout engine. Visual Studio Code utilizes the editor component known as "Monaco," which is also employed in Azure DevOps, previously referred to as Visual Studio Online and Visual Studio Team Services. Instead of employing a project system, this software enables users to access and navigate one or several directories, which can subsequently be stored in workspaces for subsequent utilization. This feature enables the code editor to function as a language-agnostic tool suitable for editing code in any programming language. The platform provides support for multiple programming languages and encompasses a range of distinctive

characteristics across each language. The project tie settings allow for the exclusion of unwanted files and directories. Several capabilities in Visual Studio Code are not readily accessible through the user interface's menus. However, these features can be reached by utilizing the command palette. Visual Studio Code has the capability to be expanded through the utilization of extensions, which may be accessed from a centralized repository. This encompasses enhancements to the editor as well as support for other languages. One prominent characteristic of the system is its capacity to generate extensions that enhance compatibility with additional programming languages, themes, and debuggers. These extensions also facilitate static code analysis and incorporate code lintels through the utilization of the Language Sieve Protocol.

5.6 The Proposed Flow Chart of Methodology

The principal objective of electronic commerce (e-commerce) is to effectively target a wide consumer base at opportune moments, hence augmenting sales and enhancing the profitability of the enterprise. The primary functions of electronic commerce (e-commerce) encompass the facilitation of commercial transactions including the exchange of products and services, as well as the transmission of financial resources or information through online platforms. The major objective of every organization is to priorities cost reduction, a goal that may be efficiently achieved through the utilization of E-Commerce, as depicted in figure 4

Figure 4 : Proposed Flow Chart of Methodology

VI. Outcome

The researcher evaluated the graphical user interface (GUI) in terms of its simplicity and ease of use for the end user. For instance, the system's primary command button in operation is depicted in figures 5 and 6, as presented below, subsequent to the completion of the user login screen and the purchase of items [31]. The current module enables the establishment of user cart accounts and payment, as depicted in figure 7. The system includes a distinct order identifier and an anticipated delivery date for the item that has been purchased. Additionally, there is a "continue shopping" button that, if being clicked by the user, will redirect them to the Main Activity [32]. The depicted figure 8 illustrates the capability of incorporating a product into the application.
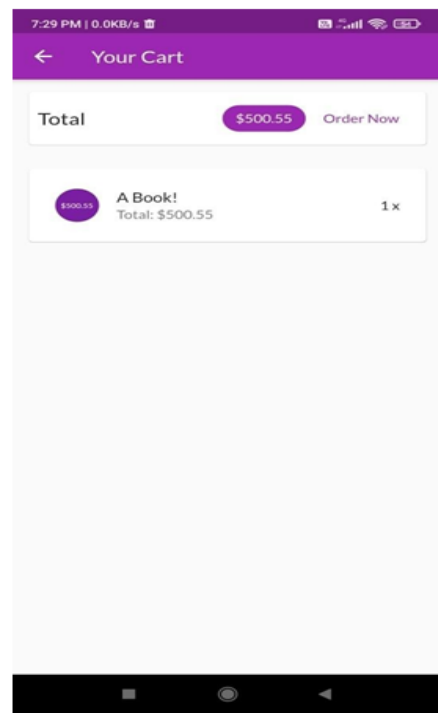
Figure 5 : Home' Page of Proposed System

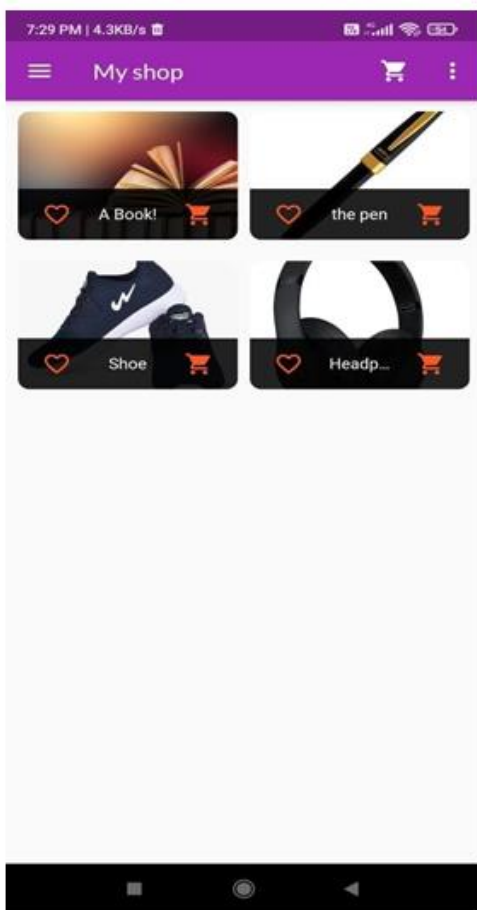**Figure 7** : Cart Module of Proposed System

Figure 6: My Shop of Proposed System

Figure 8: Edit Module of Proposed System

VII. CONCLUSION

In contemporary society, the prevalence of Ecommerce applications is steadily increasing, thereby assuming a progressively vital role in enhancing digital

technology. Since the inception of the internet and the subsequent rise of ecommerce, a multitude of options have emerged for both businesses and consumers alike. Over the years, technology has seen ongoing advancements in order to enhance the shopping experience for consumers. In conclusion, it can be observed that the e-commerce industry is seeing significant growth and success in recent times. In contemporary times, a considerable number of organizations have embraced the use of electronic commerce (e-commerce). Due to the global prevalence of illicit activities in the realm of e-commerce, including within India, this phenomenon has garnered significant attention. Therefore, it may be inferred that in the future, the growth of e-commerce would accelerate. In the future, it is anticipated that e-commerce would emerge as a crucial determinant of success for companies. It is projected that the Indian economy would surpass the US economy by the year 2045. E-commerce is anticipated to play a significant role in this development. This project is a modest undertaking aimed at fulfilling the requirements of a retail establishment. Additionally, various coding methodologies that priorities user-friendliness have been implemented. This package is expected to outperform other packages in meeting the organization's criteria. The primary goal of software planning is to provide a structured framework that facilitates the manager in generating realistic estimates within a specified timeframe at the initiation of the software project. It is imperative to routinely update this framework as the project advances. This website offers a computerized iteration of the shop manipulation system, providing advantages to both users and shop visitors. The entire process is conducted online, enabling users to look for and purchase a wide range of products. Additionally, the system includes a user login feature that allows users to access and view the progress of iodide products. Users may also utilize this feature to request items or provide ideas. The system offers an administrative login feature that enables administrators to perform

various tasks such as adding items, reviewing user activity, providing periodic discounts, and sharing information about different events for customers.

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Cite this article as :