**ENHANCEMENT OF COMPUTER LABORATORY MANAGEMENT ON STOCK INVENTORY SYSTEM**

A Capstone Project Proposal Presented to the

Faculty of College of Computer Studies

**BENEDICTO COLLEGE – MANDAUE CAMPUS**

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In Partial Fulfillment of the Requirement for the Degree of

**Bachelor of Science in Information Technology**

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**ABSTRACT**

|  |  |
| --- | --- |
| TITLE | ENHANCEMENT OF COMPUTER LABORATORY MANAGEMENT ON STOCK INVENTORY SYSTEM |
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This study focuses on developing a stock inventory management system to improve efficiency in tracking resources at Benedicto College Main Campus. The current manual process leads to inaccuracies, delays, and increased costs. By implementing a web-based system, this study aims to stock inventory management, minimize errors, and ensure equipment availability for students and faculty.

By addressing the limitations of stock inventory management, this study seeks to improve operational efficiency, optimize resource allocation, and support sustainability efforts within the institution. The findings will contribute to better inventory control in academic settings, providing a reliable foundation for future research and development in stock inventory system.

***Keywords:*** ***Stock Inventory System, Computer Laboratory, Real-Time Tracking, Automation, Web-Based Technology, Operational Efficiency***

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- The Researchers

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**Chapter 1**

**THE PROBLEM AND ITS SCOPE**

**Rationale**

Enhancing the efficiency of computer laboratory through stock inventory system is all about making life easier for everyone involved, from laboratory managers to students and staff who rely on the equipment. The system helps avoid the frustration of running out of supplies or dealing with broken devices by keeping everything organized and up-to-date. By tracking what’s available and what needs attention, laboratory managers can ensure that equipment is always in good condition and ready when people need it, reducing unnecessary costs and minimizing downtime. Stock inventory system creates a sense of accountability, making it easier to find missing items or prevent loss, while also cutting down on the time and effort spent on tedious tasks like manual inventory checks. The data system provide help managers make smarter choices about when to upgrade or replace equipment, so it can focus on creating a smoother, more reliable experience for users. Plus, it supports sustainability by helping laboratory responsibly manage and retire old equipment.

Computer laboratories are crucial for education, supporting students and teachers in their academic activities. Managing various hardware can be challenging, often leading to disruptions and costs. A stock inventory system can improve efficiency providing real-time information on available equipment. This helps identify and fix equipment issues before it escalates, extending device lifespans and reducing failures. Stock inventory system also allows laboratory managers to make informed purchasing decisions, reducing waste and promoting responsible equipment disposal. Overall, these systems enhance the user experience by ensuring access to well-maintained, ready-to-use equipment, thereby better supporting the educational goals of institutions.

The researchers proposed this capstone project to address issues with the current stock inventory system at Benedicto College Computer Laboratory. The existing methods are prone to errors, which can impact the accuracy, real-time updates, and accessibility of information regarding equipment and resources within the laboratory. The researchers initiated this study to highlight and rectify the shortcomings it observed in the current system employed by the institution.

The aim of this project is to implement a stock inventory system of Computer Laboratory at Benedicto College Main Campus to improve resource management by allowing for accurate tracking of equipment and supplies, which will enhance cost efficiency and minimize losses. By offering real-time data analytics and predictive capabilities, the system will facilitate informed decision-making, streamline operations, and ensure adherence to institutional policies. Centralizing inventory information will also enhance communication among departments, leading to better service delivery and increased student satisfaction. Ultimately, this system aligns with the college's mission to provide high-quality education while optimizing resources and promoting sustainability initiatives.

**Theoretical Background**

A stock inventory system is crucial for managing resources in a computer laboratory, ensuring efficient tracking of hardware assets. As technology becomes integral to education, an effective stock inventory system optimizes resource allocation, minimizes downtime, and enhances overall asset management. By providing real-time data insights, it helps administrators identify usage trends and forecast future needs, ultimately improving the learning environment and maximizing the return on investment in technology for students and faculty.

**Management of Inventory using Control Theory (A.S White, January 1, 1999).** This theory explores the system approach to stock inventory system, highlighting the role of System Dynamics (SD) and other Cybernetic models while discussing their respective strengths and limitations. The primary goal of a system-based analysis is to understand how a business's structure influences its overall performance. The SD methodology focuses on identifying causal relationships, whereas Cybernetic models aim to develop analytical expressions that describe the entire process, emphasizing system inputs and outputs. Findings from basic stock inventory system illustrate proportional control within conventional theory. More advanced control algorithms, such as proportional, derivative, and integral (PID), demonstrate a refined approach to inventory control, capable of reducing stock levels by up to 80%, leading to significant cost savings. These insights are particularly relevant to Just-in-Time (JIT) and Material Requirements Planning (MRP) strategies.

**Computer Lab work on Theory (Emma Enstrom,** **2010).** This theory refers to a system of ideas designed to explain a concept based on fundamental principles rather than direct practical application. In a computer lab, this theory plays a crucial role in understanding various aspects of computer science, including algorithms, data structures, computational complexity, and automata theory. It also extends to areas such as networking, where theoretical concepts underpin protocols, data transmission, and network architecture. Additionally, in software engineering, this theory provides the foundation for software design, development methodologies, and system architecture. Understanding these theoretical principles is essential for effectively applying it in practical computer lab work.

**Inventory Theory (Emre berk, 2016).** According to Emre Berk, inventory theory focuses on managing the quantity and timing of asset replenishment to meet future demands. This theory introduces the core principles and foundational models of inventory theory, essential components of supply chain management. The aim is to familiarize readers with key concepts, models, and theoretical outcomes, providing a basis for further exploration and guiding them through existing literature. The discussion categorizes inventory models based on various factors: echelon structures (single versus multiple locations or levels), demand processes (deterministic versus stochastic demands), problem horizon lengths (finite versus infinite time frames), and perishability (nonperishable versus perishable goods). Initially, the chapter defines essential terminology and identifies inventory-related costs. It then develops continuous and periodic review models under deterministic demand scenarios, highlighting the fundamental trade-offs between different cost components. To build intuition, simplified models are presented first, followed by more complex versions that relax initial assumptions, leading to realistic models with deeper insights. Given the prevalence of stochastic demands in both theory and practice, the chapter extensively examines these scenarios. In the context of continuous-review with stochastic demand, three distinct modeling approaches are detailed, laying the groundwork for various solution methods found in the literature. Special cases are also explored to enhance understanding. While discussions on multi-item and multi-echelon stock inventory system are concise, all fundamental models and results are included, with ample references provided for further study. The modeling approaches assume a basic understanding of probability and stochastic processes; however, intuitive explanations are offered for specialized techniques to assist those less familiar with the concepts. The focus remains on model development and the consolidation of existing knowledge. Where optimal control policies are available, they are presented; in their absence, commonly used approximations or heuristics are discussed. To demonstrate some heuristic methods and models, simple numerical examples are included. The chapter concludes by addressing practical issues and considerations encountered when implementing the discussed models.

**Web–Based Intelligent Inventory Management System Theory (Maramidola O.A et. al., 2017).** In accordance to Maramidola, the theory emphasizes the integration of web technologies with intelligent algorithms to improve the efficiency and accuracy of stock inventory system. The systemwas restricted to on-premise infrastructures, which limited both accessibility and scalability. The advent of web-based technologies has led to a shift towards cloud-based or server-side solutions, allowing real-time access to data from any internet-connected device. These web-based system leverage technologies like HTML, CSS, JavaScript, along with server-side languages such as PHP and SQL, to facilitate smooth user interaction, database handling, and continuous updates. This transformation empowers businesses to make more informed decisions by providing real-time information on inventory levels, order statuses, and sales patterns (Maramidola et al., 2017).

By adopting web-based platforms, companies can access inventory data in real-time, enhancing scalability and flexibility compared to conventional, locally-hosted system. The intelligent algorithms within the system assist in optimizing stock level, forecasting demand, and calculating reorder points, which helps mitigate the risks of both stockouts and excess inventory. This capability for real-time data processing enables businesses to swiftly adjust to changes in the supply chain, leading to increased operational efficiency and reduced costs.

**STOCK INVENTORY SYSTEM**

**Management of Inventory using Control Theory**

(A.S White, January 1, 1999)

**Computer Lab work on Theory**

(Emma Enstrom, 2010)

**Inventory Theory**

(Emre berk, 2016)

**Web–Based Intelligent Inventory Management System Theory**

(Maramidola O.A et, al., 2017)

**ENHANCEMENT OF COMPUTER LABORATORY MANAGEMENT ON STOCK INVENTORY SYSTEM**

Figure 1

**Theoretical Framework**

**Statement of the Problem**

The current stock inventory system at Benedicto College, primarily dependent on manual processes, has become inadequate in meeting the growing demands of the institution’s educational operations. Inaccuracies in stock counts, delays in replenishing essential materials, and difficulty in tracking inventory flow, are disrupting the availability of critical supplies needed for academic and administrative functions. These inefficiencies not only result in overstocking or shortages but also lead to increased operational costs and hinder the smooth delivery of educational services.

**General Problem of the Study**

The inefficiency and inaccuracies in stock inventory system continue to pose significant challenges for organizations. Many institutions and businesses, especially those still using manual or outdated methods, struggle to maintain accurate records of stock levels, track inventory movement, and ensure timely restocking of supplies. This often leads to issues such as overstocking, stock shortages, and an increase in operational costs. Furthermore, the lack of real-time data and automated processes hampers decision-making and resource allocation, resulting in delayed services or production.

**Specific Problem of the Study**

The study seeks to address the following specific problems:

1. Updating inventory tracking system. Leading to mismanagement of hardware assets and inefficient resource allocation.
2. Difficulty in accessing and integration of inventory data. Making it challenging to monitor stock levels and streamline operations.
3. Insufficient reporting capabilities and data analysis. Hindering informed decision-making and overall efficiency.

**General Objective of the Study**

The primary objective of this study is to develop and implement an efficient stock inventory system for the computer laboratory of the school. The system aims to improve the tracking, monitoring, and management of computer equipment, peripherals, and other related supplies. By enhancing accuracy in inventory records, automating stock replenishment processes, and providing real-time access to inventory data, the system seeks to ensure the timely availability of resources, reduce operational costs, and support the overall functionality of the computer laboratory. This study seeks to address on how to develop and implement an efficient stock inventory system that will improve accuracy, streamline operations, reduce costs, and ensure the timely availability of resources.

**Specific Objective of the Study**

The system is expected to:

1. To develop a real-time inventory tracking system that ensures accurate and timely updates of hardware assets, minimizing mismanagement and promoting efficient resource allocation.
2. To implement a centralized and accessible inventory database that enables seamless data integration for easier monitoring of stock levels and improved operational flow.
3. To incorporate advanced reporting and analytics features that provide comprehensive insights for better decision-making and enhanced inventory management efficiency.

**Scope and Limitation**

**Scope**

The proposed stock inventory system is designed to enhance the management of computer laboratory resources by efficiently tracking hardware assets, monitoring inventory levels, and automating stock updates. It will provide real-time updates on inventory status, allowing laboratory managers to oversee available equipment, identify shortages, and ensure timely restocking. Additionally, the system will send automated alerts for maintenance schedules and low supply levels, preventing potential disruptions in the laboratory’s operations. To support decision-making, the system will generate detailed reports and analytics, helping administrators plan equipment upgrades, allocate budgets effectively, and ensure compliance with the institution’s resource management policies.

Furthermore, the system will prioritize security and ease of use. Access will be restricted to authorize personnel to maintain data integrity and promote accountability. The user-friendly interface will simplify the process of updating and retrieving inventory information, making it accessible even to non-technical users. By integrating these features, the system aims to streamline stock inventory system, reduce human error, and improve overall operational efficiency within the computer laboratory.

**Limitation**

Despite its benefits, the system has certain limitations that may impact its overall effectiveness. The accuracy of stock inventory system heavily depends on the correct initial data entry and regular updates from users. If personnel fail to input or update information consistently, discrepancies may arise, leading to errors in stock monitoring. Additionally, while the system can send alerts for scheduled maintenance and low supplies, it cannot prevent unexpected hardware failures or predict when a piece of equipment will break down. The system will minimize downtime through timely notifications, but it does not eliminate the need for manual inspections and repairs.

Another limitation is the potential impact of financial constraints on system development and maintenance. Budget restrictions may delay upgrades or the integration of advanced features. Additionally, linking the stock inventory system with other institutional platforms, such as accounting or procurement systems, may require additional development efforts, increasing both time and costs. Lastly, the system's effectiveness depends on user compliance. Failure of authorized personnel to follow proper inventory procedures, such as updating records and responding to system alerts, may compromise accuracy and efficiency.

**Significance of the Study**

The study of the stock inventory system in the computer laboratory at Benedicto College holds considerable significance for various stakeholders, as outlined below:

**Administrators.** Administrators will gain real-time access to inventory data, enable to have effective monitor usage, plan budgets for equipment upgrades, and make well-informed decisions regarding resource allocation. The system will also improve accountability and transparency in asset management.

**Lab Managers and Staff.** The system will enhance resource management by automating the tracking of equipment and maintenance, minimizing manual inventory tasks, and ensuring that resources are available when needed. Real-time updates will help prevent equipment shortages and breakdowns.

**Students and Faculty.**  With reliable, well-maintained equipment, students and faculty will experience fewer interruptions, such as hardware malfunctions, missing devices, or system downtime. This will create a more efficient learning environment, leading to a smoother academic experience and increased user satisfaction.

**School.** The system will enhance resource management, reduce losses, and optimize budget allocation. By streamlining asset tracking and maintenance, it will improve administrative efficiency and support a well-equipped learning environment.

**Future Researchers.** The study will offer important insights into stock inventory system within academic settings, providing a foundation for future research on improving resource management in other institutions.

**Chapter 2**

**REVIEW OF RELATED LITERATURE AND RELATED STUDIES**

**Related Literature**

**Introduced a study titled Laboratory Inventory System by Hashim, et. al., (2013),** which addresses the challenges of managing laboratory inventory through extensive paperwork. Recognizing the need for a more organized process, it developed the *Laboratory Inventory System* (LIS) specifically for the Faculty of Electronics and Computer Engineering (FKEKK). This system focuses on efficiently recording and updating data, with a reporting feature that enables users to quickly view the status of laboratory equipment and components.

**Automated Laboratory Item-Inventory System with Barcode by Aguirre, et al. (2013)**. The research aims to develop an automated stock inventory system for the College of Engineering, utilizing a barcode reader for efficient item tracking. The study demonstrates that the system is both effective and user-friendly, improving the management of laboratory resources. The design focuses on simplicity while maintaining careful attention to the system's internal interface. The software operates consistently, ensuring reliable service to both students and faculty. The system's step-by-step procedure guarantees that each task is completed successfully, enhancing the overall process of laboratory item management.

**Based on the analysis of the existing purchase, sale and inventory management model by Quiying Yan (2019),** an information-based purchase, sale and inventory management system is designed to meet the needs of small and medium-sized business enterprises. In response to these challenges, Yan proposes the development of an information-based purchase, sale, and inventory management system tailored specifically to the unique needs of SMEs. This new system aims to streamline the processes involved in managing inventory, facilitating better tracking of stock levels, sales, and procurement activities.

**Inventory management systems by Ganesha, et al., (2020),** play a crucial role in understanding the purchase phenomenon, including product value, timing, frequency, stock cover, inventory turns, and minimum sales thresholds. Understanding the role of each product and consumer, determining the type of product, purchase frequency, and who decides on purchasing is essential.

**Web-Based Online Inventory Information System by Soegoto, et.al., (2020)**. The research demonstrates how web-based online inventory systems can improve human performance and optimize work processes within companies. The study uses a descriptive method and reviews related literature to emphasize the significance of these systems as innovative solutions for efficient goods management. Web-based inventory systems simplify complex tasks, which is particularly advantageous for large companies in streamlining their operations. As a result, many businesses are adopting these systems to boost efficiency. Companies that implement web-based inventory systems are continuously working to improve their inventory management processes to better support their business activities.

**Related Studies**

In developing a stock inventory system for computer laboratory, several studies provide insights into effective stock inventory system. These studies address challenges like the absence of centralized databases, manual errors, and inefficient tracking, offering solutions to improve accuracy, resource management, and efficiency—key factors for the proposed system’s success.

**Developed the Lab Inventory Tracking System (LITS), (Megat Hariri et. al 2014).** The IT-Media department of University Technology PETRONAS (UTP) will efficiently manage and track laboratory inventory. The study identifies challenges arising from the absence of a centralized database, making it difficult for staff to monitor equipment and generate inventory reports. To address this, LITS was designed using the Rapid Application Development (RAD) model, enabling automated tracking and real-time report generation. The findings indicate that LITS improves resource management, enhances accuracy, and streamlines inventory processes. This study provides valuable insights for the development of similar systems, including the proposed inventory tracking system for Benedicto College’s computer laboratory.

**Developed the Web-based Computer Laboratory Inventory Management System April Rose A. Zaragosa et al. (2022).** This study highlights the importance of inventory management in monitoring assets while balancing custodial requirements and storage capacities. Designed to assist school administrators and custodians, the system was evaluated using a standard questionnaire, with statistical analysis based on mean values. Developed using the Rapid Application Development (RAD) model, it emphasizes iterative progress and continuous improvements. The system was rated “Very Good” in functionality, usability, and performance efficiency, making it a relevant reference for similar projects, including the proposed inventory system for Benedicto College’s computer laboratory.

**Inventory Management System for Education Institutions (Shashwati Singh et al. 2022).** This study focuses on developing an advanced software-based Inventory Management System (IMS) tailored for engineering institutes. The system aims to address critical issues in record-keeping of laboratory equipment and similar inventory items. By implementing this IMS, educational institutions can maintain accurate records of their assets, streamline inventory processes, and enhance operational efficiency. The study emphasizes the importance of a centralized system to manage inventory effectively, reducing manual errors and improving resource allocation.

**Developed the Inventory Management System (IMS) Chan Chin, et. al., (2023**). The system improved inventory control, customer orders, and order delivery for Small and Medium Enterprise (SME) retail stores in Malaysia. This study focuses on assisting store owners and employees in tracking product stock arrivals and recording customer reservations. The system was developed using PHP for the backend and HTML, CSS, and JavaScript for the frontend, following the Rapid Application Development (RAD) methodology, which emphasizes iterative development. While IMS enhances inventory tracking and management, the study acknowledges certain limitations and suggests future improvements. This research offers valuable insights for developing similar systems, including the proposed inventory tracking system for Benedicto College’s computer laboratory.

**Development of Academic Warehouse Inventory by Abraham Ayegba Alfa et. al., (2024).** This study highlights the challenges of inventory control in educational institutions, where manual processes lead to delays, inaccuracies, and inefficiencies. To address these issues, an academic warehouse inventory system was developed to improve tracking, recording, and monitoring of stock. Built using HTML, JavaScript, PHP, and MySQL, the system enhances speed, accuracy, and security compared to traditional manual methods. The research emphasizes the need for advanced inventory solutions to streamline operations and ensure efficient resource management in educational settings.

**Chapter 3**

**TECHNICAL BACKGROUND**

**Development Software**

The integration of technology has become a crucial factor in enhancing efficiency and optimizing processes within the constantly evolving educational landscape. One of the key challenges academic institutions faces is managing and tracking stock inventory system in computer laboratories. Traditional methods of stock inventory system often result in inefficiencies, equipment misplacement, and difficulties in resource allocation.

The capstone project, focuses on developing an stock inventory system tailored for thecomputer laboratory. This system aims to streamline resource management, reduce costs, and prevent asset losses by providing a centralized platform for tracking laboratory equipment, ensuring proper distribution, and minimizing mismanagement.

By implementing this solution, the researchers aim to modernize the existing stock inventory system and address the institution's pressing challenges. The study highlights the significance of an automated stock inventory system and the benefits it offers in terms of accuracy, efficiency, and real-time monitoring.

The project will be developed using the following software:

**Front End Development Tools**

**HTML.** A form of programming code used to instruct a browser to create the structure for individual web pages on a website. This markup language is a fundamental component of how billions of people perceive and consume pages on the internet.

**Why use HTML?**

HTML, which stands for Hypertext Markup Language, is a markup language used to structure and format content on the web. It is used to create and structure documents for the World Wide Web, and it is the primary language used to create web pages. HTML consists of a series of elements, or tags, that are used to define the structure and content of a web page. These elements can be used to create headings, paragraphs, lists, links, and many other types of content. HTML also includes attributes that can be used to provide additional information about an element or to modify the way an element is displayed.

**CSS.** Used to style and layout web pages — for example, to alter the font, color, size, and spacing of the content, split it into multiple columns, or add animations and other decorative features.

**Why use CSS?**

Using Cascading Style Sheets (CSS) allows developers to separate content from presentation. In other words, with CSS the visual layout of a Web page can be established with style sheets, while the content can be put into HTML. CSS gives developers the ability to change the linear layout of a page — the order of elements on a Web page when all styles and formatting are removed — without altering its visual layout. This is important because the linear reading order of Web content is the order in which screen readers access the content. Another advantage with CSS is that it gives the end user control over the Web page style as well.

**JavaScript.** Allows developers to create dynamically updating content, use animations, pop-up menus, clickable buttons, control multimedia, etc.

**Why use JavaScript?**

JavaScript makes a website’s user interface easier to navigate and makes web pages more interactive and engaging. That’s why it’s used by tech giants Google, Facebook, Amazon, YouTube, and Twitter to give static information more functionality and make it come to life with 2D/3D graphics, animated images, interactive pop-up videos, interactive maps, and real-time content updates.

**Angular**. An open-source front-end framework by Google for building dynamic, single-page web applications. Using TypeScript, it supports two-way data binding, modular design, and reusable UI components. It offers tools and APIs for forms, routing, and HTTP, and follows the MVC pattern to improve code organization and efficiency.

**Why use Angular?**

Angular is used because it helps build dynamic, scalable, and maintainable web applications. It offers a component-based structure, promotes code reusability, and ensures a seamless user experience with two-way data binding and real-time updates. Angular TypeScript support, dependency injection, and a rich ecosystem of tools make development faster, more secure, and easier to manage. Additionally, its active community and long-term support ensure ongoing improvements and updates, making it a reliable choice for modern web projects.

**Back-end Technology**

**Node.js.** An Open Source, cross-platform runtime environment for executing JavaScript code. Node is used extensively for server-side programming, making it possible for developers to use JavaScript for client-side and server-side code.

**Why use Node.js?**

Node.js is a server-side JavaScript runtime environment that has gained widespread popularity due to its versatility and efficiency. One primary use of Node.js is in building scalable and high-performance web applications. Its event-driven, non-blocking I/O model allows for handling a large number of concurrent connections, making it particularly well-suited for real-time applications like chat applications, online gaming, and collaborative tools.

**Back-end Framework**

**Express.js**. A back-end web application framework for building RESTful APIs with Node.js, released as free and open-source software under the MIT License. It is designed for building web applications and APIs. It has been called the **de facto** standard server framework for Node.js.

**Why use Express.js?**

Express JS offers simplicity, flexibility, efficiency, minimalism, and scalability to the programmers.

**Sequelize ORM.** A popular Object-Relational Mapping (ORM) library for Node.js, which provides an abstraction layer over relational databases, making it easier to interact with databases using JavaScript objects instead of raw SQL queries.

**Why use Sequelize ORM?**

Developers looking for a dependable and well-documented ORM frequently choose Sequelize because of its extensive community and established reputation.

With its broad API, you may connect with your data in a variety of relational databases, such as MySQL and SQL Server.

**Front-end design**

**Tail wind.** Carries different meanings based on the context. In aviation and meteorology, it describes a wind moving in the same direction as an object, aiding its speed. In business and economics, it signifies advantageous factors that promote growth, like low interest rates or increased market demand. In technology, Tailwind CSS is a widely used utility-first framework designed for efficient web application styling.

**Why use Tail wind?**

The use of "tailwind" varies depending on the context. In aviation and meteorology, a tailwind helps increase speed and reduce fuel consumption, making travel more efficient. In business and economics, it refers to favorable market conditions that support growth, boost revenue, and enhance financial performance. In technology, Tailwind CSS is a utility-first framework that simplifies web development by minimizing the need for custom CSS and ensuring design consistency.

**Database Management System**

**MySQL.** Store data in tables that map to objects. Each table has a schema defining what columns each row of the table will have. Developers can reliably store and retrieve many data types, including text, numbers, dates, times, and even JSON.

**Why use MySQL?**

MySQL is an easy-to-use and flexible RDBMS. Within 30 minutes of starting MySQL’s simple installation process, it is able to modify source code to meet the developer’s needs. And as a free, open-source system, it doesn’t need to spend money for this level of freedom, including upgrading to an advanced version.

**Integrated Development Environment**

**Visual Studio Code (VS Code).** Streamlined code editor with support for development operations like debugging, task running, and version control.

**Why use Visual Studio Code?**

At its heart, Visual Studio Code features a lightning-fast source code editor, perfect for day-to-day use. With support for hundreds of languages, VS Code helps

you be instantly productive with syntax highlighting, bracket-matching, auto-indentation, box-selection, snippets, and more. Visual Studio Code includes built-in support for IntelliSense code completion, rich semantic code understanding and navigation, and code refactoring.

**API Development**

**RESTful API.** An interface that two computer systems use to exchange information securely over the internet.

**Why use RESTful API?**

REST APIs can scale efficiently because REST optimizes client-server interactions. Statelessness removes server load because the server does not have to retain past client request information. Well-managed caching partially or completely eliminates some client-server interactions.

**Build Tool**

**NPM (node package manager)**. The default package manager for Node and is written entirely in JavaScript.

**Why use Node Package Manager?**

It enables you to install libraries, frameworks, and other development tools for your project, similar to installing a mobile application from an app store. You gain access to safe Node.js projects for development.

**API URL Test**

**Postman.** A global software company that offers an API platform for developers to design, build, test, and collaborate on APIs.

**Why use Postman?**

Using Postman for API testing has many benefits, from its easy-to-learn and intuitive interface to its support for various types of APIs. It allows you to test different aspects of your APIs, such as functionality, performance, security, and documentation.

**Development Environment**

The development of the Benedicto College Main Campus Inventory System Capstone Project involved a wide array of software tools and technologies. Visual Studio Code served as the primary Integrated Development Environment (IDE), supporting multiple programming languages like HTML, CSS, and JavaScript, along with essential functions such as task running, version control, and debugging. HTML was used to structure the web pages, CSS handled styling and layout, and JavaScript was utilized for creating interactive user interfaces, ensuring code reliability and maintainability. The Tailwind framework facilitated the creation of mobile-first, responsive websites, enhancing the user experience across different devices. For data management, MySQL was chosen for its efficient storage and retrieval capabilities. Node.js, a JavaScript runtime, was used for server-side programming, offering high performance and scalability.

Additionally, the development environment likely included project management and team communication tools to ensure smooth collaboration and coordination among developers and researchers. The environment emphasized compatibility and integration across various software platforms.

**Tools and Technologies Used**

In creating this system, the ASUS TUF Gaming A15 FA506NF was utilized. The installed Operating System is Windows 11. The processor is an AMD Ryzen 5 7535HS with 6 cores and 12 threads, running at a base clock speed of 3.3GHz and a max boost clock of 4.55GHz, optimized for both gaming and multitasking. The installed RAM consists of 8GB or 16GB DDR5 memory, which is upgradeable for enhanced performance. For storage, the main boot drive is a 512GB NVMe SSD, ensuring fast read and write speeds. An additional M.2 slot is available for storage expansion. The laptop is equipped with an NVIDIA GeForce RTX 2050 graphics card with 4GB GDDR6 VRAM, supporting ray tracing and DLSS for improved gaming and graphical performance.

**Chapter 4**

**METHODOLOGY**

**Project Feasibility**

The current stock inventory system process in the computer laboratory of Benedicto College Main Campus is manually performed using spreadsheets. This method is prone to human error, time consuming and often results in difficulties tracking and locating equipment or supplies. This study focuses on enhancing the computer laboratory’s stock inventory system with its project entitled "Enhancement of Computer Laboratory Management for Stock Inventory System," which aims to automate and streamline inventory-related tasks for improved accuracy and efficiency.

By implementing an enhanced stock inventory system, laboratory personnel will be able to monitor equipment availability, track stock levels in real time, and generate reports for better decision-making. This will reduce the chances of misplaced assets, eliminate duplicate purchases, and minimize inventory shortages. From a technical perspective, the system is feasible using existing technologies that support user-friendly design, recordkeeping, and real-time monitoring.

Ensuring financial feasibility, a specific development timeline will be created based on system complexity and available resources. Regular tracking of development progress and clear communication with stakeholders will be essential throughout the project lifecycle. Developing this system for the computer laboratory offers a practical and beneficial solution for the school’s IT department and administration. The next phase will include a cost-benefit analysis and the preparation of a detailed development plan to implement the proposed solution effectively

**STOCK INVENTORY SYSTEM**

**LOG-IN**

**ENTER** **CREDENTIALS**

**VERIFY USER ROLE**

**INVENTORY MANAGER/**

**STAFF**

**SUPER ADMIN**

**ADMIN**

Full System Access

MANAGE USER

(Add User, Edit & Delete User)

Read-only Access

User Account Management

View Inventory Data

View Inventory

View Reports

Audit Log Access

Generate Reports

No Modification Permissions

System Configuration

Manage Defective Items

Search Filter Items

**Figure 2**

**Work Breakdown Structure**

**Cost and Benefits**

In the Philippines, the enhancement of a Computer Laboratory Stock Inventory System may require an initial investment ranging from PHP 500,000 to PHP 1 million, depending on the system’s complexity, real-time capabilities, user access levels, and automation features. This budget typically includes developer salaries, server/hosting services, training, integration with existing systems, and equipment tracking features. Yearly maintenance may cost around PHP 30,000 to PHP 80,000, depending on system usage and updates required.

To minimize cost, this project can be developed within a budget range of PHP 300,000 to PHP 600,000, targeting basic inventory functionalities such as stock-in/stock-out tracking, alerts for low stock, automated logs, and reporting. The Payback Period (PBP) can help determine how long it will take to recover the investment based on estimated yearly cost savings and efficiency gains.

Although it may take some time to fully recover the investment, the system offers significant long-term benefits such as enhanced efficiency, better decision-making, and improved accountability. It is important for institutions to allocate sufficient resources to ensure timely completion and delivery of a high-quality, reliable system.

**Table 1**

**Existing Cost**

**EXISTING WEBSITE EXPENSES**

|  |  |
| --- | --- |
| **Developer Salary** | **55, 000 Php** |
| **Web Hosting** | **2,000 Php** |
| **Print Expenses** | **Php 2,500 for ink, Php 400 for electricity = Php 2,900 \* 9 months = Php 26, 100.00** |
| **Bond Papers for Printing Documents** | **Php 1,160 \* 9 months = Php 10, 440.00** |
|  | |

**Table 2**

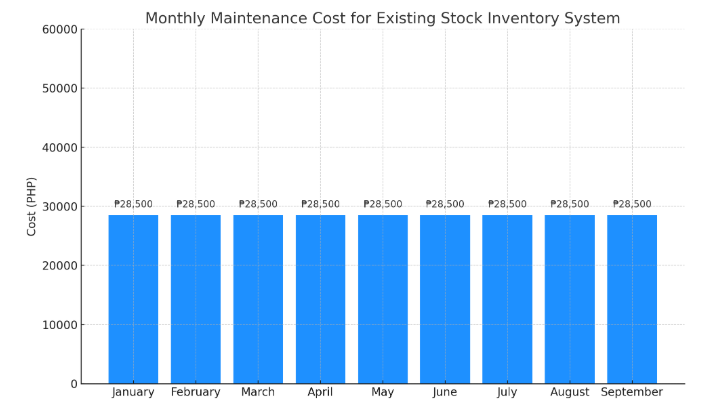
**Development Cost (Total Expenses)**

|  |  |
| --- | --- |
| **POSITION** | **MONTHLY SALARY** |
| Front-End Developer | 20,000 php |
| Back-End Developer | 35,000 php |
| Web Hosting | 2,000 php |
| Project Manager | 15,000 php |
| Researcher | 10,000 php |
| Documentation | 5,000 php |
| **TOTAL ₱87,000 every month \* 11 month = 957,000 php** | |

The table shows the **Development Cost** which is **₱957,000.00** over a 9-month development period. This cost covers entry-level salaries for one front-end and one back-end developer, along with monthly web hosting fees. The **₱957,000.00** represents the **required client investment** for building and deploying the **Stock Inventory System**.

**Figure 3**

**Monthly Expenses**

****

The table below shows the existing cost and the expenses of the developer of the existing Stock Inventory System.

**Table 3**

**Deployment Cost**

|  |  |
| --- | --- |
| **EXPENSES** | **COST** |
| **Developers Salary (Front end and Back end)** | **Php 55,000 monthly \*11 months = php php 440,000** |
| **Web Hosting** | **Php 3,500 for 1 year** |
| **Print Expenses** | **Php 100 per ink, php 100 for electricity = Php 200 \* 11 months = Php 2,200.00** |
| **Bond Papers for Printing Documents** | **Php 100 \* 11 months = php 1,100** |
| **Total = php 446,800** | |

The development cost is the breakdown of the expenses during the deployment of the website.

The project’s Cost and Benefits are calculated as follows:

Net Benefits: Development Cost – Deployment Cost = php 510,200

Benefits Cost Ratio: Development Cost/Deployment Cost = 2.14

Return on Investment: (Dev Cost – Dep Cost) Dep Cost x 100 = 114.18%

According to this calculation, the client will receive their investment back within 2 to 2.5 years.

**Moscow**

ENHANCEMENT OF COMPUTER LABORATORY MANAGEMENT ON STOCK INVENTORY SYSTEM

Must Have:

1. User login system (Admin, Staff)
2. Admin panel for managing stock items
3. Item quantity tracking and update logs
4. Add/Edit/Delete Stock Items
5. Database Backup &Restore Feature

Should Have:

1. Barcode or QR Code Scanning
2. Maintenance Request Module
3. Search and Filter Function
4. Monthly Inventory Report Generation
5. User Activity Dashboard

Could Have:

1. IT Support Staff Account Access
2. Automated Email Notification for Low or Expiring Stocks
3. Inventory Analytics
4. Mobile Access

Won't Have:

1. Manual Inventory Logs via Excel
2. Support for Primary/Elementary Lab Systems
3. Highly Advanced AI Forecasting Features
4. Inventory for Non-Computer Equipment

**Figure 4**

**Gantt Chart**

**Figure 5**

**Critical Path**

**Data and Process Modeling**

**Figure 6**

**Existing Flowchart**

**Figure 7**

**Proposed Flowchart**

**Figure 8**

**Use Case Diagram**

**Narrative**

**Figure 9**

**Activity Diagram**

**Figure 10**

**State Chart Diagram**

**Design**

**Entity Relationship Diagram**

**System Architecture**

**Security**

**-Authorization**

**-Strong Passwords**

**-Update and Maintenance**

**Development**

The development of the Benedicto College Main Campus Inventory System Capstone Project involved a wide array of software tools and technologies. Visual Studio Code served as the primary Integrated Development Environment (IDE), supporting multiple programming languages like HTML, CSS, and JavaScript, along with essential functions such as task running, version control, and debugging. HTML was used to structure the web pages, CSS handled styling and layout, and JavaScript was utilized for creating interactive user interfaces, ensuring code reliability and maintainability. The Tailwind framework facilitated the creation of mobile-first, responsive websites, enhancing the user experience across different devices. For data management, MySQL was chosen for its efficient storage and retrieval capabilities. Node.js, a JavaScript runtime, was used for server-side programming, offering high performance and scalability.

**Hardware Specification**

In creating this system, the ASUS TUF Gaming A15 FA506NF was utilized. The installed Operating System is Windows 11. The processor is an AMD Ryzen 5 7535HS with 6 cores and 12 threads, running at a base clock speed of 3.3GHz and a max boost clock of 4.55GHz, optimized for both gaming and multitasking. The installed RAM consists of 8GB or 16GB DDR5 memory, which is upgradeable for enhanced performance. For storage, the main boot drive is a 512GB NVMe SSD, ensuring fast read and write speeds. An additional M.2 slot is available for storage expansion. The laptop is equipped with an NVIDIA GeForce RTX 2050 graphics card with 4GB GDDR6 VRAM, supporting ray tracing and DLSS for improved gaming and graphical performance.

**Chapter 5**

**SUMMARY, CONCLUSION, AND RECOMMENDATION**

**Summary**

This study focused on enhancing the computer laboratory management through the development of an improved stock inventory system. The project aimed to address existing issues such as manual tracking, inaccurate inventory records, limited data accessibility, and inefficient reporting methods. By implementing a computerized inventory management system, the laboratory can now efficiently monitor equipment status, manage item issuance and return, and generate accurate reports in real time. The system also ensures better organization of resources and provides data security, thereby contributing to the overall effectiveness of lab operations.

**Conclusion**

The enhanced stock inventory system significantly improved the management of the computer laboratory by automating processes and minimizing human error. It resolved critical problems such as data inconsistency, difficulty in tracking items, and delayed updates. The system proved to be a reliable tool in managing hardware assets, streamlining inventory processes, and improving decision-making through detailed and accurate reporting. With its user-friendly interface and real-time capabilities, the system enhanced operational efficiency and resource accountability within the laboratory.

**Recommendation**

It is recommended that the enhanced inventory system be fully implemented and maintained in the computer laboratory to sustain its benefits. Regular system updates and user training should be conducted to ensure continued effectiveness and adaptability. Additionally, future enhancements such as barcode scanning, mobile access, and integration with other institutional systems could further optimize inventory management. Lastly, expanding the system’s use to other departments may improve resource monitoring and standardize asset management across the institution.

**DEFINITION OF TERMS**

**Asset Tracking** – The method of identifying and monitoring physical assets (such as computers and accessories) to ensure accountability and proper usage.

**Automation** – The use of technology to perform tasks without human intervention, reducing errors and improving efficiency.

**Computer Laboratory** – A facility equipped with computers and related devices used for academic and practical purposes, typically managed by an educational institution.

**Database** – An organized collection of data that is electronically stored and accessed, used to manage and retrieve inventory records in the system.

**Defective Items** – Laboratory equipment or components that are damaged, malfunctioning, or no longer in usable condition, and must be tracked separately.

**Inventory System** – A system used to track, monitor, and manage the availability, usage, and status of items or equipment within an organization.

**Real-time Monitoring** – The ability to track inventory updates and changes as they happen, ensuring timely and accurate data.

**Reporting Module** – A feature of the system that generates summaries, usage logs, and data reports for review and analysis.

**Resource Management** – The strategic handling and organization of assets and equipment to maximize efficiency and minimize loss or misuse.

**Stock Management** – The process of overseeing and controlling the ordering, storage, and use of components or equipment in the laboratory.

**System Enhancement** – The process of improving an existing system by adding new features or upgrading its functionality for better performance.

**User Interface (UI)** – The design and layout through which users interact with the inventory system, intended to be intuitive and easy to use.

**BIBLIOGRAPHY**

**ONLINE SOURCES**

* [Implementing\_an\_Automated\_Inventory\_Management\_System\_for\_Small\_and\_Medium-sized\_Enterprises](https://www.researchgate.net/publication/371112018_Implementing_an_Automated_Inventory_Management_System_for_Small_and_Medium-sized_Enterprises) https://www.researchgate.net/publication/371112018
* [Review-Related-Literature-0115](https://www.scribd.com/document/541931071/Review-Related-Literature-0115) https://www.scribd.com/document/541931071/
* [Inventory-System-Capstone-Project-Documentation](https://www.scribd.com/document/495096219/Inventory-System-Capstone-Project-Documentation) https://www.scribd.com/document/495096219/
* <https://www.sciencedirect.com/science/article/pii/S2212827115012019>
* [Analysis\_of\_the\_Inventory\_Management\_System\_Towards\_Enhanced\_University\_Service\_Delivery](https://www.researchgate.net/publication/373766654_Analysis_of_the_Inventory_Management_System_Towards_Enhanced_University_Service_Delivery) https://www.researchgate.net/publication/373766654
* Mohammaditabar, Davood, Seyed Hassan Ghodsypour, and Chris O'Brien. "Inventory control system design by integrating inventory classification and policy selection." *International Journal of Production Economics* 140.2 (2012): 655-659.
* Soegoto, E. S., and A. F. Palalungan. "Web Based Online Inventory Information System." *IOP Conference Series: Materials Science and Engineering*. Vol. 879. No. 1. IOP Publishing, 2020.
* Hashim, N. M. Z., and N. A. M. M. Arifin. "Laboratory inventory system." *International Journal of Science and Research (IJSR) Volume* 2 (2013): 261-264.

**APPENDICES**

**APPENDIX A**

**Users Guide**

**APPENDIX B**

**GRAMMARIAN’S CERTIFICATE**

**CURRICULUM VITAE**