



Laboratory Equipment Management System for Hardware courses in Technical College Matara. Diploma in ICT

A dissertation submitted for the diploma in information technology



SLKDEV - Group Two (2)

Technical college Matara

2023

Hardwar Lab Equipment Management System

1. Introduction

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1.1 Introduction

In today's world, with the rapid development of the information and communication technology field, all sectors are moving forward in the field by identifying new opportunities. Nowadays, due to the internet facilities and technical facilities, we can easily accomplish many tasks. Medical, educational, financial and other fields will also perform their tasks efficiently and effectively using this new technology. Among these, in the field of education, using information and communication technology facilities and internet facilities, the daily education activities of students can be carried out very effectively.

This makes their educational activities easier and they are able to explore new knowledge. We can computerize the existing methods of these educational institutions. But still in many organizations, this method is done according to the traditional method. But those processes can be complex and time-consuming tasks. In Sri Lanka, which is still a developing country, most of the organizations still carry out the same organizational activities in the traditional way.

Matara Meddawatta Technical College is an educational institution where most of the students are studying. In this technical college, the computer hardware laboratory equipment of the computer hardware laboratory equipment is stored, stored, removed and updated and the tasks are still done according to the manual method. But this method has problems with maintaining information. To maintain information in this computer hardware laboratory, books and documents such as IT lab Inventory, stock book and receiving order book etc. are used. Due to maintaining the information under the manual system, if any damage occurs to these books and documents, the information will be destroyed. And the recording of this information is done by

the laboratory staff. If there is any mistake or omission on the part of the staff, the wrong information will be recorded in the books. Then the information cannot be used effectively. Also, a year-end summary report should be obtained including all the information about the equipment of the computer hardware laboratory. As mentioned above, there is a risk regarding the security of the information due to the excesses that have arisen, so it is not possible to obtain a summary report. There is also a cost for books and documents.

It is proposed to computerize this system and establish a computer hardware management system to suppress the problems mentioned above. This proposed system provides security of information and the ability to obtain accurate information without delay. This enables the laboratory staff to carry out the functions of the computer hardware laboratory in an efficient manner. By being able to enter information about the equipment more securely and regularly into the system, it is possible to get a regular report and make regular decisions.

1.2 Problem Domain

The process of maintaining and updating data and information about computer equipment in the computer laboratory of Matara Maddawatta Technical college is carried out according to a manual method. The following processes are carried out in their laboratory process.

Here, the information about the newly acquired equipment in the laboratory will be recorded, the information about the updating of the equipment and the information about the removal and broken equipment will be included.

Also, at the end of the year a summary report should be obtained including all details about this equipment, for example the newly acquired computer equipment in the laboratory, the equipment to be removed from the laboratory and the broken computer equipment to be repaired.

This method is used in the computer lab as it is maintained in a manual way. But due to the inefficiency of this books, there is a problem regarding the security of the information. Outdated devices may not be compatible with new software, tools of operating systems this can lead to difficulties in testing, programming devices and analyzing results older devices may generate data in incompatible formats or with limited data storage capabilities. This makes it difficult to effectively manage and analyze data ensuring the compatibility of various computer components such as Hardware components, peripherals and software applications can be

challenging. New devices may not work well with older Hardware software, leading to compatibility issues and potential performance issues. Data stored on devices can be compromised when moved outside the laboratory.

Encryption, secure authentication and remote data wiping are critical to prevent data exposure if the device is lost or stolen. Devices may experience connectivity issues when moved to different locations. Incompatible or unreliable network connections can hinder the performance of the device, especially if it relies on cloud services or remote servers.

1.3 Motivation for the Project

As a solution to the problems mentioned above, instead of maintaining the information in the computer laboratory under a manual system, a more efficient and effective service can be obtained by maintaining a computerized information system as suggested. Especially by establishing this proposed new system, the information of the computer laboratory equipment is related. Security can be confirmed.

If it is necessary to obtain data about a certain device while maintaining information in the manual system. It will take a considerable amount of time. By installing the new proposed system, information about any required device can be obtained without delay under the search facility.

Also, the existing manual method can reduce the cost of I.T lab inventory, stock book, receiving order book used in maintaining information. The most special thing is that a summary report should be obtained at the end of the year, including information about new equipment introduced into the laboratory during the year, repaired equipment and equipment removed from the laboratory due to broken or other reasons.

In maintaining the information based on this existing manual method, there is a problem regarding the accuracy and security of the information. The proposed new computerized system ensures the security of information so a more accurate report can be obtained. By using the rapidly growing information and communication technology and internet facilities in today's world, we are able to get a more efficient service by avoiding problems. Therefore, effective service can be obtained by installing the proposed new system.

1.4 Aims and objectives of the proposed system

The objective of the proposed system is to develop laboratory equipment management system

For hardware courses Matara technical college through this system all the equipment assists in the laboratories are system all the equipment miniatous keeping marcher and equipment in

In good working order making efficient and effective use of equipment and resources. The main objective of this system is to computerize the existing manual system so waste time waste paper and find nothing wrong. Also, at the end leaving all the goods in the laboratory. Also, at the end of the year, one of the purposes of this is to check all the items available in the laboratory ** that day and get a report. Also review, maintenance, reporting, computerization of obsolete equipment information etc.

1.5 Scope of the project

This is project system suggest a solution to automate (computerized) the manual requirement process. The hardware laboratory. At this time, it usually maintained at this time, it usually maintained the details about computer hardware equipment by a manual system. They keep an inventory book and stock book for maintain them. But we saw the difficulties in that system and it was very difficult to store data correctly about equipment.

So, our group members planned about a computerized system for the hardware laboratory.

Equipment inventory management is a critical aspect of running a hardware laboratory effectively. It involves the systemic tracking , organization and maintains of all equipment and assets within the lab. Equipment maintenance encompasses a set of activities designed to keep machinery, instruments and devices in good working condition. The scope of equipment maintains includes. Equipment reservation and utilization management are essential for efficient and effective use of equipment and resources, especially in shared facility, laboratories and organization where equipment is a valuable asset.

1.6 Out line

Following is a brief description of the remaining chapters of the dissertation.

2. Background

- 2.1 Introduction
- 2.2 Review of present well-known hiring systems
- 2.3 Critical Analysis of the Similar Systems
- 2.4 Summary

2.1 Introduction

The background study is mainly considering the similar systems which are currently available on the internet when we talk about our proposed group project, we are asked to make a laboratory equipment management system for hardware courses in the Technical College Matara.

There are some systems which are used to maintain the equipment of the Computer Hardware Laboratory. The manual recruitment process has many drawbacks. Some of them are outdated devices may not be compatible with new software, tools or operating systems. This can lead to difficulties in testing, programming devices may generate data in incompatible formats or with limited data storage capabilities. The solution to these problems is a computerized system for maintaining the equipment in Hardware laboratory. Computerization make it easy.

2.2 Review of present well-known hiring systems

Some hardware management system methods are given below and some of them can be applied to this system.

1. IT Asset Management (ITAM) Software

IT Asset Management (ITAM) software solutions vary widely in terms of features, scalability, and suitability for different organizational needs. Here's a list of well-known ITAM software providers from around the world:

- SolarWinds SAM (Software Asset Management)
(<https://www.solarwinds.com/server-application-monitor>)
- ServiceNow IT Asset Management
(<https://www.servicenow.com/products/asset-management.html>)
- ManageEngine Asset Explorer
(<https://www.manageengine.com/products/asset-explorer/>)
- Flexera IT Asset Management (formerly Flex Net Manager Suite)
(<https://www.flexera.com/products/flexnet-manager>)

2. Customized Solutions

Open-source hardware management systems are software solutions that enable organizations to efficiently track, manage, and optimize their hardware assets using open-source technologies. These systems are often customizable and offer flexibility for tailoring to specific needs. While there are various open-source options, here are some notable ones from around the world:

- Snipe-IT (<https://snipeitapp.com/>)
- GLPI (Gestionnaire Libre de Parc Informatique) (<https://glpi-project.org/fr/>)
- i-doit (<https://www.i-doit.org/>)
- Rack Tables (<https://sourceforge.net/projects/racktables/>)

3. Enterprise Resource Planning (ERP) Systems

Enterprise Resource Planning (ERP) systems are comprehensive software solutions that help organizations manage various aspects of their business operations, including finance, human resources, supply chain, manufacturing, and more. ERP systems are essential for streamlining processes, improving efficiency, and providing a unified view of an organization's data. Here are some well-known ERP system providers from around the world:

- SAP (<https://www.sap.com/index.html>)
- Oracle (<https://www.oracle.com/>)
- Microsoft Dynamics 365 (<https://dynamics.microsoft.com/en-us/>)
- Infor (<https://www.infor.com/>)

Among the above methods, IT Asset Management (ITAM) Software, Customized Solutions can be used and Enterprise Resource Planning (ERP) Systems meet the needs of this system and this cannot meet the user's needs.

2.3 Critical Analysis of the Similar Systems

In the above Section, 2.2 described the similar systems and some of their features. In this section compare these features with the proposed Laboratory Equipment Management System Table 2.1 shows a summary of the critical analysis of similar systems.

Table 2.1: Critical analysis of the proposed system & existing systems

Features	Snipe-IT	GLPI	I-doit	SAP	Proposed System
Import Details	Yes	Yes	Yes	Yes	Yes
Manage Information	Yes	Yes	Yes	Yes	Yes
Searching & Sorting	No	Yes	No	No	Yes

Backup & Resort	Yes	Yes	Yes	No	Yes
Data Security	No	Yes	No	Yes	Yes

2.4 Summary

A very effective method for computerized laboratory management system. it automates the whole. above section 2.2 mentioned the several systems which have different features. also, table 2.3 has been shown the critical analysis of the feature in those system. The proposed system combined all these features together to satisfy user requirements.

3. Methodology

3.1 Introduction

This chapter is giving an overview of the entire design of the laboratory equipment management for hardware courses in Technical College. It consists of analysis design and implementation parts of the system. When a system developed, system analysis is an important activity. The analysis is mainly focused on requirement gathering, fact-finding, identifying the functional and non-functional requirements and requirements specification of the system. The design process translates requirements into the software system. System design can be done with a Unified Modeling Language(UML). The main objectives of the design process are the identification of the software components, the software architecture, interfaces, data structures and algorithms.

3.2 Requirement Gathering

When we create a system, there should be a necessity for that. So, when we making the computer hardware laboratory equipment management system, requirement gathering or requirement elicitation is a very important part of the project.

Gathering and awareness the necessities is a process of different parties. The system is ready to fulfill the neediness indwelling's of the parties.

If an author is unable to do the requirement gathering task properly, it may have a significant impact on the results of system. There are many facts finding techniques available for analysis, but here we used interviews, observation and document analysis.

Interview

Interview are the most commonly used and primary ways for information gathering from stakeholders we did more interview with teachers, students

and the hardware lab assistant by asking different questions from them, we were able to get enough details about their problems.

Observation

In this technique, we can gather requirements by observing the existing manual system. It is very helpful to understand the weakness of the required functionalities of the system.

Document Analysis

Analyzing the current process and documentation can help to understand the client's current situation. Getting new equipment's or throughway the broken equipment's in the hardware laboratory, searching about the equipment's in lab and getting a summary report about the equipment's from a computer system were the aim of our project. We were able to get new ideas of a new system.

3.3 Requirement Analysis

Requirements analysis is a very important and unique part of the software development process. Functional and non-functional requirements are used to analyze the software development process. Information should be collected to get a clear understanding of the new system proposed to be developed. The requirements for planning, implementing and confirming the success of the new system should be clearly stated. Various methods are used to analyze and find solutions to the problems that arise in the new system. The information related to the new system collected through discussions, observations and documents can be divided into two parts called functional and non-functional requirements based on the analytical information.

3.3.1 Functional Requirements

Functional requirements describe what the system should do. Below described the functional requirements of the proposed system.

Functional requirement of an administrator

- 1- Ability to access the system and extract information.

Access to the system is granted to the lab assistant and the relevant computer lab staff member after providing unique data.

- 2-The ability to browse information about the device.

The lab assistant who manages the system can access the system and enter all the information about the equipment under the relevant categories.

- 3.-Great ability to access information quickly.

By using the search facility, information about the relevant equipment can be retrieved without delay.

- 4.- Ability to manage information and remove unnecessary information

In the long-term maintenance of information, the information about the equipment should be updated and maintained. Also, the new proposed system has the ability to remove the expired and unused data from the system.

- 5.Being able to obtain regular information reports.

The year-end summary report should be obtained so that all the information about the laboratory equipment is included. The new proposed system ensures the security of the information and the reports can be obtained regularly.

3.3.2 Non-Functional Requirements

Non-functional requirements describe how the system works

Usability

After proposing and developing the latest system, the computer lab's hardware information system should be regularly introduced. Here, the lab staff are generally computer literate to use and handle this system. By being a knowledgeable staff, you will be able to understand the workings of the system and work with the system accurately and efficiently.

Performance

Being able to access the system without delay and get accurate information about the relevant equipment is a special function of this new system. This allows the computer lab staff to provide fast and efficient service to users.

Security

Compared with the previous signature system, the security of the information entered into the system can be confirmed to the maximum. Also, being able to maintain the information by updating it is an advantage of the new system.

Reliability

Since the security of the information entered into the system is at the maximum level, it is possible to provide a more efficient service to users with reliability. It is possible to obtain accurate information in this manner, thus making more reliable and accurate decisions.

3.4 Design techniques

The design process translates requirements into a diagram representation of the software. System design can be done with a Unified Modelling Language (UML). The major objectives of the design process are the identification of the software components, the software architecture, interfaces, data structures and algorithms [13]. A UML model comprises a set of diagrams. Figure 3.1 below shows the UML diagram hierarchy. In here entity relationship diagram, use case diagram and sequence diagram are described below.

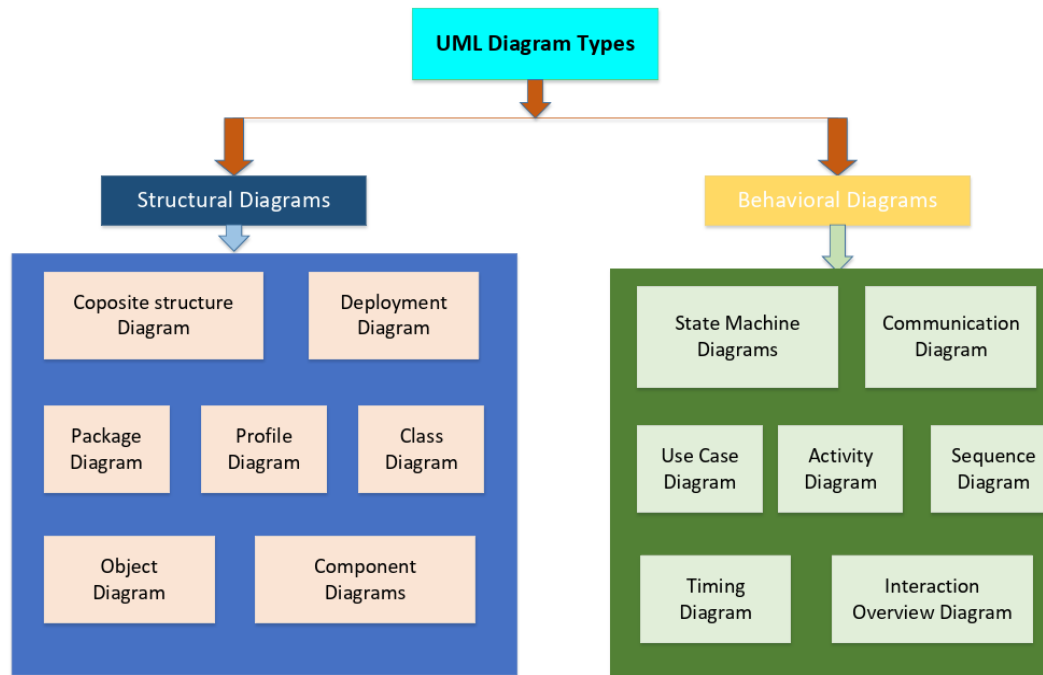


Figure 3.1 UML diagram hierarchy

3.5 Entity Relationship Diagram

Entity Relationship Diagram (ERD) shows the entities such as people, objects or components and their relationship to each other. ER Diagrams mainly consist of entities, relationships and attributes. An entity is an object, person, concept or event. It is something which stores data. Normally shown as a rectangle. Relationships are how entities are associated with each other. Relationships are normally shown as diamonds or labels directly on the connecting lines. The attribute is a property or characteristic of an entity. It is shown as an oval or circle [13]. The ER diagram for the proposed system is shown in Figure 3.2. and the high-level architecture of the system is shown in Figure 3.3.

3.6 Use Case Diagram

Use case diagrams consist of Unified Modeling Language (UML). Graphically describes who will use the system and how the user interacts with the system. The proposed system has three main actors Employer, Applicant and administrator. A use case diagram for the proposed system is shown in Figure 3.4.

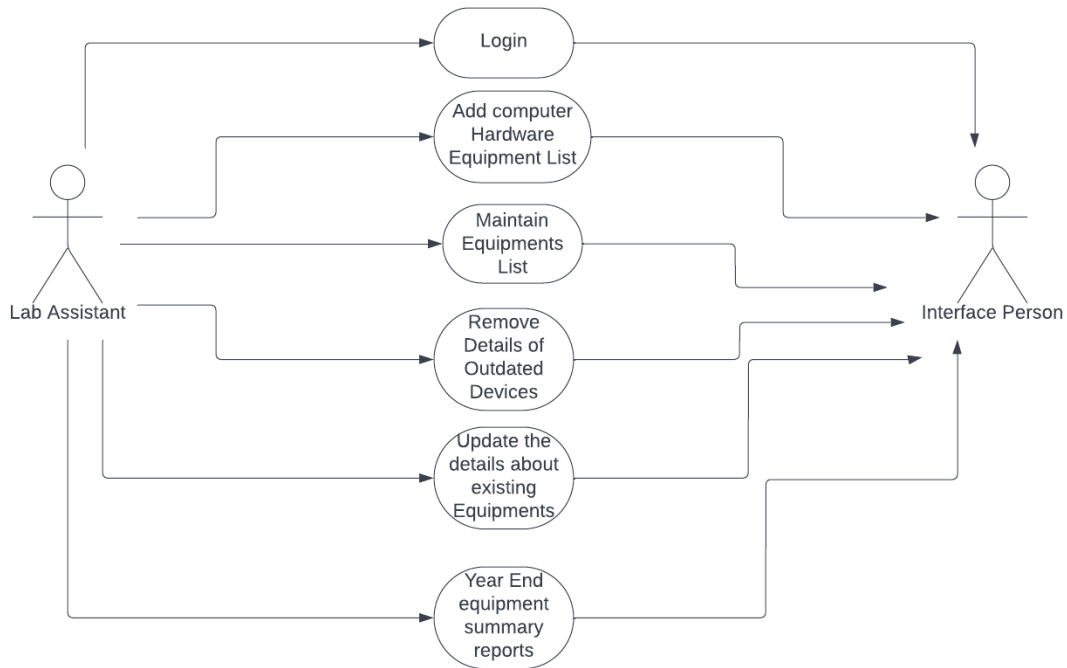


Figure 3.4 Use Case Diagram

3.6.1 Use Case Narratives

Use case narratives are the text-based description of use cases. Descriptions should be written in natural language and it is a very useful communication tool between the developer and the users. Use case narratives for the developed system is shown in Table 3.1 - 3.5.

Table 3.1 Use case narrative for Home Page

Use Case	Home Page
Description	User should display to home page of system
Primary Actor	Client, Applicant
Secondary Actor	Interface Person
Pre-conditions	
User Display to home page	
Flow of Event	
	1.user redirect to login page 2.user can contact helpdesk
Post-condition	
	1. Once the user registered and activate the account, the user can access functionalities.

Table 3.2 Use case narrative for user login

Use Case	Login Page
Description	To access the functionality of the system user should log in to the system.
Primary Actor	Client, Applicant, Admin
Secondary Actor	None
Pre-conditions	

1. Client, applicant and admin must login with the system.
2. Activate the account.
Flow of Event
1. The user enters the login interface.
2. The user fills in their username & password in each box to run the login process.
3. The user can now log-in to the dashboard.
Post-condition
Go to dashboard

Table 3.3 Use case narrative for Dashboard

Use Case	Dashboard
Description	Manage items of the laboratory
Primary Actor	Client
Secondary Actor	None
Pre-conditions	
The client manages the system.	
Flow of Event	
1. Client needs to add new equipment.	
2. Client needs to get a yearend report.	
3. Client needs to get destroy list .	
4. Client need to disposal list.	
Post-condition	
Manage EMS(Equipment Management System)	

3.7 Sequence diagrams for the entire process

The sequence diagram shows the sequence of messages exchanged between the objects needed to carry out the functionality of the system. It is a type of interaction diagram and is used to understand the requirements for a new system. A sequence diagram is shown in Figure 3.5.

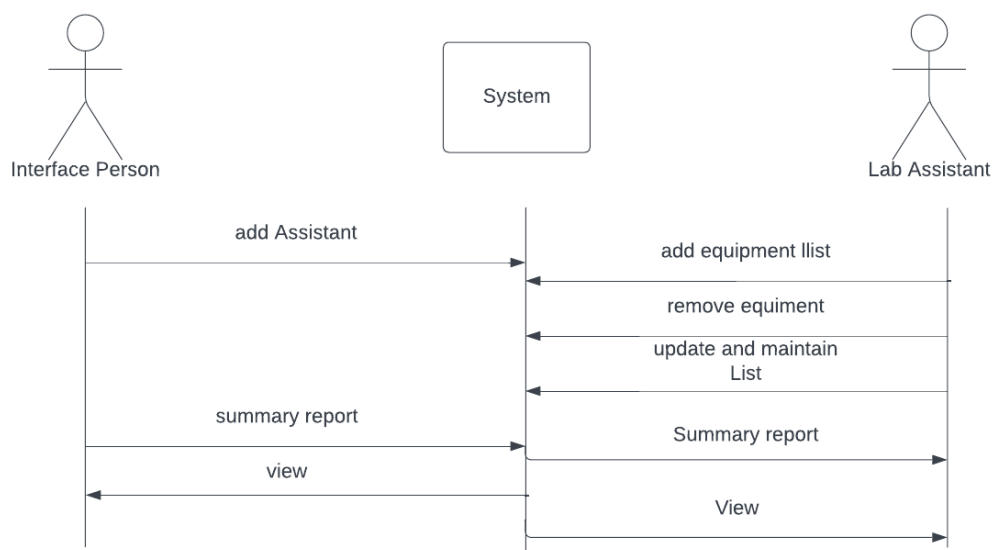


Figure 3.5 Sequence diagram for the entire system

3.8 Implementation Environment

Convert system specifications to an executable system is known as implementation. In here convert the design into user-friendly interfaces for front end and back end for performing system functions. Convenient language and suitable tools were chosen during the coding and development process. For implementation process, server-side environment and client-side environment were very important factors. These requirements are shown in Table 3.6 and Table 3.7. Furthermore, the author has selected agile software development life cycle (SDLC) as the system development methodology. Agile methodology is very helpful to design and develop the right product. It is based on iterative development and continuous improvement. Agile methodology allows continuous changes in the requirements and initial stages. This model is very flexible and can easily adapt the project to the customers' needs and expectations. The system architecture will be three-tier architecture. The client-tier consists of the user interface and data access levels for the user of the system. The application-tier consists of the application logic. The database-tier consists of all the data related to the system.

3.9 Development tools and techniques

XAMPP

XAMPP is a free and open-source cross-platform server developed by Apache Friends. It contains Apache HTTP Server, MariaDB database, PHP and Perl. XAMPP is supporting Windows, Linux and Mac operating systems. XAMPP is a popular cross-platform web server that allows programmers to write and test their code on a local webserver.

Bootstrap

Bootstrap is a free and open-source front-end toolkit for developing websites. designed to enable responsive development of mobile – first website , bootstrap provides a collection of syntax for template designs. It contains HTML and CSS as well as JavaScript. Bootstrap.

PHP

Hypertext Preprocessor (PHP) is a widely-used open-source server-side scripting language created by Rasmus Lerdorf. Php scripts are executed on the server . php supports many database (mysql, Informix, oracle, Sybase, solid, postgresql, generic ODBC, etc.). In here PHP used as a development language.

HTML

Hypertext Markup Language (HTML) is the standard markup language for designing web pages. In here we used HTML for design interfaces. A markup language is a set of markup tags. The tags describe document content . HTML document contain HTML tags and plain text.

CSS

Cascading Style Sheets (CSS) is a style sheet language. CSS is a cornerstone technology of the World Wide Web, alongside HTML and JavaScript. CSS describes how HTML elements

are to be displayed on screen or in other media. CSS saves a lot of work . it can control the layout of multiple web pages all at once.

JavaScript

Java script is an object-oriented programming language designed for the worldwide web . java script code is embedded directly into common HTML document and is interpreted by the web developers to include high level of interactivity in web pages.

3.10 Test Plan

Test strategy

Description of the testing approach
Test methodologies , techniques , and tools to be used.
Identification of testing environments.
Roles and responsibilities of the testing team

Test environment setup

Hardware and software requirements.
Configuration management.
Data setup and preparation

Security testing

Assess the system for vulnerabilities.
Evaluate compliance with security standards

User acceptance testing (UAT)

Collaborate with end-users for validation.
Document and resolve user feedback and issues.

3.11 System Overview

This section provides a brief explanation of the overall system. These hardware devices management System (CEMS) has front and back-end interfaces. some are the user interfaces are described below. Rest of the interface and system functionality.

Home Page

The website is the front end of the system. It is used as a platform for building A user loading button is included. Website (Figure 3.6). About us page consists of company introduction. Also, contact page has the contact details of the ministry.

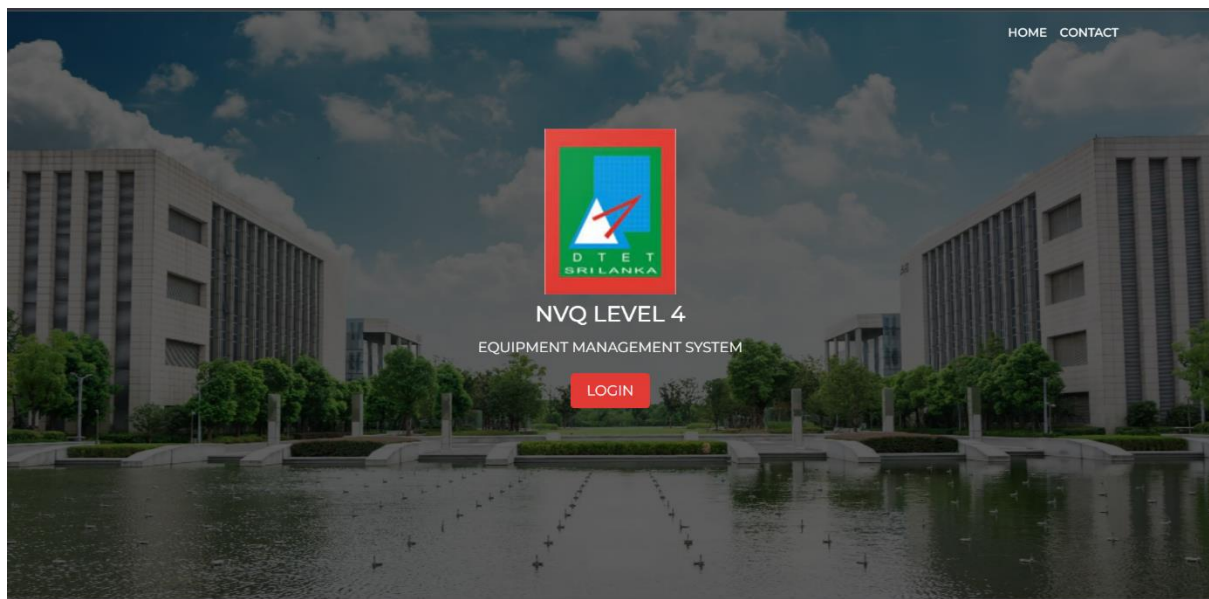


Figure 3.6 Published vacancies in website

Login Page

Through this login interface, the user can login to the system by providing the username and password provided by the ministries. A screenshot of the login page is shown in Figure 3.8.

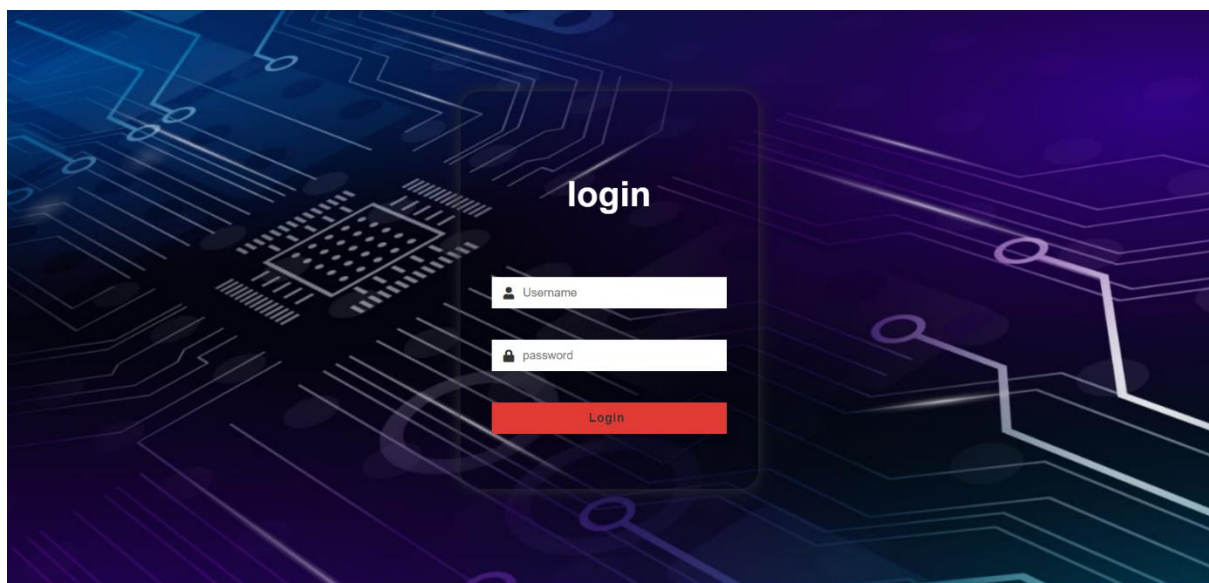


Figure 3.7 Login Page

Dashboard

Admin can access this after successful login. It contains the following functions
Need to admin. Stock Details, Disposal Details, Destroy Equipment Details, Helpline Contact, Backup facility, Equipment Search and selection dashboard are key
Functions consist of a dashboard. A screenshot of the dashboard is shown in Figure 3.9.

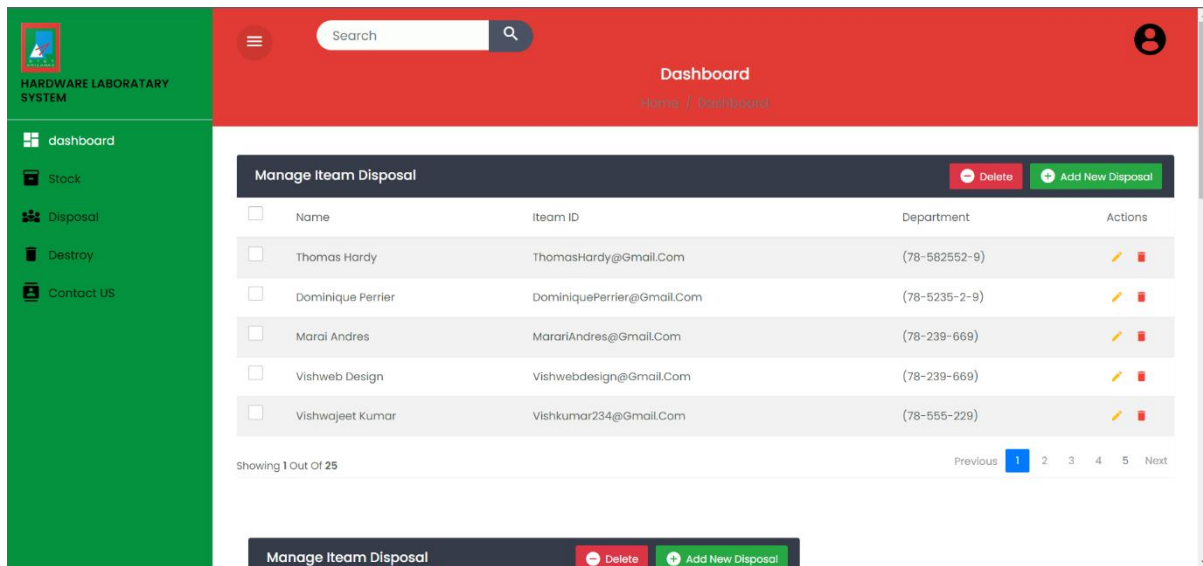


Figure 3.8 Dashboard

3.12 Summary

This section mainly focused on the analysis of the user requirements and design part of the entire system. It contains requirement gathering, finding functional and non-functional requirements, software architecture design and initial diagram designs such as ER diagrams and UML diagrams. ER diagram, use case diagram and sequence diagram which are discovered in the design section. Furthermore, we have discussed development tools, techniques and test plans. Finally, it contains a few of the interfaces of the system.

4 Evaluation

4.1 Introduction

4.2 Main objective of the Test process

4.3 Cross-browser Testing

4.4 Test Cases

4.5 User Acceptance Test

4.6 User Evaluation

4.7 Summary

4.1 Introduction

This chapter gives an overview of the entire testing and evaluation process of the Laboratory equipment management system for hardware course in Technical College Matara. The primary purpose of software testing is to deliver quality software to the client. The developed

system is tested against the user requirements, which are gathered at the requirement gathering phase.

4.2 Main objective of the Test process

The foremost objective of the testing process is to make sure the final output meets the end-user requirements. A subsequent important objective is finding bugs when occurred during the development phase. At the same time, it provides the quality output (bug-free) to the customer is another objective of the software testing process.

4.3 Cross-browser Testing

Cross-browser testing is a very important part of web-based applications. In here browser testing is carried out on the latest browsers such as Firefox, Chrome, IE and Safari.

Tested pages		Status		
		Firefox	Chrome	Edge
Home Page		Pass	Pass	Pass
Login Page		Pass	Pass	Pass
Dashboard	• Profile	Pass	Pass	Pass
	• Stock	Pass	Pass	Pass
	• Disposal	Pass	Pass	Pass
	• Destroy	Pass	Pass	Pass
	• Contact Us	Pass	Pass	Pass

4.4 Test Cases

Test cases have test data and expected results for a particular test scenario. Test cases have the following values added to the system. It gives an idea about the truthfulness of the system and how its features work.

Login page


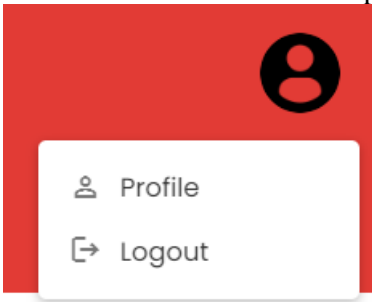
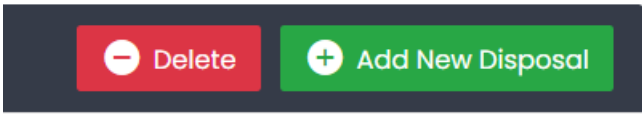
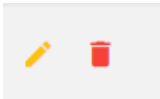

Table 4.3 Test case for user Login

ID	Test Case	Expected Result	Status
01	Press the Login button without filling data	Show error messages for “Username & password” [Please enter your password] [please enter your user name]	Pass

02	Insert all the correct data and press the login button	Successfully log into the system and view dashboard.	Pass

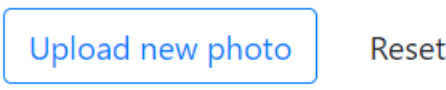
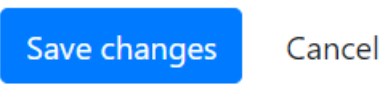

Admin Dashboard

Table 4.3 Test case for Dashboard

ID	Test Case	Expected Result	Status
01	Search Data in the system	Successful Search data in the dashboard 	Pass
02	Click Profile icon	Successful work profile icon 	Pass
03	Click Delete and Add Buttons	Successful work Delete and Add Button 	Pass
04	Add Delete Action Buttons in Table	Successful work Delete and Add Button 	Pass
05	Transform in Admin Dashboard Pannel	Successful Transforming Dashboard Pannel	Pass
06	Calander tile in Dashboard Pannel	Success Display Calander Tile 	Pass

Account Information

Table 4.3 Test case for Account Information

ID	Test Case	Expected Result	Status
01	Upload Photo & Reset Button	Successful work and Add Button 	Pass
02	Save Changes & Add Button On Change Name and Password Fields	Successful work and Add Button 	Pass
03	Profile Photo view	Successful work and Add Profile Photo 	Pass

Contact Form

Table 4.3 Test case for Contact Form

ID	Test Case	Expected Result	Status
01	Click Send Button	Successful Sent Email to Developers	

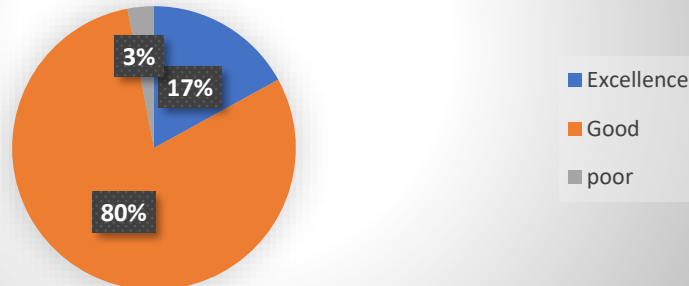
4.5 User Acceptance Test

User acceptance test (UAT) is one of the critical and very important tests before the software is released on to the live environment. In here, user test whether the system operates according to their requirements. It is useless if the developed system does not operate according to the client's expectations. The user acceptance testing was conducted by the Laboratory equipment management system for hardware course in Lab Assistant because he is the end-user of the system. If the bugs found by him, it will fix immediately.

4.6 User Evaluation

Here, after user acceptance testing, the user checks whether the system works as per their requirements. Feedback on the system. An overview of how satisfied a user is with the system. According to the questionnaire above Every user gave their feedback. User Acceptance Test was conducted by Lab Equipment Management System for Lab Assistant Hardware Course as end user. Evaluate system security features and protocols

Laboratory Equipment Management System For Hardware course in Technical College Matara.



80% users said Lab Equipment Management System is good for hardware course It makes their process smoother. 17% of users said the system was excellent Users said the system was great. Overall, 97% of users are satisfied with the system. However, 3% of users are not satisfied with the new system. Because most of them didn't Have good IT literacy and are passed with manual method.

4.7 Summary

This chapter mainly focused on the testing part of the Lab Equipment Management System . Initially, units are tested it is called unit testing. Subsequent, units of the system integrated and tested. Consequently, the whole system tested against the user requirements gathered at the beginning. Finally, the user's acceptance. Equipment Information Management Handling equipment maintenance troubleshooting information into the system chapter is include.

5. Conclusion

5.1 introduction

This last chapter discussed on concludes the lesson learned, problems encountered, limitations and suggestions for any future enhancements.

5.2 lesson learned

During the system development process gain the real-world experience of software. Also gain knowledge about programming languages such as PHP, HTML, CSS, Java Script and gain knowledge of how to use Bootstrap templates for interfaces. It was mandated to learn MYSQL and other technologies. As well as managing time according to the project guidelines and given project schedule is really important.

5.3 problems encountered

During the system development process following dominant problems encountered.

- ❖ Requirement gathering difficulties and sometimes gathered requirements was change. (Clients would not be able to clearly represent the requirements what they need.)
- ❖ It was really difficult to deliver the final product within the given time frame.

- ❖ Lack of knowledge and experience regarding developing languages are another major issue. (Online tutorials were helped to gain the required knowledge)
- ❖ Sometime mismatch the gathered requirements due to the misunderstanding and miscommunication.

5.4 outcome

The developed hardware lab equipment management system is very user-friendly and easy to use. Without a high level of IT literacy, anyone can access this system. This system has the scope of all the main functions required for a smart recruitment process, such as,

- View, edit & delete equipment details
- Admin can generate reports
- Admin can get backups and restore backups.

5.5 future work

However, there are some improvement and future ideas that can be applied to make a fully functional HEMS. Some of them are,

- mobile app
- disposal tracking facility
- Sending an SMS message to the rejected person regarding the deadline for handing over the discarded devices

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Appendix A: Questionnaire

Interview Questionnaires on computer Hardware Laboratory Equipment Management

System in Technical College Matara

1. What do you need a system for?
2. Explain the process of maintaining, handing over and taking over the equipment of hardware lab?
3. Who are expected to enroll the system ?
4. How does the user can handle this system ?
5. How long does the organization take for the maintaining and managing process of the hardware lab?
6. What is the requirement to be met by the lab assistant for handle the system?
7. How do you list equipment of the hardware lab?
8. How do you record about stock list and the other information about equipment?
9. What are the disadvantages of the current process?
10. Would you like to use a different method for the managing computer hardware laboratory equipment?

Appendix B: Use Case Diagram

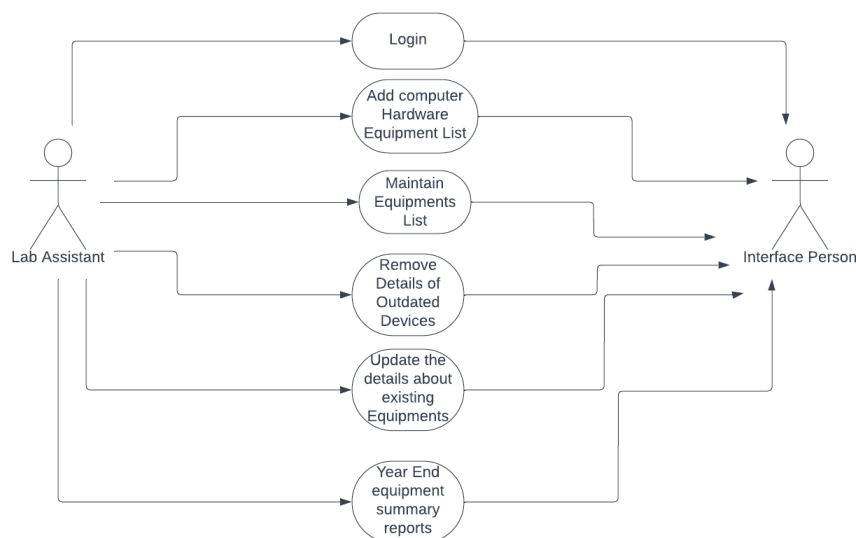


Figure B.1 Use Case Diagram for Admin

Appendix C: User Documentation

The user can enter the system using the username and password provided by the organization.(Figure C.1).

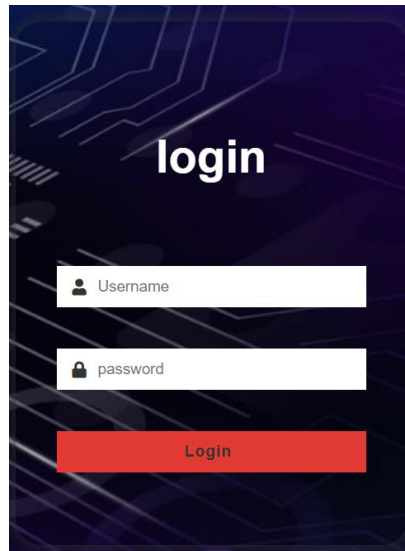


Figure C.1: Login

After insert Username and password admin directed to the system dashboard. From the left-hand side, the navigation menu admin can navigate the different pages. Figure C.2 display the dashboard.

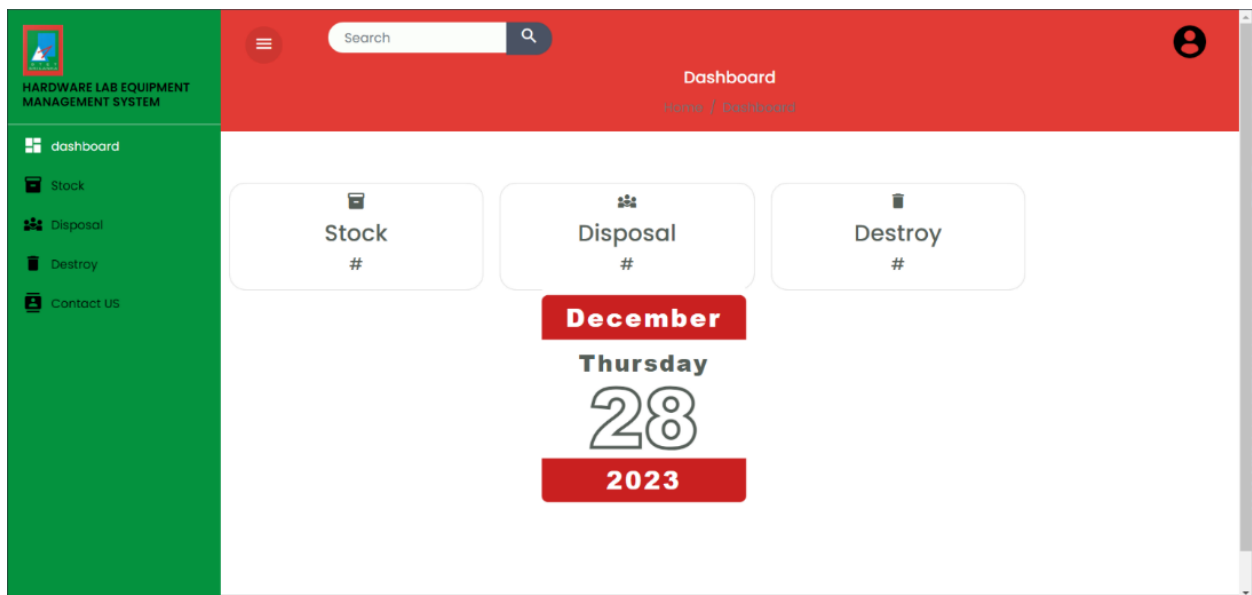


Figure C.2: Dashboard

User can click Add New Item button in Stock to add a new item. Figure C.3 display the Add Item.

Add Item

Item Name

Item ID

Quantity

Cancel

Add

Figure C.3: Add Items

Appendix D: User Evaluation

Computer hardware laboratory equipment management system

User Evaluation Form

Name: _____ Designation: _____

(Instruction for Each Statement Please check whether Excellent=4, Good=3, Average=2, Poor=1)

- Can you make your work easy by using the development system
☐ Excellent ☐ Good ☐ Average ☐ Poor
- Do you agree that the develop system fluid benefits to your requirement Management process
☐ Excellent ☐ Good ☐ Average ☐ Poor
- Do you think the system is better than the exit in Manual approach
☐ Excellent ☐ Good ☐ Average ☐ Poor
- Do you satisfied with the available feature of the system
☐ Excellent ☐ Good ☐ Average ☐ Poor
- Did you encounter any difficult by using the system
☐ Excellent ☐ Good ☐ Average ☐ Poor
- First impression of website in hardware laboratory system
☐ Excellent ☐ Good ☐ Average ☐ Poor
- Do you satisfy with the message (DONT ADD or ADD) display in the system
☐ Excellent ☐ Good ☐ Average ☐ Poor
- Any improvements (if applicable)

Figure D.1 User evaluation form

Once analyzed the given answers of each question, identified the following results.

Table D.1 User feedback

	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7
Excellent	3	3	2	3	2	1	2
Good	10	9	6	6	14	10	9
Average	1	1	2	2	1	1	0
Poor	0	0	1	0	2	0	1

1. can you make your work essay by using the development system?

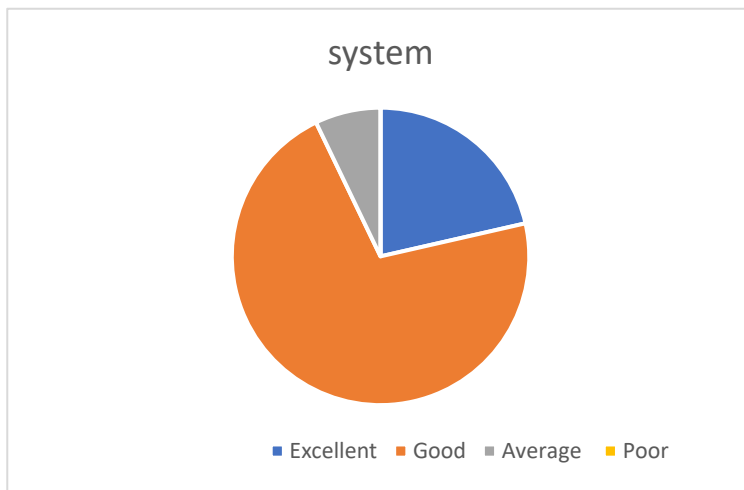


Figure D.2 Question

2. Do you agree that the developed system would be beneficial to your recruitment management process?

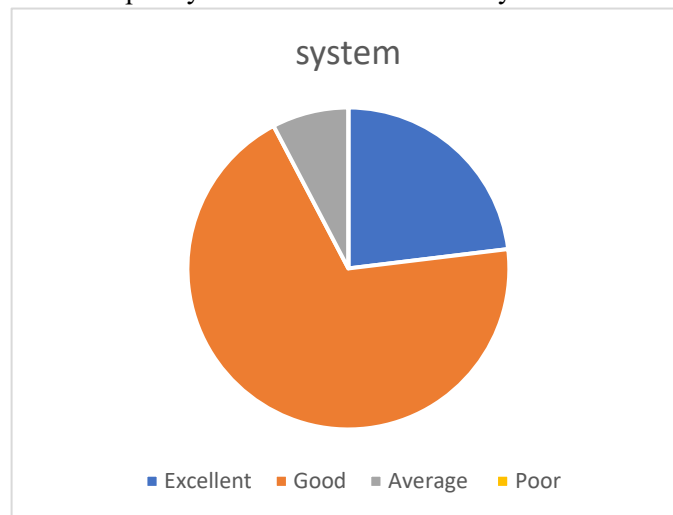


Figure D.2 Question

3. Do you think this system is better than the existing manual approach?

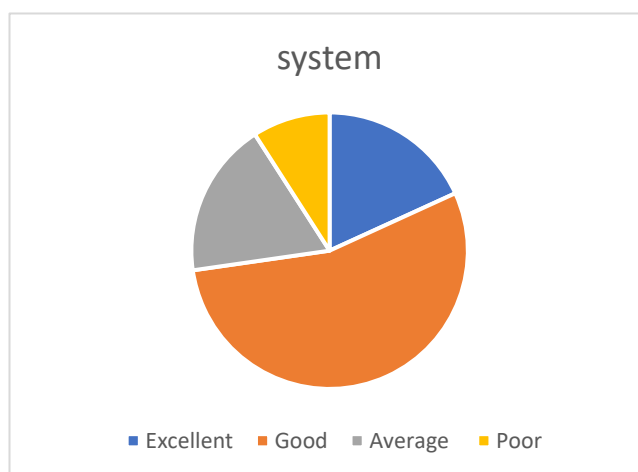


Figure D.2 Question 3

4. Do you satisfy with the available features of the system?

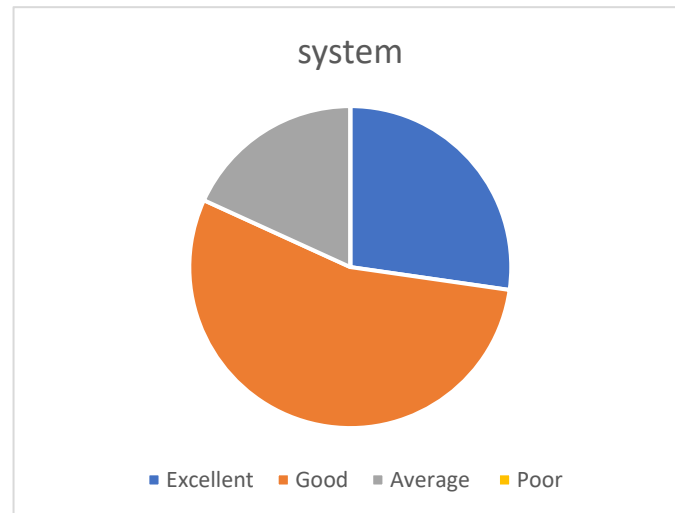


Figure D.2 Question 4

4. Did you encounter any difficulty while using the system?

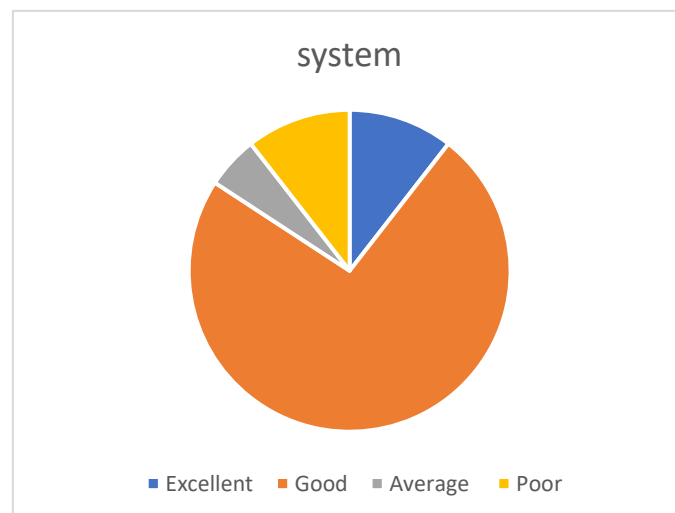


Figure D.2 Question 5

6. first impression of website Hardware Laboratory system?

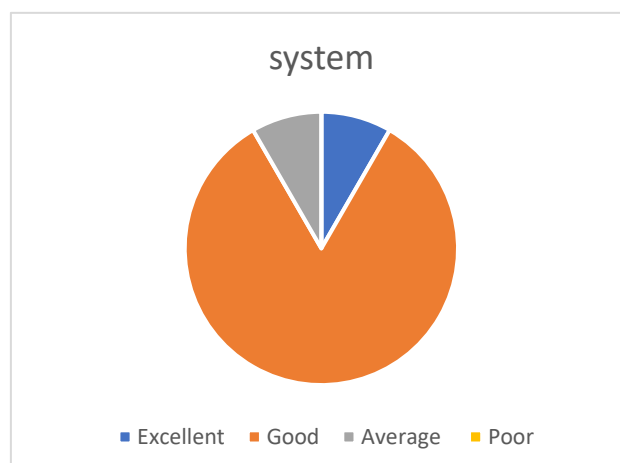


Figure D.2 Question 6

7. Do you satisfy with the messages (DON'T ADD or ADD) display in the system?

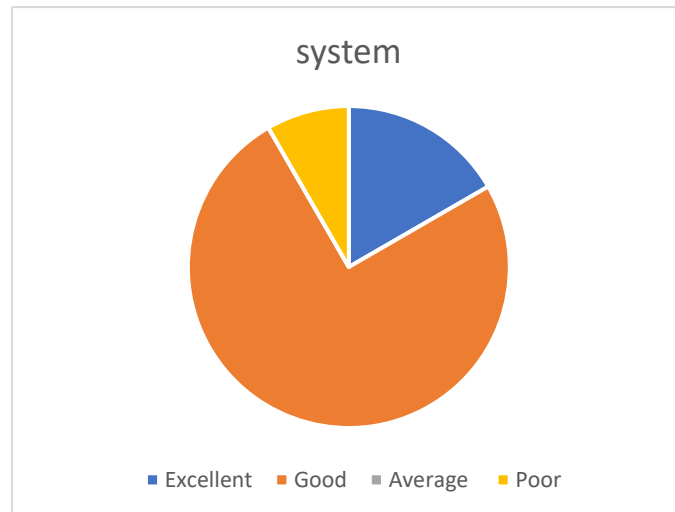


Figure D.2 Question 7

Appendix E: System Documentation

Title: Laboratory Equipment Management System

Date: 28th December 2023

Version: 1.0

System: Web application

This documentation provides system implantation information for the system administrators, developers who involve in further system enhancements. Also, those who would like to get the technical information to configure and use the system successfully.

Hardware Configuration

- Intel Core i5 Processor
- 8GB RAM
- 64-Bit Operating System
- 250GB Hard Disk Drive

- Monitor 1366 X 768
- Internet

Software Configuration

- XAMPP (Apache, PHP, MySQL)
- Web browser – Microsoft Edge /Fire Fox/Google Chrome

Configuration of the pre-requisites

XAMPP is an open-source freely available software bundle which contains Apache, MySQL, PHP. Using XAMPP can configure the system locally with the webserver and database. XAMPP can install on Windows, Linux or Mac Operating system.


Steps to configure the system:

1. Download and install XAMPP software
2. Start the XAMPP server
3. Copy all the project files into XAMPP Server host folder located in C:/xampp/htdocs
4. Go to the web browser and type “localhost/phpmyadmin” and import the database file to restore the database.
5. Go to the system folder and edit the configuration file
... hlsystem\admin\libs\config.php
6. Edit the database connection for the system 'hostname' 'localhost', Host Name of the Server 'username' 'root' Database User Name 'password' " Database Password 62 'database' 'hlsystem', Database Name
7. Type following URL on web browser to view the hlsystem website
<http://localhost/hlsystem/index/home.php>
8. Type following URL on web browser to access the back end of the recruitment management system
<http://localhost/hlsystem/admin/login.php>

Appendix F: Database Design

#	Name	Type	Collation	Attributes	Null	Default
1	username	varchar(10)	utf8mb4_general_ci		No	None
2	password	varchar(12)	utf8mb4_general_ci		Yes	NULL


Login Table

#	Name	Type	Collation	Attributes	Null	Default
1	lteam_name	varchar(30)	utf8mb4_general_ci		No	None
2	lteam_ID 	varchar(10)	utf8mb4_general_ci		No	None
3	Quantity	int(100)			Yes	NULL




Stock Table


1:M

#	Name	Type	Collation	Attributes	Null	Default
1	Iteam_name	varchar(30)	utf8mb4_general_ci		No	None
2	Iteam ID 	varchar(10)	utf8mb4_general_ci		No	None
3	Name	varchar(25)	utf8mb4_general_ci		Yes	NULL
4	ID	varchar(25)	utf8mb4_general_ci		Yes	NULL

Disposal Table

1:M



#	Name	Type	Collation	Attributes	Null
1	Iteam_name	varchar(30)	utf8mb4_general_ci		No
2	Iteam ID 	varchar(10)	utf8mb4_general_ci		No
3	Quantity	int(100)			No
4	Department	varchar(25)	utf8mb4_general_ci		No

Destroy Table

Figure F1: Database Design