**CHAPTER ONE**

**GENERAL INTRODUCTION**

**1.0 INTRODUCTION**

The advancement in information technology in these recent years has led to a significant impact to the higher education institutes. The development has virtually altered the characteristics of the learning environment, paving the way of new teaching and learning experiences. Modern trends have affected the procedures of obtaining the books and other teaching materials. The procedures include selecting the publisher, ordering the books and delivery. Hence, most of the university’s book stores nowadays prone to purchase books online. Through online ordering book, data can be managed properly; minimizing shipping costs dramatically, increases the profit margins and provides competitive advantage to the vendors who find ways to minimize shipping costs.

Generally, each Institution have its own procedure in purchasing books for students. The common practices are where most lecturers directly order the books from vendors. After distributing the required books to the lecturers and upon received the recommendation, the vendor will then sell those books to students. All flow of processes is done manually. Some universities do not allow their lecturers to order books directly from the vendor but this task will be handled by the university’s book store. However, the ordering is still done manually. This could attributes to problems mainly time consuming, and books may not be delivered to the right person or faculties due to many parties involved along the way of the ordering processes.

The Gateway ICT Polytechnic Saapade (GAPOSA) is considered as ICT Polytechnic in south west Nigeria. This is the Polytechnic carrying out intakes three-times a year. The university has expanded nationwide, 2 branch campuses throughout the country (Saapade and Ayepe campuses) with about 10,000 students, With this network and over 1000 staff, the university offers more than 50 academic programme. Hence, to enhance the Polytechnic’s efficiency in delivering the learning process, it is crucial for the institute to develop an e-service system, namely the on-line ordering book.

**1.1 BACKGROUND OF STUDY**

The Gateway ICT Polytechnic Saapade, Ogun State Nigeria, is one of the Higher Institutions of Learning the Federal Government can boast of because of the quality of graduates it produces. It was established with the aim of providing and equipping adequate and edifying information and motivation for the students who enroll therefore studies. It is located in the western part of Nigeria.

In this school is cited the school bookshop located in the School at school market. It was established only for the for the school. It was built to aid students in their learning by providing books for them at a cheaper rate with less compulsion.

The Bookshop is called **GAPOSA BOOKSHOP**. It is from the revenue that is generated from the bookshop that the polytechnic is managed.

**1.2 MOTIVATION AND PROBLEM DESCRIPTION**

The existing system of operation and method of transaction in the schools bookshop has been haunted by the following problems;

* Poor arrangement of books in the shop
* Dirty and stuffy hall
* Time wastage in searching for desired books

**1.2.1 OBJECTIVES OF THE STUDY**

The purpose of the study is to identify the problems inhibiting the bookshop growth and recommend practical solutions, analyzing the existing problems or systems of transaction and complete mode of operation.

**1.2.2 SCOPE OF THE STUDY**

The importance of this study (i.e. Gateway ICT Polytechnic Saapade Bookshop or Gaposa Bookshop) is based on transaction changes in the operation, the cost of executing some other operations, their functions and their benefits.

**1.3 CASE STUDY BACKGROUND: GAPOSA BOOKSHOP**

Typically, in GAPOSA, ordering books for students for any subjects are conducted by the Head of Class (HOC) themselves. Normally, lecturers will make calls to vendor to order books and provide the information on the number of students that estimated by themselves based on the latest semester. However, there is possible mismatch between estimated number of students and the number of actual student that will register when the new semester start. It happened because there were cases where students failed on certain subjects from previous semester, postponed the study or unable to complete the study due to personal reasons. For students who failed subjects, they have to register on the other subject. The lecturers, therefore, need to contact the vendor to update the number of books ordered. If the books are already sent to the vendor, the balance of the book needs to be returned to the lecturer. If there is a need for addition number of books, the delivery may be delayed and creates inconvenience for the lecturers and students to start the class without the main text. In addition, the ordering information could lose either on the side of lecturers or vendors themselves. Hence, though the conventional way of ordering process seems to be simple, yet problems can exist at any stage of the chain, from the ordering books until the arrival, or vice versa. Some vendors offer the convenience of searching their online databases containing thousands of book titles. Such search can be done by a variety of search terms, such as book title, author, subject, ISBN and many others. Upon finding the desired book, a lecturer would have an option of ordering and do the transaction online.

**1.4 PROBLEM STATEMENT**

The current system of ordering books for GAPOSA Bookshop involves a manual process managed by the Head of Class (HOC) and lecturers. This process is fraught with inefficiencies and potential errors. The mismatch between the estimated and actual number of students leads to over-ordering or under-ordering of books. This mismatch arises due to students failing subjects, postponing their studies, or dropping out, which impacts the accuracy of book orders. Lecturers need to constantly update the vendors, leading to delays and logistical challenges. Furthermore, the manual handling of orders and records increases the risk of data loss or miscommunication, affecting the timely availability of books for students.

**1.4.1 ISSUES WITH THE PREVIOUS SOFTWARE**

The previous software, if any, used by GAPOSA Bookshop and lecturers to manage book orders, presents several issues:

1. **Lack of Integration:** The software may not be integrated with the student registration system, leading to inaccuracies in the number of books required.
2. **Manual Updates:** Lecturers have to manually update book orders, causing delays and potential errors in communication with vendors.
3. **Data Loss:** There is a high risk of losing order information due to the lack of a centralized, secure database.
4. **Inconvenience:** The process of returning excess books or ordering additional copies is cumbersome and time-consuming, affecting the start of classes.
5. **Limited Search Capabilities:** The previous software might not offer robust search functionalities, making it difficult for lecturers to find and order the required books efficiently.

**1.4.2 NEED FOR NEW SOFTWARE**

A new software system is needed to address the inefficiencies and issues of the current book ordering process at GAPOSA Bookshop. The new system should:

1. **Integration with Student Data:** Seamlessly integrate with the student registration system to provide accurate book requirements based on actual student enrollment.
2. **Automated Updates:** Automatically update book orders as student registrations change, reducing the need for manual intervention by lecturers.
3. **Centralized Database:** Maintain a secure, centralized database for all book orders and transactions, minimizing the risk of data loss.
4. **Improved Logistics:** Streamline the process for returning excess books and ordering additional copies to ensure timely availability for students.
5. **Enhanced Search Functions:** Provide robust search capabilities for lecturers to quickly find and order books by various criteria such as title, author, subject, and ISBN.
6. **Online Ordering and Transactions:** Enable lecturers to order and transact online, simplifying the ordering process and reducing delays.

**1.5 COMPARISON OF APPROACHES**

In addressing the inefficiencies and issues of the current book ordering process at GAPOSA Bookshop, several approaches were considered. These include:-

* Maintaining the status with the manual process
* Implementing incremental software improvements, and developing a comprehensive new software system with integrated payment and ordering capabilities.

**1.5.1 WHY OTHER APPROACHES ARE NOT SUITABLE**

* **Maintaining the Manual Process:**
* **Inefficiency:** The current manual process is time-consuming and prone to errors, leading to delays and logistical challenges.
* **Lack of Accuracy:** Estimations of book requirements are often inaccurate, resulting in over-ordering or under-ordering.
* **Data Loss Risk:** There is a high risk of losing or misplacing order information, which can disrupt the entire ordering process.
* **Incremental Software Improvements:**
* **Limited Integration:** Small-scale improvements may not provide seamless integration with the student registration system, maintaining the risk of inaccuracies.
* **Manual Updates Persist:** Incremental changes may not automate updates to book orders, requiring continuous manual intervention.
* **Partial Solutions:** Such improvements may only address specific issues without offering a comprehensive solution, leaving other problems unresolved.
  + 1. **WHY THIS APPROACH IS BETTER**

The proposed new software system offers a holistic solution that addresses all the identified issues comprehensively:

1. **Integration with Student Data:**
   * **Accuracy:** By integrating with the student registration system, the software ensures accurate book order quantities based on actual student enrollment data.
   * **Automatic Updates:** Automated updates to book orders as student registrations change, reducing manual efforts and errors.
2. **Centralized Database:**
   * **Security:** A secure, centralized database minimizes the risk of data loss and ensures that all order information is stored safely.
   * **Accessibility:** Centralized data can be easily accessed by authorized personnel, improving coordination and reducing miscommunication.
3. **Improved Logistics:**
   * **Streamlined Process:** The software streamlines the process for returning excess books and ordering additional copies, ensuring timely availability for students.
   * **Efficiency:** Reduced delays in book deliveries enhance the overall efficiency of the book ordering process.
4. **Enhanced Search Functions:**
   * **Ease of Use:** Robust search capabilities allow lecturers to quickly find and order books by various criteria, simplifying the ordering process.
   * **Comprehensive Search:** Search by title, author, subject, and ISBN provides flexibility and improves the user experience.

C**HAPTER TWO**

**LITERATURE REVIEW**

**2.1 THEORETICAL BACKGROUND**

The theoretical background for this study involves several key areas. E-commerce and online retail management principles explore the dynamics of buying and selling goods over the internet. These principles cover aspects such as online consumer behavior, website usability, digital marketing strategies, and supply chain management. Payment integration systems examine the technologies and protocols that facilitate secure online transactions. This includes topics like payment gateways, encryption, digital wallets, and fraud detection mechanisms. Information systems and technology adoption theories focus on how individuals and organizations adopt and use new technologies. The Technology Acceptance Model (TAM) and Diffusion of Innovations (DOI) theory are particularly relevant in understanding the factors influencing the successful implementation of an online bookshop with integrated payment systems.

**2.1.1 HISTORY OF ONLINE BOOKSHOPS**

Online bookshops have transformed the way consumers purchase books, offering convenience and a wider selection compared to traditional brick-and-mortar stores. The evolution of online bookshops can be traced back to the mid-1990s with the advent of the internet and the rise of e-commerce.

**2.1.2 HISTORY AND EVOLUTION**

The concept of online bookshops emerged in the mid-1990s, with Amazon.com being one of the pioneers. Founded in 1994 by Jeff Bezos, Amazon started as an online bookstore before expanding into other product categories. The success of Amazon demonstrated the viability of e-commerce and encouraged other retailers to enter the online book market. Early online bookshops focused on providing a vast selection of titles, competitive pricing, and convenience through home delivery.

Over the years, online bookshops have evolved to include digital formats such as e-books and audio books, further expanding their reach and accessibility. Technological advancements have enabled features like personalized recommendations, user reviews, and advanced search functionalities, enhancing the user experience. Additionally, partnerships with publishers and the development of sophisticated logistics networks have improved the efficiency of book distribution.

This brief history of on-line bookshop is taking its roots from the parent system which is the E-commerce also known as electronic commerce. Online book shopping is the buying and selling of books specifically over the internet. Unlike the general name E-commerce which involves buying and selling of all other goods and services. It is interesting to say that the

Relationship between them is that there is an exchange of goods instead of at the location of the store; it is conducted on-line and makes use of technologies such as electronic data interchange, E-mail, electronic fund transfers or smart cards to receive payment and keep track of transactions. As history has it, at the close of the century the bulk of on line book shopping as a part of E-commerce transactions were retail transactions as security and encryption technology over the internet improved. It was affected by the explosive growth in E-commerce due to the expansion of the medium (internet) in the late 1990s. It almost moved faster than other segments of E-commerce transactions due to the ease and interest in people to be more knowledgeable. It spiced up the transactions in E-commerce because from the statistics E-commerce grew from $11.2 billion in 1998 to $31.2 billion in 1999, and in the year 2003, the transactions were predicted to grow to $380 billion. All these came to be as on-line book shopping started to become one of the fastest growing segments of E-commerce. As it is said its transactions are business-to-business. Soon after then, companies like eBay created a new aspect of E-commerce which is the consumer-to-consumer transactions.

**Conclusively**, on-line book shopping joined as E-commerce became the ideal medium for markets to experiment with adjustments in their store environments and promotions to reach the most effective market target. Companies can now use the information they get from on line book shopping sites like **www.bookserve.ca** to find out what products are selling, where the bulk of their customers come from and what promotions and sales bring in the most customers.

**2.1.3 CONCEPT OF ONLINE SHOPPING**

Literally, the word shopping denotes the activity of going to shops and buying things (0xford Advanced Learners Dictionary). According to Kiely T. On-line shopping is the buying and selling of goods or services on-line or via the internet or other networks. While Microsoft Encarta premium is of the opinion that it is the exchange of goods or services by means of the internet or other computer networks. This follows the basic principle of traditional commerce i.e. the buyers and sellers coming together to exchange goods for money and profit. This concept provides an opportunity or avenue for consumers and retailers to communicate with each other and carry out their objectives i.e. conduct business.

**Rani Kalacota** (1997) defined On-line shopping as part of an on-line business where consumers meet their suppliers for goods and services while Christopher M.H and Chris F. K (1994), defined On-line shopping as the process of managing on-line financial transactions by individuals and companies. This however, includes **business-to-business (B2B),** **Business-To-Consumer(B2C) and business-to-government(B2G) transaction.** However, On-line shopping launches its focus on the systems or methods and procedures whereby all financial documents and information are exchanged. The on-line financial statements are not left out. According to Christopher M. and Chris F. K’s (2002) comments on this, on-line shopping is particularly concerned with the technologies that enable EPI systems function well on the internet. But Batty, J.B and Lee R.M. (1995) were of the opinion that there is no working and internationally recognized and agreed definition of on line shopping. On-line shopping however has got to be defined with the three factors involved, which are the network which is the medium through which the relevant activities are carried out; the processes which are involved and to be included in the general domain of on-line shopping and lastly the actors which are the buyers or customers involved in the transactions.

**2.1.4 CONCEPT OF COMPUTER NETWORKING AND THE INTERNET**

According to Microsoft Encarta premium (2022), computer networking is simply a system used in linking two or more computers. Networking itself is a group of connected computers that allow people share information and equipment. Computer networking uses a communication link or node through which the E-mails, files resources and other applications are sent and received. A computer system and a printer can both serve as communication links in a network. However, there are other devices. It has layers, and criteria, parts and connection types, topology and types of networks, network peripherals and at areas of applications. All these a computer networking process must pass through to ensure effective on-line business. Networks are specified through broad and narrow definitions. The broad definition considers an on-line transaction to be the sale or purchase of goods or services either between businesses, households, individuals, government, and other private or public organizations. The role of networking in on-line book shopping is that of conveying, providing computer system and other resources and connecting them for the on-line transactions. The internet on the other hand is a computer based global information system. It is composed of many interconnected computer networks. Each network may link tens, hundreds or even more. The satellite systems are vital tools/equipments in internet computer network. Its role is of paramount importance. It includes advertising the books selling, buying delivery and providing other customer services. Meanwhile, the narrow definitions of Batty J.B and Lee R.M (2022) have it that internet transaction (on-line shopping) to the sale or purchase of goods and services whether between businesses; households’ individual’s governments and other public or private organizations are conducted over the internet. The goods and services are ordered over the internet, but the payment and the ultimate delivery of goods or services may be conducted on or off line.

**2.1.5 INTERNET ACCESS**

According to Microsoft Encarta premium (2021) Internet Access technological refers to the communication between residences or a business and the ISP (internet services provider) that connects them to the internet. They are of three types namely; dedicated, dial up and wireless internet access. It is therefore the communication that is going to exist between the customer, the ISP and the bookshop through the internet. It is all about the easy accessibility the customers will enjoy.

**2.1.6 THE CONCEPT OF INTERNET GATEWAYS**

The computer system hardware contains software that connects networks that use different protocols (the rules the hardware components and the software components use to communicate) or that transfers data between two incompatible applications on a network. It reformats data so that it is acceptable to the receiving network application. The term internet gateway is usually used to describe any computer that transfers data from one computer system to another.

**2.2 CONCEPTUAL FRAME WORK**

**2.2.1 RESEARCH METHODOLOGIES**

This section reviews previous research related to online bookshops and payment integration systems. Several studies have examined the evolution and impact of e-commerce on traditional retail, highlighting the shift in consumer behavior towards online shopping. Research on payment integration systems has focused on the development and improvement of secure transaction methods, addressing issues such as fraud, user authentication, and transaction efficiency. The methodologies used in these studies vary widely, including case studies, surveys, experimental designs, and comparative analyses. Academic research often emphasizes the theoretical aspects and empirical validation of e-commerce and payment systems, while industry reports provide practical insights and market trends. The methodology in developing this prototype consists of three phases, which are:-

1. Define requirement
2. Analyze requirement
3. Validate functionalities

**2.2.1 ADVANTAGES AND DISADVANTAGES OF PREVIOUS RESEARCH**

Previous research has several advantages, including the identification of key success factors for online bookshops, such as user-friendly interfaces, efficient payment systems, and reliable delivery services. These studies provide a foundation for understanding the critical components of a successful online retail platform. However, there are also disadvantages, such as limited scope, lack of empirical data, and outdated technology considerations. Some studies may focus too narrowly on specific aspects, failing to provide a comprehensive view of the entire system. Additionally, rapid technological advancements can render some research findings obsolete, necessitating continuous updates and new studies to stay relevant.

**2.2.2 PROPOSED SOLUTION**

The proposed solution involves developing a comprehensive online bookshop for GAPOSA with an integrated payment management system. This solution aims to streamline the book ordering process, enhance transaction security, and improve overall user experience for students, lecturers, and vendors. The system will provide a centralized platform where lecturers can order books, update quantities based on real-time student registration data, and track order status. Students will have access to the bookshop to purchase required textbooks easily, and vendors will receive accurate and timely orders, reducing delays and mismatches.

**2.2.3 HOW THE PROPOSED SOLUTION DIFFERS FROM OTHERS**

The proposed solution differs from previous approaches by focusing specifically on the unique needs of GAPOSA's bookshop operations. Unlike general online bookshops, this system is tailored to handle the specific challenges faced by GAPOSA, such as frequent changes in book quantities due to student enrollment variations. It incorporates modern payment integration techniques, real-time inventory management, and automated order tracking. The solution also includes a user-friendly interface designed for both lecturers and students, making the process of ordering and purchasing books more intuitive and efficient.

**2.2.4 WHY THIS PROPOSED SOLUTION IS BETTER**

This solution is better because it addresses the specific challenges faced by GAPOSA, such as mismatched book orders, delays in delivery, and loss of ordering information. By providing a centralized system for managing book orders and integrating secure payment methods, the proposed solution enhances efficiency, reduces errors, and ensures timely availability of textbooks. The inclusion of real-time data updates helps lecturers make accurate orders, and automated tracking keeps all stakeholders informed about the order status. This reduces the administrative burden on lecturers and improves the overall academic experience for students by ensuring they have the necessary textbooks when classes begin. The proposed system's user-friendly interface and robust security measures further enhance its effectiveness, making it a significant improvement over the existing processes.

**2.2.5 THE WORLD WIDE WEB AND ITS BENEFITS**

This is the multimedia interface that connects us to resources or the customers to the documents, goods, services, e-mails, chats about the books and other websites available on the internet. The World Wide Web which is abbreviated www is the window from which we see the information in the internet. It all began in 1992, prior to it, the internet was just an ordinary text, documents without pictures, sounds or video, it is through the website that we will carry out the on-line book shopping. The benefits accruing from the use of the World Wide Web are so numerous. To mention but a few, the ease it has given to people to send and receive messages to study and even purchase goods on-line and to know and see things and other people in other parts of the world.

**2.2.6 PREREQUISITE** **RESEARCH**

The main method of research concerning this project is by observation and interview with the bookshop chairman. After frequent visits to the bookshop, it was easy to draw out conclusions from some observation about the current system. Brief interviews with some students who agreed having an idea of the bookshop were also of great help to this project

E-service quality has turned into a quickly moving target due to the pace of competition and the ease of duplicating service features in the online world. Burt and Sparks (2023) suggest that we are witnessing the harnessing of the internet to enhance business efficiencies leading to the emergence of new formats within the sale of goods. Such innovations have increased competitive pressures on traditional bricks and mortar store retailing (Dholakia and Uusitalo, 2022). Aligned with the online ordering books context, many claims that the future of purchasing transaction lies in multi-channel retailing (Dennis et al., 2002) where, rather than competing with the internet, retailers should incorporate it as part of their retail strategy, adopting a hybrid strategy combining both online and offline activity through a bricks and clicks approach. However, even established retailers recognize the difficulty inherent in “going it alone” in the transition to an online environment. One way of overcoming this difficulty is through joining an established online portal which provides a support network through which to access this challenging environment.

Online Ordering Book System is a system that sells book directly to its customers by using secure internet commerce software (www.cup.co.uk/bookshop/faq). The main purpose of this system is to provide immediate feedback to customers. For example, after making an order, the customer may access information of their ordering status.

According to Shrewsbury-Gee (2022), the Director of Operations at Scholastic Canada said that the benefits of online ordering have already been enthusiastically greeted by a test group of teachers, who can place book club orders when it suits them in real-time, 24 hours a day, seven days a week. Within this system, no actual manual work is involved, thus, saves time and money. The online system brings very specific benefits such as**:-**

* Performance Assessment: Online feedback provides a powerful tool for focused and direct input of an individual’s and/or team’s performance.
* Competency Assessment: Using a role and competency profile as a basis, a company can measure its level of skill at various levels. For example, the degree of customer service at individual, team, department and company level.
* Leadership assessment and development: Through the use of leadership questionnaires, the online system produces valuable and cost effective feedback.
* Change facilitation: Feedback from staff acts as barometer as a culture and the climate of the company. The short feedback loop aids in highlighting, motivating and executing changes within the organization while they are still relevant.
* Quick processing: The online facility enables large numbers of people’s assessments to be processed and reported quickly following completion and intervention. This allows for speedy feedback of results to individuals and the company, thus, enabling appropriate and business decisions.
* Cost effective and value for money: the combination of these benefits, particularly speed and flexibility of administration and quality reporting result in significantly lowers unit costs when compared to manual and other forms of manual administration and processing.

Cooperative of Gateway ICT Polytechnic (Saapade) use the internet to transform book buying into the fastest, easiest and most enjoyable shopping experience possible. With the implementation of online web based ordering book, University Malaya is the place to find and discover anything we want to buy through online ([**www.gaposa.edu./bookstore**](http://www.gaposa.edu./bookstore)).

Based on the cooperative Gaposa online ordering book, there are some standard processes that can be used as a guideline in online ordering book system such as:-

* Order form: Buyer must fill in this form.
* Categories: Buyers can choose the book category and the book title. It will give a detailed information or content of that book. Here buyer can click **“ADD TO CART**” to buy a book online.
* Forthcoming title: This menu shows the listing of book category and title that would be published in the future. When we click the book title, the description of that book will appear.
* Search Book: Buyer can check that books those are interested

**Figure 1:**  Shows the website of **Gaposa bookshop** Customer can browse the listing of book available. To order that book, customer needs to contact directly the vendor via e-mail or by phone.

After studying the several online book shop such as mph book shop, Cafebook Mart, cooperative of Gaposa , there are several standard characteristic must be followed such as:-

* A unique number called International Standard Book Number (ISBN) must be used to identify all books. This must be included within all book descriptions to ensure the catalogue is accurate as there may be more than one book with the same title name.
* All buyers must supply the following information such as name, address, telephone number, e-mail address and other required information.

**2.3 EMPIRICAL FRAME WORK**

**2.3.1 THE MERCHANT ACCOUNT**

According to (Duncan et al 2021), merchant account is a contract under which an acquiring bank extends a line of credit to a merchant, who wishes to accept payment card transaction of a particular card association brand. Without such a contract, one cannot directly accept payments by any of the major credit card brands. When using an intermediary payment services provider (such as pay pal), the merchant account is held by the service provider itself. Here, the contract of the Acquiring bank with the merchant is informally referred to as a merchant account. It is rather a line of credit and not a bank account.

Under this contract, the acquiring bank exchanges funds with issuing banks on behalf of the merchant, and pays the merchant for the net balance of their daily payment card activity.

**2.3.2 KEY FEATURES AND FUNCTIONALITIES**

Modern online bookshops offer a variety of features and functionalities designed to enhance the shopping experience:

* **Advanced Search and Filtering:** Users can search for books by title, author, genre, ISBN, and other criteria. Filtering options allow users to narrow down search results based on price, format, publication date, and customer ratings.
* **Personalized Recommendations:** Algorithms analyze user behavior and preferences to suggest books that the user might be interested in, increasing the likelihood of purchases.
* **User Reviews and Ratings:** Customers can read and leave reviews and ratings for books, helping other users make informed purchasing decisions.
* **Multiple Formats:** Online bookshops offer books in various formats, including print, e-books, and audio books, catering to different user preferences.
* **Convenient Payment Options:** Secure payment gateways support multiple payment methods, including credit/debit cards, digital wallets, and bank transfers, making transactions easy and safe.
* **Efficient Delivery Services:** Partnerships with logistics providers ensure timely delivery of physical books, while digital formats can be downloaded instantly.
* **Customer Support:** Online bookshops provide customer support through various channels, including email, chat, and phone, to assist users with their queries and issues.

**2.3.3 PAYMENT INTEGRATION SYSTEMS**

Payment integration systems are essential for enabling secure, efficient, and user-friendly transactions in online bookshops. These systems have evolved significantly over the years, adapting to new technologies and consumer needs.

**2.3.4 EVOLUTION OF PAYMENT INTEGRATION SYSTEMS**

The evolution of payment integration systems began with basic credit card processing. Early e-commerce platforms relied on third-party services to handle transactions, which often involved cumbersome procedures and security concerns. As e-commerce grew, so did the need for more sophisticated and secure payment solutions.

The introduction of Secure Socket Layer (SSL) encryption technology marked a significant advancement, ensuring that sensitive information, such as credit card details, was securely transmitted. The late 1990s and early 2000s saw the rise of payment gateways like PayPal, which offered additional layers of security and convenience by allowing users to store their payment information and make transactions without repeatedly entering their card details.

In recent years, the development of Application Programming Interfaces (APIs) has revolutionized payment integration, enabling seamless integration of various payment methods directly into online platforms. Mobile payment solutions, digital wallets, and cryptocurrency payments have further expanded the options available to consumers.

**2.3.5 MODERN PAYMENT INTEGRATION TECHNIQUES**

Modern payment integration techniques incorporate a variety of methods to provide secure, efficient, and flexible payment options for users:

* **Payment Gateways:** Services like PayPal, Stripe, and Square facilitate online payments by connecting e-commerce platforms with financial institutions. These gateways offer robust security features, including encryption and fraud detection.
* **Digital Wallets:** Digital wallets such as Apple Pay, Google Wallet, and Samsung Pay store users' payment information and allow for quick and secure transactions using mobile devices. These wallets often use biometric authentication for added security.
* **Mobile Payments:** Mobile payment solutions enable users to make payments directly from their smartphones. Services like Venmo and Zelle offer peer-to-peer payment options, while NFC (Near Field Communication) technology enables contactless payments at physical locations.
* **Cryptocurrency Payments:** With the rise of cryptocurrencies like Bitcoin and Ethereum, some online bookshops have started accepting digital currencies as payment. This method offers anonymity and reduced transaction fees but comes with volatility risks.
* **API Integration:** APIs provided by payment processors allow seamless integration of payment functionalities into e-commerce platforms. This integration enables features such as recurring billing, multi-currency support, and automated payment workflows.
* **Security Measures:** Modern payment systems employ advanced security measures, including two-factor authentication (2FA), tokenization, and end-to-end encryption, to protect user data and prevent fraud.

**CHAPTER THREE**

**SYSTEM DESIGN AND IMPLEMENTATION**

* 1. **DEFINE REQUIREMENT**

In this phase, two types of fact-finding method used are informal interview and background reading. From this phases, the target users were identified which are the person in-charge of Gaposa, lecturers and buyers. The informal interviews were carried out with the person in-charge of Gaposa bookshop and lecturers in order to understand the flow of ordering book. The defined requirements will be transformed into functionalities that focus on handling the ordering system. Based on the informal interview, some problems were briefly identified where they can help in identifying the functionalities and a few solutions were suggested such as:-

1. A person to appoint as an administrator and from time to time to engage in some form of discussion.
2. Processes should be included in Online Ordering System ore:-
3. **Stock management:** All books arrival will be keyed in the database including the course related to the books.
4. **Ordering process:**  Lecturers can insert the book information that is needed. So the person in charge of Gaposa bookshop will use this information to order book from the vendor. After that, lecturer can check the status of the book without asking the person in charge. This process will be benefited for parties and lecturers.
5. List of order report, status of ordering, report delivering If this prototype transform into a real system, the real system will produce reports such as a listing order, order status and delivery report.

**3.2 DATA COLLECTION AND INPUT GENERATION**

Data collection and input generation are critical for populating the system with accurate and up-to-date information. This involves gathering data on available books, student enrollment, and transaction records. Ensuring data accuracy and integrity is essential for the system's reliability. The data collection process will be conducted through several steps:

* 1. **Import Data from Existing Databases:**

- Extract existing data on books, students, and transactions from legacy systems or external databases.

- Use data migration tools and scripts to transfer this data into the new MySQL database, ensuring that all data is mapped correctly to the new schema.

**B. Manual Data Entry by Administrators:**

- Create an administrative interface with forms for entering and updating data manually.

- Administrators will use this interface to input new book details, update student enrollment information, and log transactions.

- Validate data entry to ensure that all required fields are completed and data formats are correct.

**C. Real-time Updates through User Interactions:**

- Develop user interfaces that allow lecturers and students to interact with the system.

- Lecturers can add or update book orders and student information directly through the system.

- Students can register for courses and view available books, triggering real-time updates to the database.

**D. Creating Forms for Data Entry:**

- Design and implement forms for book details, user registrations, and transaction logs.

- Ensure that these forms are user-friendly and include validation checks to prevent incorrect data entry.

- Use technologies like HTML, CSS, JavaScript, and jQuery to create dynamic and responsive forms.

**E. Storing Data in the MySQL Database:**

- Use PHP to handle form submissions and interact with the MySQL database.

- Store all collected data in well-structured tables, ensuring relationships between tables are correctly defined (e.g., linking students to their orders).

- Implement indexing and caching strategies to optimize database performance.

**F. Data Verification and Cleaning:**

- Regularly verify the accuracy of the data stored in the database.

- Use automated scripts and manual checks to identify and correct any inconsistencies or errors in the data.

- Implement data cleaning processes to remove duplicate entries and ensure data quality.

**G. Backup and Recovery:**

- Set up regular backup schedules to ensure that all data is securely stored and can be recovered in case of system failures.

- Use backup tools compatible with MySQL to create full and incremental backups.

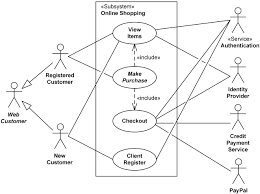
**3.2.1 ANALYZE REQUIREMENT**

The requirement of Online Ordering Book System will be analyzed and known as functionalities. The functionalities will be presented using UML diagram and supported documents. UML is used to model the user’s requirements. It is a language for visualizing, specifying, constructing and documenting the artifacts of a system under development (Booch et al. 2020). The rational rose was used to construct all the UML diagrams below:

* Use case diagram
* Activity diagram
* Sequence diagram
* Collaboration diagram
* Class diagram
* A list of requirements
  + 1. **VALIDATE FUNCTIONALITIES**

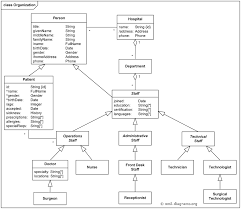
The prototype is used to validate the functionalities. The aim of validation is to identify and rectify all errors like inconsistency, omission and incorrect information. There are twenty six (26) functional requirements documented in this project. The following diagrams and supporting textual information constitute the functionalities:-

* Use case diagram The use case diagram has two actors which are the person in charge of Gaposa bookshop and lecturer. There are six use cases which are **Lecturer Registration**, **Stock management, Book Status**, **Make order**, **Status Order** and **Authentication Procedure**. The use case diagram is shown in **Figure 2.**

****

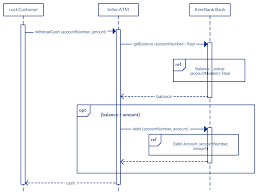
**Figure 2: Use Case Diagram**

* Use case specification Use case specification is the detail description on the use case diagrams. The use cases are prioritized based on their priority.
* Class diagram: The class diagrams contain fourteen (14) classes. This diagram was packaged to show the boundary, controller and entity classes as shown in Figure 3.

****

**Figure 3: Class diagram**

* Interactive diagram: There are twenty seven (27) interaction diagrams (sequence diagram). Figure 4 shows one of the sequence diagrams about the Administrator login into the system.

****

**Figure 4: Sequence diagram**

* Activity diagram Eleven (11) activity diagrams have been developed. They are lecturer view the status order, lecturer and administrator login the system, administrator register, update, delete and view lecturer’s information, administrator view book stock and category information, administrator add, update, delete the book and category. Lastly, administrator view book in stock, book ordered, book delivery and report delivered.

**3.3 THE NEW SYSTEM DESIGN**

In the process of evaluating the solution and the specifications of a detailed on-line based solution, there is need for the system design In designing the new system, the software and hardware aspects were taken into considerations in order to produce a workable website that will allow effective and efficient communication between the customer, the merchant and the acquiring bank or acquirer. Also the customer can make an order, make payments for the goods ordered, and the goods/books will be shipped to him/her.

* **DATA DESIGN:** This involves the choice of data structure and database. The website uses MYSQL server as the database. This sophisticated database allows the administrator to monitor effectively and run some query language in the server. It is equipped with maximum security to prevent hacking
* **USER INTERFACE DESIGN**: It is a system that permits the interaction between human beings and the computer. The project has a user interface design because of the level of interaction the buyer or credit or master card wants.
* **PROCEDURAL DESIGN**: This involves the design of an efficient algorithm that will satisfy the functional description of the various sub systems of on-line book shopping.

**3.3.1 PROGRAM MODULE SPECIFICATIONS**

These are the program module:

i. Home page

ii. About Us

iii. Engineering Books

iv. Political Books

v. Science Books

vi. Architectural Books

vii. Accounting Books

viii. Environmental Design Books

ix. E-commerce Books

x. Public Administration Books

xi. Economics Books

xii. Building Technology Books

xiii. Statistical Books

xiv. Material Books

xv. General books

xvi. Sociological books

**3.3.2 OVERALL SYSTEM DESIGN**

The overall system design details how the various components of the system interact to provide a seamless user experience. The front-end user interface will be designed using HTML, CSS, JavaScript, and Bootstrap, ensuring a responsive and visually appealing design. The back-end server processes will be managed using PHP, which will handle business logic and interactions with the database. The database schema will be designed using MySQL, ensuring efficient data storage and retrieval. The system will support real-time updates, secure transactions, and robust error handling mechanisms.

**3.3.3 TOOLS AND TECHNOLOGIES USED**

The development and implementation of the online bookshop will employ a range of tools and technologies:

* **HTML, CSS, and JavaScript:** These will be used for structuring and styling the web pages, and creating dynamic and interactive user interfaces.
* **Bootstrap**: A popular CSS framework that ensures responsive and mobile-friendly web design.
* **jQuery and AJAX:** These JavaScript libraries will be used to enhance interactivity and enable asynchronous data loading, improving the user experience by allowing parts of the web page to update without requiring a full page reload.
* **PHP:** A server-side scripting language that will handle the back-end logic, including processing user requests, managing sessions, and interacting with the database.
* **MySQL:** A relational database management system that will store and manage the data for the online bookshop, including user accounts, book inventory, and transaction records.
* **APACHE SERVER:** For database and to process php files as well as web page.

**3.4 IMPLEMENTATION OF THE PAYMENT INTEGRATION SYSTEM**

The implementation of the payment integration system focuses on integrating secure and efficient payment methods into the online bookshop. This includes setting up payment gateways to process transactions securely, ensuring compliance with financial regulations, and implementing security measures such as SSL encryption and fraud detection mechanisms. The system will support various payment options, including credit and debit cards, digital wallets, and other online payment methods. The PHP code will handle the interaction with payment gateways, ensuring that payment information is processed securely and efficiently.

**3.4.1 ALGORITHM DESIGN**

Algorithm design involves developing the algorithms that power the various functionalities of the system. These include algorithms for searching and sorting book titles, processing payments, updating inventory in real-time, and handling user authentication. The algorithms will be optimized for performance, accuracy, and security. For example, search algorithms will use indexing and caching to provide fast and relevant search results, while payment processing algorithms will ensure secure and efficient handling of transactions.

* Searching and Sorting Book Titles

1. Search Algorithm

- Input: A search query and a list of books.

- Process:

1. Convert the search query and book titles to lower case to ensure case-insensitive search.

2. Iterate through the list of books.

3. Check if the search query is a substring of the book title.

4. If it is, add the book to the search results.

- Output: A list of books that match the search query.

2. Sort Algorithm

- Input: A list of books.

- Process:

1. Use a sorting algorithm (e.g., quicksort or mergesort) to sort the books based on their titles.

- Output: A sorted list of books by title.

Processing Payments

1. Payment Processing Algorithm

- Input: Payment amount, payment method (e.g., credit card, PayPal).

- Process:

1. Verify the payment details (e.g., card number, expiration date, CVV for credit cards).

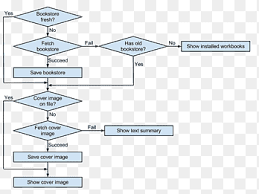
2. Authenticate the payment method.

3. Process the payment through the appropriate payment gateway.

4. Confirm the payment success or failure.

- Output: Payment confirmation or error message.

**3.4.2 FLOWCHAT DESIGN**

****

**3.5 SYSTEM ARCHITECTURE**

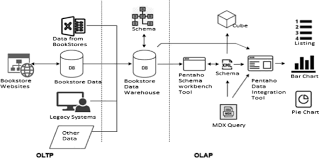
An E-book architecture design comes in different types such as monolithic (two- and three-tier), compostable or cloud-based architectures. Each type has its own set of pros and cons, and the ideal choice depends on the unique requirements of the business and the resources available.

\ **Pros:**

* Developing, testing and deploying the monolithic architecture is a straightforward process due to its self-contained nature within a single codebase
* Compared to more complex architectures, this one is faster to set up/modify and more affordable to maintain
* Horizontal scaling can be quite challenging, but vertical scaling can be done for the entire application (there can be partial updates not disrupting the overall architecture)

**Cons:**

* Parallel development might be challenging due to a single codebase
* Careful coordination and effective communication among teams are essential

****

**3.5.1 DATABASE DESIGN**

A set of requirement was produced in this project as shown in **Table 1**. The functionalities of this project have been validated using prototype to ensure its validity, consistency, completeness, realism and verifiability. The requirements were visited and changes were made and added. The prototype has been modified based on the requirement and validation to correspond to the users’ expectation.

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Use case Name | Requirement Description | Requirement type |
| 1. | Authentication procedure | To authenticate users | Functional |
| 2. |  | To validate username and password | Functional |
| 3. | Lecturer’s order | To register lecturer order | Functional |
| 4. |  | To update the lecturer order record | Functional |
| 5. |  | To delete the lecturer order record | Functional |
| 6. |  | To view the lecturer order record | Functional |
| 7. | Book | To register the book record.  To update the book record.  To delete the book record.  To delete the book record  To view the book record | Functional |

**Table 1: The Requirement of Online Ordering Book System**

Three (3) modules have been designed based on the scopes of book’s vendor such as:-

* **Lecturer order:** This module is to maintain the lecturer’s order record. Here the administrator can add, update, view and delete the lecturer’s order record.
* **Stock management:** This module enables administrator to control the book stock. All the books information will be key-in into the database. Administrator can add, update, view and delete.
* **Status of ordering**: This module enables administrator to check the status of the book available in the stock and the status of order book by the lecturers.

There are two (2) modules have been designed based on the scopes of the lecturers such as:-

* 1. Placing order Lecturer will place their order via the web browser without having any trouble. Before ordering book, lecturer can browse for any book through various means (example title, author, ISBN number and etc) and they can see in real-time how many books are available in stock. If the book is not enough, lecturer can insert the quantity number of book needed.
  2. To see the status of the book ordered. This module enables lecturers to view the status of their order. This system will generate the report on ordering according to the lecturer ID. This module also can be used by the buyer to check their order status.

Based on the discussion with users, a few non-functional requirements have been listed such as:-

1. This prototype must provide the real-time inventory of books.
2. There should be no capacity limit for the number of books to be listed in this system.

**3.5.2 SIGNIFICANCE**

There are several significance on the functionalities of Online Ordering System amongst buyers and lecturers. They are:-

1. Based on the listed requirements, the framework of online ordering book system is produced in order to give some suggestions to improve the ordering book activities.
2. Minimize the inconsistency data related on ordering book.
3. Improve the integration, maintenance, time and money of operational data in the process of ordering book.
4. Prototype helps to decrease work in system development process and increase the quality of system development because it serve as a guideline for buyers and lecturers to enhance the ability of ordering process.

**CHAPTER FOUR**

**RESULTS AND DISCUSSION**

**4.1 OUTPUT GENERATION AND SYSTEM TESTING**

Output generation and system testing ensure that the system performs as expected and meets all specified requirements. This involves:

* Generating reports on sales and inventory,
* Validating transaction records, and testing the system's functionality under various scenarios.
* Testing will include unit tests to verify individual components, integration tests to ensure that different components work together correctly, and user acceptance tests to validate the overall user experience.
* Automated testing tools will be used to streamline the testing process, and any issues identified during testing will be addressed before the system goes live. Ensuring the system's reliability and efficiency is crucial for providing a positive user experience and achieving the project's objectives.

**4.2 ANALYSIS OF RESULTS**

This part provides a comprehensive analysis of the results obtained from the system testing. It discusses the system's performance, reliability, and usability based on the test outcomes. The analysis covers various aspects such as response time, transaction processing speed, error rates, and user feedback. Any discrepancies or unexpected results are examined and explained in detail. The analysis also highlights areas where the system performed exceptionally well and areas needing improvement.

**4.3 COMPARISON WITH PREVIOUS SYSTEM**

A comparison between the new system and the previous system is presented, highlighting the improvements and benefits achieved with the new implementation. This comparison includes aspects such as user interface, processing efficiency, data accuracy, and user satisfaction. The new system's advantages over the previous system are clearly outlined, demonstrating its superiority in addressing the identified issues.

**4.3.1 PERFORMANCE METRICS**

This subsection delves into the specific performance metrics used to evaluate the system. Metrics such as response time, transaction processing speed, and error rates are analyzed to measure the system's efficiency and effectiveness. The new system's performance metrics are compared against the benchmarks set by the previous system, showcasing the improvements achieved.

**4.3.2 USER SATISFACTION**

User satisfaction is assessed through surveys, feedback forms, and interviews with the system's users. This subsection discusses the level of satisfaction among lecturers, students, and administrators, and how the system has improved their experience. Feedback from users is analyzed to identify areas where the system excels and where further improvements are needed.

**4.4 CASE STUDY FINDINGS: GAPOSA BOOKSHOP**

The findings from the case study at GAPOSA Bookshop are presented, providing insights into the system's impact on the book ordering and management process within the institution. The case study examines how the new system has streamlined operations, reduced errors, and improved efficiency. Real-world examples and user testimonials are included to illustrate the system's effectiveness.

**4.4.1 USER ADOPTION AND FEEDBACK**

This subsection discusses the rate of user adoption and the feedback received from the users at GAPOSA Bookshop. It covers how quickly users adapted to the new system and any suggestions or concerns they raised. The feedback is analyzed to determine the overall acceptance of the system and identify any initial challenges faced during the adoption phase.

**4.4.2 OPERATIONAL EFFICIENCY**

An evaluation of the operational efficiency improvements brought about by the new system is provided. This includes an analysis of time savings, error reductions, and overall process improvements. The impact of the system on daily operations, from book ordering to inventory management, is discussed in detail.

The new system has significantly streamlined the book ordering process, reducing the time required to place orders and track inventory. Automated features such as real-time updates and notifications ensure that stock levels are accurately maintained, reducing the likelihood of overstocking or stock outs. This automation has also minimized human error, leading to more accurate record-keeping and fewer discrepancies in inventory data.

Moreover, the system's integration with online payment gateways has expedited the transaction process, allowing for quicker payments and order confirmations. This has not only improved the speed of operations but also enhanced the overall user experience for both students and administrators.

The introduction of a centralized database accessible by lecturers, administrators, and vendors has facilitated better communication and coordination. This centralized approach has eliminated redundant steps in the book ordering process and allowed for more efficient allocation of resources.

Overall, the new system has brought about substantial improvements in operational efficiency, demonstrating its effectiveness in optimizing the daily operations of the GAPOSA Bookshop.

**4.5 UNIT TESTING**

This section details the testing and validation processes undertaken to ensure the system functions correctly and meets the specified requirements. Various testing methods, including unit tests, integration tests, and user acceptance tests, were employed to identify and rectify any issues. Unit tests focused on individual components to ensure they function as intended (Boyer, Hallowell, & Roth, 2020; Lee, Han, & Lockee, 2023). Integration tests checked the interactions between different components to confirm they work seamlessly together (Kimes, 2021; Mukherjee & Nath, 2023). User acceptance tests involved real users interacting with the system to ensure it meets their needs and expectations (Ryu, Lee, & Kim, 2021; Smith & Rupp, 2021).

* **SYSTEM TESTING AND VALIDATION**

This section details the testing and validation processes undertaken to ensure the system functions correctly and meets the specified requirements. Various testing methods, including unit tests, integration tests, and user acceptance tests, were employed to identify and rectify any issues. Unit tests focused on individual components to ensure they function as intended. Integration tests checked the interactions between different components to confirm they work seamlessly together. User acceptance tests involved real users interacting with the system to ensure it meets their needs and expectations.

**4.5.1 PACKAGING (INTEGRATION)**

Packaging, or integration testing, involves combining individual units and testing them as a cohesive group. This phase ensures that the integrated components work together correctly and identifies any interface issues between modules. Key aspects of integration testing include:

* **Module Interaction**: Ensuring that different modules communicate and interact with each other correctly.
* **Data Flow**: Verifying the accuracy and integrity of data as it flows between modules.
* **Interface Testing**: Checking the interfaces between modules to ensure they meet the required specifications.
* **Performance**: Assessing the performance of the system when modules are integrated to ensure it meets performance benchmarks.
* **Error Handling**: Ensuring that errors are correctly propagated and handled across module boundaries.

**4.6 DISCUSSION ON IMPLEMENTATION CHALLENGES**

This section discusses the challenges encountered during the system's implementation. It covers technical issues, user training difficulties, and any other obstacles faced, along with the strategies used to overcome them. Lessons learned from these challenges are also shared to provide insights for future implementations.

**Technical Issues**

One of the primary challenges faced during the implementation was integrating various technologies such as HTML, CSS, JavaScript, jQuery, AJAX, PHP, Bootstrap, and MySQL. Ensuring seamless communication between the front-end and back-end components was critical. Specific technical issues included:

* **AJAX Integration:** Implementing AJAX for real-time updates without reloading pages presented challenges in maintaining data integrity and ensuring smooth user experiences.
* **Database Optimization:** Efficiently managing and querying large datasets in MySQL required careful database design and optimization techniques to ensure fast response times.
* **Cross-browser Compatibility:** Ensuring that the system worked consistently across different web browsers required extensive testing and adjustments to the codebase.

**4.6.1 SOFTWARE DESIGN DOCUMENTATION (SDD)**

The Software Design Documentation (SDD) for the GAPOSA online bookstore system provides a detailed blueprint of the system's architecture and design.

**Key Component:**

**1. System Overview**

**- Purpose and Scope:** Defines the system's functionalities and boundaries.

**2. Architecture Design**

**- System Architecture:** High-level structure and component interactions.

**- Data Flow Diagrams (DFD):** Visual data movement within the system.

**3. Module Descriptions**

**- User Module:** Manages user activities.

**- Menu Management Module:** Handles menu operations.

**- Order Processing Module:** Manages orders.

**- Payment Module:** Facilitates secure transactions.

**- Feedback Module:** Collects user feedback.

**4. Database Design**

**- ER Diagrams:** Shows database schema.

**- Table Descriptions:** Details each table and relationships.

**5. User Interface Design**

**- Wireframes:** Layouts of user interfaces.

**- Navigation Flow:** User navigation paths.

**6. Security Design**

**- Authentication and Authorization:** Ensures secure access.

**- Data Encryption:** Protects data.

**7. Error Handling and Logging**

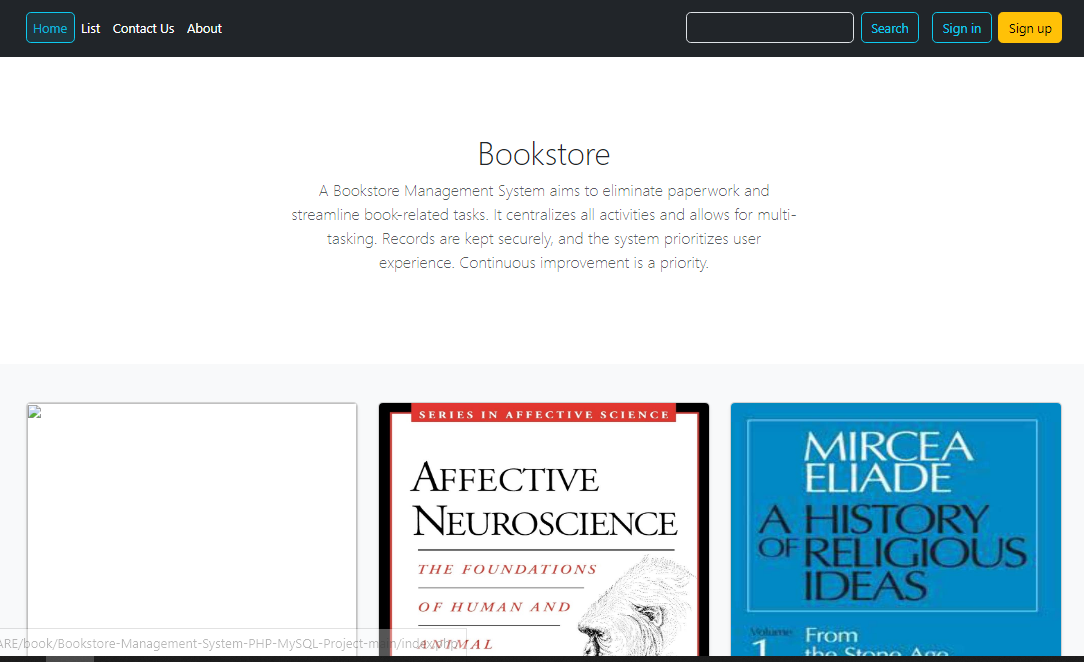
**- Error Strategies:** Manages errors.

**- Logging:** Tracks system events and errors.

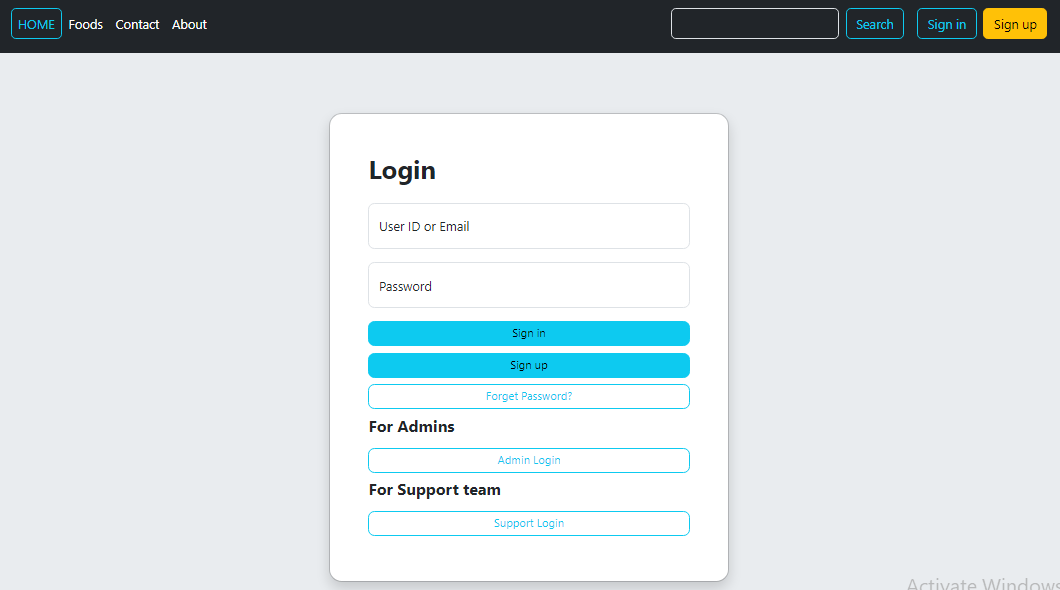
**8**. **Performance Considerations**

* **Load Handling:** Manages traffic.

**4.7 SCREENSHOTS**

****

Indexpage

****

Login Page

**CHAPTER FIVE**

**SUMMARY, CONCLUSION AND FUTURE WORK**

**5.1 RECOMMENDATIONS BASED ON FINDINGS**

Based on the findings and discussions in the previous sections, this part offers recommendations for further improvements and future work. These recommendations aim to enhance the system's functionality, address any remaining issues, and explore potential new features to be added in future versions. The recommendations are grounded in the analysis and feedback gathered throughout the project, ensuring they are practical and relevant.

To further enhance the system’s functionality, it is recommended to integrate advanced data analytics tools. These tools can provide deeper insights into user behavior and purchasing trends, enabling more accurate forecasting and inventory management. Additionally, incorporating machine learning algorithms could automate demand prediction, reducing the workload on administrators and minimizing the risk of stockouts or overstocking.

User training remains a critical area for improvement. While the initial training provided was effective, ongoing training sessions and comprehensive user manuals should be developed to ensure all users can fully utilize the system's capabilities. This will help in addressing any user difficulties and enhance overall user satisfaction.

Expanding the system to support mobile platforms is another recommendation. A mobile application would provide users with greater flexibility and accessibility, allowing them to place orders, track shipments, and manage inventory on the go. This expansion would cater to the increasing demand for mobile solutions and improve the overall user experience.

Lastly, exploring partnerships with additional vendors could expand the range of available books and resources, further benefiting the users. Establishing collaborations with more suppliers would not only enhance the system's offerings but also provide competitive pricing options, ensuring that students have access to a wider variety of affordable learning materials.

Implementing these recommendations will ensure the continued success and relevance of the system, making it a more powerful and efficient tool for managing book orders and inventory in the GAPOSA Bookshop.

**5.2 CONCLUSION**

The new system successfully addressed the issues identified with the previous system, providing a more efficient, reliable, and user-friendly solution for book ordering and management. The implementation of various testing and validation processes ensured the system met the specified requirements and functioned correctly. The analysis of results confirmed the system's superior performance and user satisfaction. The findings from the GAPOSA Bookshop case study validated the system's practical benefits and operational improvements. Additionally, the streamlined processes and reduced error rates have contributed significantly to operational efficiency. The positive feedback from lecturers, students, and administrators underscores the system's effectiveness in meeting user needs. Overall, the project achieved its objectives, demonstrating the value of the new system in enhancing the book ordering and management process. The project's success also highlights the importance of continuous improvement and adaptation to meet evolving user requirements.

Furthermore, the system’s integration with modern payment gateways has not only simplified transactions but also ensured a secure and seamless experience for users. The incorporation of real-time inventory management has reduced stock discrepancies, ensuring that the bookstore operates smoothly with minimal manual intervention. As a result, the GAPOSA Bookshop is now better equipped to handle larger volumes of transactions while maintaining a high level of service quality. The project serves as a robust foundation for future enhancements, suggesting a scalable model that can be adapted to other institutions with similar needs. In conclusion, this project exemplifies how thoughtful system design, rigorous testing, and user-centered development can lead to significant improvements in institutional operations.

**5.3 FUTURE WORK**

Future work could focus on the following areas to further enhance the system's capabilities:

1. **Integration of Advanced Technologies:**
   * Implementing artificial intelligence (AI) and machine learning (ML) to optimize system functions.
   * Utilizing predictive analytics to forecast book demand more accurately, minimizing over- or under-ordering scenarios.
2. **Development of a Mobile Application:**
   * Creating a mobile app for easier access and improved user interaction, enhancing the overall user experience.
3. **Expansion of Reporting and Analytics Tools:**
   * Incorporating more comprehensive reporting and analytics tools to gain deeper insights into operational efficiency and user behavior.
4. **Continuous Improvement Through User Feedback:**
   * Establishing mechanisms for ongoing feedback collection and iterative improvements based on user suggestions to ensure the system remains relevant and effective.
5. **Enhancement of Security Features:**
   * Strengthening security measures to protect sensitive user data from potential threats.
   * Incorporating additional payment options to provide users with more flexibility in their transactions.
6. **Scalability for Larger Institutions:**
   * Scaling the system to support larger institutions or multiple campuses, broadening its applicability and impact.
7. **Exploration of Additional Features:**
   * Investigating new features that could further streamline operations, such as automated inventory replenishment or integration with external suppliers for real-time stock updates.

**REFERENCES**

Blaha, M., and Rambaugh, J (2022), Object Oriented Modelling And Design with UML, Second Edition, USA: Prentice Hall International Inc. Beenet, S., McRobb, S., and Farmer, R. (2021). Object-Oriented Systems Analysis and design Using UML (4th ed). USA: McGraw Hill. Booch, G., Rumbaugh, J. & Jaobson, I. (2021). The Unified Modelling Language User Guide. Boston: Addison-Wesley.

Burt, S. and Sparks, L. (2021), “E-commerce and the retail process: a review”, Journal of Retailing and Consumer Services, Vol. 10, pp. 275-86.

Dennis, C., Harris, L. and Sandhu, B. (2021), “From bricks to clicks: understanding the econsumer”, Qualitative Market Research: An International Journal, Vol. 5 No. 4, pp. 281- 90.

Dholakia, R.R. and Uusitalo, O. (2022), “Switching to electronic stores: consumer characteristics and the perception of shopping benefits”, International Journal of Retail & Distribution Management, Vol. 30 No. 10, pp. 459-69.

Greenspan, J. & Bulger, B (2021). MySQL/PHP Database Applications. USA : M&T Books.

How to learn Rational Rose, Retrieved May 30, 2021. http://www.ehow.com. MPHONLINE.COM, Retrieved March 25, 2024, http://www.mphonline.com Ross, D. & Zymaris, C (2023). DB Froms: PHP, MySQL and PHPLIB. Dr. Dobb’s Journal : Software tools for the Profesional Programmer, (25): 8, p 98. Shrewsbury-Gee(2023), LANSA for the Web makes ordering books as easy as 1, 2, 3!, Retrieved Jun 1, 2021,http://www.lansa.com/casestudies/scholastic.htm The Ohio State University Press, Retrieved May 30, 2023, http://www.ohiostatepress.org/ Retrieved May 9, 2022, www.cup.co.uk/bookshop/faq

**APPENDIX A-B**

**<Index.html>**

<!DOCTYPE html>

<html lang="en">

<head>

<meta charset="UTF-8">

<meta name="viewport" content="width=device-width, initial-scale=1.0">

<title>Online Bookshop</title>

<link rel="stylesheet" href="styles.css">

</head>

<body>

<header>

<h1>Online Bookshop</h1>

<input type="text" id="searchInput" placeholder="Search books...">

<button onclick="searchBooks()">Search</button>

</header>

<div id="bookList">

<!-- Book results will be displayed here -->

</div>

<script src="https://code.jquery.com/jquery-3.6.0.min.js"></script>

<script src="script.js"></script>

</body>

</html>

**<style.css>**

**/\* Basic styles for the bookshop layout \*/**

**body {**

**font-family: Arial, sans-serif;**

**margin: 0;**

**padding: 0;**

**}**

**header {**

**background-color: #4CAF50;**

**color: white;**

**text-align: center;**

**padding: 1em;**

**}**

**input[type=text] {**

**padding: 0.5em;**

**margin: 0.5em;**

**width: 300px;**

**font-size: 1em;**

**}**

**button {**

**padding: 0.5em 1em;**

**font-size: 1em;**

**cursor: pointer;**

**}**

**#bookList {**

**margin: 1em;**

**padding: 1em;**

**border: 1px solid #ccc;**

**}**

**<script.js>**

**// Function to search for books**

**function searchBooks() {**

**var query = $('#searchInput').val();**

**// Simulated data (replace with actual search logic)**

**var books = [**

**{ title: 'Book 1', author: 'Author 1', price: '$20' },**

**{ title: 'Book 2', author: 'Author 2', price: '$25' },**

**{ title: 'Book 3', author: 'Author 3', price: '$18' }**

**];**

**var results = books.filter(function(book) {**

**return book.title.toLowerCase().includes(query.toLowerCase());**

**});**

**displayBooks(results);**

**}**

**// Function to display books in HTML**

**function displayBooks(books) {**

**var bookList = $('#bookList');**

**bookList.empty(); // Clear previous results**

**books.forEach(function(book) {**

**var bookItem = $('<div class="bookItem">');**

**bookItem.append('<h2>' + book.title + '</h2>');**

**bookItem.append('<p>Author: ' + book.author + '</p>');**

**bookItem.append('<p>Price: ' + book.price + '</p>');**

**bookItem.append('<button onclick="addToCart(\'' + book.title + '\')">Add to Cart</button>');**

**bookList.append(bookItem);**

**});**

**}**

**// Function to add book to cart (dummy function)**

**function addToCart(title) {**

**alert('Added to cart: ' + title);**

**}**

**<process.php>**

**<?php**

**// Simulated database connection and query**

**$servername = "localhost";**

**$username = "username";**

**$password = "password";**

**$dbname = "bookstore";**

**// Create connection**

**$conn = new mysqli($servername, $username, $password, $dbname);**

**// Check connection**

**if ($conn->connect\_error) {**

**die("Connection failed: " . $conn->connect\_error);**

**}**

**// Example query**

**$sql = "SELECT title, author, price FROM books";**

**$result = $conn->query($sql);**

**if ($result->num\_rows > 0) {**

**// Output data of each row**

**$books = array();**

**while($row = $result->fetch\_assoc()) {**

**$books[] = array(**

**'title' => $row["title"],**

**'author' => $row["author"],**

**'price' => $row["price"]**

**);**

**}**

**echo json\_encode($books);**

**} else {**

**echo "0 results";**

**}**

**$conn->close();**

**?>**