

SCHOOL STORE INVENTORY SYSTEM

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**An Information Systems Project Proposal submitted to the Strathmore Institute in partial
fulfilment of the requirements for the award of the Diploma in Business Information
Technology of Strathmore Institute**

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Declaration

We declare that this work has not been previously submitted and approved for the award of a Diploma by this or any other University. To the best of our knowledge and belief, the document contains no material previously published or written by another person except where due reference is made in the document itself.

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Approval

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Acknowledgement

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Abstract

According to Kelchner (2017), common problems that face manual inventory systems include inaccurate needs analysis, decentralized design, lack of system optimization and misplaced inventory items. The main purpose of this project was to develop a computerized school inventory management system to facilitate safe storage and retrieval of data, monitoring of stock levels and borrowed items and overall automation of the manual inventory management system.

The computerized inventory management system captures and maintains details of suppliers, stock of items in the school, requisition orders, records of items issued and returned, details of teachers and students in the school, records of items in their respective categories and records of approved and deferred orders.

The system development methodology that was used was prototyping. Tools that were used to develop the system are HTML, CSS, PHP and JavaScript.

Table of contents

Table of Contents

Declaration.....	ii
Approval.....	ii
Acknowledgement.....	iii
Abstract	iv
CHAPTER 1: INTRODUCTION	1
1.1 Background Story	1
1.2 Problem Statement	2
1.3 General Aim	2
1.4 Specific Objectives	2
1.5 Justification	2
1.6 Scope and Limitation	3
CHAPTER 2: LITERATURE REVIEW	4
2.1 Introduction	4
2.2 Challenges faced	5
2.3 Review of other systems	5
2.3.1 Lightspeed Retail	6
2.3.2 Oracle NetSuite	6
2.4 Conceptual framework	7
2.5 Conclusion	7
CHAPTER 3: RESEARCH METHODOLOGY	9
3.1 Introduction	9
3.2 System Development Methodology	9
3.3 Functional and non-functional requirements.	10
3.3.1 Functional Requirements	10
3.3.2 Non-functional Requirements	10
3.4 Tools and Techniques	11
3.5 Deliverables	12
FIGURE 4.2: CONTEXT LEVEL DATA FLOW DIAGRAM	14
DATA FLOW DIAGRAM LEVEL 0.....	15
4.3 DATA FLOW DIAGRAM LEVEL 1	16

4.4ERD	17
4.5 SEQUENCE DIAGRAMS.....	18
4.5.1 Admin Sequence Diagram	18
4.5.2 User Sequence Diagram	19
4.6 DATABASE SCHEMA	20
4.6 WIREFRAME DIAGRAMS.....	21
.....	21
.....	22
CHAPTER 5: IMPLEMENTATION AND TESTING.....	23
5.1 Implementation	24
Introduction	24
5.1.1 Principal Module.....	24
5.1.2 Heads of Department Module	25
5.1.2 Store Clerk Module	25
5.1.2 User Registration Module	27
5.1.2 User Login Module	27
.....	28
5.2 Testing.....	28
5.2.1 Black-box testing.....	28
CHAPTER 6: CONCLUSIONS, RECOMMENDATIONS AND FUTURE WORKS.....	32
6.1 Introduction.....	32
6.2 Conclusions.....	32
6.2 Recommendationss	32
6.3 Future Works	32

No table of figures entries found.

CHAPTER 1: INTRODUCTION

1.1 Background Story

Administration bodies in schools must maintain an account for all the resources owned by the school using a laid down procedure. Heads of departments and sections in the school are responsible for making requisition orders using forms which are then forwarded to the principal/head teacher for validation and approval. After orders have been approved, suppliers are then contacted to deliver the required items. When the orders are received from the supplier, the store clerk verifies the quality and quantity and he/she records them accurately into a general journal book. Details from the general journal book are then transferred to different types of inventory books.

The inventory books used are:

Permanent Inventory: Non-perishable and re-borrowable items such as computers are recorded.

Expendable Inventory: Non-perishable (but used over a long period of time) items such as exercise books are recorded.

Consumable Inventory: Perishable and used once items such as chemicals are recorded.

All this information was stored using a manual system. Distribution of items received from suppliers and monitoring of stock levels was also done manually.

During distribution of items such as text books to a large population of students at a go, the teacher in charge was delegated with the responsibility to issue the items and records returned to the store. Teachers were also issued with items for their personal use directly from the store.

In the permanent inventory, items recorded were expected to be returned to the store by the end of the duration borrowed. Failure to return the items is noted and the borrowers are notified. Items that were not returned within the duration of borrowing were considered to be lost and (for example) a penalty of 20% of the market value was computed and added to the cost of the item. A bill was then generated and handed over to the concerned person.

Monitoring of stock levels was done by the store clerk regularly. When a stock item was running low, the concerned teacher was notified to make a reorder.

1.2 Problem Statement

The challenges that faced the manual inventory system mainly affected the store clerk. Manual monitoring and updating of records was tiresome which usually occurred during receiving of orders from suppliers and distributing of items. These challenges were addressed so as to create a conducive working environment for the store clerk and other employees and also smoothen processes that revolve around the store.

1.3 General Aim

The main purpose of this project was to develop a computerized school inventory management system to facilitate safe storage and retrieval of data, monitoring of stock levels and borrowed items and overall automation of the manual inventory management system.

1.4 Specific Objectives

- i. To investigate the current system for its lack of satisfaction of user needs.
- ii. To analyze challenges that are faced by users of the system.
- iii. To design and develop a computerized school inventory management system
- iv. To test the developed computerized school inventory management system.

1.5 Justification

This new system has a number of advantages over a manual system in terms of its functionalities and how it makes regulation of items in the store easier.

It has a database which stores more records than the manual filing system which is currently used. This will also save on physical space.

It has a simple user interface for easy navigation to a user's desired destination.

It incorporates timeliness as the reports and feedback is easily accessed among the store, suppliers and users of store items.

Additionally, making orders by users is fully assured as they can view real time availability of items of which this information is given by suppliers of the items.

The store clerk, who runs the store is now in more of a capacity to handle user needs. This is because he is able to monitor the various categories of items which are highlighted in the system.

1.6 Scope and Limitation

The environment of the system is within a school hence the system only incorporate data and functions required by the end users who are part of the school. This means that outside of the school environment, the system is not functional to any other user needs apart from suppliers of the store therefore emphasizing on user requirements and following the feasibility study carried out for the proposed system.

Some limitations of the system include: There is no barcode system hence recording of items will have to be typed into the system with item numbers. It is not integrated with the library management system. It is not able to renew contracts of suppliers. It is not able to implement biometric security.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Through the research into various inventory systems, it can be concluded that inventory is to success of any entity be it a business or an institution (Girsch-Bock, 2018). A number of organizations have turned to inventory management applications to help manage in house assets.

For institutions such as schools, the inventory of necessary school supplies should be handled with extreme supervision as these are materials required on a day to day basis for the running of such institutions.

We live in a world of instant gratification (Girsch-Bock, 2018) hence items that are in demand have to be supplied on time. The purpose of inventories therefore is to fulfill this while that of inventory management systems is to take it even further to a more satisfactory way of managing inventories for the users.

With the manual system, objectives were fully carried out but with a computerized system, the aspect of saving time and space comes in. Storage of files were replaced with soft copy records which are much easier to even retrieve given proper management of these systems.

A manual system required more personnel to gear the system to its most productive level whereas a computerized system would only require few personnel to maximize operational success.

For the manual system, it was difficult for suppliers to liaise with store officials as there was no available basis of information communication other than ordinary means such as cell phone and email communication. This slows down operation by a big amount of time.

This lack of proper management may lead to delay in supply hence users of inventory items may become inconvenienced (Girsch-Bock, 2018).

Furthermore, as inventories are meant to facilitate future consumption or value addition, this may actually be the contrary in occasions of mismanagement or improper systems (MSG, 2019).

Operations have to be periodically reviewed which is quite a difficult by use of physical logs and records hence computerized systems offer the resources to carry out system review while saving time for other important activities (MSG, 2019).

2.2 Challenges faced

After complete and thorough analysis was carried out on the system, user dissatisfactions were put across. These are the challenges faced by users:

There were large amounts of time consumed between ordering of items and delivery of items to the store by suppliers. This slowed down other operational activities in the institution.

Additionally, there was a large number of misplaced items, some of which have not been recorded or accounted for. This amounts to a huge loss to the institution.

The manual system did not implement details of suppliers. This did not provide accountability of items which were delivered to the store for quality and satisfactions. It is important that these records are kept for purposes of follow up.

Together with misplacement of items, a proper system of penalizing users was in order to be implemented to ensure all items were accounted for. This would curb losses incurred by the institution unknowingly.

Furthermore, there was big amount of physical space taken by files and folders used to keep records of inventory activities in the manual system. This resulted in loss of information which usually is of use in future events such as stock taking or financial analysis.

Due to numerous amounts of files and folders, it is difficult to retrieve relevant information required by the user at certain times. This is because one would have to search through all these files to look for one specific record. This is both tedious and time consuming.

Records that are not processed correctly are bound to be prone to error. This was such when it came to the hand written records of a manual system. The lack of processing capability of a person to realize errors and mistakes causes erroneous data entries which later cost user and the institution as an entity at large.

2.3 Review of other systems

Large organizations and other businesses have always sought for proper inventory management systems. This has called for developers to come up with various kinds of inventory management

systems. From Point of Sale in retail stores to warehouse software, all these systems were analyzed prior to the development of this system.

Some of the systems that were analyzed were as follows:

2.3.1 Lightspeed Retail

This is a software developed as a cloud-based POS system which can be used by various retailers to manage the store inventories (Merchant .M, 2019).

One of the reasons why Lightspeed is one of the top inventory management software is that stock can be ordered from the point of sale. This saves time to call on suppliers and helps in memory of orders that are to be made (Merchant .M, 2019).

Furthermore, it has preloaded catalogues, where being a retail inventory system, items need to be viewed on the interface hence orders are able to be made as there is live information from the store inventory on items (Merchant .M, 2019).

Moreover, it implements label and barcodes of items this enables faster update of information into the system. Items can easily be delivered by suppliers and even quicker bought by customers of the retail (Merchant .M, 2019).

2.3.2 Oracle NetSuite

The main feature in NetSuite ERP is the ability to manage the inventory from multiple locations. This enables one to know the exact amount of supplies needed as per demand of these items (Finances Online, 2019).

NetSuite allows you to keep your inventory up to date on a regular basis it offers tools which give visibility of all inventory parts of the organization and calculate key factors automatically (Finances Online, 2019).

Moreover, it keeps a count of inventory by organizing different categories of supplies according to volume and other factors. It also ensures timing of count to keep this systematic (Finances Online, 2019).

Lastly, it has been made unique to warehousing whereby it includes unique features such as inventory tracking. Inventory locations are first identified and defined and the organized into bins and containers and each bin is modified according to the item stored (Finances Online, 2019).

2.4 Conceptual framework

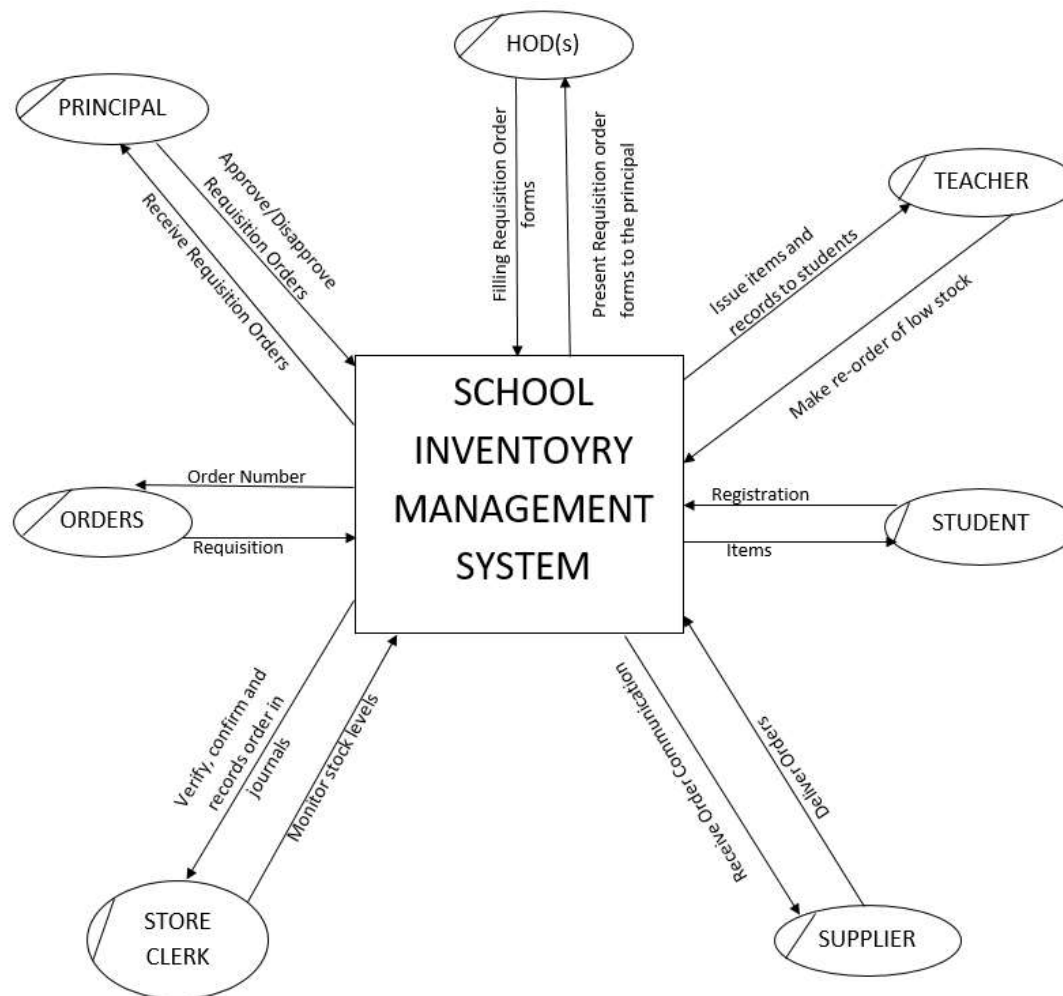


Figure 1: Conceptual Framework

2.5 Conclusion

After a review of systems and coming up with facts that support the implementation of a new system, it can now be justified that a computerised system can be built for the school inventory. The stakeholders are now enlightened enough to see the flaws of the manual system and its setbacks.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

A methodology is a formalized approach to implementing the system development life cycle. According to researchmethodology.net (2019), research methodology describes research methods, approaches and designs in detail highlighting those used throughout the study, justifying the researcher's choice through describing advantages and disadvantages of each approach and design taking into account the practical applicability of the research.

According to Allan and Randy (2005), they insist that when conducting a research methodology, it should meet the following criteria; should be the most suitable to achieve goals of the research and should be made possible to replicate the methodology used in other researches of the same nature.

3.2 System Development Methodology

A system development methodology is a framework that is used to structure, plan and control the process of developing an information system. The system development methodology that is used during this research is prototyping. Prototyping entails building a prototype, testing it and improving it until an acceptable prototype is achieved which provides a base to produce the final system.

The first stage of prototyping involved planning which helped define the problem and scope of the existing system and also come up with a feasibility report for the entire project. Analysis and requirements gathering was the next stage whereby the requirements of the system were defined and users interviewed to know what they expect from the proposed system.

The third stage had quick designing and building of the prototype. A simple design of the system was created to give an idea of the system to the future users. A prototype was then developed with the help of the design to come up with a working model of the required system. The next step involved the users evaluating the prototype to see where improvements could be made and also eliminating errors when the prototype was being refined. Once the prototype was fully refined, a final system was developed.

The fifth stage involved implementation where the design was transformed into source code. Thorough testing was also carried out to remove bugs from the system before the final product was implemented. Maintenance and support was the final stage after the new system was integrated to its new environment and users had been trained. The final documentation will come in handy when transitioning from the old system to ensure that the smooth flow of processes is maintained.

3.3 Functional and non-functional requirements.

A requirement is a statement of what the system must do. According to Inflectra (2018) a System Requirements Specification is a document that describes the features and behaviour of a system. Requirements are divided into two categories which are functional and non-functional requirements.

3.3.1 Functional Requirements

Functional requirements describe the functions a software must perform. Some of the functional requirements needed in the school inventory management system are:

Only top management employees have been authorised to view revenue data and full details of the users in the system: This is to ensure that sensitive data is kept safe and also establish levels of users within the system. The inventory management system should allow administrators and users to update their information: This is to ensure that information stored within the system is accurate at all times. The system will notify store keepers when stock is running low: Facilitates in smooth replenishing of goods in the store without being caught off guard.

3.3.2 Non-functional Requirements

Non-functional requirements define the quality attribute of a software system and ensures the usability and effectiveness of the entire software system. Non-functional requirements are important and can be critical for the success of a project (Ibrahim, 2009). Some of the non-functional requirements needed in the school inventory management system are:

The inventory system database is constructed to facilitate generation of reports: Reports are essential when doing auditing processes hence usage of capital can be tracked with ease. Access of the system is monitored by admins: This is to ensure that there is no unusual activity occurring within the system and also to keep of unauthorised users of the system. The systems performance

will be thoroughly analysed: This will help reduce system down time and also aid system support staff to formulate better maintenance measures.

3.4 Tools and Techniques

The tools and techniques that were used to develop the school inventory management system are:

Software tools:

HTML: According to w3schools.com (2019), Hyper Text Mark-up Language is an authoring language that is used for creating documents on the World Wide Web. HTML is used to define the structure and layout of the web based school inventory management system.

CSS: Cascading Style Sheets is a stylesheet language that is used to describe the presentation of a document written in HTML and describes how elements should be rendered on screen, on paper or on other media. CSS is used to style the web based system to make it more appealing.

JavaScript: According to educba.com (2019), JavaScript is a client scripting language used to make a web page more dynamic and give it special effects. JavaScript is used to add more functionality to the web-based inventory system.

PHP: According to w3schools.com (2019), Hypertext Pre-processor (PHP) is a widely used open source scripting language and its scripts are executed on the server. PHP is used to host the web based inventory system on a local server.

XAMPP: The Cross-Platform, Apache, Maria DB, PHP and Perl is a simple Apache distribution that makes it extremely easy for developers to create a local web server for deployment purposes. The XAMPP application is used to create a database for the inventory system in collaboration with phpMyAdmin.

Clickup: Clickup is a project management software that helps a team of developers collaborate and meet goals on time while managing resources and cost.

Hardware Tools:

Laptop: Two laptops with eighth generation processors were used for code editing and designing of the school inventory management system.

Flash disks: Flash disks were used as back up storage for the system’s code and documentation.

3.5 Deliverables

ACTIVITIES	SEPTEMBER				OCTOBER				NOVEMBER			
	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4
CONCEPT NOTE												
PROPOSAL												
ANALYSIS AND DESIGN DIAGRAMS												
DEVELOPMENT												
SYSTEM DEMO												
FINAL DOCUMENTATION AND REPORT												

Figure 2: Gantt Chart

Concept Note: this is a summary of a proposal containing a brief description of the idea of the project and the objectives to be pursued.

Proposal: This is a concise and coherent summary of the proposed project and sets out the central issues that the one intends to address.

Analysis and Design diagrams: This is a representation of the proposed system that helps human readable requirements to be transformed into actual code.

System Prototype: This is an early release of a system built to test a concept and evaluate the new design to enhance precision by developers and users.

Final Documentation and Report: This is a detailed report of the newly developed system that will guide new users on how to install and operate the new system and also aid in transferring of data from the old system.

CHAPTER 4: ANALYSIS AND DESIGN DIAGRAMS

FIGURE 4.2: CONTEXT LEVEL DATA FLOW DIAGRAM

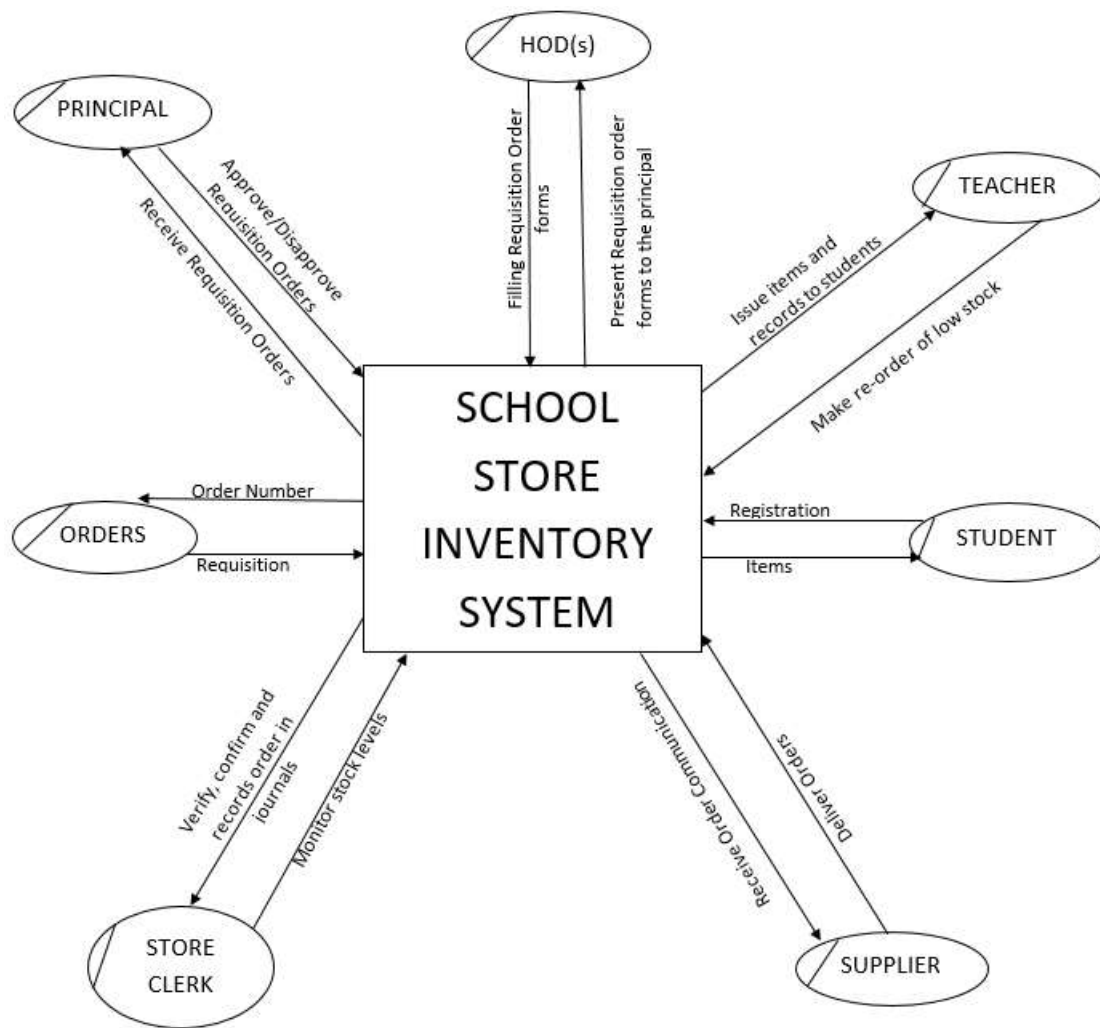


Figure 3: Conceptual Framework

DATA FLOW DIAGRAM LEVEL 0

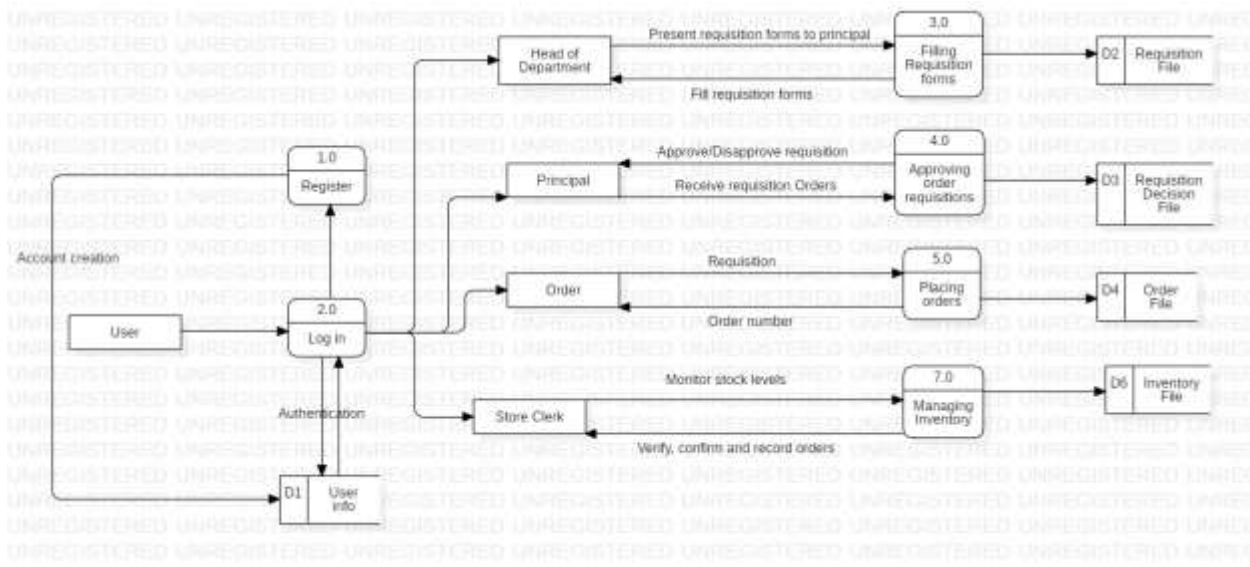


Figure 4: Level 0 Data Flow Diagram

4.3 DATA FLOW DIAGRAM LEVEL 1

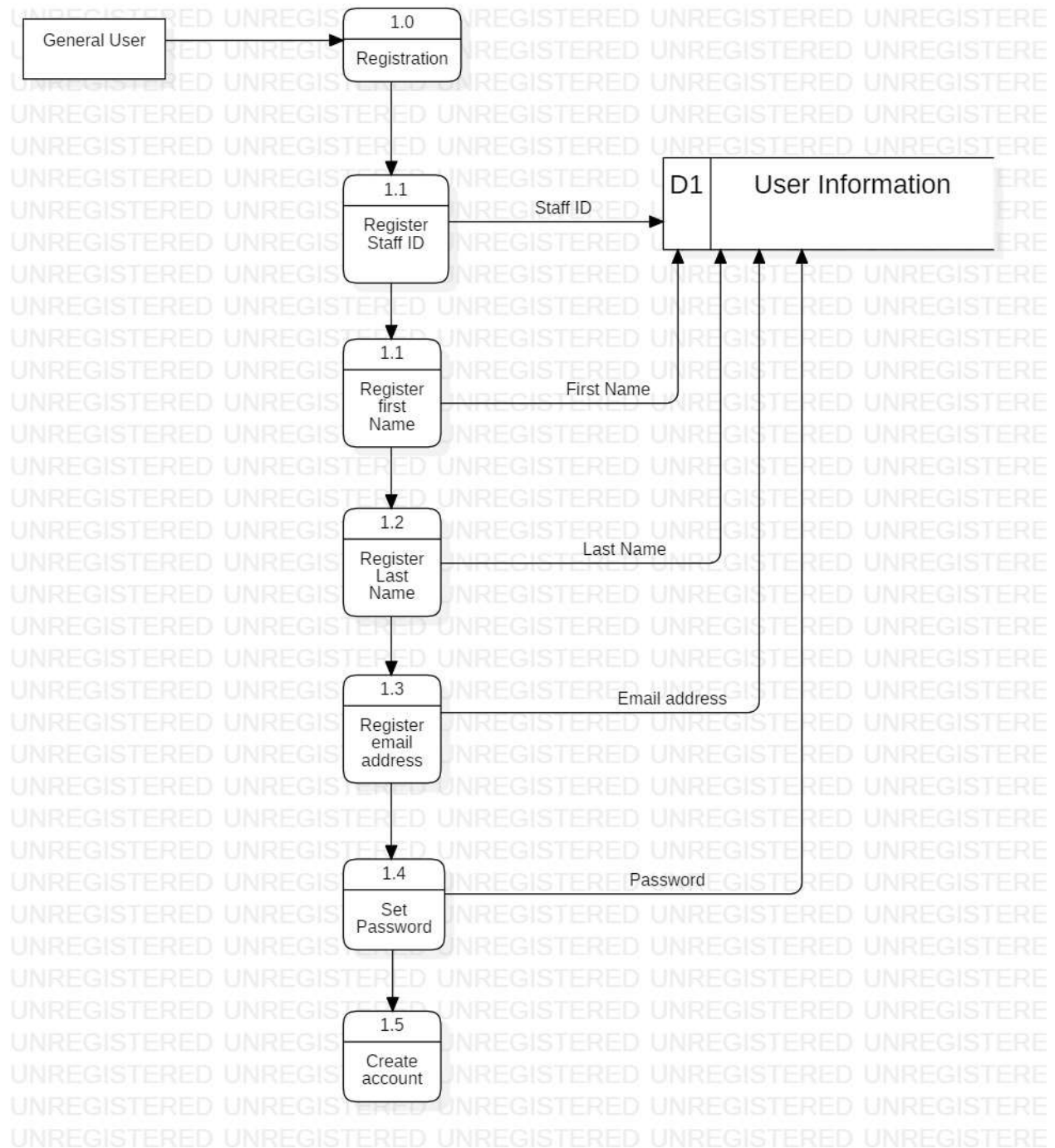


Figure 5: Level 1 Data Flow Diagram

4.4ERD

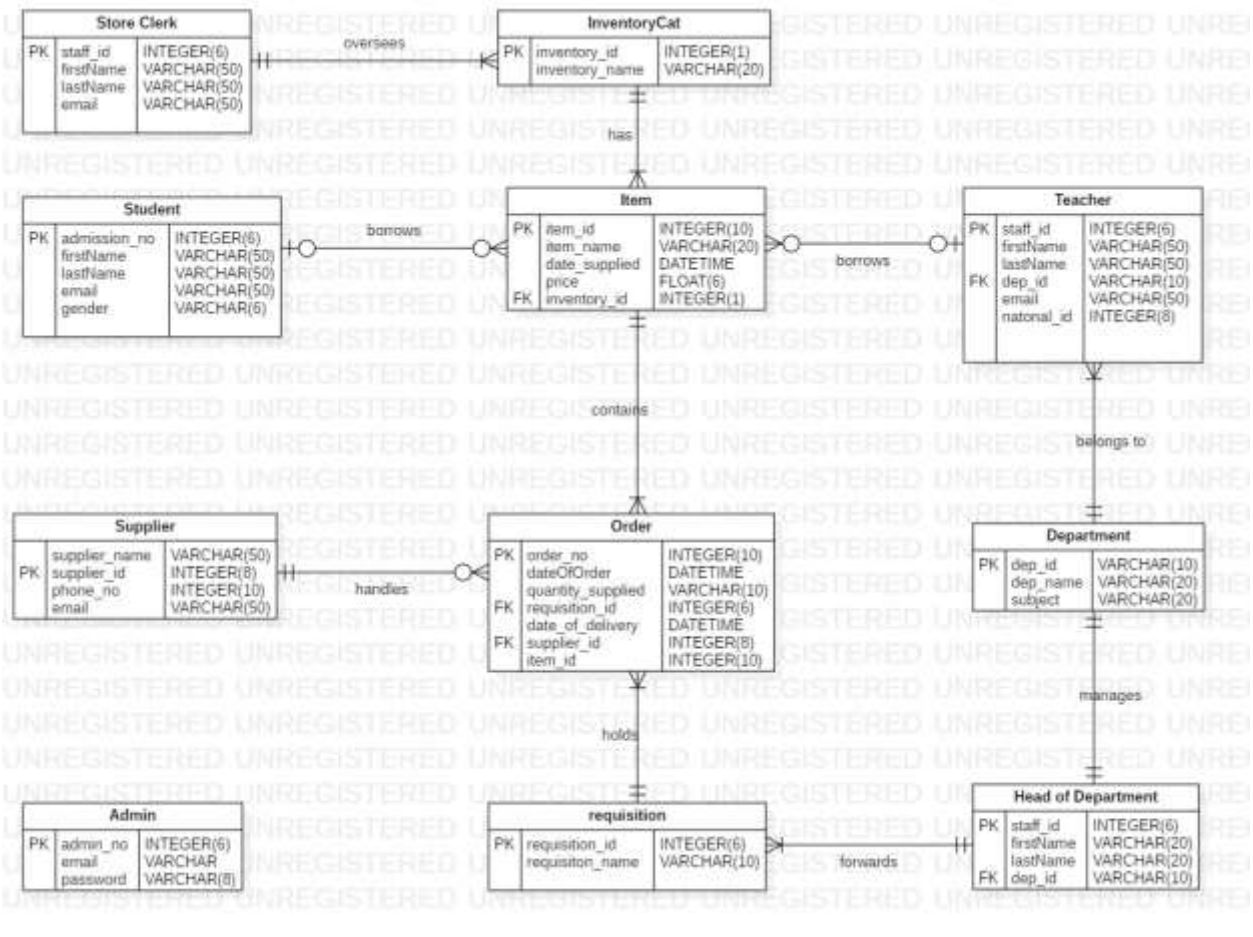


Figure 6: Entity Relationship Diagram

4.5 SEQUENCE DIAGRAMS

4.5.1 Admin Sequence Diagram

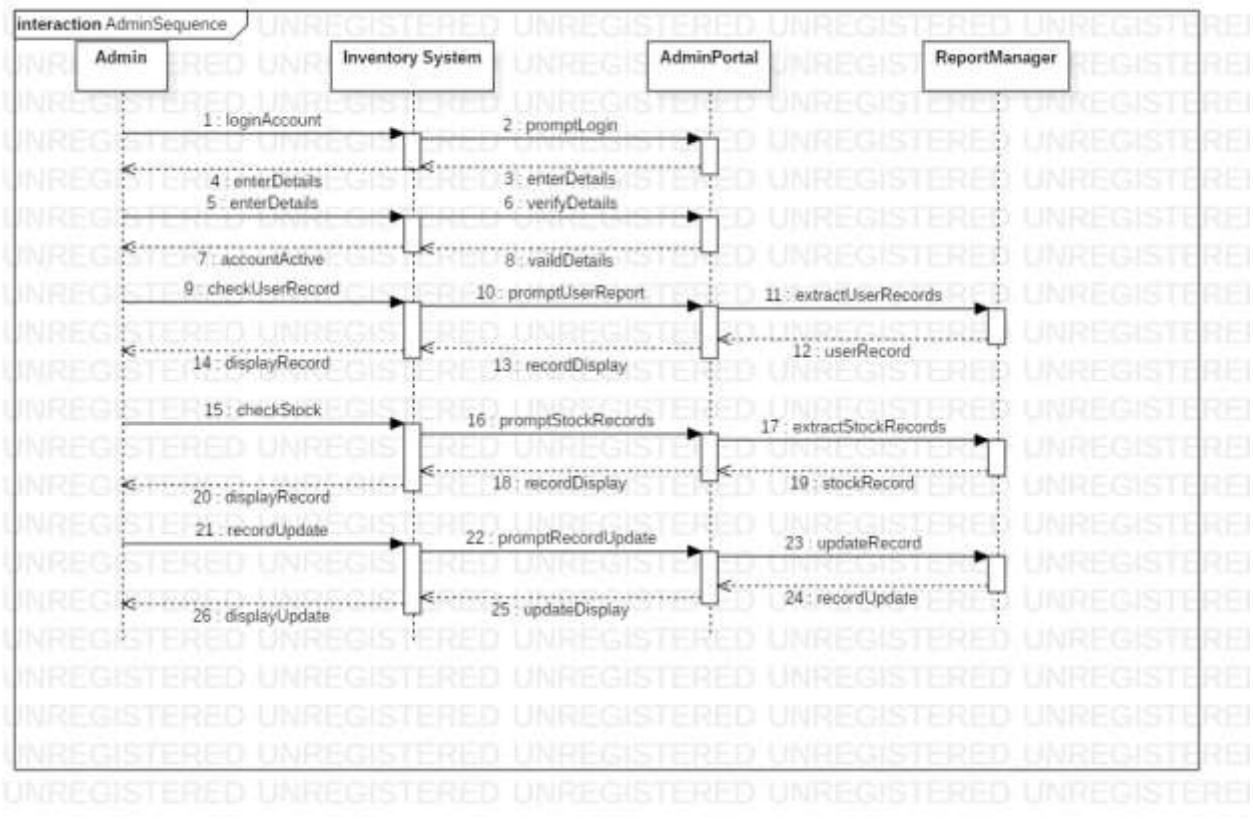


Figure 7: Admin Sequence Diagram

4.5.2 User Sequence Diagram

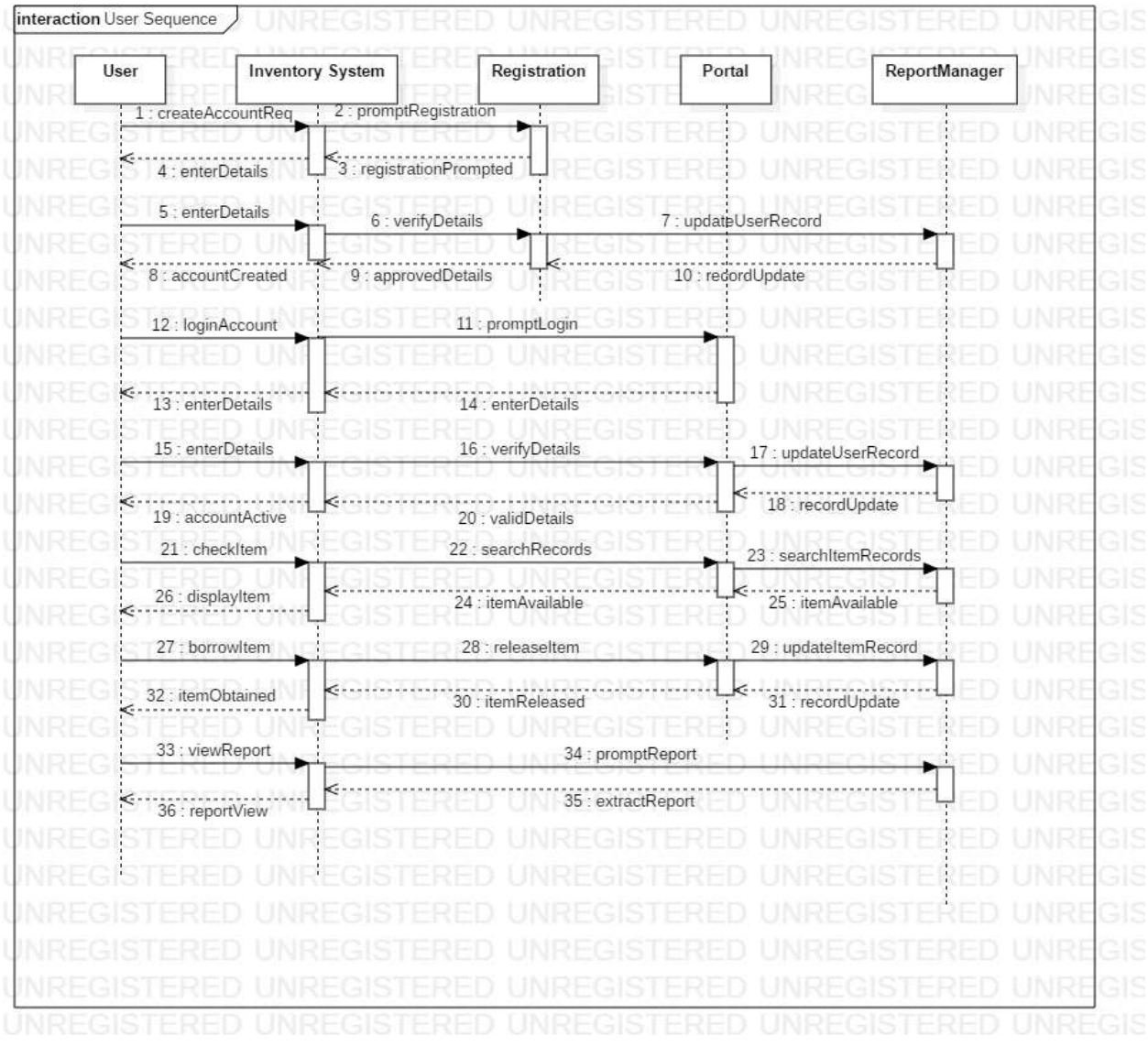


Figure 8: User Sequence Diagram

4.6 DATABASE SCHEMA

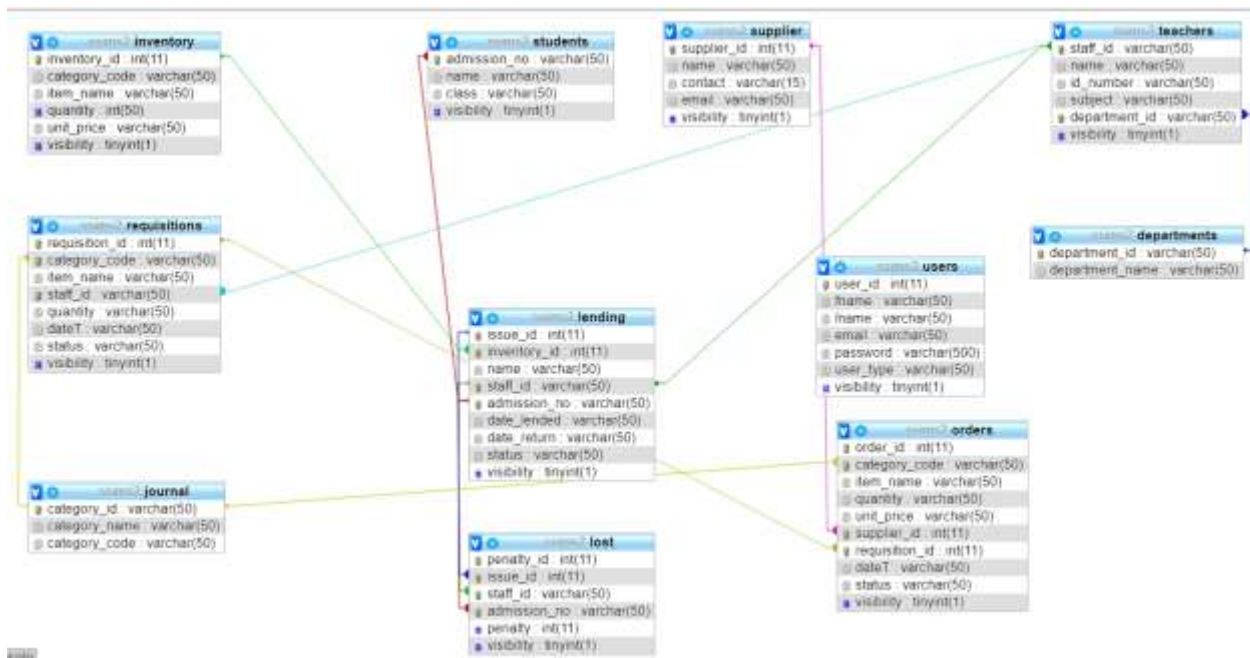


Figure 9: Database Schema

4.6 WIREFRAME DIAGRAMS

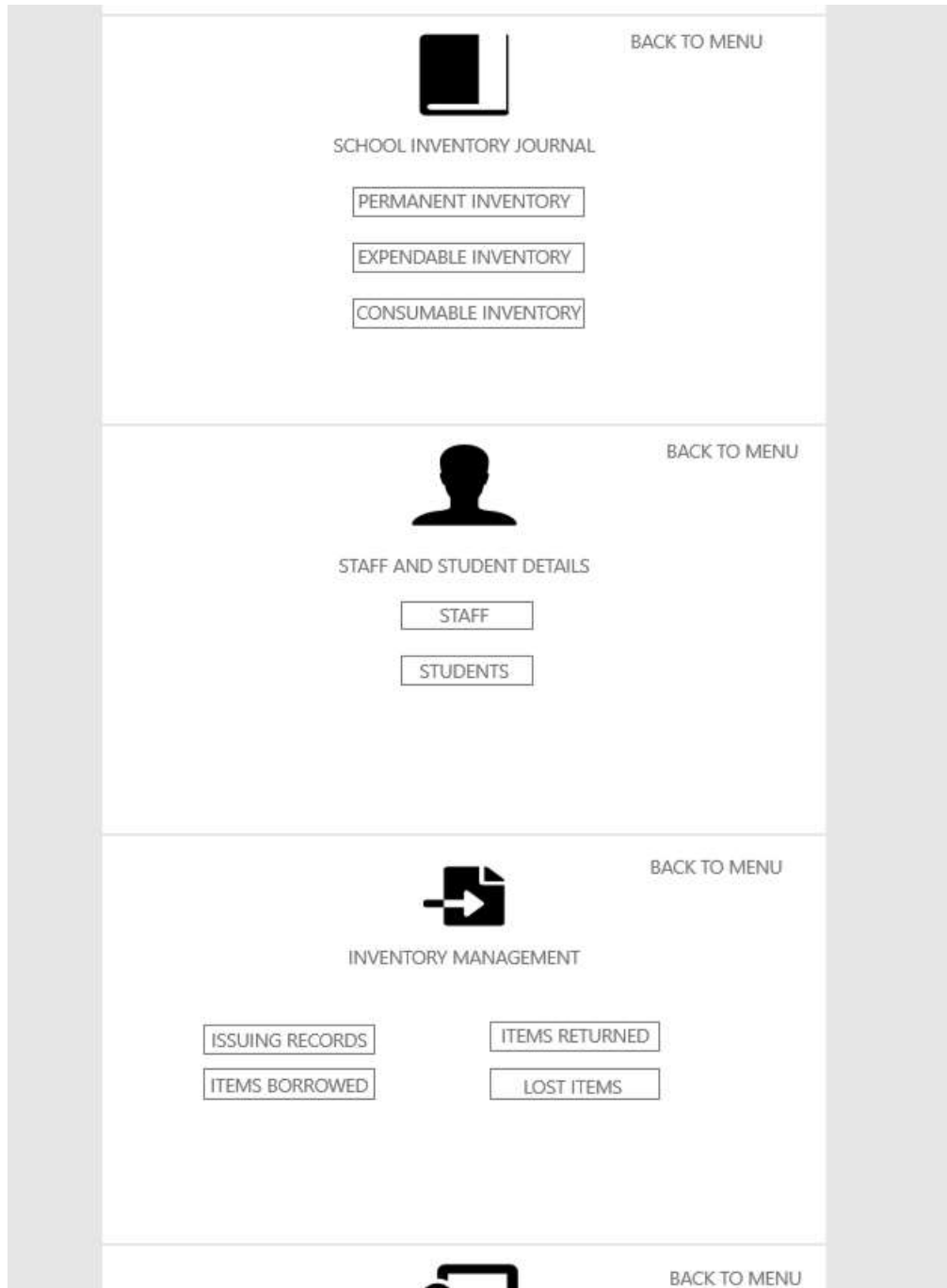


Figure 10: Wireframe

The wireframe is divided into three main horizontal sections. The top section is for user authentication, featuring a user icon, the title 'STORE CLERK', and input fields for 'EMAIL:' and 'PASSWORD:', followed by a 'LOG IN' button. The middle section is a menu for school management, starting with a header containing a school building icon and a graduation cap icon. Below this are eight buttons arranged in two columns: 'SCHOOL INVENTORY', 'DEPARTMENTS', 'INVENTORY MANAGEMENT', 'SUPPLIERS AND ORDER DETAILS', 'STAFF AND STUDENT DETAILS', 'PENALTIES', 'PRINCIPAL'S OFFICE', and 'GENERAL REPORTS'. To the right of this menu is a 'LOG OUT' link. The bottom section is for department selection, featuring a header with a department icon and the title 'DEPARTMENTS'. Below this are five buttons: 'MATHEMATICS AND SCIENCES', 'HUMANITIES', 'LANGUAGES', 'TECHNICALS', and 'SPORTS'. To the right of this section is a 'BACK TO MENU' link. A footer section at the very bottom contains a large exclamation mark icon and another 'BACK TO MENU' link.

STORE CLERK

EMAIL:

PASSWORD:

LOG IN

SCHOOL INVENTORY DEPARTMENTS

INVENTORY MANAGEMENT SUPPLIERS AND ORDER DETAILS

STAFF AND STUDENT DETAILS PENALTIES

PRINCIPAL'S OFFICE GENERAL REPORTS

LOG OUT

BACK TO MENU

DEPARTMENTS

MATHEMATICS AND SCIENCES HUMANITIES

LANGUAGES TECHNICALS

SPORTS

BACK TO MENU

Figure 11: Wireframe 2

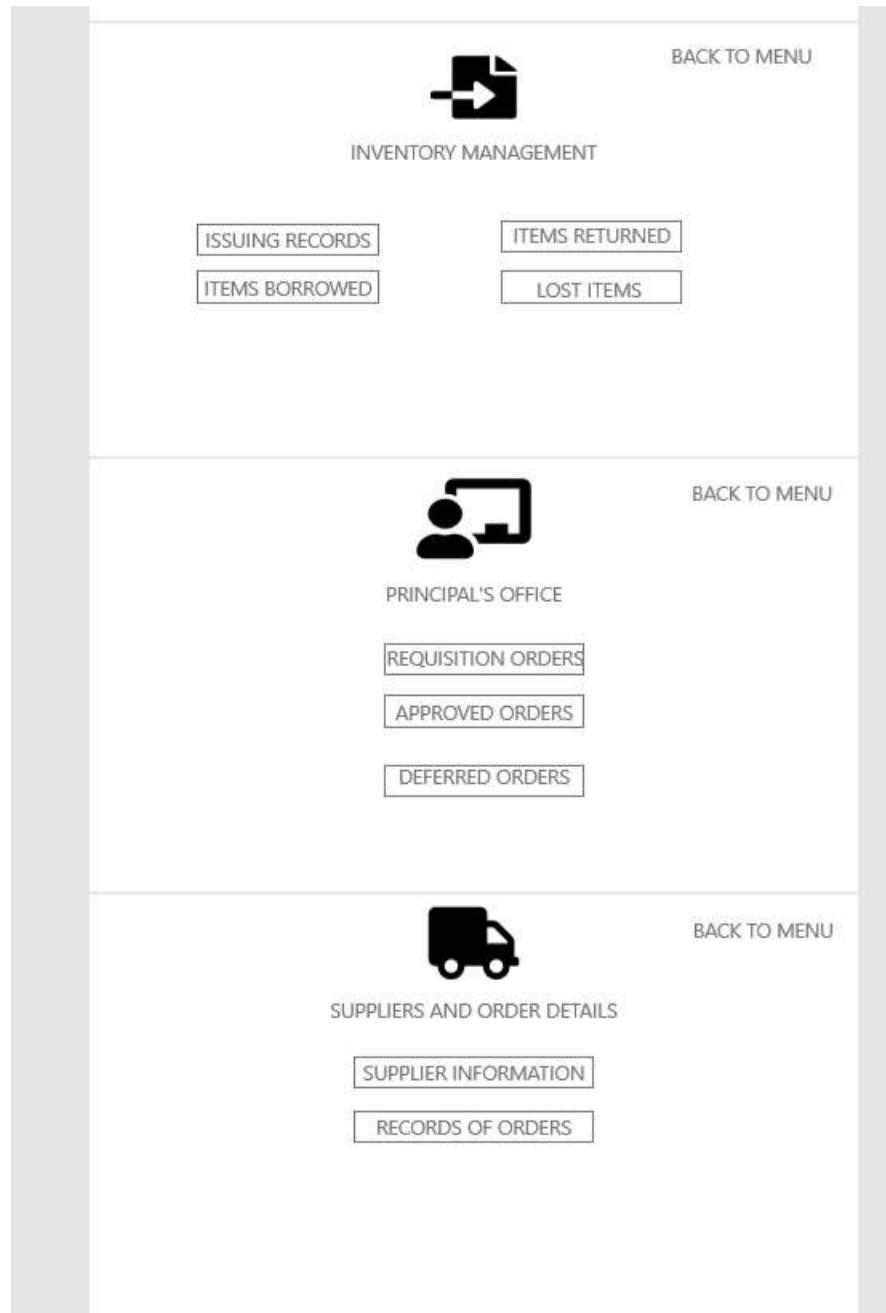


Figure 12: Wireframe 3

CHAPTER 5: IMPLEMENTATION AND TESTING

Introduction

This chapter entails the documentation of how the system software was constructed, tested and debugged for it to be suitable for presentation to the users.

5.1 Implementation

Software Implementation is process of conceiving, specifying, designing, programming, documenting, testing, and bug fixing involved in creating and maintaining applications, frameworks, or other software components (DRM Associates, 2002).

5.1.1 Principal Module

This module allows the school principal who is one of the main users of the system, a way to monitor requisitions from the various departments.

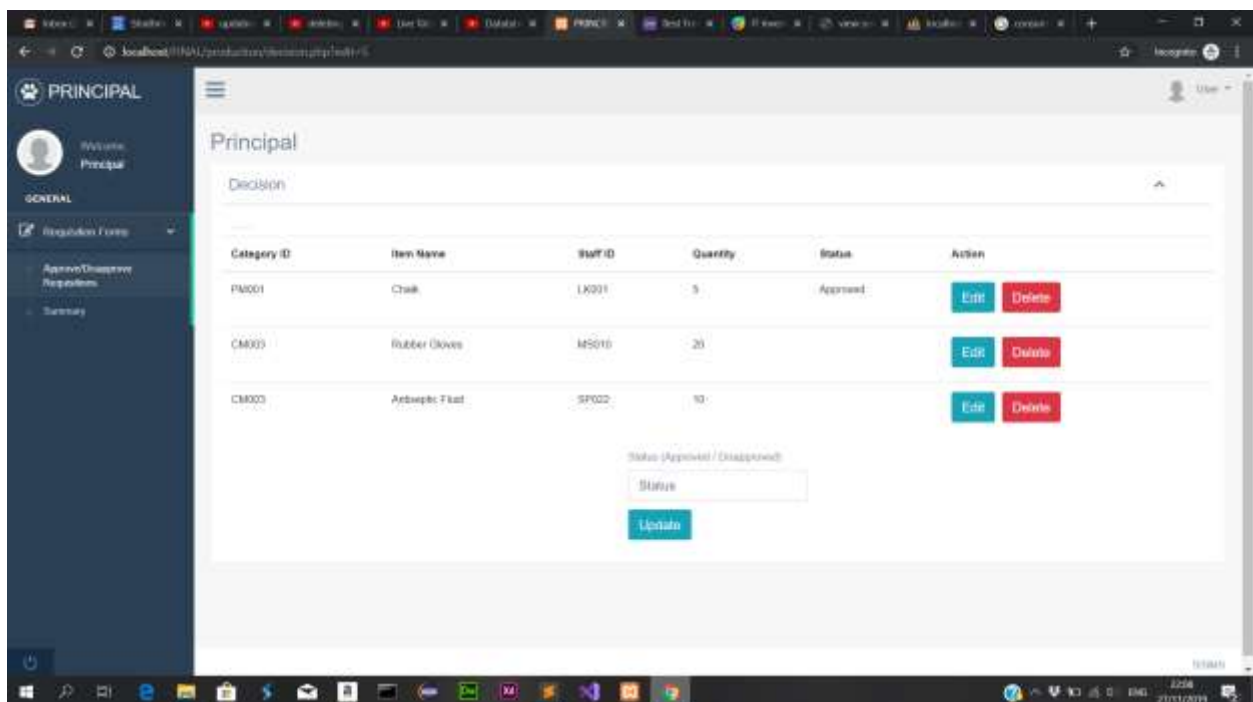


Figure 13: Principal Module

5.1.2 Heads of Department Module

This module allows the heads of the departments to handle all their requisitions.

5.1.2 Store Clerk Module

This module allows the store clerk to carry out his various functions.

- a. Item Entry

This section allows the store clerk to enter records of item within the store.

- b. Item Issue

This section allows the store clerk to lend items from the permanent inventory to the students and teachers.

- c. Item Return

This section allows the store clerk to handle items returned by students and teachers which were borrowed from the permanent inventory

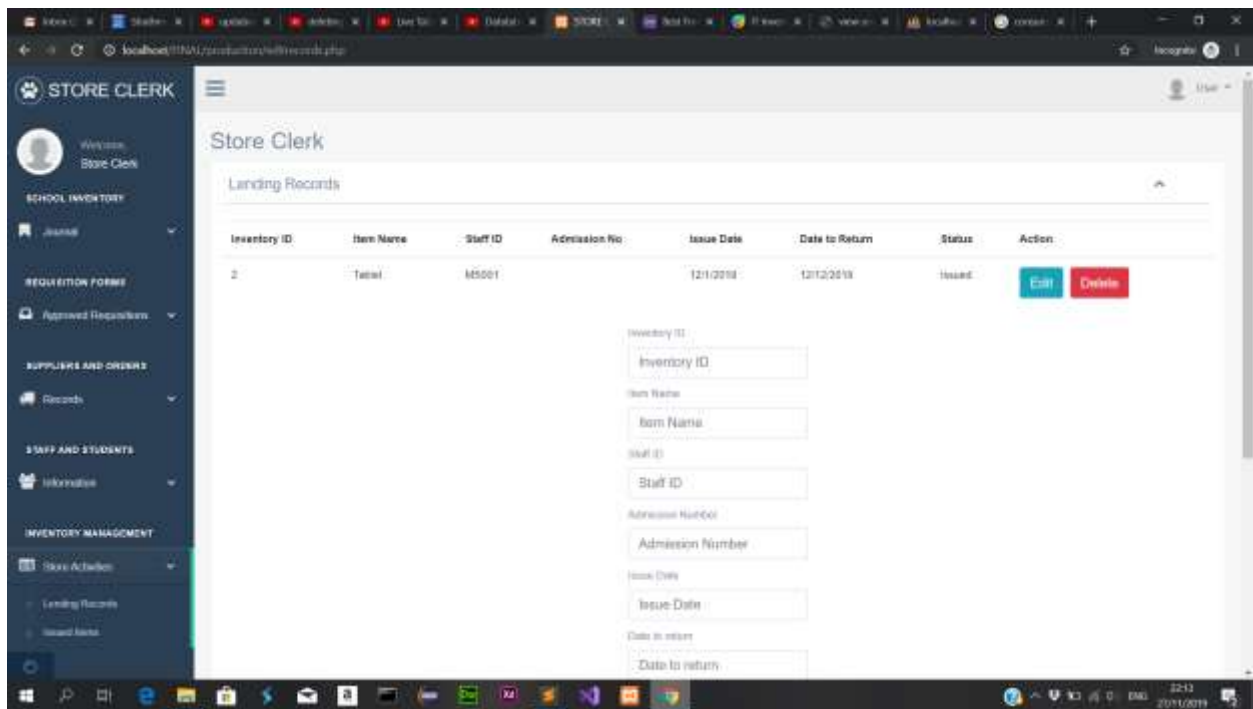


Figure 14: Item Module

d. Inventories

This section allows the store clerk to list the various inventories of the store within the system.

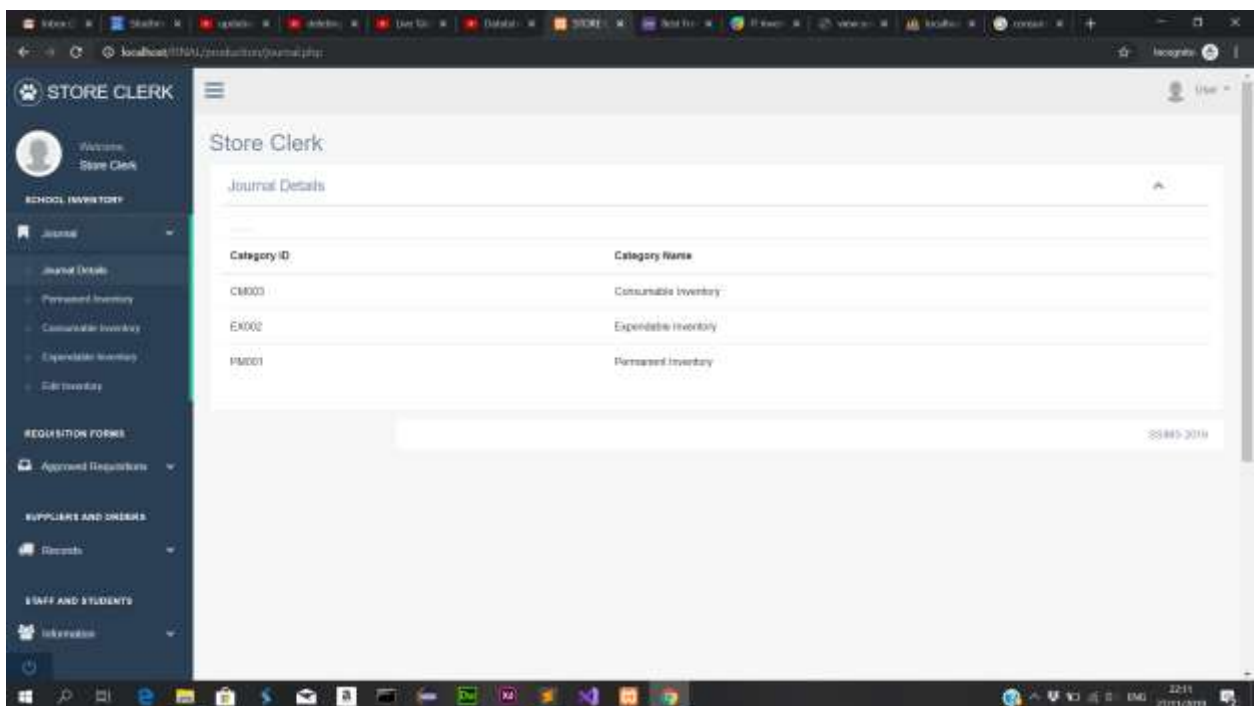


Figure 15: Store Clerk Module

5.1.2 User Registration Module

This module allows one to create a user account for the system.



The screenshot shows a web browser window with the address bar displaying 'localhost/TPAC/production/registration.php'. The page has a dark header with navigation icons and a 'login' link. Below the header, there is a blue link that says 'Back to Home Page'. The main content area is titled 'Registration' and contains a form with the following fields: 'First Name' (placeholder: First Name), 'Last Name' (placeholder: Last Name), 'Email Address' (placeholder: Email), 'Password' (placeholder: Password), and 'Usertype'. The 'Usertype' field has three radio button options: 'Principal', 'HCO', and 'Store Clerk'. At the bottom of the form is a yellow 'Register' button.

Figure 16: Registration Module

5.1.2 User Login Module

This module allows one to login to their account.

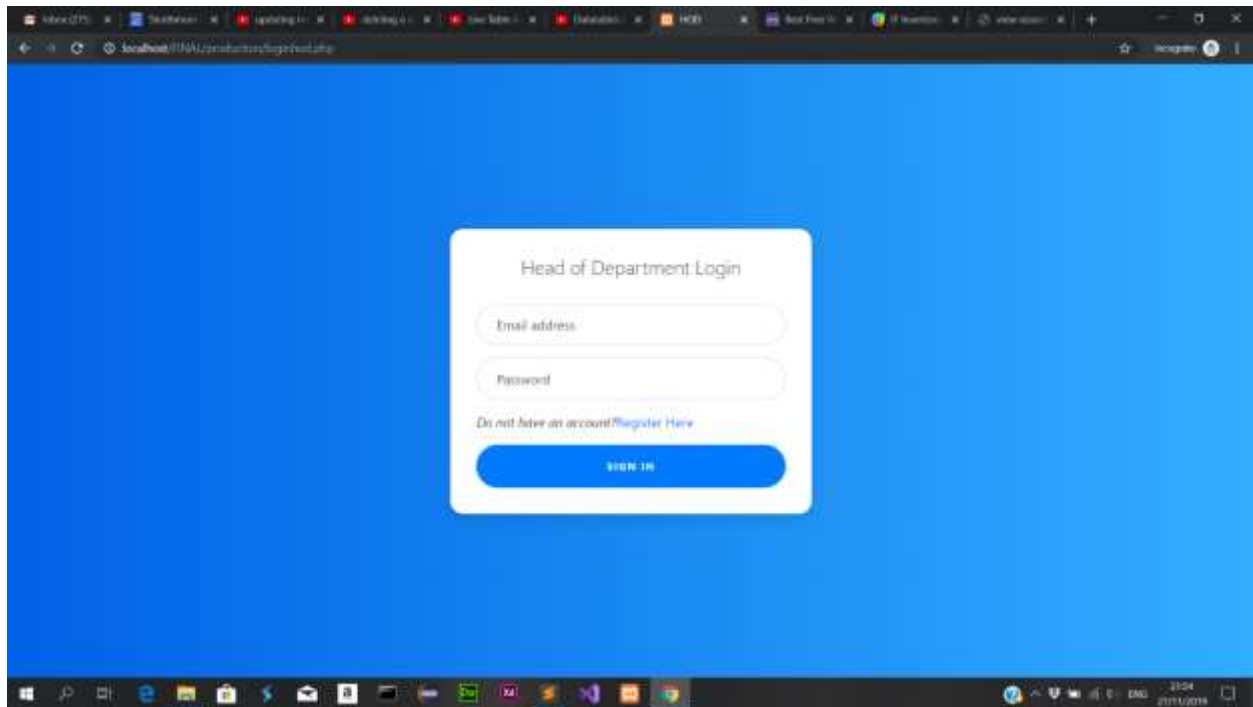


Figure 17: User Login Module

5.2 Testing

Testing is the process of evaluating a system or its components with the intent to find whether it satisfies the specified requirements or not. Testing is just as important as coding mainly because it reduces software failure (Gelperin and Hetzel, 1988). Testing of the School Inventory System was done so as to point out the defects and errors that were made during the development phase.

The system was tested using black box testing.

5.2.1 Black-box testing

Black-box testing is whereby a random user interacts with the system without knowledge of how the system is structured inside the box. One is able to test the functionality of the system by noting whether the user had an easy time using the system. The non-functional requirements can also be monitored by noting whether the system had any defects during the time period which the user interacted with the system.

Test ID	Check	Pre-condition	Test data	Priority level
1	Does the system allow a user to submit a requisition	The user should be eligible for use of the system(registered)	Requisition ID:1 Category Code: EXOO2 Item Name: Chalk Staff ID:MS001 Quantity:2 Date:12/4/2019 Status: Pending	High
2	Does the system allow the user to approve and disapprove submitted requisitions	The user has to be logged in as the principal.	Requisition ID:1 Category Code: EXOO2 Item Name: Chalk Staff ID:MS001 Quantity:2 Date:12/4/2019 Status: Pending	High
3	Does the system allow the store clerk to enter items into the system	The store clerk must have logged in and opened the item entry form	Inventory ID:1 Category Code:PM001 Item Name:Ruler Quantity:1 Unit Price:15.00	High
4	Does the system allow the store clerk to lend items to users	The store clerk must have logged in and opened the lending form Item(s) must be available in the permanent inventory.	Issue ID:1 Inventory ID:2 Name:Tablet Staff ID: MS001 Date Lended:12/1/2019 Status:Issued	High

5	Does the system allow the store clerk to record returned item	The store clerk must have logged in and opened the item return form The item must have been lended.	Issue ID:1 Inventory ID:2 Name:Tablet Staff ID: MS001 Date Lended:12/1/2019 Status:Issued	High
6	Does the system allow the store clerk to create and edit inventories	The store clerk must have logged in and opened the inventories form	Category ID:1 Category Code:PM001 Category Name: Permanent Inventory	High

Table 1: Black Box testing

Test ID	Expected results	Actual results	Status	Remarks
1	The system should indicate that the entry was successful and successfully stored in the database	Entry successful and record appears in the database.	Success	Good performance
2	The system should allow this user to approve or disapprove the requisition	A requisition submitted was successfully approved Another requisition submitted was disapproved successfully.	Success	Good performance
3	The system should allow this user to enter item records and notify them of the success of record entry.	An item record submitted returned a success message indicating the record was successfully stored in the database	Success	Good performance
4	The system should allow this user to issue items from the permanent inventory to other users.	The item was prompted for checking out and a success message indicated this was implemented successfully.		

5	The system should allow the user to add the item back to the inventory and reset its availability	The item is made available again and a success message shows that the update was successful	Success	Good performance
6	The system should allow a user to create inventory categories and store them in the database	Inventory Category was added and successfully stored in the database	Success	Good Performance

Table 2: Test Results

Testing	Deployment	
<ul style="list-style-type: none"> - Intel™ Core i7 - RAM 1.5MB - HP 15 Laptop 	<ul style="list-style-type: none"> - Intel™ Core i5 or above - RAM 4MB or above 	Hardware Specifications
<ul style="list-style-type: none"> - Sublime Text Editor - Apache Web Server version 3.2.2 - Google Chrome version 78.0.3904.108 	<ul style="list-style-type: none"> - Google Chrome version 78.0.3904.108 - Apache Web Server version 3.2.2 	Software Specifications

Table 3: Hardware and Software Specifications

CHAPTER 6: CONCLUSIONS, RECOMMENDATIONS AND FUTURE WORKS

6.1 Introduction

This chapter discusses conclusions, recommendations and future works of the school store inventory system.

6.2 Conclusions

This project has been able to review the school store inventory system and used by the school and been able to improve it. This has also brought out further areas of improvement within the school store and the school as a whole. The challenges faced while the manual system was used have now been largely done away with.

6.2 Recommendations

The Since the system is web based it is recommended that system users have an Internet connection. System users will also have to have email addresses which will be used as their usernames. Some of the tools used to build the system will require users to use the latest versions of web browsers such as Google Chrome and Mozilla Firefox

6.3 Future Works

Some features that would be implemented into system in later releases include automatic calculation of penalties, real time updates of items in the system and integration with other systems in the school such as the library management system.