

# Development of Web Application Complaint Management System

## (A Case Study of Covenant University Environment)

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**Abstract-** Complaint management schemes have shown to be a unique and effective technique for assessing students, staff and visitors' satisfaction in a university environment. It has aided in promoting change and improvement in the way operations are carried out and ensuring that students and staff are served to the best of the University's capacity. Although there have been significant improvements in complaint management, the manual complaint report technique still has a lot of room for improvement. This research aims to create a web application based on a complaint management system for the Covenant University community, using a hypertext markup language (HTML) and cascading style sheets (CSS) for the front end as the programming language. Python Django as the database to enhance the way complaints are handled and analysed in the university environment. The system was high-speed and more efficient than the currently employed deployment and testing method.

**Index Terms-** Web-Application, Complaint Management System, Covenant University, Students.

### I. INTRODUCTION

Complaint management ensures that all reported complaints in an organization are adequately followed up and that any issues are immediately resolved. Complaints are challenging to track and monitor, and manually managing each one would be inefficient and time-consuming. Covenant University presently does not have an automated mechanism in place to track and handle complaints[1][2][3]. The current process of filing complaints has proven to be highly stressful for students and staff, especially in universities in developing nations since it necessitates repeated journeys to the proper departments to guarantee that problems are processed. This research aims to establish and build a web application podium that will allow University (Covenant University as a case) students, faculty, staff, and guests to file any complaints concerning situations that require immediate attention[4].

In a world where efficiency and speed are always encouraged, having an online system that allows individuals to swiftly file any complaints and receive a resolution is becoming increasingly needed. Organizations will lag behind their competitors if complaints are not handled timely, appropriately, professionally, and efficiently. The way to build enduring client connections is to create superior value and fulfilment of the client's expectations, which can be accomplished through a complaint management system. If an organization wants to grow, it must implement complaint management systems as one of the important methods[5]. It is impossible to exaggerate the relevance of customer or client complaint management systems in the complete running of corporate organizations. A rare complaint would signal the clients' preferences and predispositions[6]. Complaint management entails attempting to stimulate the expression of grievances from clients(in this case, students, faculty and guests) through email, toll-free lines, or an online survey and activities linked to quality improvement based on stated complaints as it is being done by most organizations[5]. In its broadest meaning, complaint management refers to the process through which organizations handle client complaints[7]. When handled properly, complaints can aid a company's growth and advancement toward its goals. The old system of customers writing their complaints down in person at a firm branch or filling out a hard copy of the complaint form is time-consuming. It could be problematic to get a timely response across to the clients that lodged the complaints and some of the complaints are left unattended [8]. These same challenges are faced by the University system as an organization and this can affect the image of the institution and cause unrest among students due to the unresolved complaints of the stakeholders of the institution. Therefore, this research work proffers a solution to the challenges of not having an interactive or online platform to formally lodge a complaint and the slow response time experienced in the old system of lodging a complaint and getting a timely response.

### II. RELATED STUDIES ON COMPLAINT MANAGEMENT SYSTEM

The complaint management system recognizes the link between the goal of resolving complaints and customer loyalty, and it make a generous effort to act quickly on issues that can be fixed right away[9]. Successful organisations see customer complaints as opportunities for product growth and improvement. They understand that there is a link between resolving customer complaints and their loyalty to the organization, so this encourages them to make a generous effort to act quickly on the complaint that could be fixed immediately. Osman and his co-authors had envisioned a generic web-based complaint management solution. They used an online gateway to develop an online complaint management system that residents could utilize to express their discontent with the supplies provided during the outbreak. Rokhmawati planned an E-complaint system for GraPARI Telkomsel Malang, Indonesia with Pradana. They intended to improve the efficiency of the complaints process for handling customer complaints. Given the limited number of

GraPARI devices available, acknowledging client discontent through the GraPARI machine was deemed insufficient to resolve the clients' concerns[10]. The call centre was considered unable to address all of the problems to their total capacity because each complaint treatment process must be presented directly to the client[11]. They provided a solution by establishing a statistics system to improve Customer Relationship Management activities to accept client complaints.

Businesses will ensure that an adequate mechanism is in place to allow their customers to ability to speak about their concerns and have those concerns addressed on time, according to Jiankang et al. [12].

Encouraging businesses to invite perplexed customers to complain as suggested that companies invest resources in empowering complaints and reimburse customers lavishly [13]. They indicated that this would improve client retention and help the firms rank higher than their competitors. Shahin saw customer complaints management and the related fundamental difficulties in establishing client loyalty and retention [14].

In directing CCM frameworks and using quality management techniques in such frameworks, he noticed that managers deal with various challenges, such as varying social difficulties. Culture is an essential factor that can affect customer loyalty, complaint procedures, and employee attitudes. All of this adds up to increased profitability for the company [15]. Apart from the advantages of collaborating as a group, it appears that service employees should be trained to deal with difficult situations clearly and compassionately.

It is seen as an essential benefit in encouraging trust in employees to be enabled. The association will face a significant customer exodus to competitors if it does not address the issues above. As a result, the company can dramatically reduce client losses by considering current and new customer complaints and ensuring that the problem is rectified. Customers are constantly in contact with a company that can adequately handle complaints. Customers do not waste time providing positive or negative feedback to the company because they can do so online. If problems are resolved quickly, customers will be more satisfied and loyal to a company. Businesses can use consumer complaints to their advantage in today's competitive market, forming a strong bond with their customers. Nasr and Akhdir aimed to modify a previously established complaint management system that needed clients to go to the office building for any form of support [16].

The existing Framework, they claimed, was well-known and challenging to use. They designed a new system to make complaint submissions easier to handle, monitor, and respond to and provide the organization with a helpful tool for detecting and acknowledging issue areas and preventing duplicate complaints. Users would be able to make complaints, and personnel would be able to reply to customers based on those complaints [9]. They offered a web application for registering grievances at a corporation as part of their recommended Framework.

Given the complaints' location, the appropriate authorities may take action and try to address the situation as soon as possible, as is reasonable under the circumstances. As a result of management, the time issue and writing desk labour associated with registering issues and maintaining records in a complaints book are compact. Their projected Agenda addresses the flaws of the existing system by providing a simple way to register, track, and resolve issues. It also improved client management and boosted the company's standard by reducing response time [17][18]. The future system was further accessible, with Complaints following and checking the system's status. The page admin can examine the number of customers, experts, and pending and completed issues in the administrator dashboard. Also, the user may view which issues have been successfully resolved on the long-run complaint page. Businesses will ensure that an adequate mechanism is in place to allow their customers to ability to speak about their concerns and have those concerns addressed on time, according to Jiankang et al. [12].

The various complaint management systems have been explained in this section, with articles justifying their usefulness and effectiveness. To avoid employing traditional complaint management procedures, web-based complaint management solutions have been created. This application is helpful for humans to file a complaint about the use of online software to save people's time.

### III. METHODOLOGY

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The approaches used to create the complaint management system are discussed in this section. To make the design more reusable, the plan was broken down into several components. User interfaces, database models, and structure are detailed in the platform's system requirements.

Each component serves a particular purpose in the system as a whole. Users will be able to use the system's authentication functionality to sign in and perform specified actions. Authorized users can utilize the system to file complaints, delete complaints, and take action on such complaints.

The proposed system identifies the system's intended users, followed by the system's requirements for proper operation. The Covenant University environment (students, faculty, and visitors) was used as a case study.

#### System Architecture

The system architecture describes the system's collective software components and how that structure ensures the system's conceptual integrity. It is an organized solution that satisfies all technical and operational requirements [20][24]. It entails determining how software components will be merged to produce the desired result. Client-Server Architectural Style is the architectural design style used, in Figure 1.

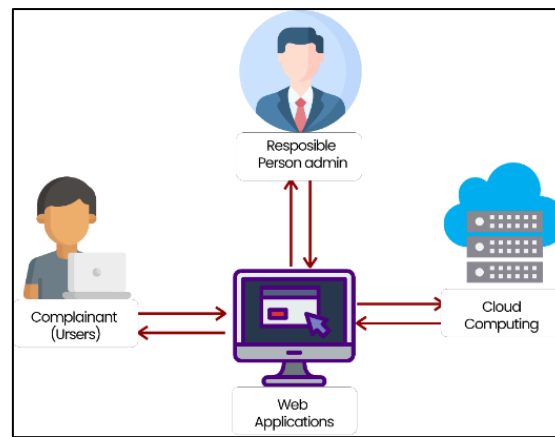


Figure 1: System Architecture Physical Design

### Client-Server Architecture

Client-server loads are shared in this type of architecture. It includes a central infrastructure that hosts the client's server. It is a service-oriented architecture that enables clients to receive continuous, uninterrupted service. Rather than delivering a whole file, it replies to client requests by reducing network traffic. A system allows for separate client and server systems [21][23]. The Python HTTP server is utilized as the backend server; Python Django is the DBMS (database management system). The users are the system's numerous clients; the internet is the network that connects the two.

### Client Structure.

The client uses a Graphical User Interface (GUI) to transmit queries, and then waits for a response before processing it. Before generating the output of the completed actions, the server authenticates users. Several major components make up the complaint management system, including:

- The login/logout management module:* This module is responsible for the data validation and authentication required to access the system during the login process. It's also in order to keep the audit trail up to date for security purposes.
- Complaint submission module:* This module would handle an authenticated user entering a complaint into the system. Random users would be barred from filing a complaint.
- Complaint management modules:* This allows the admin to change complaints, modifying them from pending to completed status. It also entails removing inappropriate contributions, such as those containing profanity or were resolved after the issue was resolved.
- Complaint viewing module:* This module would allow anyone with access to the website to read all of the system's registered complaints without having to log in.

These modules are available through various interfaces that allow users to interact with them and grant them viewing and editing privileges as needed. The login/logout management module, complaint filing module, and complaint retrieval module are accessible to regular users. An administrator has access to all modules and the complaint management module at the same time.

### Software Prerequisites

Software plays an essential role in today's systems. It allows systems to fully function and accomplish tasks while maintaining the user's flexibility and control [Laird23]. The software requirements are as follows:

- Linux, Mac OS, and Windows OS are examples of operating systems.
- Python Django as a programming language
- Development tools: VS Code, Git, and Postman
- Django is a database management system.

### Design of the System of the Web-based Compliant Management Platform

The complaint management system's system design is shown in Figure 1, and the different layers involved are shown in Figure 2. In contrast, Figure 3 illustrates the processes and stages involved in lodging a complaint and receiving a response.



Figure 2: The Complaint Management System's Basic Architecture

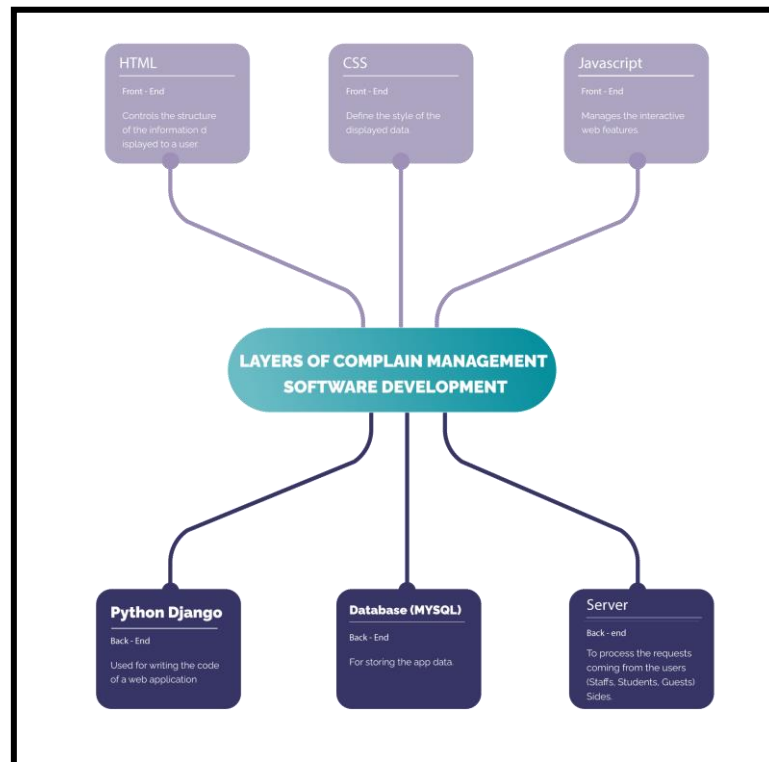


Figure 3: The Complaint Management System's Block Diagram

### System Modelling

The Unified Modeling Language (UML) is used to create a formal Complaint Management System model. The UML is a standard language for describing, visualizing, building, and documenting all software system artefacts. It enables the designer to present varied perspective views of the system pieces using diagrams. There are three essential parts to use case diagrams:

- System: This depicts the functional requirements that allow the system to fulfil its intended purpose.
- Actors: These are the system's users. They interact with the system to complete tasks.
- Goals: These are the proposed objectives of the system.

### The Dynamic Model

Dynamic UML diagrams are used to model the system's behaviours. The interactions between different aspects of the system are modelled independently and grouped under the Interaction UML diagrams. Because of the different participants in a project, use cases are indicated at varied degrees of abstraction. This promotes improved integration, communication, and understanding among the stakeholders concerned[22][27].

The functionality of a system as experienced by its users is captured using a use-case diagram. To put it an additional way, it's used to visualize how the system interacts with the outside environment. The following modules have been created to organize the system's functionality;

- User Management of Login/Logout
- Complain Acknowledgement
- Complain Retrieval
- Complain Update

The user management of login and logout are given in Table 4 and Table 5 respectively.

The incremental development model is Specification, development and validation are interleaved, which may be plan-driven or agile as well. And this is shown in Figure 4 with its different components. The cost of accommodating changing customer requirements is reduced through this model and the amount of analysis and documentation that has to be redone is much less than is required with the waterfall model.

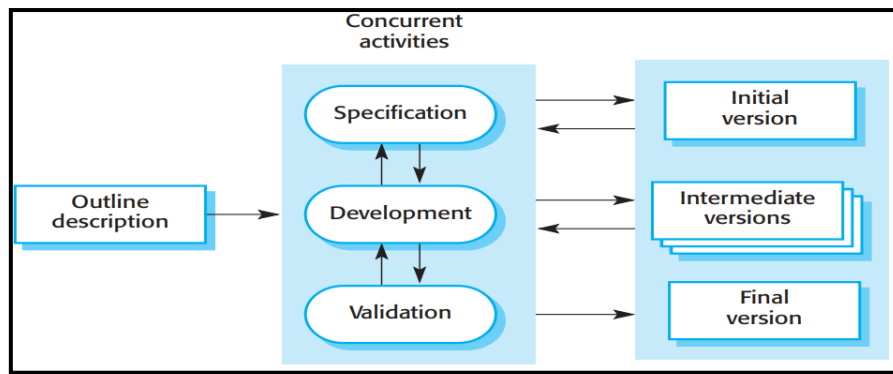


Figure 4: Incremental development model

- a) It is easier to get customer feedback on the development work that has been done. Customers can comment on demonstrations of the software and see how much has been implemented. More rapid delivery and deployment of useful software to the customer is possible. Incremental development problems are stated as follows:
- b) The process is always not visible most time, Development needs regular deliverables to measure progress.
- c) If systems are developed quickly, it is not cost-effective to produce documents that reflect every version of the system.
- d) System structure tends to degrade as new increments are added. Unless time and money are spent on refactoring to improve the software, regular change tends to corrupt its structure.
- e) Incorporating further software changes becomes increasingly difficult and costly.

**Complaint Management System Implementation**

The flowchart for the complaint management system is shown in Figure 5 with its use case shown in Figure 6 This section provides insight into the implementation of the Complaints Management System. The required systems specifications necessary to support the developed system and the tools used to develop it are provided. This is followed by a presentation of the various modules that make up the system. The following subsections describe the complaint management system implementation of the Home, Login, Signup, Add Complaint, View Complaint, and Delete Pages.

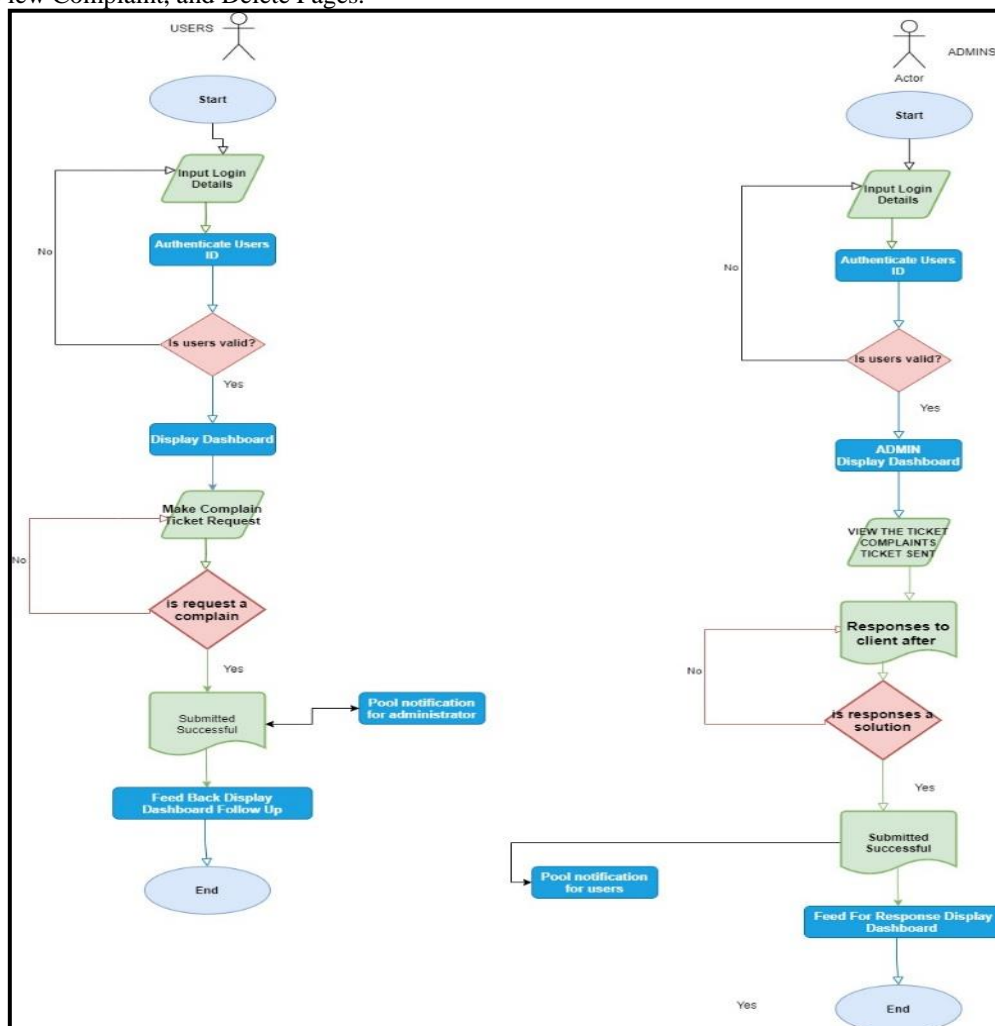


Figure 5: Complaint management flow chart for users and administrator

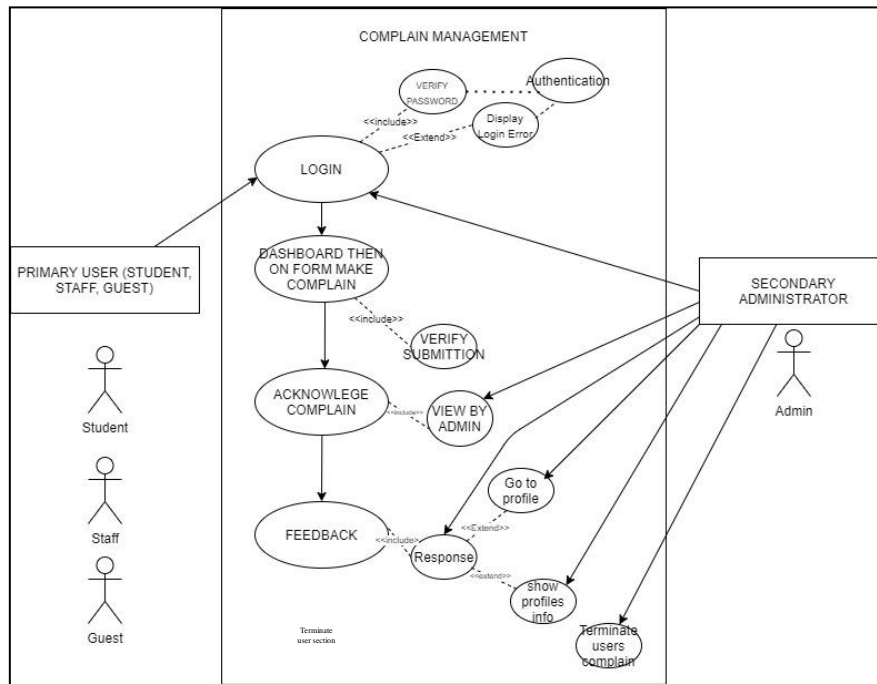


Figure 6: Complaint management using use-case narratives

Sign up and Login Screen of service for the complaint management system using Django. Suits application for 4 users admin, student, staff and guests (visitor). You would see the default login name and password as login while for sign-up you see a sign-up page, which consists of filling in the form you credential like your mail, selection of department and name and surname. After signing up, you should be able to sign in as one of the users (Guest visitor/ Student /Staff). Then after login, you see a dashboard with a menu bar of four divisions to you want to make a complaint then you document your mail and select the executives (CSIS, affairs, account officers, academic) you want your complaint to be directed then click submit and you get a notification on top of the dashboard saying successfully submitted. The users can see the progress on the dashboard whether pending, unsolved or solved on the user dashboard as well.

**The Home Page**

The platform's main page explains what it is all about. It informs the user that they are on the Covenant University-affiliated Complaints Management Platform. The home page displays all of the system's open complaints. It also features a navigation bar that allows users to visit various site pages, such as the log-in and signup pages. The complaints section is the following section on the home page. The user can view all of the complaints that have previously been entered into the database here. A loading spinner would appear while the data was being fetched from the database to indicate that processing was in progress. Through the backend code, data is retrieved from the database. The backend code serves as a go-between in Figure 7.

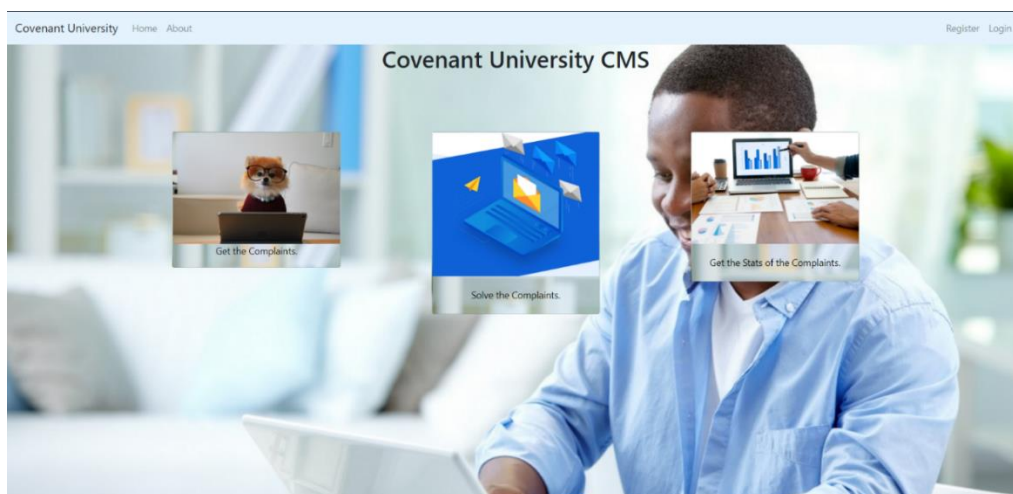


Figure 7. The designed home page of the Web-based Compliant Management Platform

### 4.3 The Login Page

Anyone with access to the system can view the login page. To gain authentication, you must provide the right email address and password. On the navigation bar, if a user has not been successfully logged in, there is a login link. If a user attempts to add a complaint while not logged in, they will be forwarded to the login page to complete the required authentication. A check is performed to confirm that the user is already logged in before they can access the add a new complaint page. The user is automatically redirected to the login page if the test returns false. If a user is already logged in, they will be granted access, and if they try to log out, they will be denied as displayed in Figure 8.

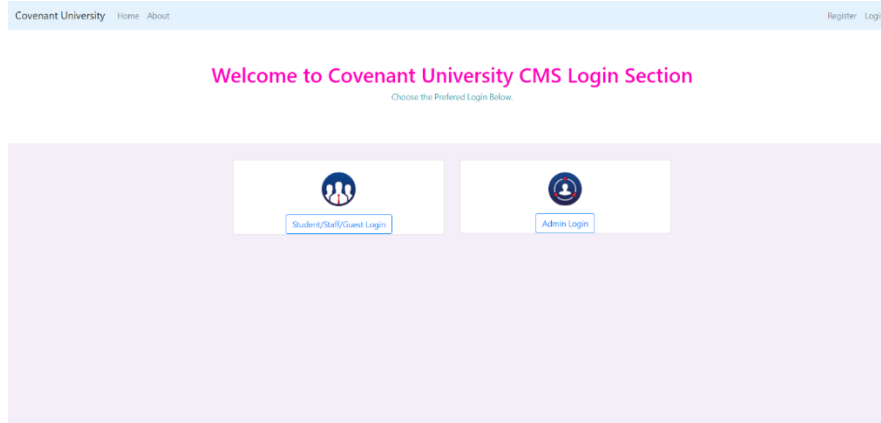


Figure 8: The Login page of the designed Web-based Compliant Management Platform

### The Signup Page

If a user is unable to log in because they do not have an account, they can create one by registering with the system. After the user enters their information, the system verifies that none of the input areas are left blank and that the passwords are both unique and longer than six characters. The details are delivered to the backend if the validation checks are successful. A check is conducted in the backend to confirm that the user does not already have an account.

If the account cannot be located, a new account is created for the user. The attributes that each user should have been specified using a user model (see Figure 9). After that, the model is used to map a new database user. The signup form shown in Figure 9 is used to collect information about a new user.

Figure 9: Create a new account page for the Web-based Compliant Management Platform

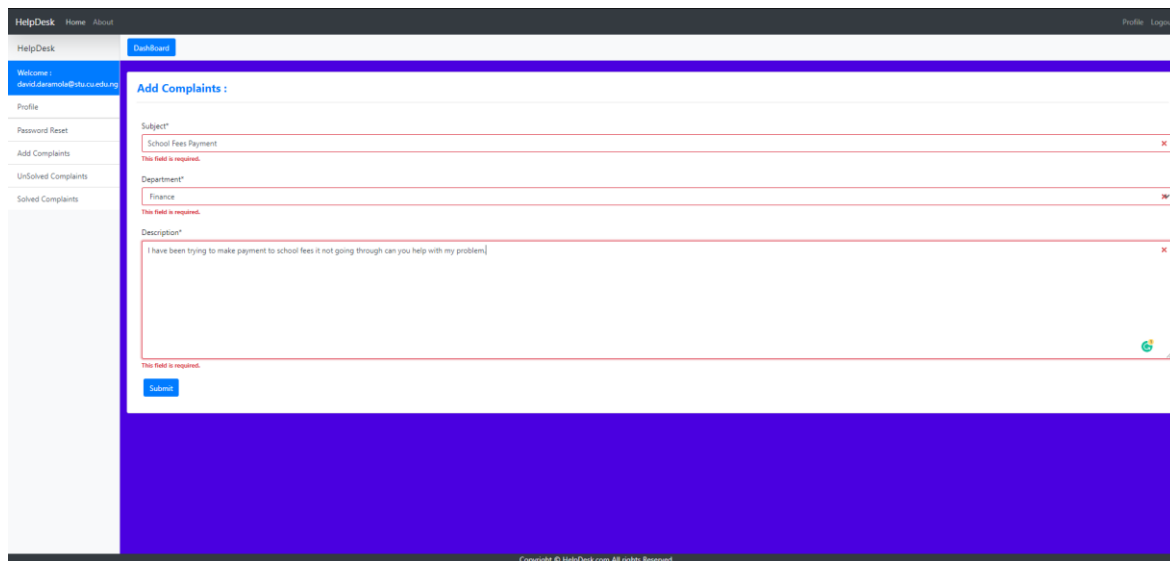
### The Add Complaint Page

To submit a new complaint to the site, a user must first be authenticated. If they are, they will be able to access this page; otherwise, they will be routed to the login page. The front-end system communicates with the back-end system to save a new complaint into the database. Figure 10 depicts the database's saved complaints.



**Figure 10 Saved complaints in the database of the Web-based Compliant Management Platform**

For each complaint, a model is constructed in the backend (see Figure 8). The complaint is saved to the Python Django cloud after the model is generated. Figure 11 illustrates the user interface for this.



**Figure 11 Add new complaint page Web-based Compliant Management Platform**

### The View Complaint page

As illustrated in Figure 12, anyone can examine a complaint and its associated details on this page. To see a complaint, a user does not need to be logged in, but they must be logged in to like or dislike it. While the page is loading, the system checks to see if the user has previously liked or disliked a complaint. When a user likes or dislikes a complaint, the original complaint data in the database is updated.



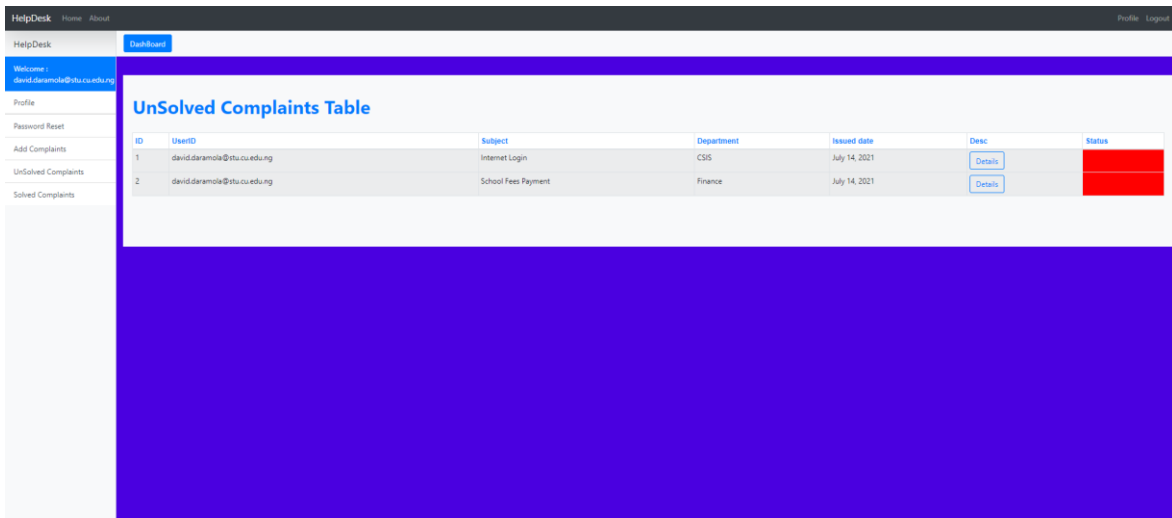


Figure 12: The page dedicated to the Web-based Compliant Management Platform.

### The Terminate Page

Only an authorized administrator has access to this page. It allows the database administrator to erase data. A delete option is not visible to regular users. The admin tag is given to every user when they join up in the database, and it is set to false by default. To give user admin capabilities, the system owner must manually modify the tag in the user database from false to true. Figure 13. depicts the true or false tag.

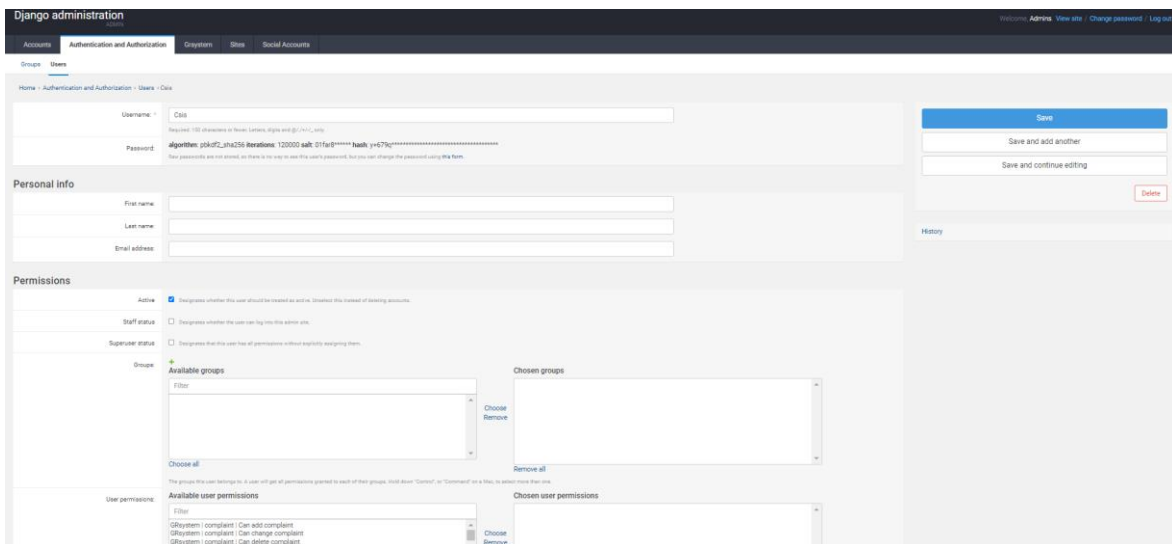


Figure 13: The Admin page Terminate to complaints.

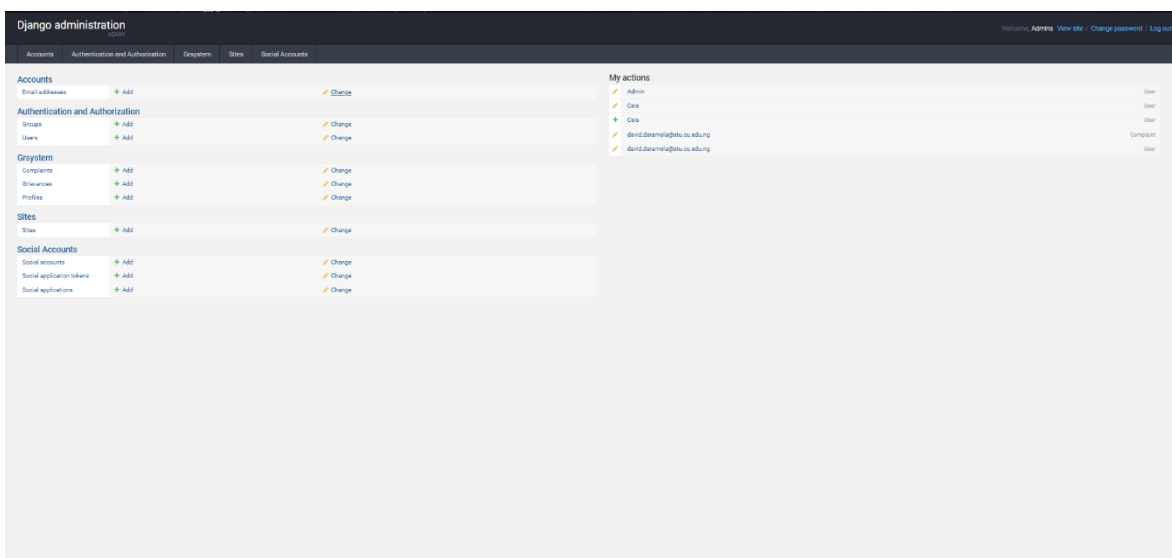


Figure 14: Admin privileges

The delete button is active when a user with admin privileges logs in, as seen in Figure 15.

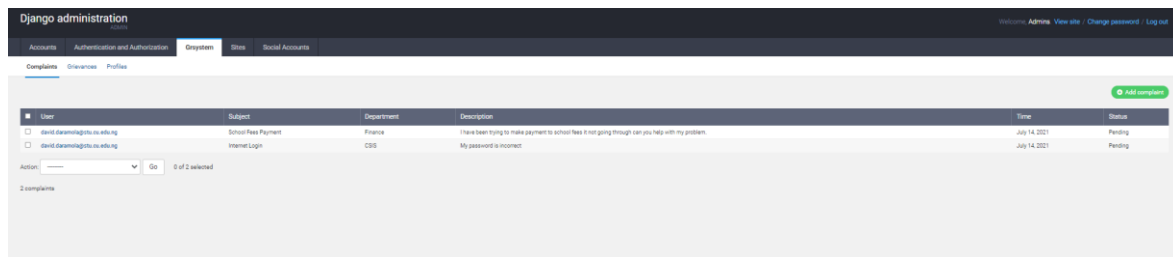


Figure 15: View the complaints page with a delete button

#### IV. CONCLUSION

This research has presented the analysis, design, implementation, and testing of the complaint management system. This designed system is expected to improve complaint management and resolution in place of manual information management and provide a secure way of expressing dissatisfaction and urgent issues. The inclusion of this web-based complaints management system in any university community will aid in improving the school management's operations in terms of processing and attending to complaints. The system's development has been done using several concepts, tools, and programming languages for the backend and frontend logic, with the feature of a database storage service. Future research direction includes introducing extra features to allow greater ease of use, these features include complaint tracking and a private messaging module. The system can also be adapted for mobile operating systems and can be used on Android and iOS devices. This complaint management system can also be adapted for use in other organizations that depend on customer satisfaction to thrive.

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