WEB-BASED LABORATORY INVENTORY MANAGEMENT SYSTEM FOR TEACHING AND LEARNING

A Capstone Project
Presented to the Faculty of the
College of Computer Studies and Information Technology,
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In Partial Fulfillment of the Requirements
for the degree Bachelor of Science in Information Technology

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EXECUTIVE SUMMARY

Web-Based Laboratory Inventory Management System for Teaching and Learning is a web-based system designed for the Institute of Arts and Sciences Department at Southern Leyte State University to manage and monitor laboratory equipment using QR code technology, as well as the availability of supplies and materials. The Waterfall Model was used to create the system. The system evaluation results show that the developed system is mostly functional, mostly reliable, mostly usable, mostly efficient, mostly agreeable in terms of maintainability and portability, mostly secure and mostly compatible. As a result, it is recommended that the organization adopt and use the system.

Keywords: laboratory management, inventory, ISO25010, waterfall model, web-based

DEDICATION

First and foremost, we dedicate this study to God Almighty, our Creator, as a solid foundation for our motivation, knowledge, insight, and wisdom. He has been the source of our strength throughout this study, and we believe that we have only surged because of His guidance.

To our instructors, who guided and assisted us in gradually achieving the goal of this study and imparting knowledge to us in the best way possible. Our gratitude extends to the College of Computer Studies of Information Technology, which has served as a haven for learning and lasting memories for us.

To our parents, guardians, and relatives, who have never stopped providing us with financial and moral support, for providing all of our necessities throughout the time we worked on this study, and for teaching us that even a large task can be completed in stages.

To all the members of this team who have sacrificed and collaborated for this study and who have never faltered amid hardship.

Ms. Czarina Ancella G. Gabi, our Capstone Adviser, for her unwavering support and guidance, who never stops teaching, sharing her knowledge, and encouraging us every step of the way, and whose encouragement has been our light in this journey.

Finally, we would like to thank our Alma Mater, Southern Leyte State University, for providing us with a new home where we can learn and grow so that we can pursue our dreams.

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Chapter I

INTRODUCTION

This chapter provides an overview of the study, including the project context, purpose and description, objectives, and scope and constraints of the capstone project, “Web-Based Laboratory Inventory Management System for Teaching and Learning.”

Project Context

Web-based apps are a form of software that lets users connect with a remote server via a web browser. They have exploded in popularity in recent years, displacing desktop apps and establishing themselves as critical tool for small and large organizations all around the world. Web-based apps offer several advantages over traditional desktop programs, the most notable of which is their portability. With web-based apps, users don't have to install additional software, and developers don't need to write multiple versions of similar applications for various operating systems. Web applications may be used on any device that can run a compatible browser and has access to the Internet (Lvivity, 2018).

School laboratories are an essential part of every school, whether it is secondary, college, or university level (Duban et al., 2019). It is an area that provides all of the equipment and other components required for scientific activities. Having a wide range of equipment and other components is extremely important. Several universities continue to use the manual method, which is inefficient and time-consuming. Perkel (2015) says that many labs keep track of their inventories using nothing more than sheets of paper in a binder or entries in an Excel spreadsheet. In the manual inventory system, tracking the

status of equipment takes time, and the data listing is sometimes not accurately inserted. Typically, when the administration wanted to inspect the equipment and components, the laboratory technicians and staff needed first to inspect their files. It is critical to keep track of the laboratory equipment record to ensure that all items are always in place. In general, lab technicians handle equipment manually by writing down the equipment information, including time and date, in an equipment circulation form (Wahab et al., 2010).

Science laboratories have a lot of pieces of equipment, supplies, materials, and other components to support the teaching and learning process for both students and teachers. It is, therefore, necessary to record and keep an inventory to keep track of the equipment's status, whether it's functional or not, in which laboratory it is placed, and other pertinent data. Likewise, a record of supplies and materials used for laboratory activities is necessary to ensure that needed supplies and materials are available when needed.

However, the use of the traditional (pen and paper) inventory system makes it more difficult and inefficient (Jane, 2017). With a manual inventory system, each inventory count must be performed on a regular basis making the task tedious and time-consuming. According to Natarajan (2021), manual tracking is a time-consuming process because one must evaluate the entire inventory one item at a time. The amount of time it takes is determined by one's inventory, which is why this disadvantage has little impact on smaller businesses that do not work with large quantities of stock. Moreover, the manual method of reporting and collecting data on inventory tools somehow doesn't rule out the possibility of data reporting errors and determining priorities for laboratory

inventory (Prasetyo & Permadi, 2021). Wroblewski (2020) states that using a manual system is prone to human error, which can cause a chain reaction ranging from inaccurate inventory counts to botched customer orders. He further said that a manual system is vulnerable to theft or loss, which can be terrifying and time-consuming situations that must then be retracted and rebuilt. With this in mind, this study proposed using QR code technology, which is thought to be much faster and more accessible, and more efficient and productive in the inventory process.

Relating to the above discussed, this study intends to implement a Web-Based Laboratory Inventory Management System for Teaching and Learning. It is a system that stores and manages data on the laboratory equipment, supplies and material, and other components of the science laboratory. This enables the person in charge of the laboratory to monitor and manage in-out equipment in the actual environment and increase efficiency in managing other laboratory supplies and materials. This allows the person in charge to organize the laboratory better and eliminate the need for paper. Further, it can also effectively prevent and reduce inventory inaccuracies in science laboratories.

Purpose and Description of the Project

Web-Based Laboratory Inventory Management System for Teaching and Learning designed to enhance and simplify laboratories in the university. This system will assist the science laboratory in charge of searching, editing, and updating information about equipment and other components in a highly efficient manner.

The purposes of the project are the following;

1. Assist in developing and implementing an effective laboratory inventory management system;
2. To reduce the use of paper in the laboratory;
3. To replace the current practice of extensive manual recording;
4. To alert when supplies and materials are almost depleted;
5. To improve the speed with which information is received; and
6. To significantly enhance and simplify laboratory work.

Objectives of the Project

The study's main objective is to develop a web-based laboratory inventory management system for teaching and learning.

Specific Objectives:

Specifically, this study intends to;

1. Create a database for storing items (equipment and materials);
2. Generate and assign a unique QR code for each laboratory equipment;
3. Provide easier access to the information and status;
4. Ensure the security of important information and data;
5. Eliminate the issues associated with the manual laboratory inventory process.

Scope and Limitations of the Project

The inventory management system is intended for the Institute of Arts and Sciences (IAS) Science Laboratories, with the science laboratory in charge as the authorized user. It will be a web-based system capable of managing and monitoring

laboratory equipment using QR code technology, as well as the availability of supplies and materials. A notification will be provided to alert the science laboratory in charge when supplies and materials are almost depleted. The system will be accessible anytime and anywhere using a computer, a tablet, or a smartphone.

The system will be inaccessible if the device is not connected to the internet. Furthermore, predictive analytics is not included in this study.

Chapter II

REVIEW OF RELATED LITERATURE

This chapter contains ideas, theses, findings or conclusions, methodologies, and other materials. Those included in this chapter aid in familiarizing the reader with information that is relevant and similar to the present study.

Related Literature

According to Ahmed (2018), whenever people think of inventory systems, they think of the retail industry. While retail stores require effective inventory management to function correctly, inventory systems are also widely used in various other industries, including manufacturing, utilities, health care, government, education, and others. Regardless of where a system is utilized, inventory management is described as a process that guarantees that a precise quantity of inventory of excellent quality is available at the right time and place.

Keeping track of things long before the industrial age entailed manually counting and tallying items. Inventory management dates back more than 50,000 years when people counted with "tally sticks." Archaeologists also discovered the use of clay tokens around 4,000 years ago. These tokens included symbols baked into clay to record sheep and other livestock. Inventory management evolved into slightly more accurate accounting and record keeping systems over time, particularly in ancient Greek and Egyptian societies. The beginning of the second industrial revolution resulted in incredible advances in inventory management. Herman Hollerith, an American inventor, created the first modern automatic computation machine. The tabulator and sorter machine were specially designed to record information using punch cards, replacing pen

and paper and saving countless hours. People could use these punch cards to record various data, including inventory. Hollerith later founded the company to become the computer manufacturing company known as IBM. Since the mid-1970s, the barcode has been many industries' primary inventory management tool. Norman Woodland invented the barcode in the late 1940s in response to a request from a distraught grocery store owner who needed assistance keeping track of inventory. The National Association of Food Chains was among the first to use the technology, which was used to reduce check-out times. The first barcode ever scanned in a supermarket was for a ten-pack of Wrigley's Juicy Fruit chewing gum (Writing Intern 2018).

Information and Communication Technologies (ICT) are having a massive impact on every field, including education. It affects all aspects of education, from teaching and learning to assessment and evaluation. It boosts educational effectiveness. It helps literacy campaigns. It broadens the scope of education by enabling mobile learning and inclusive education. It makes research and scholarly communication easier. The impact of ICT and its potential in education is enormous. It has a positive effect on all stakeholders in the education field (Tikam, 2013). Husaj (2014) states that the advanced information technology of the last decade has not only changed our world but has also become a part of our daily lives. No one could have predicted the impact of information technology as a product and a service in the past, but it has become a product without which life cannot be lived as it is now. The use of some technology tools, such as YouTube programs and video recorders, allows teachers to differentiate instruction and adapt classroom activities by providing learners with the opportunity to hear

pronunciation directly from English speakers, thereby improving language learning experiences.

Online approaches have become more widely used in many educational settings as eLearning has advanced during the twenty-first century's first decade. Distance education courses, for example, frequently incorporate web-based activities, whereas on-campus courses use blended strategies to support teaching and learning activities (Gamage et al., 2020).

Chaffee A. (2009) states that web-based applications have become increasingly important as more organizations have realized the value of incorporating new technology to supplement current inventory practices.

The importance of implementing a web-based inventory system is thus becoming critical, as the information is almost always instantly accessible, making the details of the equipment's usage available and improving the movement and anticipation of their demand, as well as the system's overall productivity. Mclean A. et al. (2006) discuss that universities attempt to establish waste-minimization programs. The broader goal of this research is to propose a conceptual web-based inventory control system for tools and equipment in the five leading laboratories of a public university's Department of Manufacturing and Materials Engineering in the Faculty of Engineering. It is hoped that the proposed system will save laboratory personnel time when borrowing and returning facilities, including equipment, and will aid in maintaining an up-to-date inventory status in those laboratories.

The laboratory, according to Rochmawati (2018), is a facility that provides all types of equipment required for scientific activities. Since there is much equipment in the

laboratory, it is necessary to record an inventory. One way to manage inventory is to have a web-based system that can instantly track and update information about the products, tools, or equipment. (Karim et al., 2011). According to Lu (2013), switching to a web-based inventory system can be intimidating for those who have always relied on traditional methods to track their products. She further said that a web-based inventory system improves efficiency and reduces administration time by automating many tasks that people find time-consuming.

A quick response (QR) code is a type of barcode that encodes information as a sequence of pixels in a square-shaped grid and can be quickly read by a digital device (Hayes, 2021). A QR Code is a two-dimensional version of a barcode that can be read horizontally and vertically. It can be linked to a wide range of information that can be used to improve marketing campaigns, internal business processes, and personal life (Stein, 2020). J. Rikala & M. Kankaanranta (2012) explains that a quick response (QR) code is a type of barcode that stores information like text, URL links, automatic SMS messages, or just about any other information that can and can be read by digital devices such as cell phones.

Quick response (QR) codes are one of the supporting technologies for mobile marketing. QR codes are used for various purposes, including making purchases, accessing additional information on the web, disseminating discount coupons, and interacting with social media. The use and popularity of QR codes are rapidly growing all over the world (Shin, Jung, Chang, 2012). According to (M A M Shukran et al., 2017), a QR code can be used as a standalone feature, commonly used with a smartphone, and is well-known for its portability. Using QR codes in inventory management systems enables

users, particularly laboratory assistants, to identify chemicals and retrieve all information instantly without needing a computer.

Lab inventory management is a critical but mundane task in every laboratory that is frequently overlooked or ignored. Effective lab inventory management can result in high cost and time savings, allowing the person in charge to run the laboratory more efficiently and productively. Web-based lab inventory management software can assist laboratories in managing their inventory efficiently and cost-effectively.

Related Studies

Enhancing Chemical Inventory Management in Laboratory through a Mobile-Based QR Code Tag

Given the increased number of chemicals and equipment available in the NDUM's chemical laboratory, a systematic method for managing those items with a reliable method is required. The primary goal of developing a chemical inventory system based on QR code technology is to improve productivity and efficiency in inventory management at the NDUM's chemical laboratory by utilizing mobile technology that can be used by the user, particularly the laboratory assistant on the go. Poor inventory management is always associated with late chemical waste disposal from the schedule. If the chemical is not disposed of properly, it will emit an unpleasant odor spreading throughout the building. The procedure was followed by installing a QR tag reader application developed in this project into the smartphone. The database has been partially filled with laboratory chemicals and instrument information, and it was done following the QR Code Scanner testing. The development of a fully functional QR Code inventory system in this study demonstrated that the QR code could efficiently manage information

at the National Defence University of Malaysia's chemical laboratory (M A M Shukran et al., 2017).

Development of a Prospective Web-based Inventory System for Management of Lab Facilities

Inventory management is a prime task for an organization to achieve its goals of maintaining the appropriate level of inventory and minimizing waste. In this age, online or web-based inventory management is vital for an organization to gain a competitive advantage. In a university setting, a web-based inventory management system will help various laboratories keep updated on the status of their tools and equipment. This study provides a model for putting a web-based inventory system in place. The system design consideration has been mapped out for this purpose, with several steps identified. PHP was used as a development language, and MySQL was used as a backend database, with CSS implemented for the interface, which can be customized to meet the needs of the user. The study would assist the person in charge of the laboratories in determining the capacity of the labs as well as general information on asset availability and would replace the current practice of extensive manual documentation recording. Future research should look into the possibility of implementing a standard procurement procedure used in the industry to reduce inventory waste. Other issues that can be discussed further include integrating the system into the faculty website and making the inventory status more accessible to teachers, students, and visitors. Furthermore, better strategies for faculty and staff must be developed in order to follow a more feasible procedure in procurement practices. (Karim et al., 2011).

A Response Web-based QR Code for Inventory in The Laboratory of Informatics, UNESA

The laboratory, according to N Rochmawati et al. (2018), is a facility that provides all types of equipment required for scientific activities. The Department of Informatics Engineering (JTIF), as one of the majors in the Faculty of Engineering at Universitas Negeri Surabaya, also has several laboratories to support the teaching and learning process for both students and teachers. Much equipment is stored in the laboratory to support learning in the Department of Informatics. Because of the equipment in the laboratory, it is necessary to record inventory. The records done so far are still manual using MS word or MS excel. One of the manual system's flaws is the possibility of missing notebooks, so lab work inventory evidence must be included. This lowers a laboratory's quality value and is deemed ineffective. This application makes use of the Bootstrap framework, which supports responsive web technology. The application can be accessed via mobile phone by using the framework. The framework allows the application to be accessed using a mobile phone. This framework may adjust to user behavior and surroundings based on platform size and monitor screen orientation. The conclusion is intended to make the laboratory inventory procedure easier at UNESA's Department of Informatics Engineering. This application is supported by responsive web technology, which will provide convenience because it can be accessed using a mobile phone. The application is tested in the laboratory. The result shows that the use of the application is more effective when compared to the manual system.

Inventory Management System Using QR Code on Android A Case Study in Computer Engineering Department

Inventory management is still done manually in the Computer Engineering Department at the Rajamangala University of Technology Thanyaburi (RMUTT). The management system will aid in inventorying by utilizing web-based and mobile applications for data collection. Quick Response (QR) Code technology is a one-of-a-kind tagging solution for each item, storing information from the server via the local network. According to Rizqi et al. (2018), implementing this system for Inventory Management System could be a solution for managing inventorying processes and storing inventory information utilizing QR codes. Based on the results of research and discussion that have already been done, it can be concluded that Inventory Management System using QR Code on Android has been applied to Computer Engineering in the Rajamangala University of Technology Thanyaburi was running well, where the results of testing the function of entity go well. The development of cloud computing-based applications has not run well because it only runs locally (local web server), but the use of web service has been applied in this research. Moreover, real-time reading of QR Codes through android was successfully applied in this research.

CHAPTER III

TECHNICAL BACKGROUND

This chapter outlines the project's technicalities, including the sort of project to be built, the technology used, and the project's functionality of the capstone project.

The technicality of the project

As proposed, the Web-Based Laboratory Inventory Management System for Teaching and Learning is implemented in the Institute of Arts and Sciences (IAS) science laboratories. It will provide convenience and ease of access for accessing inventory by scanning with a QR code and transaction records utilizing storage within a cloud-based database server. In this project, technical terms are used referencing the programs and languages used in the system: Visual Studio Code- Text Editor, Server-Client Side - HTML, CSS, PHP, Bootstrap, Database - MySQL, Functionality - Xampp, PhpMyAdmin, PHPQRCODE library.

Details of the technologies to be used

The following software and programming languages will be used in developing the system:

Table 1. Details of the technologies to be used in the final conduct of the study

Technologies to be Used	Description
PHP	PHP is a web development-oriented general-purpose programming language. Rasmus Lerdorf, a Danish-Canadian programmer, first built it in 1994. PHP is one of the easiest programming languages. PHP has a robust

	ecosystem of resources for novices, as well as a syntax that is friendly to beginners.
	XAMPP is a free and open-source cross-platform web server solution stack package created by Apache Friends, comprising mostly of the Apache HTTP Server, MariaDB database, and interpreters for PHP and Perl scripts.
 Bootstrap	Bootstrap is a powerful front-end framework for building modern web pages and online applications. It's free to use and open-source, however, it comes with a lot of HTML and CSS templates for UI components like buttons and forms. Additionally, Bootstrap enables JavaScript extensions.
 MySQL	MySQL is a relational database management system that is free and open source. That means it helps you in storing all of your blog articles, users, plugin information, and so on for WordPress sites. It is relational because it keeps information in different "tables" and relates it using "keys."
 VS Code	Visual Studio Code is a lightweight code editor that includes features for debugging, task execution, and version management. It seeks to provide developers with only the tools they need for a quick code-build-debug cycle, leaving more complex workflows to full-featured IDEs like Visual Studio IDE.
 PHP QR Code	PHP QR Code is an open-source (LGPL) library for generating QR codes, and 2-dimensional barcodes. Based on libqrencode C library, provides API for creating QR Code barcode images (PNG, JPEG thanks to GD2). Implemented purely in PHP, with no external dependencies (except GD2 if needed). The program will be used to generate the QR codes.

 CSS	Cascading Style Sheets (CSS) is a stylesheet language used to describe the presentation of a document written in HTML or XML.
 JavaScript	JavaScript is a scripting or programming language that allows you to implement complex features on web pages — every time a web page does more than just sit there and display static information for you to look at — displaying timely content updates, interactive maps, animated 2D/3D graphics, scrolling video jukeboxes, etc.

How the Project Will Work

Figure 1 depicts the Web Based Laboratory Inventory Management System for the functional decomposition of the IAS science laboratory project. The system has two types of users throughout the process: The Administrator (Science Laboratory In-charge), who is in charge of managing the laboratory accounts and inventory, and who can view all transaction records of borrowing laboratory equipment, as well as the assignment of QR codes per item in the inventory. Moreover, borrowers can also browse and request equipment and materials through their accounts.

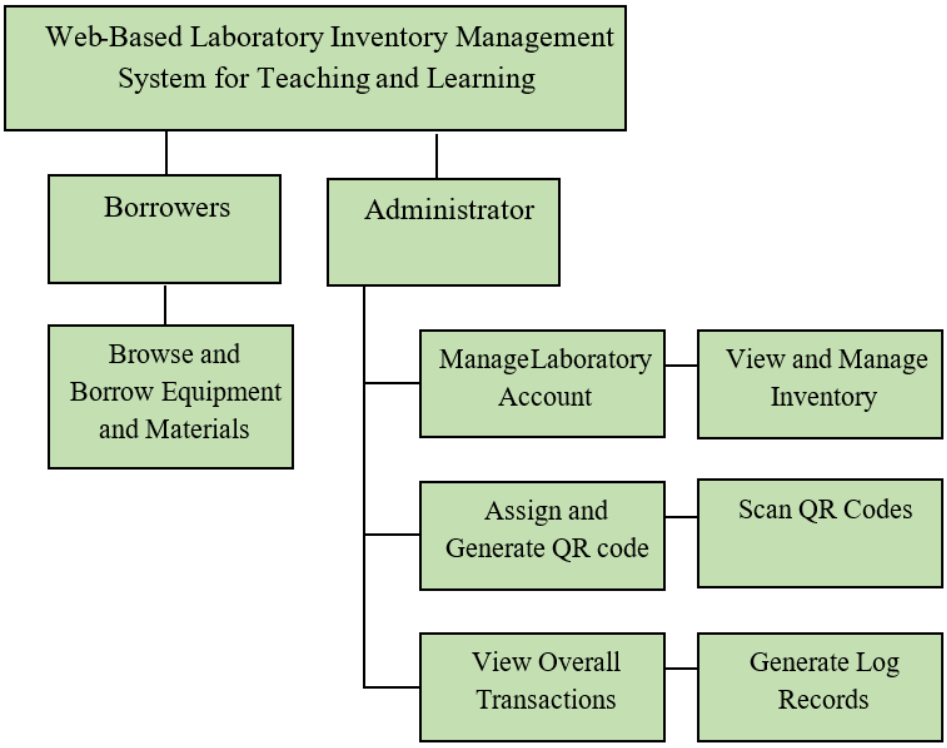

Figure 1. The Functional Decomposition Diagram of the Project

Figure 2 depicts the project's intended architectural layout. The project will be able to run if all of the critical requirements, such as hardware and software, have been met, as well as the proper configuration. The Administrator (Science Laboratory In-Charge) must have access to a PC or laptop in order to run the system. A smartphone is also required for scanning, so the system should be able to read the QR codes on the equipment in the laboratory. In order to access the system, an administrative account is required, which has full access to the exclusive features of the system. This account can view and manage the inventory stored in the database server, generate QR codes for the equipment, and assign them to each inventory so that information can be accessed via scanning. The administrative account is also responsible for the laboratory's borrowing equipment records. The system manages the borrower's request; then, the system

generates a log that is saved as the transaction record, notifying the administrator whether the borrowing is successful.

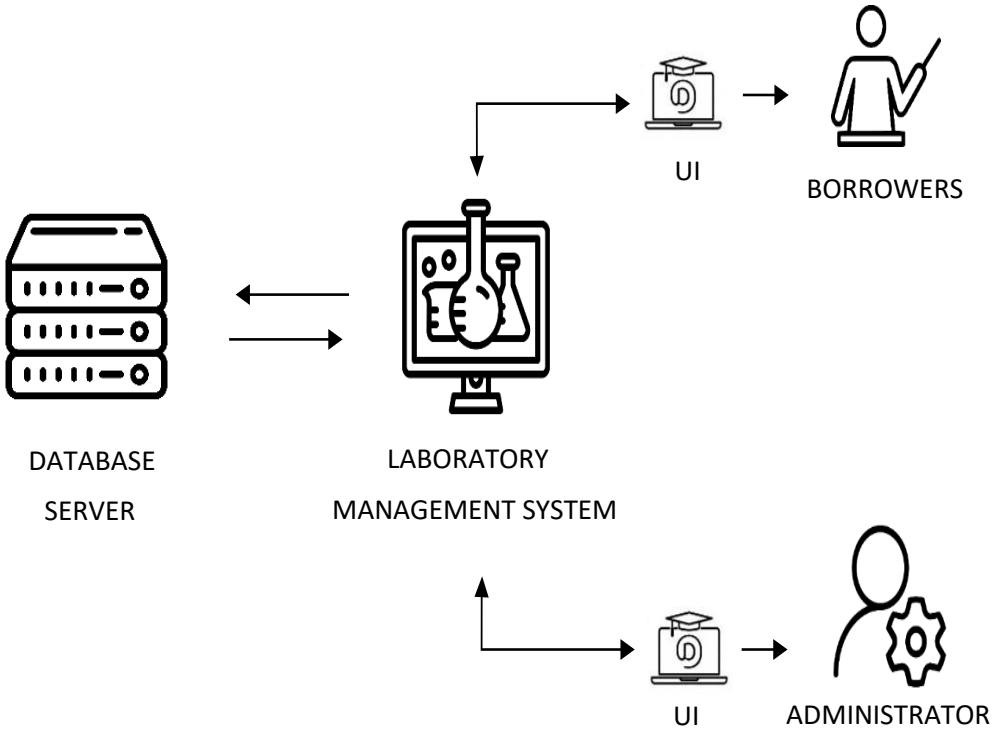

Figure 2. The project architectural layout

Chapter IV
METHODOLOGY

This chapter covers the Requirement Analysis, Requirement Documentation, Design of the Software, Design of the System, System Processes, Development and Testing, Description of the System, Implementation Plan, and Implementation Results.

Requirements Analysis

This section presents the Requirements Modelling and the Risk Assessment/Analysis of the project.

System Requirements

This section presents the system requirements and modelling of the Web-Based Laboratory Inventory Management System for Teaching and Learning.

Input

User as an Administrator:

- To utilize the system, the user must have valid login information.
- The equipment's status and quantity must be indicated when adding an item.
- The administrator must specify the room number when adding a room option.
- In regard to the pending reservations, the administrator must specify what actions to take.

User as Borrower:

- The borrower must have valid login information to access the system.
- The borrower must indicate the equipment that would like to borrow.
- The borrower must specify when and where they will utilize the equipment.
- Also, a time restriction for equipment use must be specified.

Process

- The system must validate the entered login credentials.
- A QR code will be generated and assigned to each kind of equipment when a user adds an item.
- Once the item's QR code is scanned, the system will then retrieve information and display it to the system.
- The system will utilize the device's camera as a QR code scanner.
- Based on the indications provided before saving information on the inventory, the system will automatically categorize the information of the scanned item.
- The system will automatically calculate the material deduction.

Output

- After the user (Administrator) has approved the reservation for borrowing, a printable "Borrowing Proof Receipt" will be produced.
- The system will generate printable information of the inventory.
- The system will automatically generate a graph that will delineate the inventory's status.

Performance

- The system must generate QR code for every added item.

Security and Control

- Only the Administrator is in charge of overseeing the laboratory accounts and managing the inventory.

- Only the Administrator has the access to the assignment of QR codes for each item in the inventory as well as the full transaction history of borrowed and returned laboratory equipment.

Data and Process Modelling

Context Diagram

The context diagram in Figure 3 provides a comprehensive overview of the entire system or process being analyzed or modeled. All of the external entities that will interact with the system Web-Based Laboratory Inventory Management System for Teaching and Learning are depicted in the context diagram below. Administrator and Borrowers are the two entities. The diagram depicts borrowers making reservations, which are then accepted by the administrator. The borrowers can then send and view their borrowing history. The administrator is in charge of overseeing the entire system and producing reports on it.

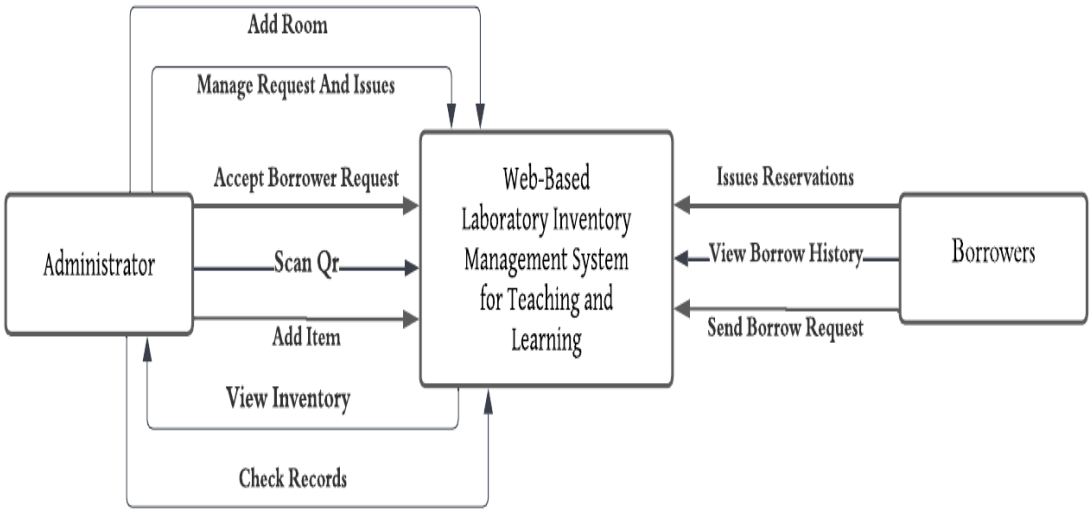

Figure 3. The Context Diagram

System Flowchart

Flowcharts are used in analyzing, designing, documenting, or managing a process or program in various fields. Its representation illustrates a solution model to a given problem. Figures 4-5 show the system flowcharts for each type of user.

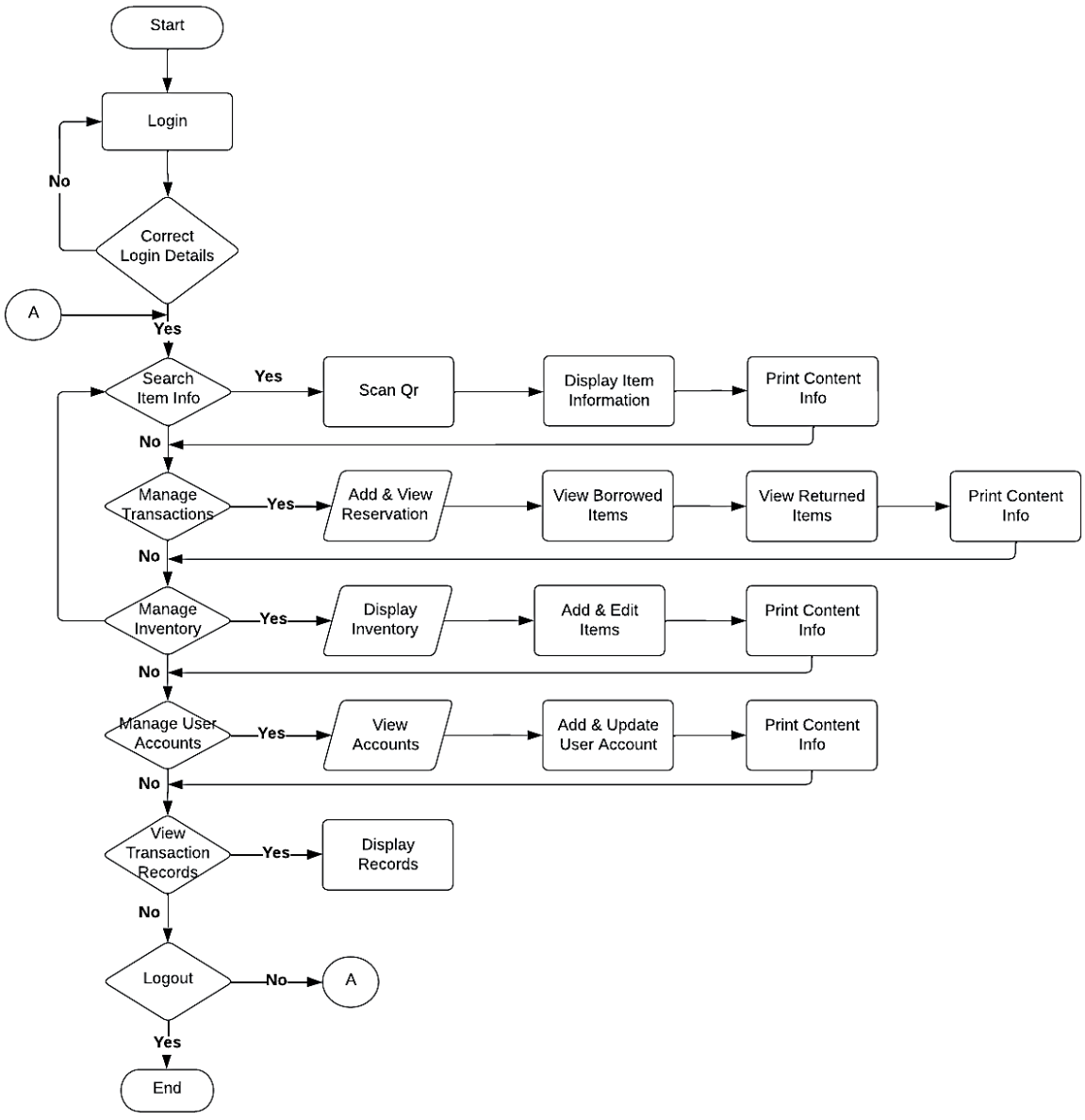

Figure 4. System Flowchart – Administrator

Figure 4 depicts the steps an administrator can take in the system. The administrator can sign in and then make a decision. If the administrator chooses search item info, he or she can scan QR codes, display item information, and print content information. If no, proceed to transaction management; he/she can add and view transactions, view borrowed items, view returned items, and print content information. If no, proceed to inventory management; he or she can view inventory, add and edit items, and print content information. If not, go forward with and manage user accounts so that he or she can view accounts, add and update user accounts, and print content information. If this is the case, proceed to view transactions and display records. Then, if no, choose log out.

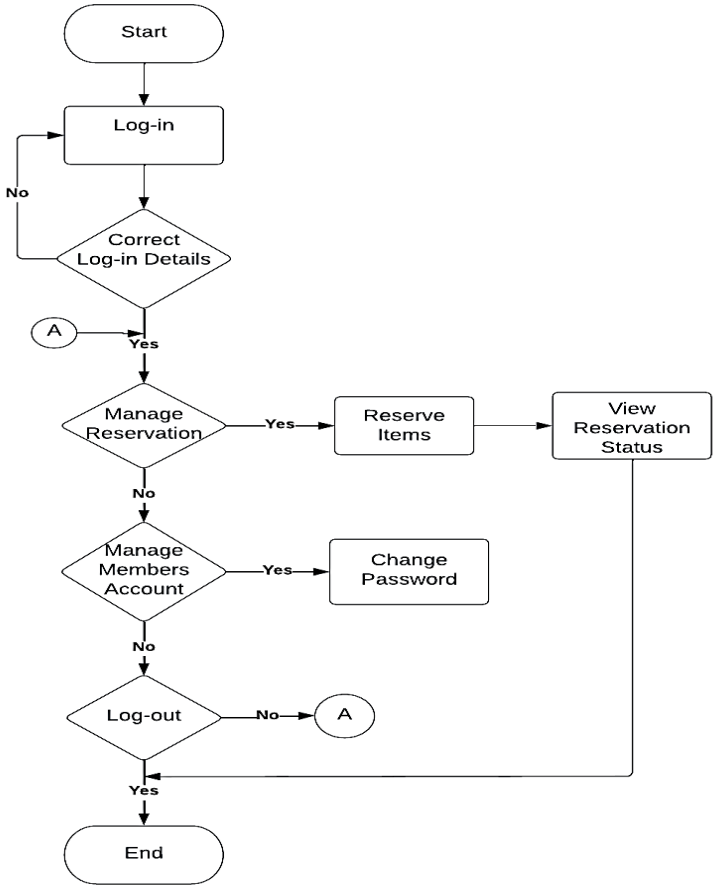

Figure 5. System Flow Chart – Borrowers

Figure 5 depicts the system steps that borrowers can take. Borrowers must first sign in with their respective accounts. Once signed in, they can select manage reservation to reserve items and view reservation status. Then, if they still need to select, they can select Manage Members Account to change their passwords. After that, log out.

Object Modelling

Use Case

Figure 6 are the Use Case Models for the proposed system. These are representations of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved.

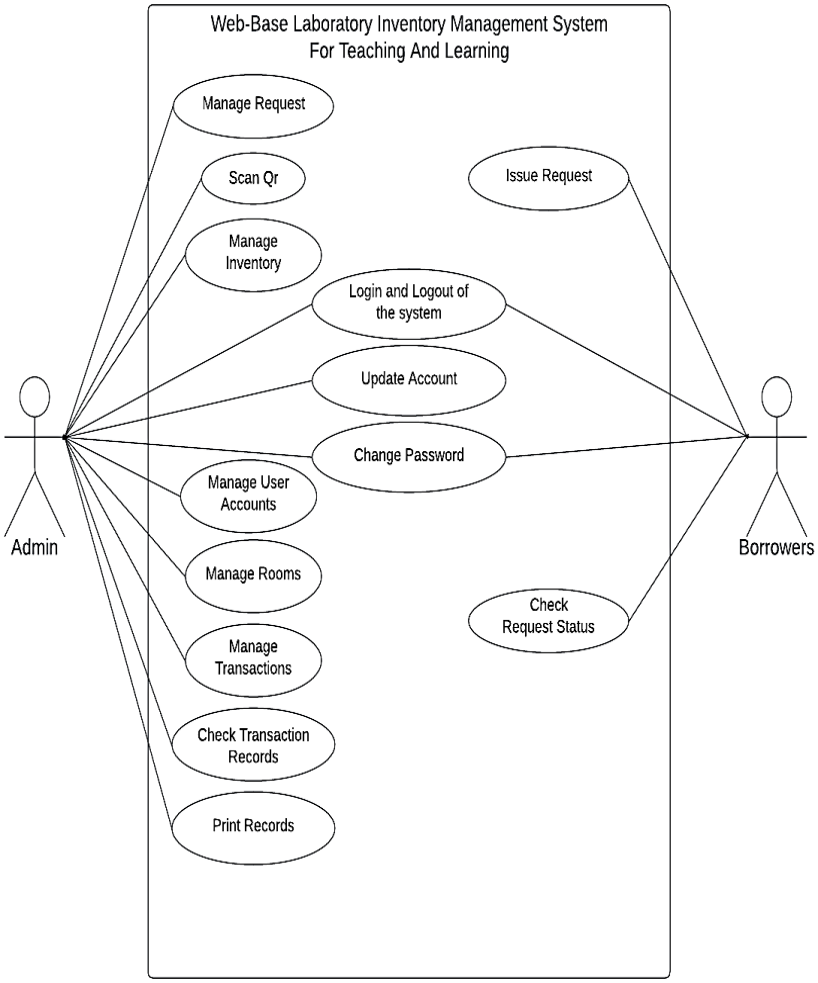

Figure 6. Use Case

Figure 6 shows two different types of system users: the administrator and the borrowers. Shown above are the functionalities that can be accessed by the first type of user, which is the administrator. The administrator can sign in, scan an item, manage transactions, manage inventory, manage user accounts, and view transaction records. The administrator is the only one with full access to the system—also shown above are the functionalities that the second type of user, the borrowers, can access. The borrowers can sign in, manage reservations, reserve items, view reservation status, change passwords, and sign out.

Risk Assessment/Analysis

Table 2 identifies and analyzes all of the potential risks and issues that are detrimental to the implementation of Web-Based Laboratory Inventory Management for Teaching and Learning. The steps to prevent or minimize the occurrence of the identified risks are also presented.

Table 2. Risk Assessment

Risk Description	**Effect**	**Risk Grading (Low, Medium, High)**	**Recovery Measure**
Malware infection	Malfunction of system Data loss	High	Install anti-virus software
No internet connection	Inaccessible application/website	Low	Subscribe to another ISP

Design of the Software

This section discusses the design and implementation of the data structures and algorithms used in the software. It presents the data design that produced the detailed data model of the database such as the Database schema in Figure 7.

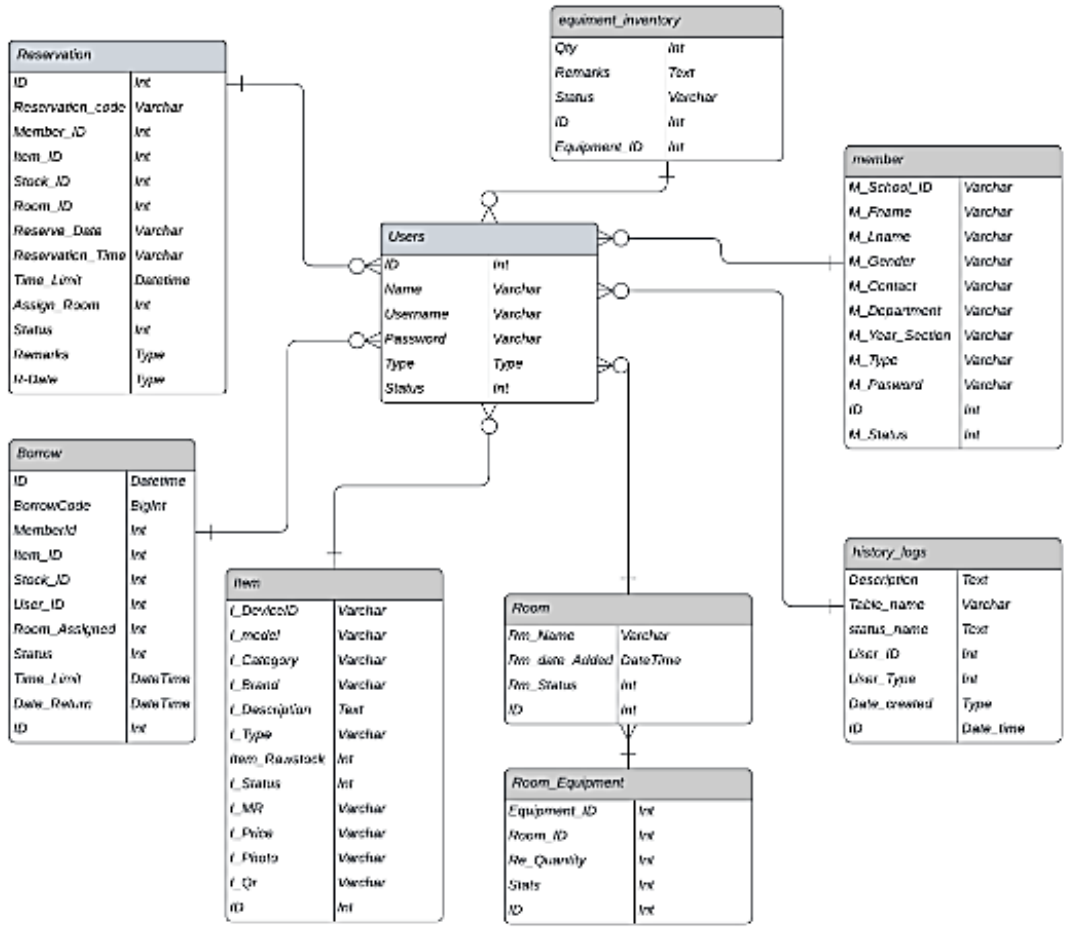

Figure 7. Database schema of the developed system

Data Dictionary

A data dictionary is a collection of descriptions of data objects or items in a data model, such as names, definitions, and attributes, for the benefit of researchers, programmers, and others who need to refer to them. A data dictionary provides detailed information about a dataset or database's contents, such as the names of measured

variables, data types or formats, and text descriptions. The data dictionary is critical to the system because it provides a concise guide to understanding and using the data and assists the administrator in understanding the database.

Table 3: Data Dictionary

Table Name: user			
Name	**Datatype**	**Length**	**Required**
id	int	11	yes
name	varchar	50	yes
username	varchar	50	yes
password	varchar	50	yes
type	int	11	yes
status	int	11	yes
Table Name: room_equipment			
Name	Datatype	Length	Required
id	int	11	yes
equipment_id	int	11	yes
room_id	int	11	yes
re_quantity	int	11	yes
stats	int	11	yes
Table Name: room			
Name	Datatype	Length	Required
id	int	11	yes
rm_name	varchar	50	yes
rm_date_added	datetime		yes
rm_status	int	11	yes
Table Name: reservation_status			

Name	Datatype	Length	Required
id	int	11	yes
reservation_code	varchar	50	yes
remark	text		yes
res_status	int	11	yes
Table Name: reservation			
Name	Datatype	Length	Required
id	int	11	yes
reservation_code	varchar	60	yes
member_id	int	11	yes
item_id	int	11	yes
stock_id	int	11	yes
room_id	int	11	yes
reserve_date	varchar	50	yes
reservation_time	varchar	20	yes
time_limit	datetime		yes
assign_room	int	11	yes
status	int	11	yes
remarks	text		yes
r_date	datetime		yes
Table Name: member			
Name	Datatype	Length	Required
id	int	11	yes
m_school_id	varchar	255	yes
m_fname	varchar	50	yes
m_lname	varchar	50	yes
m_gender	varchar	10	yes
m_contact	varchar	15	yes
m_department	varchar	50	yes
m_year_section	varchar	20	yes

m_type	varchar	50	yes
m_password	varchar	50	yes
m_status	int	11	yes
Table Name: item_transfer			
Name	Datatype	Length	Required
id	int	11	yes
t_itemid	int	11	yes
t_roomid	int	11	yes
t_stockid	int	11	yes
t_quantity	int	11	yes
date_transfer	timestamp		yes
t_status	int		yes
personincharge	varchar	50	yes
userid	int	11	yes
Table Name: item_stock			
Name	Datatype	Length	Required
id	int	11	yes
item_id	int	11	yes
room_id	int	11	yes
items_stock	int	11	yes
item_status	int	11	yes
status	int	11	yes
Table Name: item_inventory			
Name	Datatype	Length	Required
id	int	11	yes
item_id	int	11	yes
inventory_itemstock	int	11	yes
inventory_status	int	11	yes
item_remarks	text		yes
date_change	timestamp		yes

Table Name: item			
Name	Datatype	Length	Required
id	int	5	yes
i_deviceid	varchar	50	yes
i_model	varchar	50	yes
i_category	varchar	50	yes
i_brand	varchar	50	yes
i_description	text		yes
i_type	varchar	50	yes
item_rawstock	int	11	yes
i_status	int	11	yes
i_mr	varchar	50	yes
i_price	decimal	10	yes
i_photo	varchar	100	yes
i_qr	varchar	255	yes
Table Name: history_logs			
Name	Datatype	Length	Required
id	int	11	yes
description	text		yes
table_name	varchar	100	yes
status_name	text		yes
user_id	int	11	yes
user_type	int	11	yes
date_created	datetime		yes
Table Name: equipment_inventory			
Name	Datatype	Length	Required
id	int	11	yes
equipment_id	int	11	yes
qty	int	11	yes
remarks	text		yes

status	varchar	50	yes
Table Name: equipment			
Name	Datatype	Length	Required
id	int	11	yes
e_deviceid	varchar	50	yes
e_model	varchar	50	yes
e_category	varchar	50	yes
e_brand	varchar	50	yes
e_descrption	text		yes
e_stock	int	11	yes
e_stockleft	int	11	yes
e_type	varchar	50	yes
e_status	varchar	50	yes
room_id	int	11	yes
Table Name: borrow			
Name	Datatype	Length	Required
ID	INT	11	yes
date_borrow	datetime		yes
borrowcode	bigint	50	yes
member_id	int	11	yes
item_id	int	11	yes
stock_id	int	11	yes
user_id	int	11	yes
room_assigned	int	11	yes
status	int	11	yes
time_limit	datetime		yes
date_return	datetime		yes

System Process

This section describes the proposed system's IPO system process. First, researchers analyze the current problems and previous studies related to Laboratory Management, then the team conducts an interview and begins to design and develop using SDLC, and finally, it presents the functional system that the team intends to propose.

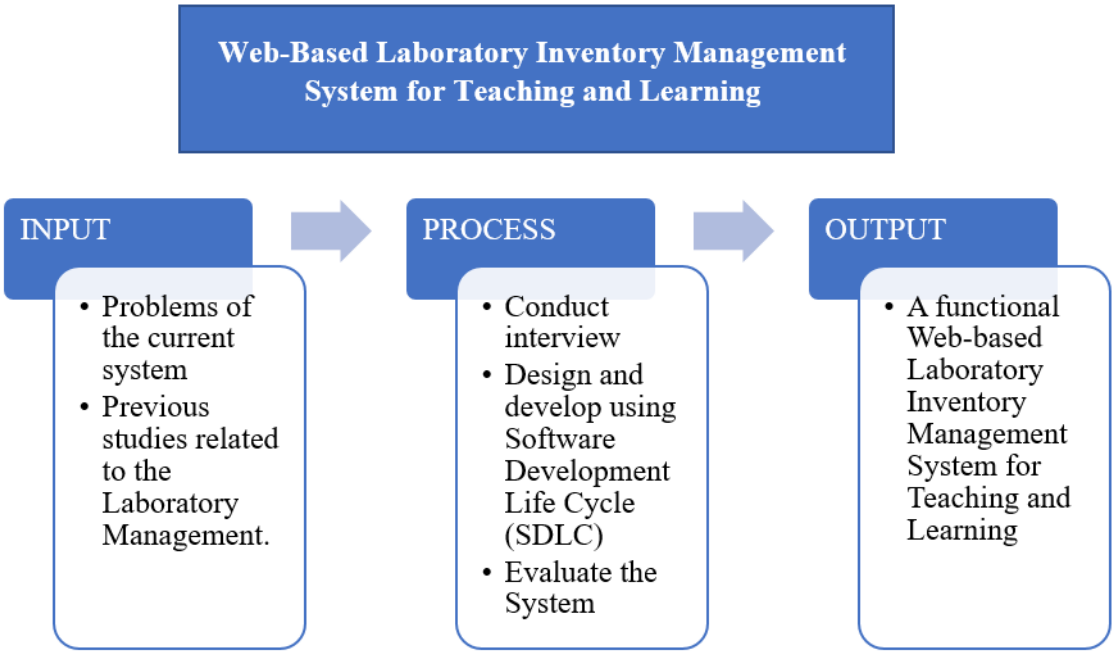

Figure 8. The IPO System Process

Development and Testing

Software Development

The researchers used the waterfall model shown in Figure 9 as the System Development Life Cycle Model. The waterfall model is a linear sequential flow. Each stage begins after the previous one has ended; it relies on information from the previous stage and has its project plan, with each stage progressing steadily downwards through

the phases of software implementation. The SDLC model waterfall model approach is the most popular and widely used for software development.

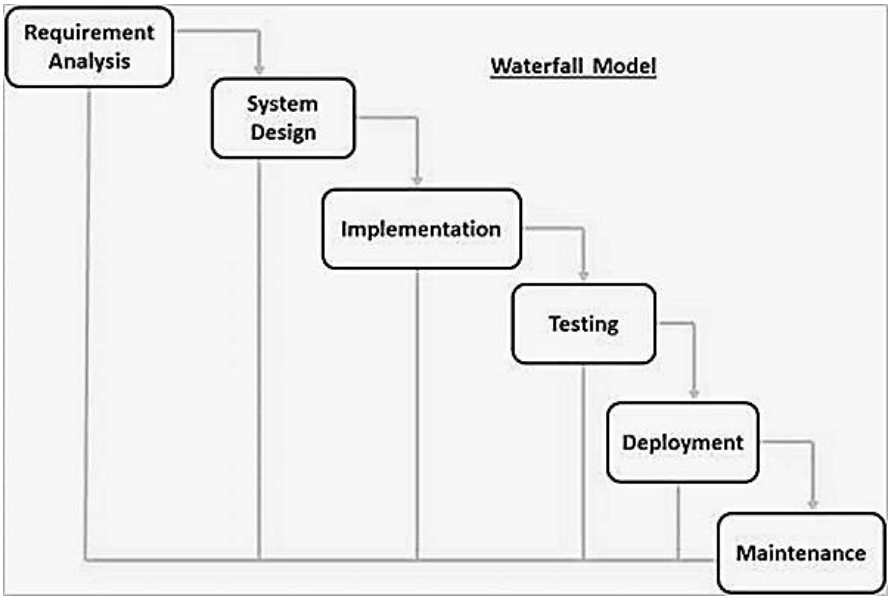

Figure 9. Waterfall Model

The Waterfall Model describes a sequential software development process in which progress is made steadily toward completion. It is a straightforward approach: complete one phase before moving on to the next; there is no going back. A testing phase for each development stage distinguishes it. Each stage begins after the previous one has ended. The project phases are requirement analysis, system design, integration and testing, deployment, and maintenance. The model used is the most suited for the development. It scopes the software's static relativity and allows departmentalization and control. A schedule with deadlines for each stage of development is established, and a product can progress through the development process model phases one by one. Each development moves from concept through design, implementation, testing, and deployment and ends up at operation and maintenance – each phase of development proceeds in strict order.

Phases

Requirement Gathering and Analysis

During the gathering and analysis phase, the researchers gathered information on potential system requirements to be developed and documented by conducting an interview and on-site visit to ensure that the real scenario was incorporated into the proposed system. Consultation with the target client was also conducted in order to make the system more realistic and effective in meeting their needs.

System Design

Each phase's requirements, specifications, and system design are studied and prepared during the system design phase. The system design aided in the hardware specification, system requirements, and overall system architecture.

Implementation

The system and units that were initially developed are integrated into the next phase during the implementation phase. Each unit created is tested and debugged for functionality, and any errors are fixed so that the application can function.

Integration and Testing

In the integration and testing phase, all the units that are developed are integrated after testing each unit. Post-integration of the system software is tested for any bugs, errors, and failures. It is done to prevent problem encounters before being presented to the client.

Deployment

In the deployment of the system, all the functional and non-functional are done, and the application is ready to be deployed and released in the school environment.

Maintenance

Finally, during the maintenance phase, some issues that arise in the client environment are resolved, and patches are released to improve the applications for future versions.

The main difference is that all phases are cascaded to each other, and progress is tracked, as seen as the phases flow downwards. Because the outcome serves as the input for the next phase, it does not overlap with the next phase. And the development of each phase is functional, with errors and failures fixed ahead of time, ensuring the application's success.

Software Specification

Shown in Table 4 are the software specifications for the development of a Web-Based Laboratory Inventory Management System for Teaching and Learning.

Table 4. Software Specification

Software	Description/Specification
Operating System	Windows 10 64 bit or latest
Xampp Server	Version 7.4
Code Editor	Visual Studio Code
Web Browser	Google Chrome

Hardware Specification

Table 5 presents the minimum hardware specifications for developing the Web-Based Laboratory Inventory Management System for Teaching and Learning.

Table 5. Hardware Specification

Hardware	**Description/Specification**
Processor	Intel Core i3
RAM	4gb
HDD	1000gb
Monitor	16 inches
Keyboard/Mouse	USB
Printer	Epson L120

Testing

The developed Web-Based Laboratory Inventory Management System for Teaching and Learning was tested after development. Unit testing was performed to ensure that the system worked as intended. Compatibility testing was also performed to ensure that the web-based system can be run on a Windows-based computer using a browser such as Google Chrome.

Description of the System

The developed system generates a user-friendly design for users of all types. The system's front end is built with PHP and other web frameworks. For the system to function, it uses bootstrap frameworks and the JavaScript scripting language. The developed system is web-responsive and data-driven, with database functionality provided by MySQL. The developed system makes use of QR Codes to improve inventory accuracy and monitoring of items in the laboratory.

Implementation Plan

Figure 10 presents the implementation plan of the project. This covers from the planning phase to evaluation of the project.

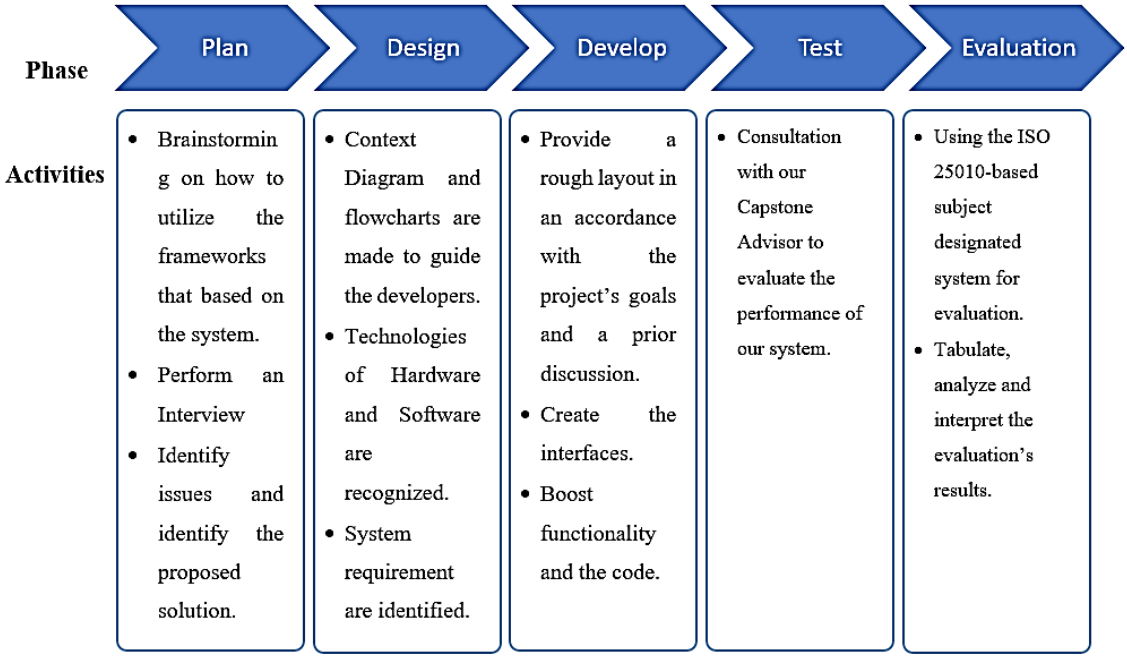

Figure 10. Implementation Plan

Implementation Result

After project completion, the panel evaluators tested the system to assess the system performance and identify its limitations and areas for improvement. The ratings of the panelists were based on the evaluation form, which was used to determine whether the various areas meet the system requirements of different ISO 25010 characteristics. Table 6 is the result of the evaluation. Frequency, mean and modal interpretation were used in the treatment of data using the corresponding Likert Scale provided below.

Functionality Indicator

Limits of Scale	Qualitative Description
4.21-5.00	Fully Functional
3.21-4.20	Mostly Functional
2.61-3.20	Functional
1.81-2.60	Slightly Functional
1.0-1.8	Not Functional

Efficiency Indicator

Limits of Scale	Qualitative Description
4.21-5.00	Very Efficient
3.21-4.20	Mostly Efficient
2.61-3.20	Efficient
1.81-2.60	Almost Efficient
1.0-1.8	Not Efficient

Usability Indicator

Limits of Scale	Qualitative Description
4.21-5.00	Very Usable
3.21-4.20	Mostly Usable
2.61-3.20	Usable
1.81-2.60	Almost Usable
1.0-1.8	Not Usable

Maintainability Indicator

Limits of Scale	Qualitative Description
4.21-5.00	Strongly Agree
3.21-4.20	Mostly Agree
2.61-3.20	Agree
1.81-2.60	Slightly Agree
1.0-1.8	Strongly Agree

Reliability Indicator

Limits of Scale	Qualitative Description
4.21-5.00	Very Reliable
3.21-4.20	Mostly Reliable
2.61-3.20	Reliable
1.81-2.60	Almost Reliable
1.0-1.8	Not Reliable

Portability Indicator

Limits of Scale	Qualitative Description
4.21-5.00	Strongly Agree
3.21-4.20	Mostly Agree
2.61-3.20	Agree
1.81-2.60	Slightly Agree
1.0-1.8	Strongly Agree

Security Indicator

Limits of Scale	Qualitative Description
4.21-5.00	Very Secure
3.21-4.20	Mostly Secure
2.61-3.20	Secure
1.81-2.60	Almost Secure
1.0-1.8	Not Secure

Compatibility Indicator

Limits of Scale	Qualitative Description
4.21-5.00	Very Compatible
3.21-4.20	Mostly Compatible
2.61-3.20	Compatible
1.81-2.60	Almost Compatible
1.0-1.8	Not Compatible

Table 6. Summary of User Evaluation on "Web-Based Laboratory Inventory Management System for Teaching and Learning"

CHARACTERISTICS	MEAN	INTERPRETATION
Functionality	3.93	Mostly Functional
Reliability	3.31	Mostly Reliable
Usability	3.5	Mostly Usable
Efficiency	3.58	Mostly Efficient
Maintainability	3.25	Mostly Agree
Portability	3.25	Mostly Agree
Security	3.43	Mostly Secure
Compatibility	3.37	Mostly Compatible
GRAND MEAN	**3.45**	

Table 6 displays the evaluation results given by the panelists who attended the presentation in terms of the stages involved in developing a Web-based Laboratory Inventory Management System for Teaching and Learning. The evaluators agreed with a mean of 3.93 that the system performs the required tasks, the results are expected, it can interact with other systems, and it prevents unauthorized access. The evaluators agreed that the system could handle errors, with a mean score of 3.31. With a mean score of 3.5, the evaluators agreed that the system is simple to understand for the user. The evaluators agreed, with a mean of 3.58, that the system responds quickly to the user and that the software uses resources efficiently. The evaluators agreed that system faults could be easily recognized and tested, with a mean of 3.25. With a mean of 3.25, the evaluators agreed that the system is simple to install and move to another environment. The evaluators agreed that the system could ensure data confidentiality, with a mean score of 3.43. The evaluators agreed that the system performs its required functions efficiently while sharing a familiar environment, with a mean of 3.37. Following the results, the evaluators mostly agreed that the system meets the ISO characteristics and is primarily functional, mostly reliable, mostly usable, mostly efficient, mostly agreed to maintainability and portability, mostly secure, and mostly compatible.

Chapter V

RECOMMENDATIONS

Based on the results of the system evaluation, the "Web-based Laboratory Inventory Management System for Teaching and Learning" is recommended for implementation. However, to further enhance the system, the following are recommended for future researchers:

1. Provision of SMS notification when reservation is accepted or denied, item is released or returned, and other.
2. Provision of system notification if consumables are almost depleted.
3. To incorporate consumable supplies in the system.

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Appendices

Relevant Source Code

[Add Members]

```
$(".frm_addmember").submit(function(e){
    e.preventDefault();

    var formData = new FormData($(this)[0]);

    console.log(formData);

    $.ajax({
        type: "POST",
        url: "../class/add/add",
        data: formData,
        contentType: false,
        cache: false,
        processData:false,
    })
    .done(function(data){
        if(data == 1){
            toastr.success("Members added successfully.");
            table_member.ajax.reload(null,false);
            $('.member-side').toggle(effect, options, duration);
        }else if(data == 0){
            toastr.error("Failed to add member");
            $('.member-side').toggle(effect, options, duration);
        }
    });

});
```

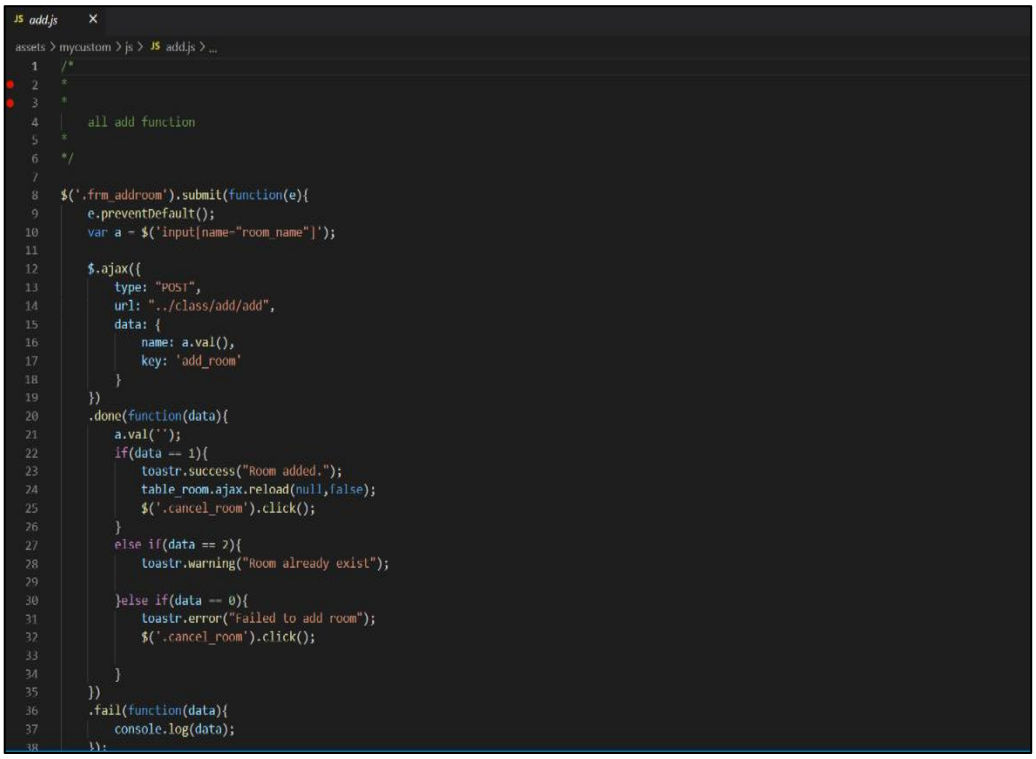
Database Connection

config.php

member > config.php

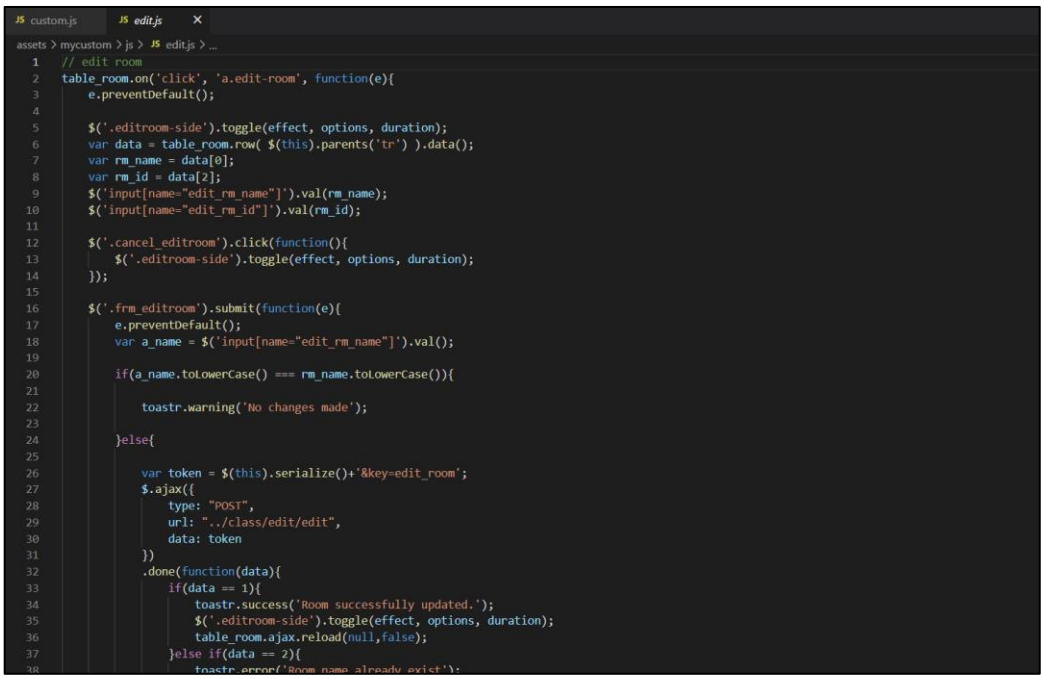
```
1   <?php
2   $servername = "localhost";
3   $username = "root";
4   $password = "";
5   $dbname = "lms";
6
7   $db=mysqli_connect($servername,$username,$password,$dbname);
8
9
10  ?>
```

Add

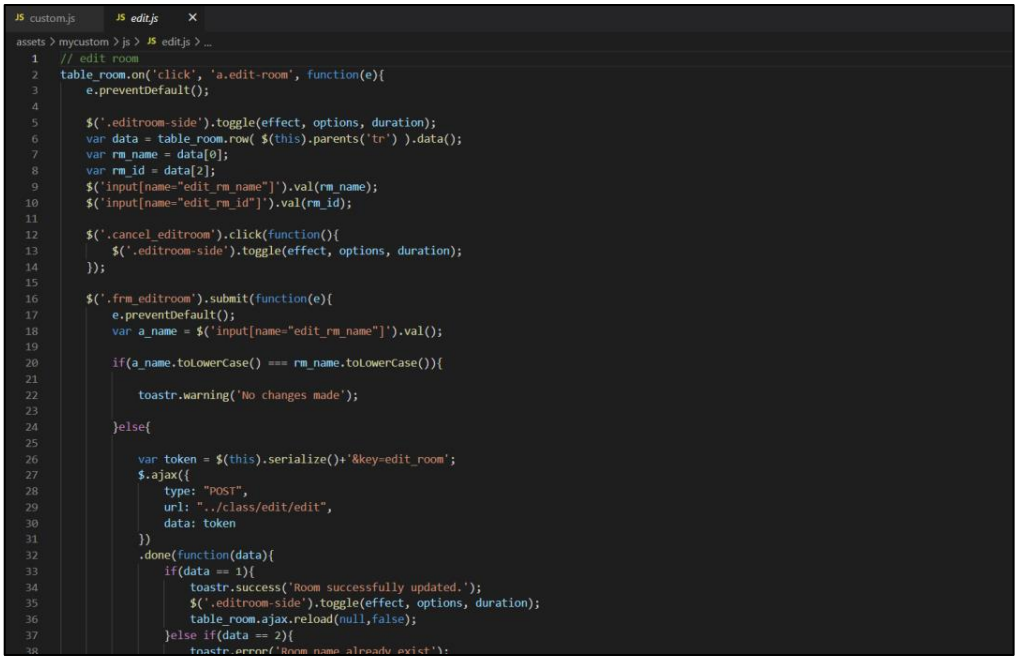


```
/*
*
*
    all add function
*
*/

$('.frm_addroom').submit(function(e){
    e.preventDefault();
    var a = $('input[name="room_name"]');

    $.ajax({
        type: "POST",
        url: "../class/add/add",
        data: {
            name: a.val(),
            key: 'add_room'
        }
    })
    .done(function(data){
        a.val('');
        if(data == 1){
            toastr.success("Room added.");
            table_room.ajax.reload(null,false);
            $('.cancel_room').click();
        }
        else if(data == 2){
            toastr.warning("Room already exist");

        }else if(data == 0){
            toastr.error("Failed to add room");
            $('.cancel_room').click();

        }
    })
    .fail(function(data){
        console.log(data);
    });
```

Edit / Update



```
// edit room
table_room.on('click', 'a.edit-room', function(e){
    e.preventDefault();

    $('.editroom-side').toggle(effect, options, duration);
    var data = table_room.row( $(this).parents('tr') ).data();
    var rm_name = data[0];
    var rm_id = data[2];
    $('input[name="edit_rm_name"]').val(rm_name);
    $('input[name="edit_rm_id"]').val(rm_id);

    $('.cancel_editroom').click(function(){
        $('.editroom-side').toggle(effect, options, duration);
    });

    $('.frm_editroom').submit(function(e){
        e.preventDefault();
        var a_name = $('input[name="edit_rm_name"]').val();

        if(a_name.toLowerCase() === rm_name.toLowerCase()){

            toastr.warning('No changes made');

        }else{

            var token = $(this).serialize()+'&key=edit_room';
            $.ajax({
                type: "POST",
                url: "../class/edit/edit",
                data: token
            })
            .done(function(data){
                if(data == 1){
                    toastr.success('Room successfully updated.');
                    $('.editroom-side').toggle(effect, options, duration);
                    table_room.ajax.reload(null,false);
                }else if(data == 2){
                    toastr.error('Room name already exist');
```


custom.js
edit.js
assets > mycustom > js > edit.js > ...
// edit room
table_room.on('click', 'a.edit-room', function(e){
e.preventDefault();
$('.editroom-side').toggle(effect, options, duration);
var data = table_room.row($(this).parents('tr')).data();
var rm_name = data[0];
var rm_id = data[2];
$('input[name="edit_rm_name"]').val(rm_name);
$('input[name="edit_rm_id"]').val(rm_id);
$('.cancel_editroom').click(function(){
$('.editroom-side').toggle(effect, options, duration);
});
$('.frm_editroom').submit(function(e){
e.preventDefault();
var a_name = $('input[name="edit_rm_name"]').val();
if(a_name.toLowerCase() === rm_name.toLowerCase()){
toastr.warning('No changes made');
}else{
var token = $(this).serialize()+'&key=edit_room';
$.ajax({
type: "POST",
url: "../class/edit/edit",
data: token
})
.done(function(data){
if(data == 1){
toastr.success('Room successfully updated.');
$('.editroom-side').toggle(effect, options, duration);
table_room.ajax.reload(null,false);
}else if(data == 2){

Evaluation Tool or Test Documents

INFORMATION AND DESCRIPTIVE SYSTEM ISO 25010 EVALUATION FORM

Likert Scale

Functionality Indicator

Limits of Scale	Qualitative Description
4.21-5.00	Fully Functional
3.21-4.20	Mostly Functional
2.61-3.20	Functional
1.81-2.60	Slightly Functional
1.0-1.8	Not Functional

Efficiency Indicator

Limits of Scale	Qualitative Description
4.21-5.00	Very Efficient
3.21-4.20	Mostly Efficient
2.61-3.20	Efficient
1.81-2.60	Almost Efficient
1.0-1.8	Not Efficient

Usability Indicator

Limits of Scale	Qualitative Description
4.21-5.00	Very Usable
3.21-4.20	Mostly Usable
2.61-3.20	Usable
1.81-2.60	Almost Usable
1.0-1.8	Not Usable

Maintainability Indicator

Limits of Scale	Qualitative Description
4.21-5.00	Strongly Agree
3.21-4.20	Mostly Agree
2.61-3.20	Agree
1.81-2.60	Slightly Agree
1.0-1.8	Strongly Agree

Reliability Indicator

Limits of Scale	Qualitative Description
4.21-5.00	Very Reliable
3.21-4.20	Mostly Reliable
2.61-3.20	Reliable
1.81-2.60	Almost Reliable
1.0-1.8	Not Reliable

Portability Indicator

Limits of Scale	Qualitative Description
4.21-5.00	Strongly Agree
3.21-4.20	Mostly Agree
2.61-3.20	Agree
1.81-2.60	Slightly Agree
1.0-1.8	Strongly Agree

Security Indicator

Limits of Scale	Qualitative Description
4.21-5.00	Very Secure
3.21-4.20	Mostly Secure
2.61-3.20	Secure
1.81-2.60	Almost Secure
1.0-1.8	Not Secure

Compatibility Indicator

Limits of Scale	Qualitative Description
4.21-5.00	Very Compatible
3.21-4.20	Mostly Compatible
2.61-3.20	Compatible
1.81-2.60	Almost Compatible
1.0-1.8	Not Compatible

SOUTHERN LEYTE STATE UNIVERSITY

MAIN CAMPUS
San Roque, Sogod, Southern Leyte
Email: president@southernleytestateu.edu.ph
Website: www.southernleytestateu.edu.ph

EVALUATION SHEET

Group: _____

Title: _____

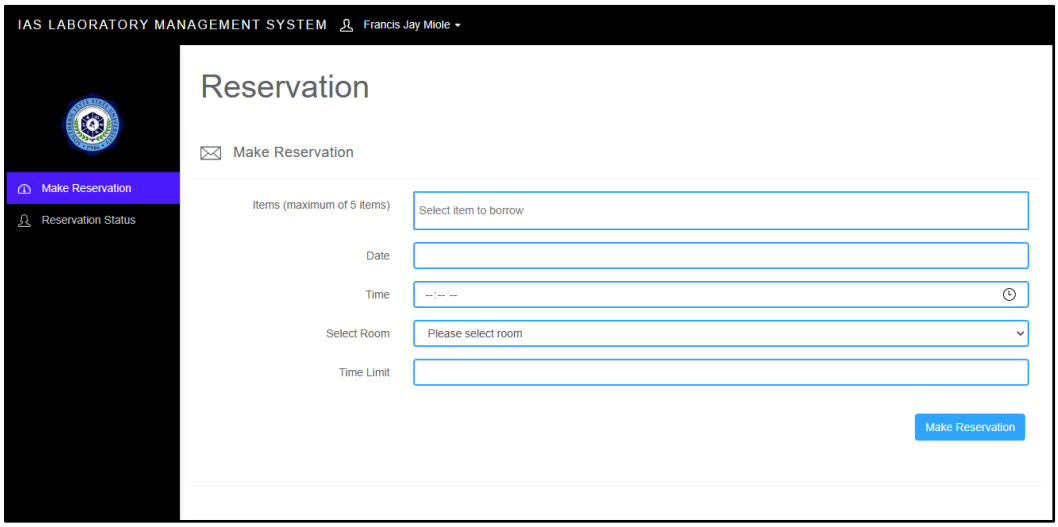
Criteria		**Score**				
Characteristic	*Sub Characteristic*	***1***	***2***	***3***	***4***	***5***
Functionality	The system performs the tasks required.					
	The result is as expected.					
	The system interacts with another system.					
	The system prevents unauthorized access.					
Reliability	Most of the faults in the system have been eliminated over time.					
	The system is capable of handling errors.					
	The system notifies the user about wrong data entry.					
	The software resumes working and restores lost data after a failure.					
Usability	The user comprehends how to use the system easily.					
	The user learns to use the system easily.					
	The user utilizes the system without much effort.					
	The system's interface looks good.					
Efficiency	The system responds quickly to the user.					
	The system's execution time is appropriate.					
	The software utilizes resources efficiently.					
Maintainability	The system faults can be easily diagnosed.					
	The system continues functioning when changes are made.					
	The software can be tested easily.					
Portability	The system can be moved to other environments.					
	The software can be installed easily. *(for administrator)*					
	The software can replace easily other software.					
Security	The software ensures confidentiality of data					
	The software prevents unauthorized access and modification to computer programs and/or data					
	The software requires authentication of users					
	A system log is maintained.					
Compatibility	The software performs its required functions efficiently while sharing a common environment and resources without negatively impacting any other product/s.					
	The software allows two or more systems, products, or components to exchange and use the information.					

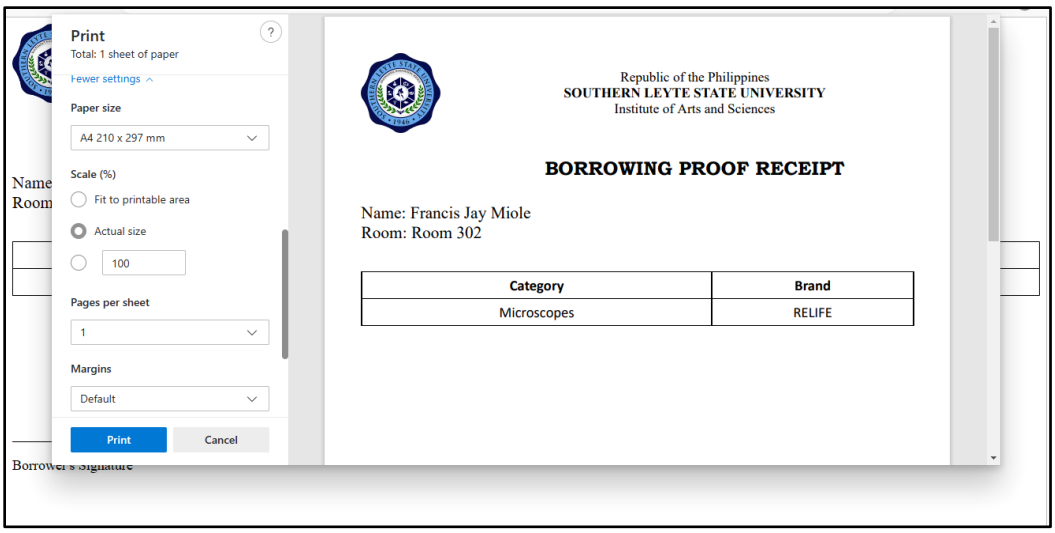
_____

Evaluator's Name *(optional)* and Signature

Date: _____

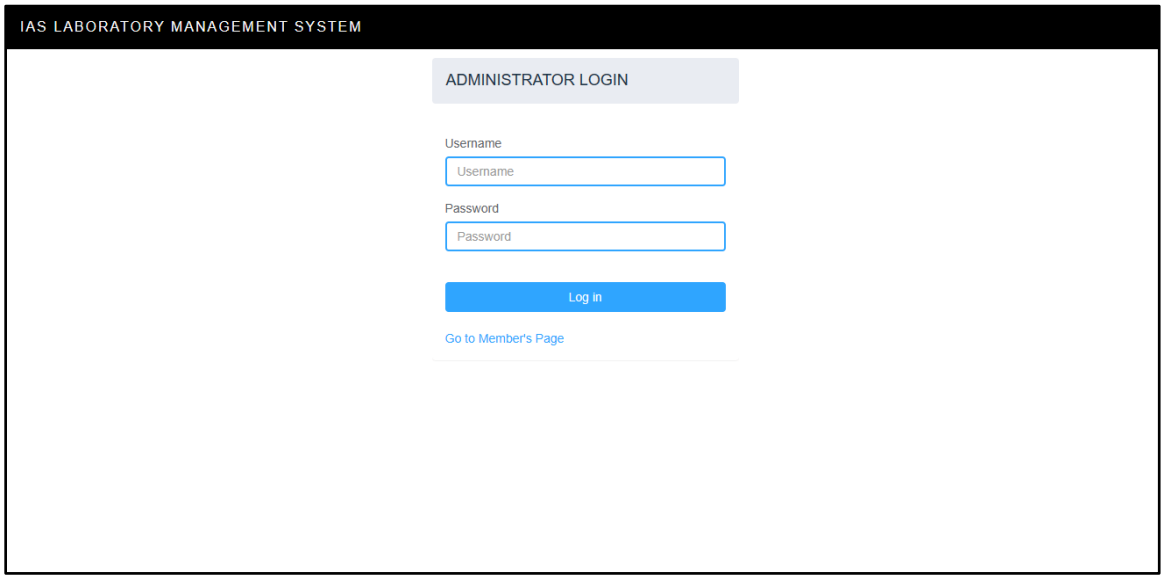
Sample input/output/Reports



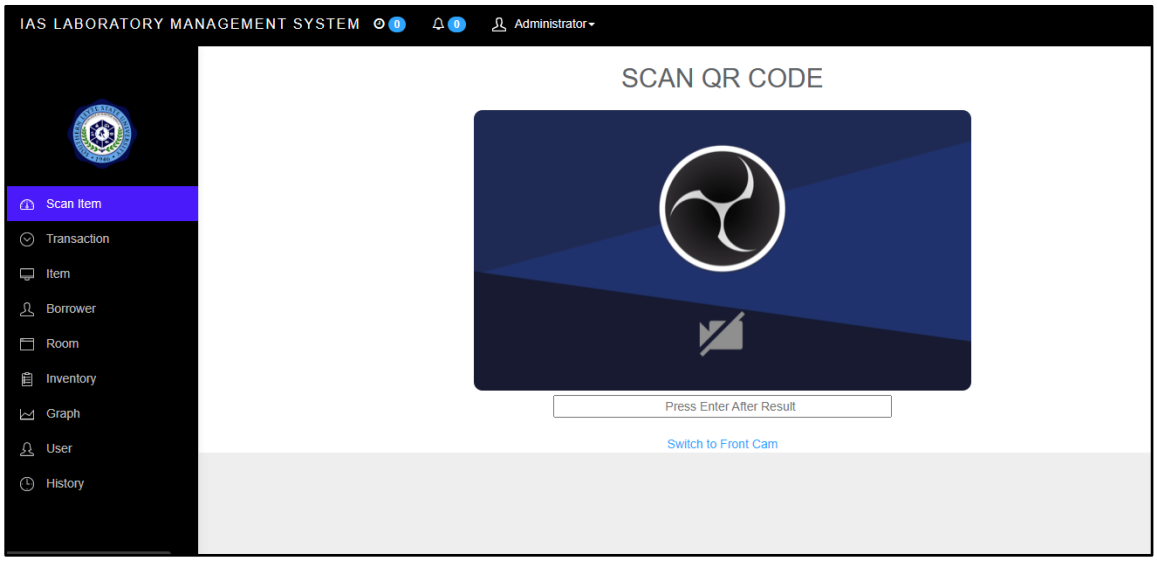


Users Guide

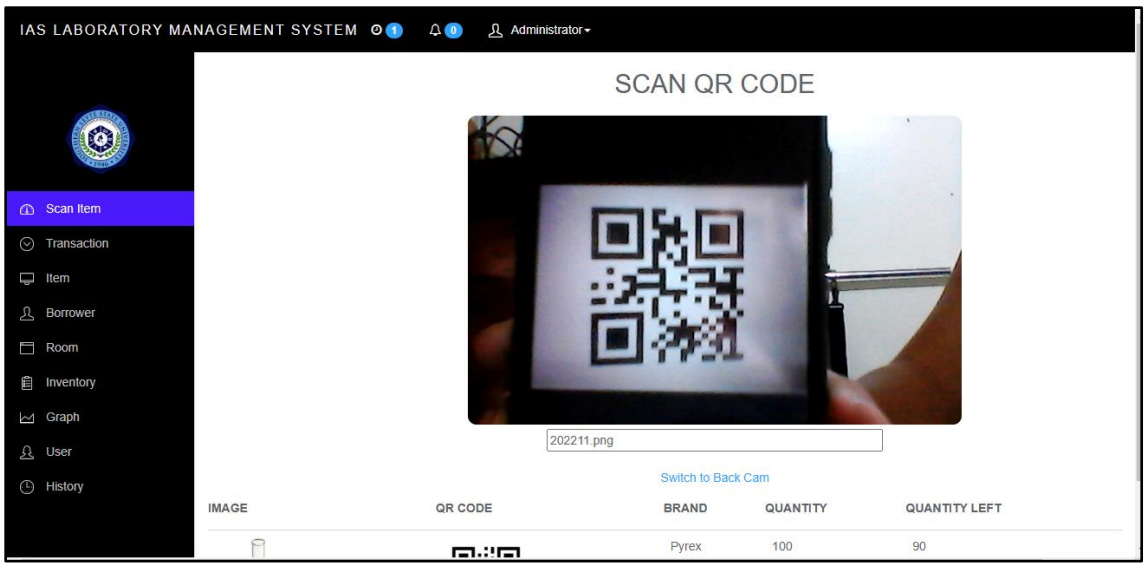
Administrator:



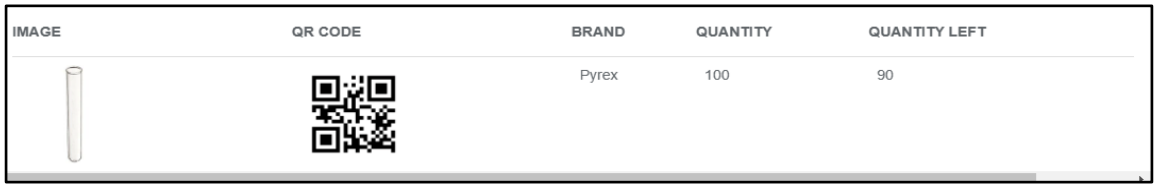
1. The administrator will log in

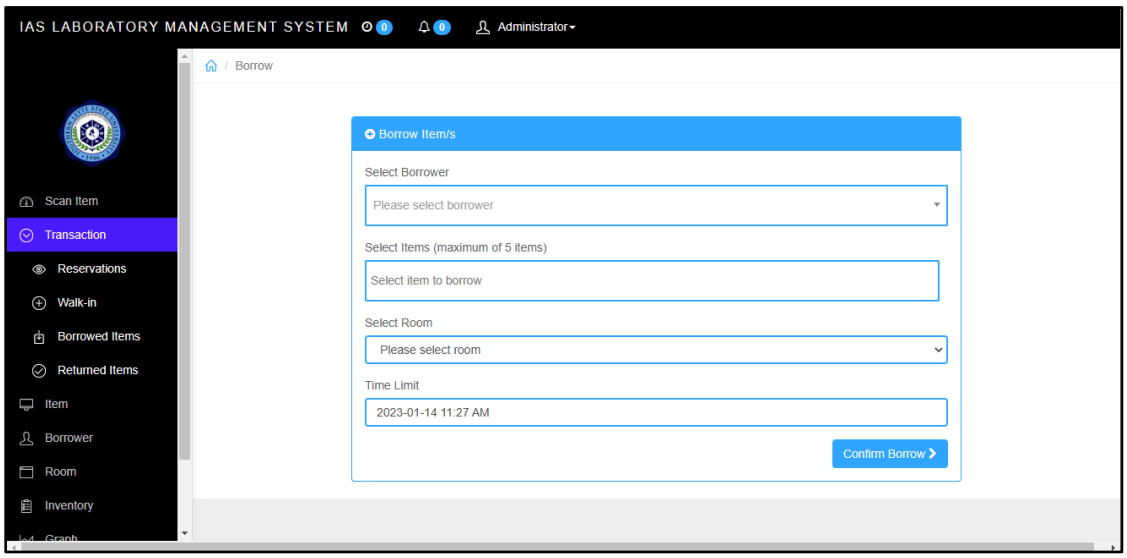


2. The administrator can scan the item

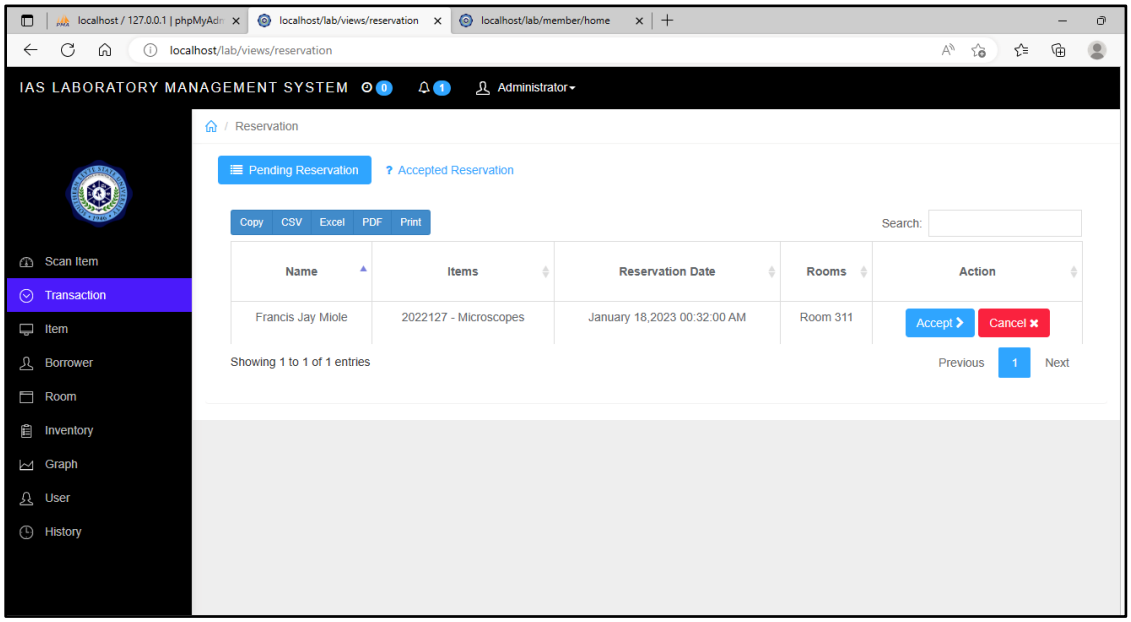


3. A QR Code is needed to scan the item in order to view the information provided below

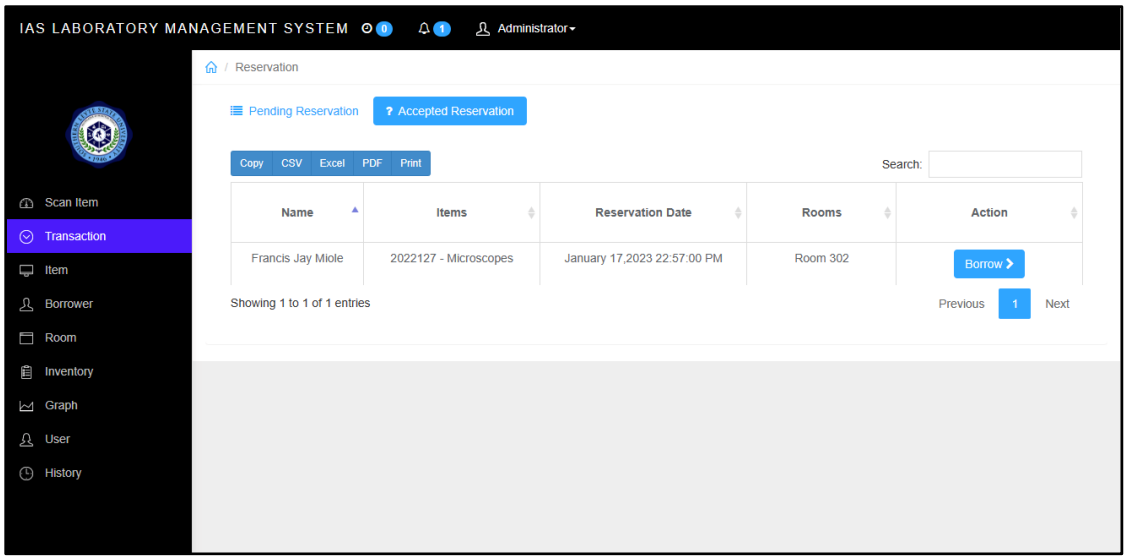




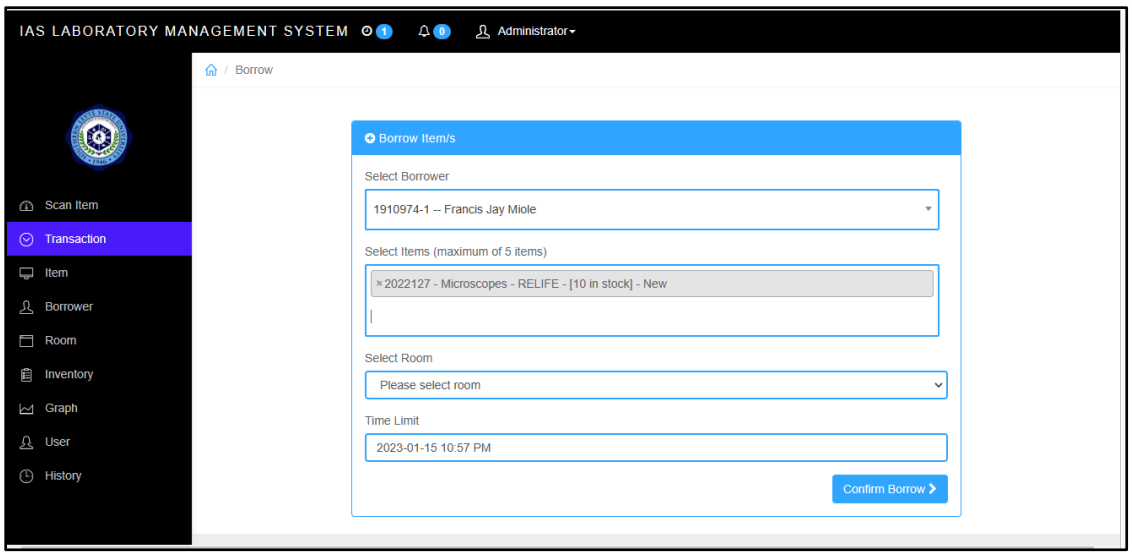
4. A transaction page is provided that contains reservation tab, walk-in, borrowed items and returned of items.



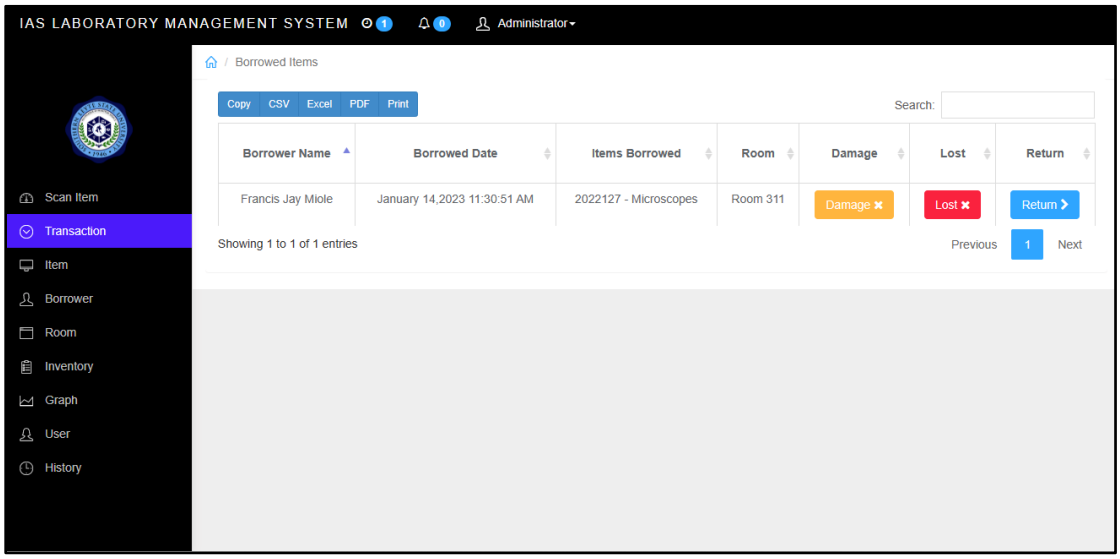
5. Use the Reservation tab to manage the borrower's reservation and decide whether or not to accept it.



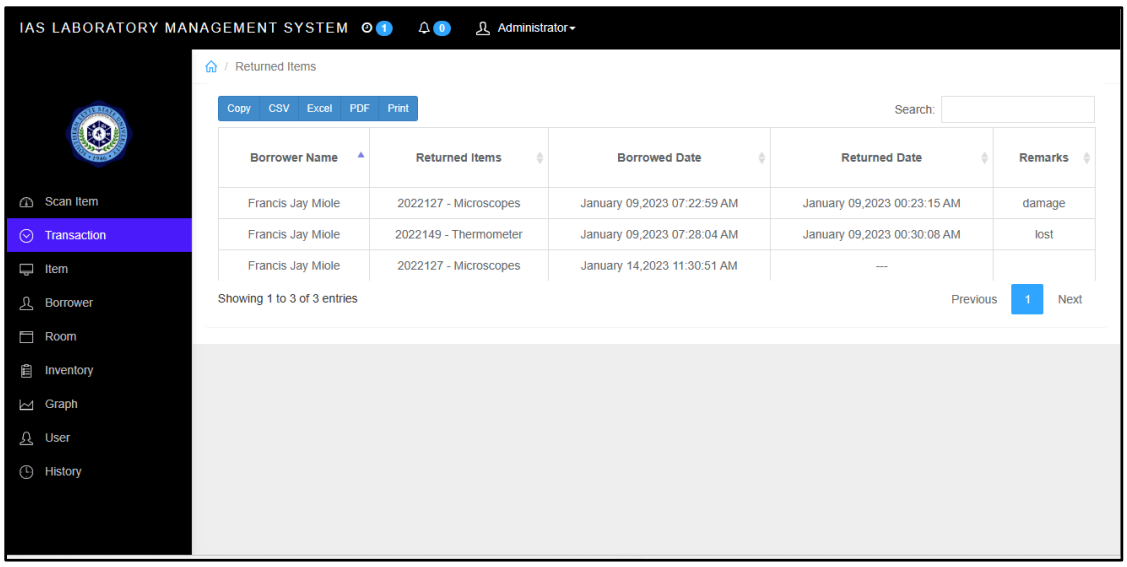
6. Reservation tab - accepted reservation



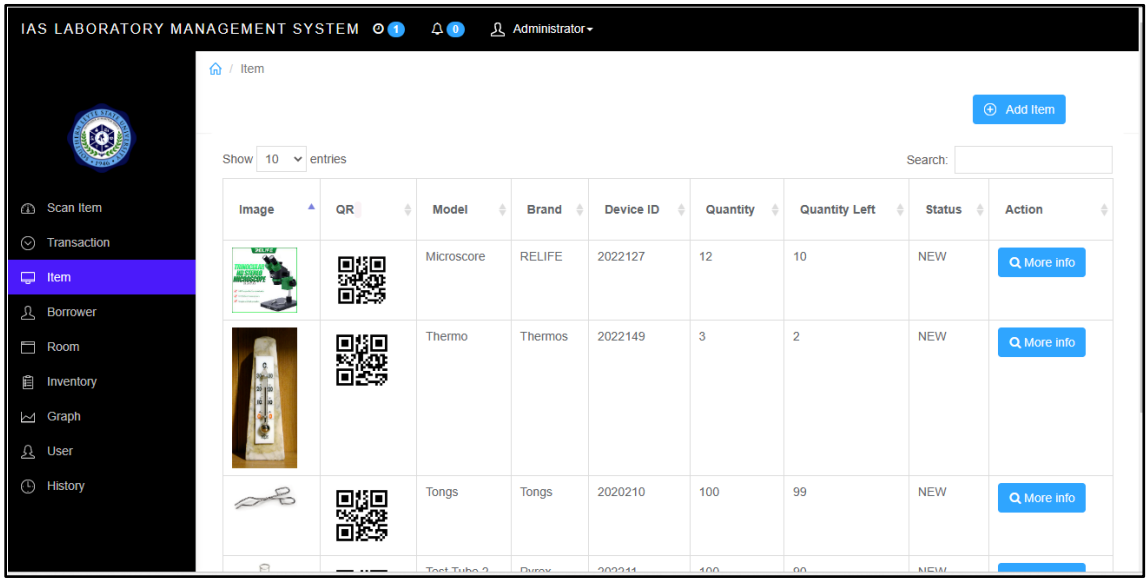
7. Walk in



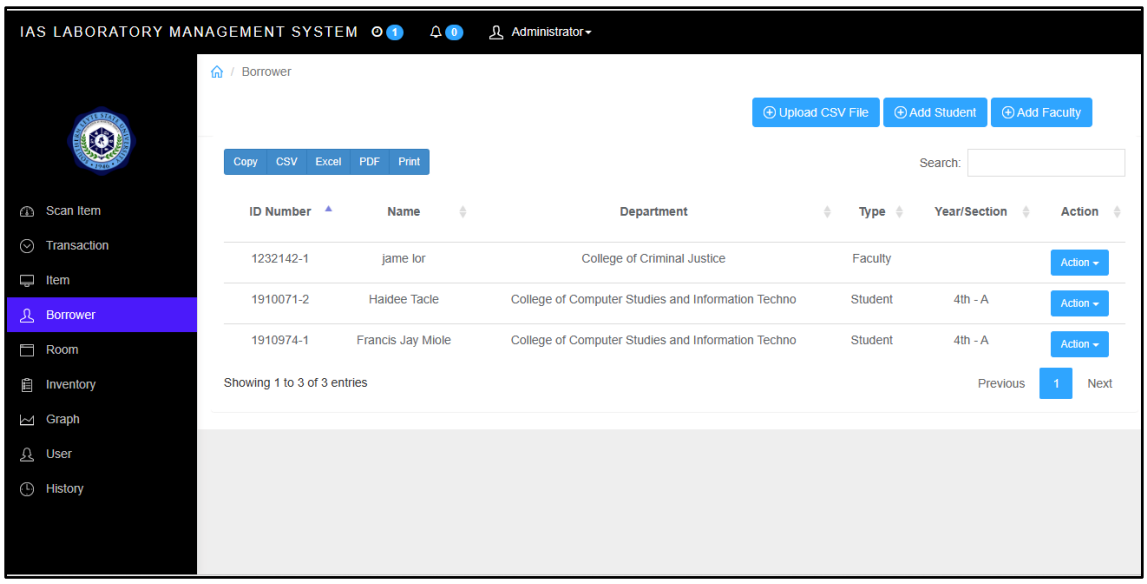
8. Borrowed Items



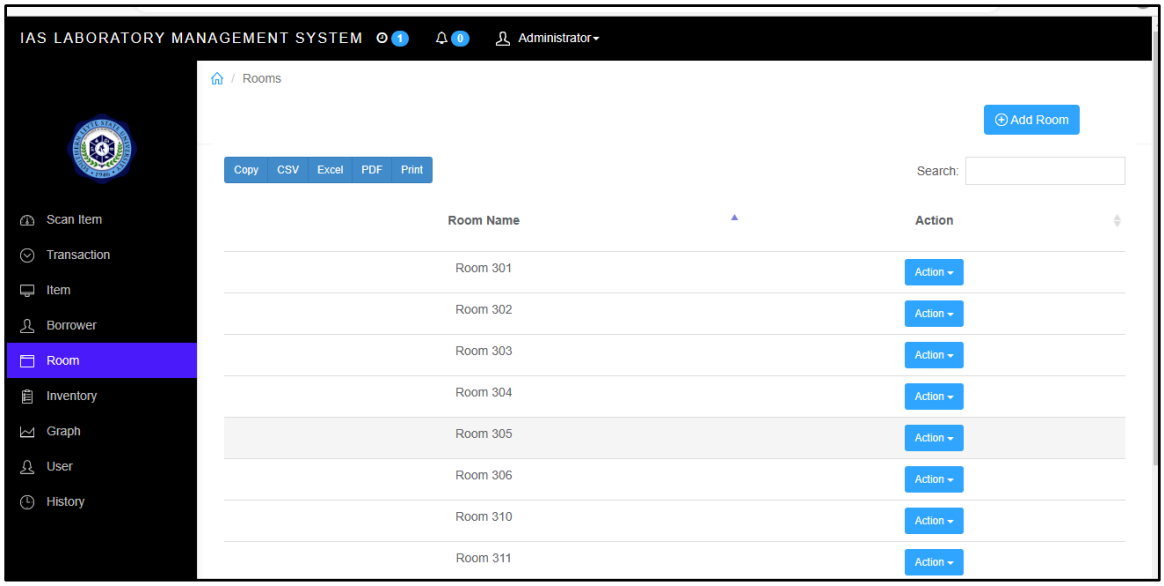
9. Returned Items



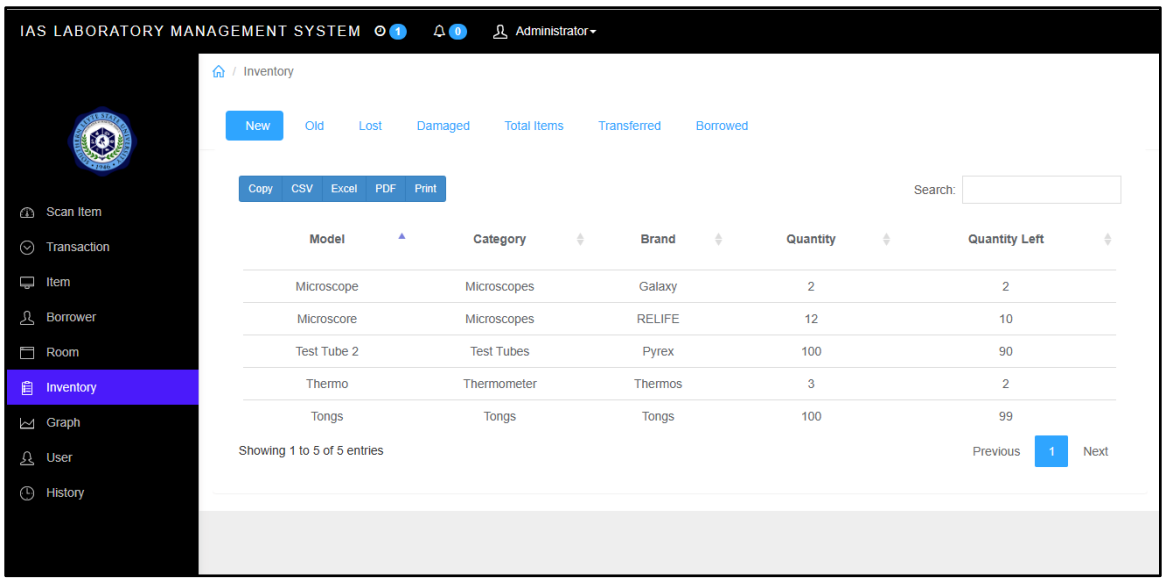
10. Administrator can add an items



11. Administrator can add borrowers

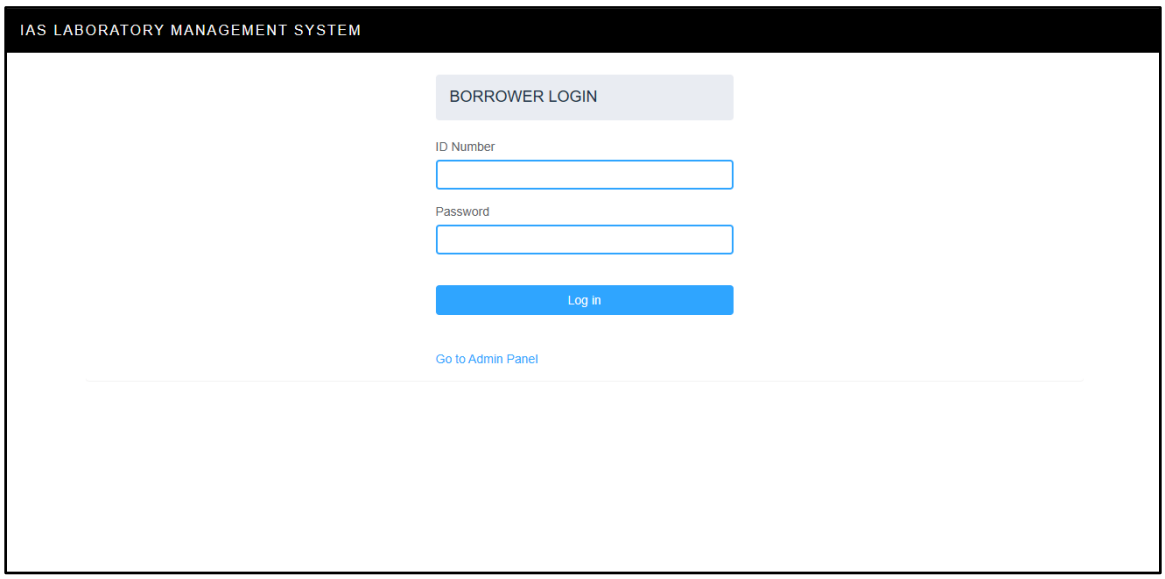


12. Administrator can add rooms

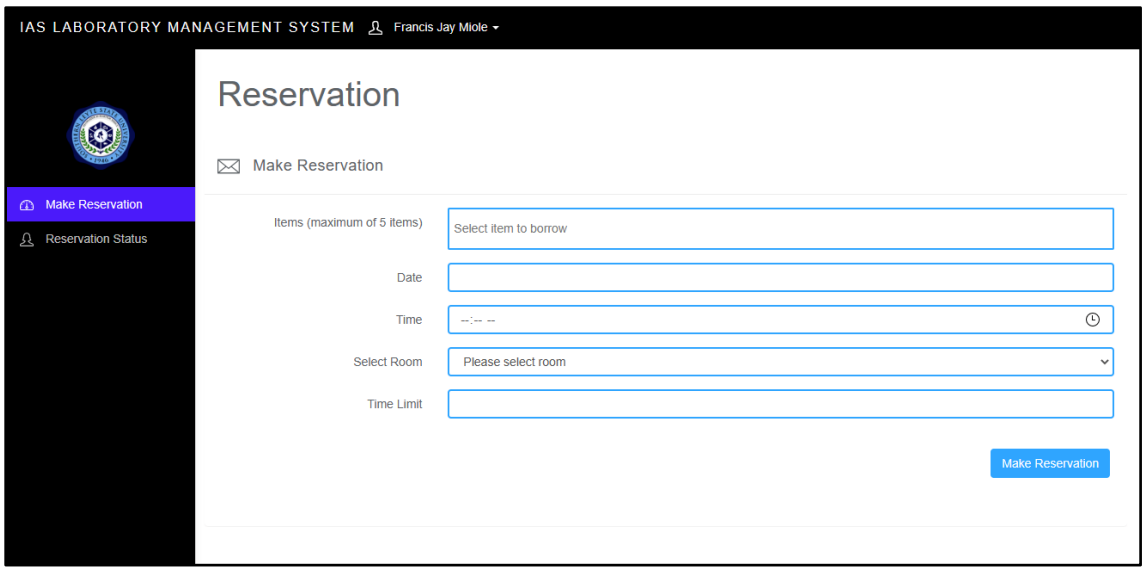


13. The administrator can view the supply availability.

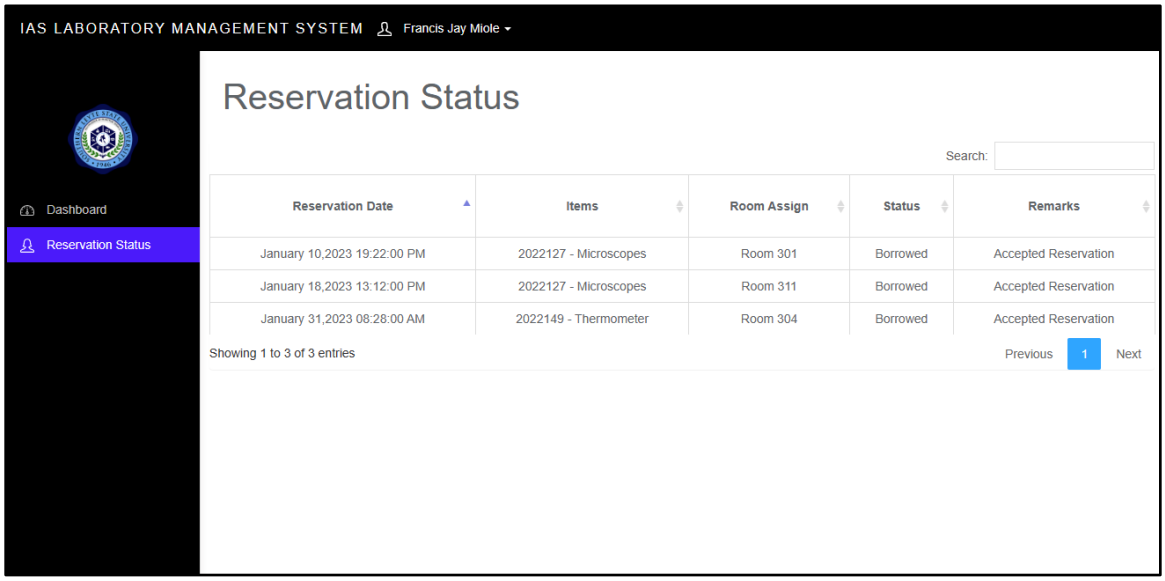
Borrowers:



1. Borrowers can access their accounts by logging in.



2. Borrowers can make their reservation



3. Borrowers can check the status of their reservations.

CURRICULUM VITAE

MAY-AN C. SARAUSA

Biasong, Libagon Southern Leyte

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Mobile Number: +639120665587

PERSONAL DATA

Date of Birth	:	**January 10, 2001**
Place of Birth	:	**Hilongos, General Hospital**
Civil Status	:	**Single**
Citizenship	:	**Filipino**
Religious Affiliation	:	**Roman Catholic**
Language/s Spoken	:	**Cebuano, Filipino, English**

EDUCATIONAL BACKGROUND:

Undergraduate Degree:

Bachelor of Science in Information Technology-Major in Programming

Southern Leyte State University-Main Campus **2019 - Present**

San Roque, Sogod, Southern Leyte

Secondary:

Libagon Academy Foundation Inc.

Talisay, Libagon Southern Leyte

Elementary:

Libagon Central Elementary School

Jubas, Libagon Southern Leyte

CURRICULUM VITAE

JAMES G. LOR

Talisay, Hilongos, Leyte

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Mobile Number: +639606642804

PERSONAL DATA

Date of Birth	: **July 21, 2000**
Place of Birth	: **San Pedro, Laguna**
Civil Status	: **Single**
Citizenship	: **Filipino**
Religious Affiliation	: **Roman Catholic**
Language/s Spoken	: **Cebuano, Filipino, English**

EDUCATIONAL BACKGROUND:

Undergraduate Degree:

Bachelor of Science in Information Technology-Major in Programming

Southern Leyte State University-Main Campus **2019 - Present**

San Roque, Sogod, Southern Leyte

Secondary:

Hilongos National Vocational School

R.V. Fulache Street, Hilongos, Leyte

Elementary:

Talisay Elementary School

Brgy. Talisay, Hilongos, Leyte

CURRICULUM VITAE

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Mobile Number: +639231403373

PERSONAL DATA

Date of Birth	:	**May 6, 2000**
Place of Birth	:	**San Isidro, Tomas Oppus, Southern Leyte**
Civil Status	:	**Single**
Citizenship	:	**Filipino**
Religious Affiliation	:	**Roman Catholic**
Language/s Spoken	:	**Cebuano, Filipino, English**

EDUCATIONAL BACKGROUND:

Undergraduate Degree:

Bachelor of Science in Information Technology-Major in Programming

Southern Leyte State University- Main Campus **2019 - Present**

San Roque, Sogod, Southern Leyte

Secondary:

Southern Leyte State University- College of Teachers Education

San Isidro, Tomas Oppus, Southern Leyte

Elementary:

San Isidro Elementary School

San Isidro, Tomas Oppus, Southern Leyte

CURRICULUM VITAE

HAIDEE F. TACLE

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PERSONAL DATA

Date of Birth	:	**April 20, 2001**
Place of Birth	:	**Tinago, Tomas Oppus, Southern Leyte**
Civil Status	:	**Single**
Citizenship	:	**Filipino**
Religious Affiliation	:	**Roman Catholic**
Language/s Spoken	:	**Cebuano, Filipino, English**

EDUCATIONAL BACKGROUND:

Undergraduate Degree:

Bachelor of Science in Information Technology-Major in Networking

Southern Leyte State University-Main Campus **2019 - Present**

San Roque, Sogod, Southern Leyte

Secondary:

Dr. Rath Memorial Institute Foundation Inc.

Cambite, Tomas Oppus, Southern Leyte

Elementary:

Cambite Elementary School

Cambite, Tomas Oppus, Southern Leyte

CURRICULUM VITAE

ISIDRO M. SIERVO

Purok 1, Hibod-hibod, Sogod, Southern Leyte

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PERSONAL DATA

Date of Birth	:	**August 21, 1997**
Place of Birth	:	**Cauayan , Negros Occidental**
Civil Status	:	**Single**
Citizenship	:	**Filipino**
Religious Affiliation	:	**Born Again Christian**
Language/s Spoken	:	**Cebuano, Filipino, English**

EDUCATIONAL BACKGROUND:

Tertiary:

ICCT COLLEGES Foundation Inc.

Associate in Computer Technology **2015 - 2017**

V.V Soliven Avenue II, Cainta Rizal

Bachelor of Science in Information Technology-Major in Programming

Southern Leyte State University **2019 - Present**

San Roque, Sogod, Southern Leyte

Secondary:

Maximo L. Gatlabayan Memorial National High School

Antipolo, Rizal

Elementary:

Justice Vicente Santiago Elementary School

Sta Ana. Ampid 2 San Mateo, Rizal

CURRICULUM VITAE

FRANCIS JAY MIOLE

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PERSONAL DATA

Date of Birth	:	**March 21, 2001**
Place of Birth	:	**Maasin City**
Civil Status	:	**Single**
Citizenship	:	**Filipino**
Religious Affiliation	:	**Roman Catholic**
Language/s Spoken	:	**English, Filipino, Cebuano**

EDUCATIONAL BACKGROUND:

Undergraduate Degree:

Bachelor of Science in Information Technology-Major in Programming

Southern Leyte State University **2019 - Present**

San Roque, Sogod, Southern Leyte

Secondary:

Consolation National High School

Salvacion, Sogod, Southern Leyte

Elementary:

Consolacion Elementary School

Salvacion, Sogod, Southern Leyte