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AUTOMATED COMPLAINT AND REPORT MANAGEMENT SYSTEM FOR TERTIARY INSTITUTIONS

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Abstract: The utilization of Information and Communications Technology (ICT) in the educational sector cannot be overemphasized. Educational system across the globe is under immense pressure to use ICT to improve the system. An Automated Complaint and Report Management System is one of the tools to achieve this goal. Over the years, the method by which complaints and reports are managed in some Nigeria Universities has not been digitalized and automated. This work presents a web-based system for complaint and report management which was developed using PHP, an open source scripting language. The system analysis and design was carried out using the Object Oriented Analysis and Design Methodology (OOADM). The database was created using MySQL and the interface designed employed CSS, JavaScript and HTML. A Supervised Machine Learning algorithm was utilized and basically used for the classification of the complaints. The result obtained shows that the developed system proved to be a better, easier, faster, reliable and more secured method for improving complaint and report handling for fair and prompt response in order to ensure effectiveness and efficiency in tertiary institutions. This is highly recommended to the management of Rhema University, Nigeria as it works towards being among the best 300 universities in the whole world.

Keywords: Complaint, Report, ICT, Lodge, Student, Educational System

I. INTRODUCTION

The utilization of Information and Communications Technology (ICT) in the educational sector cannot be overemphasized. Educational system across the globe is under immense pressure to use ICT to improve the system [1]. An Automated Complaint and Report Management System provides a tool for achieving this goal in the educational sector. For students and staff of tertiary institutions, the use of ICT in managing complaint and reports provides quick response to issues and challenges within the academic environment. A standardized complaint management system is a key component of the creative practices that academic leaders need to implement in order to eventually boost students' academic success.

Complaints are often indicative of problems in an organization that may never otherwise be realized. It originates from issues across an entire organization and it is important to generate robust reports that reveal patterns over time and demonstrate to inquiring minds that all complaints are responsibly responded to.

Online complaint and report system provides an online platform to register complaints and report to ensure better management and prompt response. Its major goal is to improve the management, monitoring, tracking and resolving of complaints and reports.

It also gives an organization a practical tool to identify and concentrate on issue areas, track complaints and monitor reports to make the system more efficient. This will facilitate policy and procedure improvement, efficiency and effectiveness enhancement, modification of service and re-assessment of the need for information. Achieving quality educational standard requires an improvement on educational service delivery, teaching and learning.

This entails the incorporation of Information and Communication Technology into all areas of the educational system in order to provide the kind of education that is generally affordable, enabling, comprehensive, reforming and equally meet the requisite human capital for achieving and improving sustainable socio-economic development of any country universal competitiveness and the ability of persons to survive in this modern environment.

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Complaints is seen as a pointer for the evaluation of the performance of organizations, it could signify some issues or fault in internal operations that require rapid revitalization so as to prevent loss of beneficial customers [7]. These issues related to complaints and reports have caused series of hindrances to academic progress in the different areas of the educational system, particularly with the enormous population often connected with academic environment. Students always encounter academic obstacles/challenges requiring rapid action. Some of these problems could be related to insecurity, financial difficulties, rape, missing script, malpractices, sexual harassment, bullying and other numerous challenges. Staff on the other hand are not left out as they face issues similar to the what the students are facing.

An effective complaint and report management approach involves carrying out three key procedures which include; promote and accept complaints, take decision on complaints and return the response to the complainant [7]. Achieving these goals require the deployment of a well automated system that can efficiently handle these processes, ensuring that delay and bias are prevented in the process.

II. REVIEW OF RELATED LITERATURES

A complaint and report management system is a system that allows users to register their dissatisfaction about an issue or event in an organization. It allows organizations to obtain feedback on how to improve their services and resolve issues that could hamper productivity.

Online complaint and report system provides an online platform to register complaints and report that saves time and eliminates bias. Complaints are often indicative of problems in an organization that may never otherwise be realized. It originates from issues across an entire organization and it is important to generate robust reports that reveal patterns over time and demonstrate to inquiring minds that all complaints are responsibly responded to. Complaint systems can be applied in different sectors of the society such as health-care, schools, businesses, social forums and in many specialized areas.

2.1 Concept of Complaint and Complaint Management

According to Collins dictionary, a complaint is a statement in which you express your dissatisfaction with a particular situation while a report on the other hand is a spoken or written account of something that one has observed, heard, done, or investigated. Complaints provide essential approach to manage an organization to be liable to the people they serve, and at the same time provide a important results that can be utilized in evaluating the performance an organization, the behavior of public that they serve and that of their employees.

Complaint management provides a way of handling problems of dissatisfaction or despondency specified by complainants. It allows effective management and curbing of problems associated to customer services. It provides a channel through which individuals working together in an organization harmonize themselves to ensure that they meet the common goals of the organization [4].

Online Complaint Management System offers an approach to resolve some common issues encountered by the general public, the major goals of the complaint system is to ensure that complaints are easily to organized, observed, followed, resolved and to provide organizations with an efficient means of discovering and aiming at problems areas, observe complaints handling process and enhance business performance. It is seen as an administrative tool for evaluating, examining and reacting to customers' complaints [10].

SERVICOM is a short form of Service Compact with All Nigerians. It is a scheme provided by Nigerian government which is geared towards organizing effective and efficient service delivery in ministries, departments and agencies to guarantee customer satisfaction and to bridge the gap between government and the people on issues bordering on service delivery in work places.

Its main goal is to combat service failure by ensuring that organizations in this country deliver expected services to its citizens and other members of the public. It ensures that the public are aware of their civil rights, the level of service they should expect and how to complain in the face of failure in the delivery of these services.

The students are the main and prospective customers in schools. The school system is targeted at providing conducive environment for students to learn and perform extremely well. It is imperative to provide an enabling academic environment to promote effective and efficient service delivery in institutions.

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When there is failure in delivering these services, it gives rise to issues and anyone affected has the right to complain [12]. It is based on these that students can gain in different capacities from SERVICOM initiatives as follows:

i. Free to complaint when lectures are not delivered as scheduled.
ii. Free to complaint when maltreated.
iii. Free to complaint when there is issue of missing scripts/results.
iv. Free to complaint when grade are incorrectly computed.
v. Free to complaint when disregarded or dispelled.
vi. Free to complaints when expected services are not rendered.
vii. Free to complaints in the case of sexual harassment or abuse.

2.1.1 Categories of Complaints

(a) Academic Complaint

Academic complaint refers to those issues that concern academic-related activities of students. It deals with issues relating to academic activities such as lectures, results, timetable, examinations, etc. Grounds for academic complaints include:

i. Incorrect assignment of grade.
ii. Improper conduct by students or lecturers toward lectures or examinations.
iii. Biasness of lecturer towards a student.
iv. Assigning inadequate time during examination.
v. Timetable clashing
vi. Victimization of student during examination.
vii. Examination malpractice.

(b) Non-academic Complaints

These are complaints regarding policies and procedures as well as the behaviour of a person or persons affiliated with an organization such as student, staff, agent, etc. There are certain conditions that occur such that a person may feel he/she was not given a fair treatment, disagree with some of the institutions guidelines, or have an exception concerning the conduct or actions of a member of staff or faculty of an institution. Universities through the Student Affairs department can assist individuals who have non-academic complaints or grievances and need help in determining the procedures to be followed. Non-academic complaint may involve:

i. Molestation
ii. Bullying
iii. Stealing/Loss of valuables
iv. Equipment malfunction
v. Unavailability of water/power
vi. Breakdown of law and order
vii. Possible violation of school policies
viii. Unethical practices by staff member
ix. Infringement of student rights

Complaint management in organizations has been extensively studied by a lot of researchers with substantial effort to discover what a good complaint management system is all about even though a lot were not accompanied by empirical review. Listed are some important literatures related to complaint management.

Manuhutu & Uktolseja [9] worked on Design and Implementation of Online Students' Complaint (Case Study of English Study Program at Victory University, Sorong). The researchers proposed a model to design a web-based complaints management system for students. The system was developed using Hypertext Preprocessor (PHP) scripting language and MySQL was employed for the creation of a corresponding database. An information system that could be used in English Study Program of the institution for receiving report and proposal from students which reduces use of paper, time and energy was developed. However, the system lacked data security and it was not extended to other sections of the department.

Nasr & Alkhider [10] worked on Online Complaint Management System. The researchers were able to achieve the main goals which included immediate access, enhanced efficiency, optimal usage of system resources, resourceful records management, generalization of the processes, reduced processing time, access to essential information, user friendliness,

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more room for further improvement. The proposed system was successfully designed, developed and tested by taking "test cases", but it lacked features that could ensure data security and integrity.

Anjali *et al.* [5] presented Complaint Management System, a web-based system that employed both a web server and application server that was made to offer different services to customers. The server accepts and responds to different kinds of requests from customers. ASP.NET, C#.NET, HTML and CSS were utilized for the interface design. The application server employed the Internet Information Service (IIS) 6.0 for the business process. The system was tested and found to achieve its objectives; however, it lacks features for sending feedback to the user.

Alve *et al.* [3] presented Web Application for Complaint Tracking and Resolving. The researchers proposed a model for managing various complaints in the hostels and colleges to help discover problems and enhance service delivery. The system consists of two main modules; the user module and administrator module. The proposed system yielded the expected result as it guaranteed timely complaint resolution, less paper usage, better understanding of issues, easy follow-up of complaints, improved usage of resource, short processing time, better management of records and ease of access. However, the research was not exhaustive as some procedures seemed to be based on assumption.

Al Abbas *et al.* [2] presented Analyzing and Implementing a System for Reporting, Follow Up and Resolving of Complaints. The web-based system could be used to report, track and resolve complaints was studied and built for various complaints management processes in various areas including universities, hospitals, shopping mall, etc. The proposed framework was designed and implemented with Unified Modelling Language (UML) diagram, Microsoft Access 2010 and Visual Studio-ASP.NET programming language. The researchers were able to achieve the aim and objectives but the system equally lacked feature for sending feedback to the user.

Gurule *et al.* [8] proposed CRM based ISP Complaint Monitoring and Resolving System. The researchers designed an android-based system that offers efficient approach to examine and resolve different users complaints by keeping records of the complaints of every users and the current status of each complaint in order to easily follow-up specific problems. The system was designed with three types of users in mind; customers, service engineers and administrators. The system was able to meet its objectives of handling and resolving complaints within a short time by constantly tracking these complaints. However, no security algorithm that would guarantee data privacy and security was specified.

Oguntosin *et al.* [11] worked on Development of a Web-Based Complaint Management Platform for a University Community. JavaScript was employed as the programming language for implementing the proposed system and MongoDB server was used to create the database management system in order to enhance complaints handling and resolution in Universities. The research revealed that students were actually fascinated about an online approach for lodging complaints because it ensures the process is made easier. The researchers were able to achieve the aim and objectives of the study; however, the system lacked features for complaint tracking and a private messaging module for feedback. But they clearly stated that the system is still open to possible enhancements with the advancement of technology.

Sukamto *et al.* [14] worked on The Design of Innovative Complaint Systems inside University to Face Globalization. The proposed model was adopted from the previously existing complaint management approaches used in Northumbria University, England and Australian International College. It was then customized for complaint management in education sector in Indonesia. A web platform for complain management was proposed, the result of the study was a concept in complain systems that improves the competitive advantage of universities in meeting global challenges. But the designed model was not developed for proper implementation of the proposed system.

Bhadouria, *et al.* [6] explored Online Complaint Management System. The main objective was particularly concerned with issues related to the internal system to make complain easier to organize, observe, follow-up and resolved by keeping track of the different stages of complaint lodged by individuals in an organization. The proposed system was successfully designed, developed and tested and the result revealed that the system met the specified requirements to an excellent extent. However, it lacks portability, versatility and tools for efficient control of records.

Anusiuba *et al.* [4] presented the Design and Implementation of a Tertiary Institution Web-Based Student Complaint Management System. For the system design, the Waterfall research methodology was employed; it was modeled using data flow diagram (DFD) which captured all the processes within the system. The system development tools utilized were the PHP programming language, JavaScript, Hyper Text Mark-up Language (HTML), Cascading Style Sheet (CSS), and MySQL. MySQL server application was used as the Database Management System (DBMS), while Visual Studio Code application served as the Integrated Development Environment (IDE). The researchers achieved the aim of

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designing a user friendly system that equally offered very effective and efficient system and as well met the project objectives. However, it lacked a feedback mechanism for communicating the solution back to the user.

III. METHODOLOGY

Object Oriented Analysis and Design (OOAD) methodology was adopted for this work. The OOAD uses a repetitive and object-oriented development technique that splits a whole system into subsystems and modules that are smaller and easier to manage. It is a widely used practical method that is applied in system analyses and design that utilizes the object-oriented paradigm and visual modeling across the system development life cycles. The Object Oriented Analysis and Design Methodology (OOADM) was preferable because it is easy to understand, use and implement. It also helps to create reusable codes that can be applied to other similar projects or used as a template for new projects. Ideally, OOADM is suitable to model and simulate real systems with improved reliability and flexibility.
The steps in an OOAD methodology generally include two major things; Object Oriented Analysis (OOA) and Object Oriented Design (OOD).

3.1 Object Oriented Analysis (OOA)

Object Oriented Analysis (OOA) involves the conversion of actual problems into a model using objects and classes as the representation tools. The analysis of the operational procedures of the proposed system was described using a detailed algorithm. Figure 1 shows the elaborated use case diagram of the proposed Automated Complaint and Report Management System.

Algorithm: Algorithm of the Proposed System:
Step 1: Start
Step 2: Register on the complaints management portal
Step 3: Login into the complaints management portal
Step 4: Type and submit a complaint
Step 5: The administrator accesses the complaint and forwards to the hostel management
Step 6: The hostel management looks into the complaint and tries to resolve it
Step 7: Else
Step 8: Forwards to the school authority
Step 9: Complaints is resolved and sent back to the system administrator
Step 10: The administrator records the solution and sends feedback to the user
Step 11: End

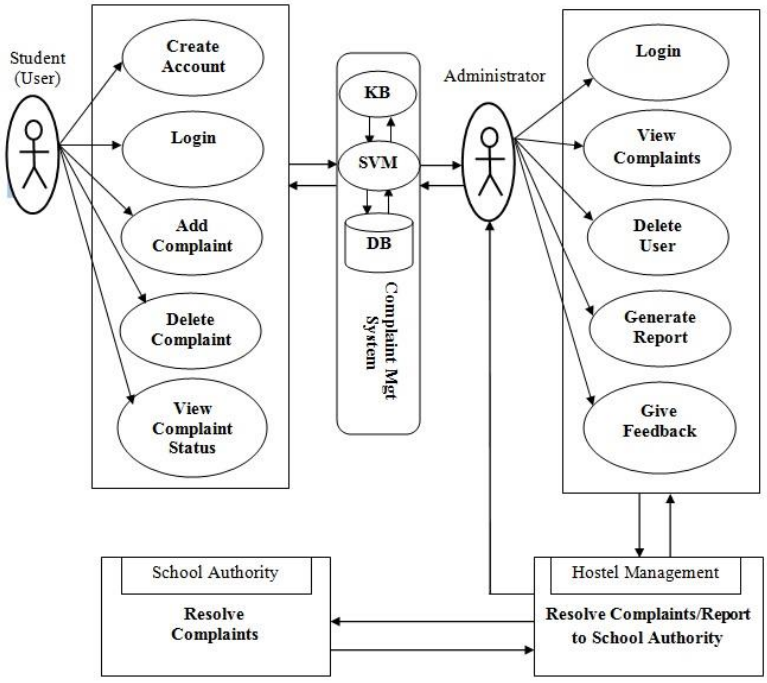

Figure 1: Use Case Diagram of the Proposed System

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3.2 Object Oriented Design (OOD)

Object Oriented Design (OOD) entails the process of transforming a problem representation usually from an object-oriented analysis into a solution representation based on objects. When carrying out object oriented design, new objects that may not be available in the representation could be added for the purpose of implementation.

3.2.1 Architecture of the Proposed System

The architecture of the proposed Automated Complaint and Report Management System for Tertiary Institution is shown in Figure 2. The system comprises of the following components:

i. User Interface
ii. System Administrator
iii. Complaint Management System using Support Vector Machine (SVM)
iv. Hostel Management
v. School Authority

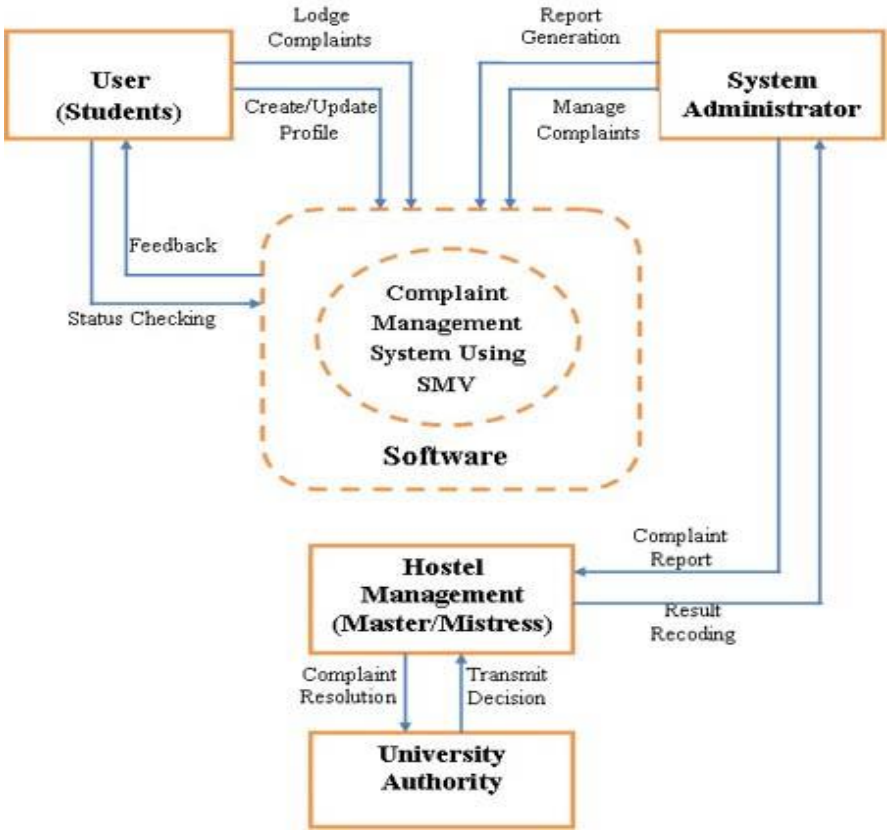

Figure 2: Architecture of the Proposed System

i. **User Interface**: This is a means of interaction between the user and the computer. It comprises all the procedures and devices that are used to accommodate communication between the system and the user. It accomplishes two major tasks: transferring information from the machine to the user and transferring information from the user to the machine.

In the developed system, a student is expected to create an account on the platform to be able to use the system. The account creation entails choosing a unique username, a strong password and other requirement including last name, first name, matriculation number as well as a telephone number. This is imperative for an account to be successfully created. The features for achieving these are available on the main page.

ii. **System Administrator**: This is a person responsible for carrying out administrative duties in a business or organization. This individual works on the computer to access submitted complaints and send reports to appropriate locations.

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iii. **Management System using Support Vector Machine (SVM)**: The computer program designed for managing the complaints through the computer via the internet.

iv. **Hostel Management**: These are personnel with the responsibility of managing the various activities within the hostel.

v. **School Authority**: This includes the Board, the Senate, the Standing Finance Committee and may includes some other units prescribed by rules or regulations.

3.2.2 Space Vector Machine (SVM)

Space Vector Machine algorithm is a kind of supervised learning algorithm that is generally used for regression and classification but it works better for classification tasks. With a specific set of training samples grouped into different classes, the SVM algorithm trains a model to efficiently predict the class of a new data based on already existing patterns. Consequently, the algorithm has significant ability to simplify a problem, which is a main objective in statistical processes. It has been mainly applied in pattern recognition because it has been established to be more effective than other pattern recognition methods such as Neural Network and Bayesian classification [13].
Space Vector Machine algorithm was employed in this study specifically as a classification tool to group different students' complaints into categories since research has proved its effective and efficient performance especially when huge dataset are involved when taking broad overview of problems.

IV. EXPERIMENT

This involves the practical methods of putting into work all the theoretical framework of the system. The implementation process of the new system was carried out using the XAMPP technology. XAMPP is a generally used open-source software stack developed by Apache Friends. It is a cross-platform that is made up of different components on which web designers and programmers test their work locally on their personal computers without actual Internet access usually referred to as local web hosting. The main purpose for using XAMPP as the technology for implementation is that it is robust and easy to use. In addition, most commonly used web server deployments utilize exact components like XAMPP, which makes it very simple to convert from a local host server to an actual web server. This is because deployment to an actual web server will involve slight or no configuration of the different constituents of the actual web server.

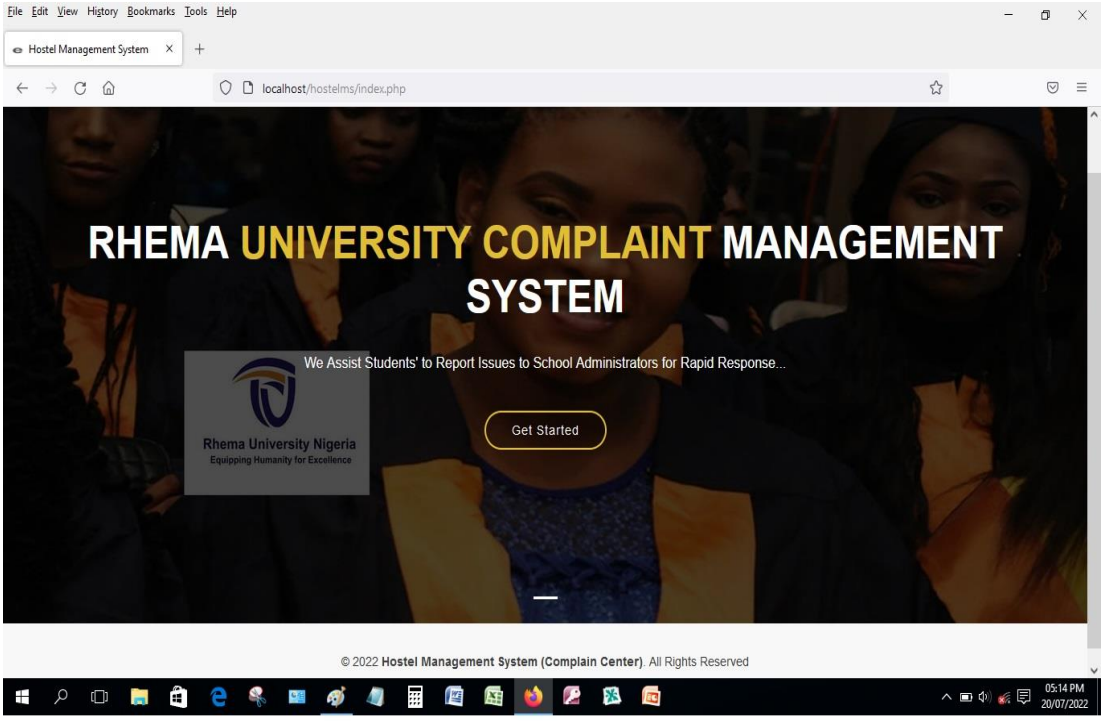

Figure 3: Home page

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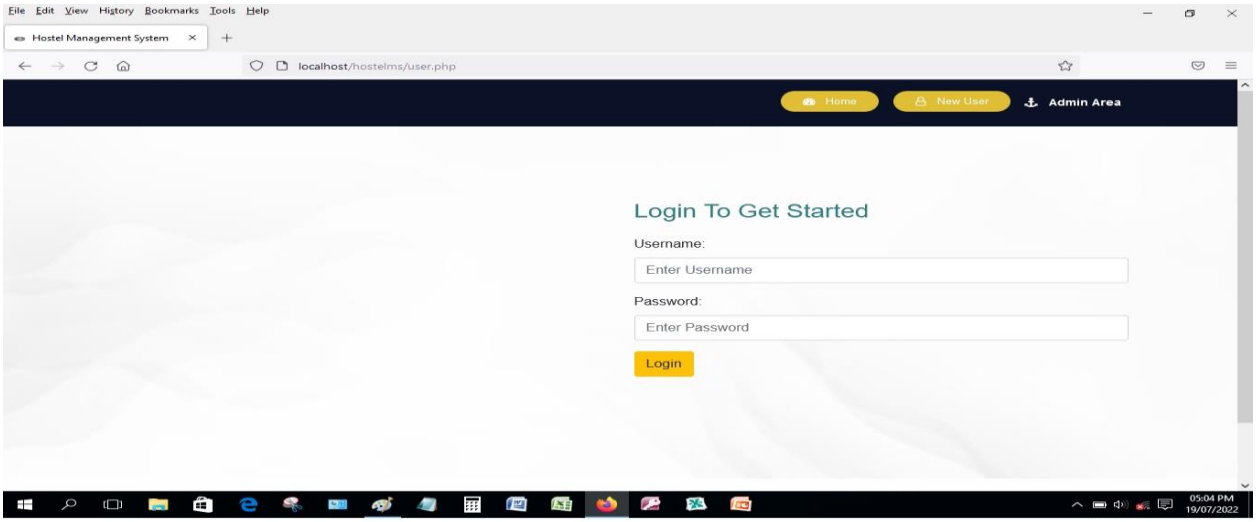

Figure 4: User Login Page

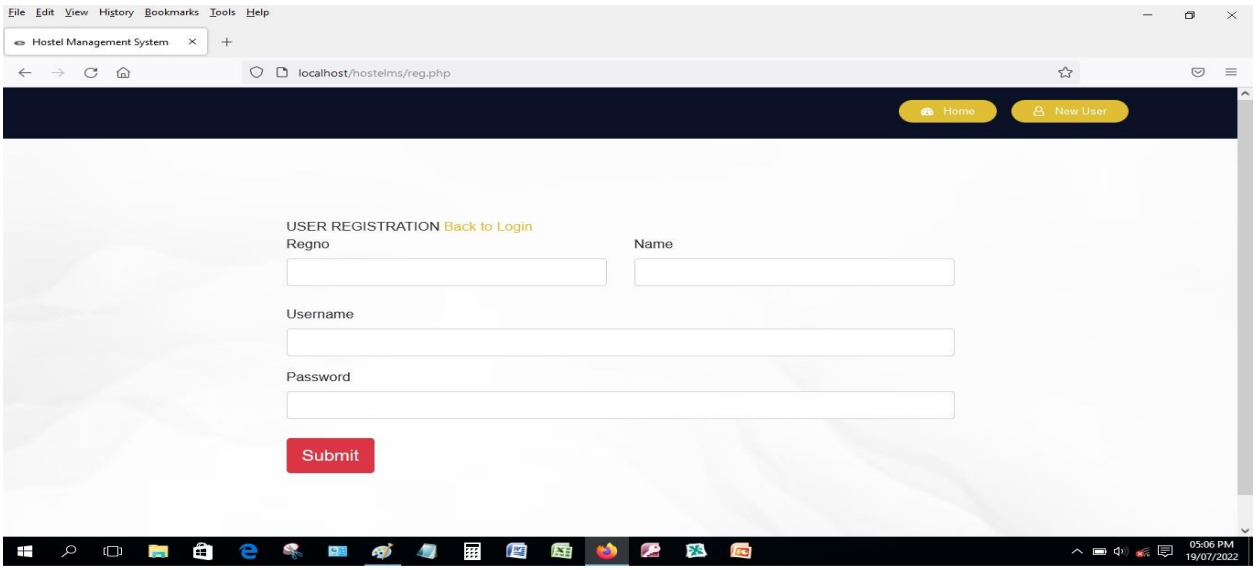

Figure 5: New Users Registration Page

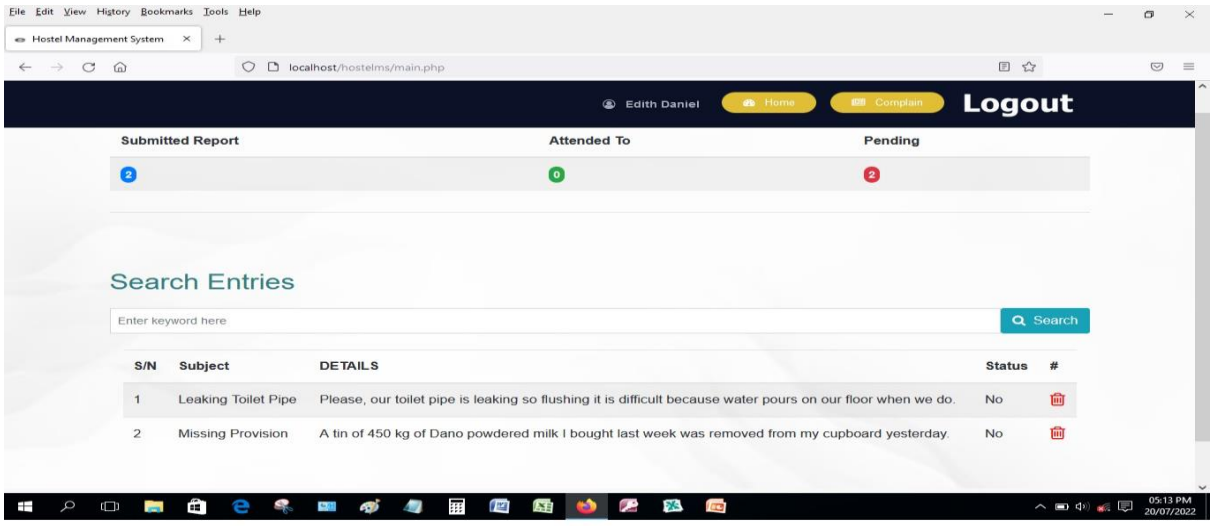

Figure 6: Students' Dashboard

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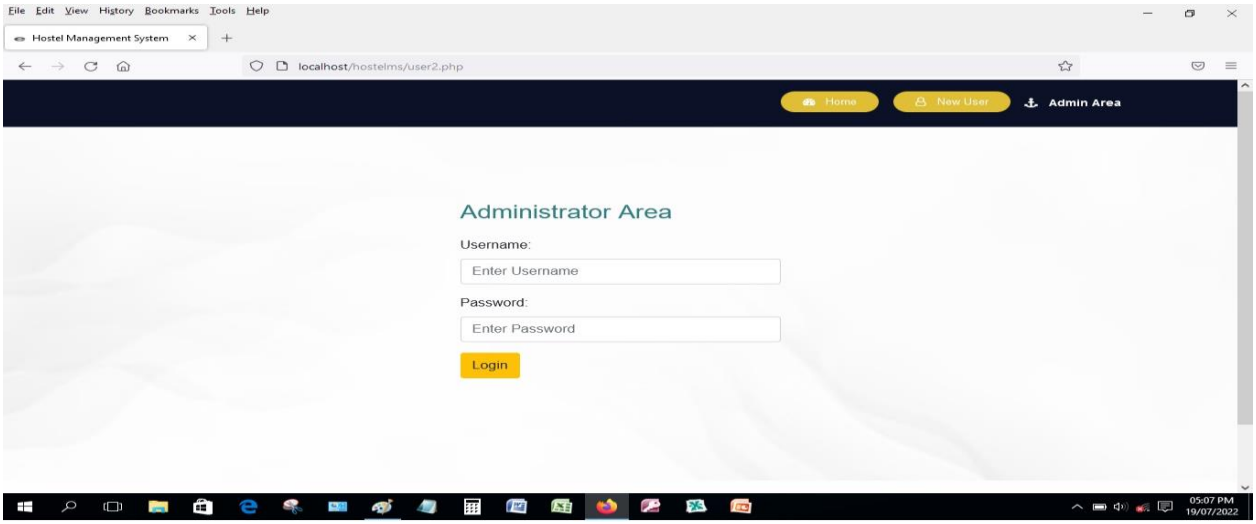

Figure 7: Admin Login Page

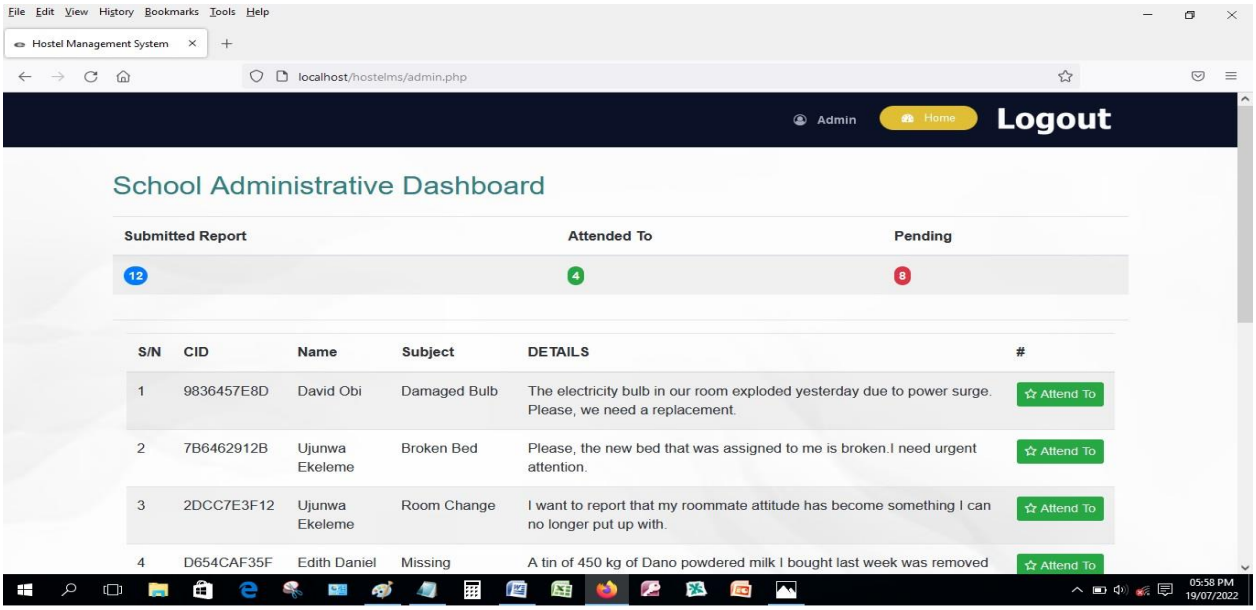

Figure 8: Admin Dashboard for Pending Complaints

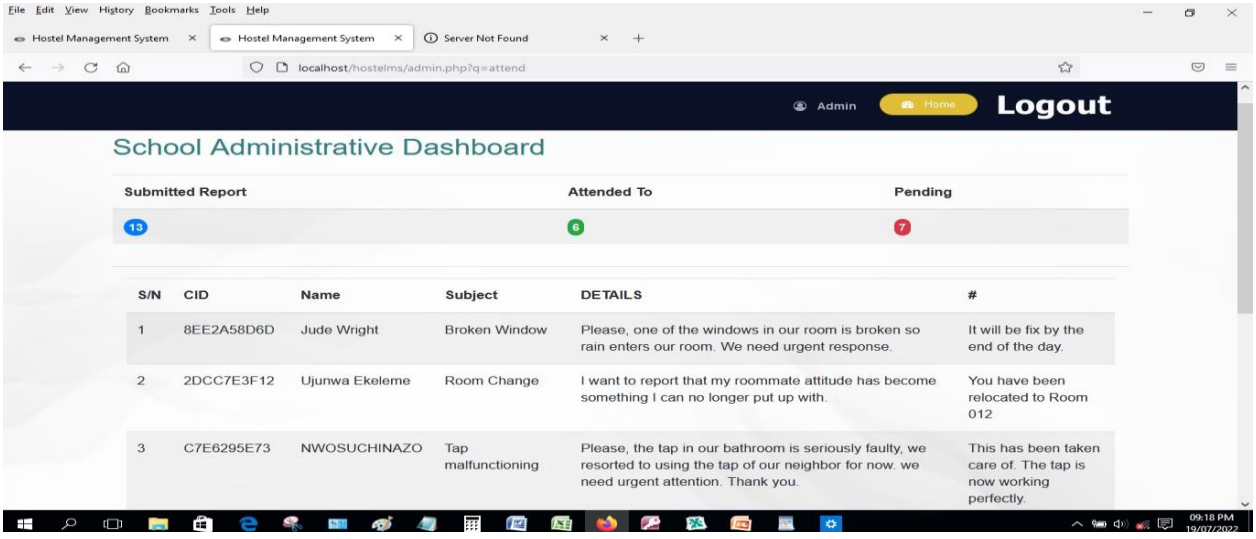

Figure 9: Admin Dashboard for Resolved Complaint with Feedback

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V. DISCUSSION OF RESULTS

The screenshots of the result obtained from the developed system are shown in Figures 3 through Figure 9. It was observed that the complaint system provides an efficient way for managing complaint starting from the students who lodge the complaint down to the administrator, hostel management and school administrators.

Figure 3 shows the home page of the proposed Automated Complaint and Report Management System for Rhema University Nigeria. The entire process begins on this page. Clicking on "Get Started", a user is redirected to the login page.

Figure 4 shows the login page, where an existing user enters account details to have access to the system. It also includes a link to go back to the home page, a link to create a new account for a new user and a link to go to the administrative dash board.

Figure 5 displays the registration page where a new user can create an account to be able to use the system. It requires the user to provide such details as students' first and last names, registration number, a unique user name and a strong password.

Figure 6 is the screenshot of the students' dashboard page. In this page, a student can make new complaint entries or check the status of existing entries, search or delete an entry. A user can also see the status of each complaint and also have access to the feedback when it is eventually added by the administrator.

Figure 7 displays the Admin Login Page while Figures 8 and 9 show the administrator's dashboard for pending complaint and administrator's dashboard for resolved complaint with feedback respectively. The administrator can log in and access all the complaints lodged by the students, the admin user name and password are embedded in the code; the admin does not require creating an account to access the portal. The admin gets a report from the student's complaint which is forwarded to the hostel management for handling. The response or solution to the complaint is sent back to the administrator who enters it into the system from where the student can access it as feedback. On this page also, the total number of submitted report, resolve reports and pending reports are indicated and clicking on any of the available links displays the full details.

VI. CONCLUSION

Automated Complaint and Report Management System for Tertiary Institutions was presented in this work; which was carried out through analysis, design, implementation, and testing of the system. The developed system provided a powerful and flexible tool, which could be used by students in academic environments to enhance complaints and report handling processes. It offered a way to make complaints easier to register, monitored, resolved, and to provide feedback in order to identify problem areas and to improve services rendered especially in academic environment. The system showed better performance than the existing manual-based system and could serve as an exceptional tool for monitoring and resolving students' complaints and as well for storing the complaints and the results for future references. The system was tested in real time and the results revealed the effectiveness and efficiency of the new system. It is user-friendly and easy to use, and comprises of excellent features that ensure that users' data are safeguarded against unauthorized access.

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