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Digitalising the Clearance Processes of Higher Education Institutions through the Design and Implementation of an Online Clearance System

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Abstract
Students in Higher Education Institutions (HEIs) are expected to participate in a number of important activities throughout their time in school including clearance before graduation. Clearance serves as a means of ensuring graduating students satisfy all required administrative criteria. Both students and clearing officers face a daunting task as a result of the present manual clearance procedures in most HEIs. The development of this online student's clearance system (UEW-SOCS) was done using the agile methodology. The languages and technologies used were ASP.NET MVC 5, MSSQL 2014 and JavaScript, HTML and CSS. The result is an effective and efficient web-based application that overcomes the challenges of manual paper-based systems characterized by mundane tasks by providing a responsive interface with role-based access to ensure high security. Ultimately, this study designed and implemented a successful and effective online clearance system for Higher Education Institutions that could be a critical decision support system.

Keywords: Students Online Clearance System; Web-based Clearance System; Systems Development; Educational Clearance System; Online Clearance System

1.1 Introduction

Clearance in institutions of higher education is the required process graduating students must go through to establish their qualification for graduation (Jonathan et al., 2019; Agbo-Ajala & Makinde, 2015). This process is used to check if students have satisfied all the necessary requirements for graduation per the institution's guidelines. Currently, final year students must pick up clearance forms and move to various offices for checks to make sure they are not indebted or hold anything belonging to the university in order to eventually graduate and earn certificates. This process is burdensome and tiring as most educational institutions perform their clearance manually which is characterized by joining long queues at clearing offices and hence prevents students from fully participating in other academic activities during that period (Idachaba et al., 2015). There are instances of absenteeism from clearing officers that lead to a waste of time on the part of students as they sometimes have to visit the same office severally before finally getting cleared. Scarce resources available are channeled into the acquisition and printing of clearance forms which then becomes an additional financial burden to such institutions. Tracking of cleared students is also difficult as clearing officers have to manually verify from paper forms to achieve this.

This study seeks to develop an efficient online clearance system which will be a digital platform or software that facilitates the process of obtaining clearances or approvals for various administrative requirements, such as registration, graduation, library fines, financial obligations, and other academic or non-academic obligations to end the manual processing of clearance for educational institutions (Kandari & Bhardwaj, 2019).

The goal of this research is to deliver to university management an acceptable, efficient, well-documented, current, and reliable online clearance application (Sowunmi et al., 2016), that will be a decision support system and facilitate the whole clearance process. This system will replace the traditional manual approach by allowing clearance officers to view students' pending clearance requests, approve requests online at the

same time allowing students to track their status, and receive necessary approvals online, thus reducing paperwork, time, and effort (Arefin et al., 2020).

1.2 Study Objectives

The main objectives of this project are to design and develop a students' clearance system that:

i. allows clearing officers to effectively and efficiently process students' clearance online with excellent response time
ii. provides transparency and accountability in the clearance process
iii. provides accessibility and convenience to their clearance status at all times
iv. allows data management and analysis of clearance status
v. enhances overall students' experiences with the clearance process

1.3 Scope of the Study

The project is designed for management and final year students at the University of Education, Winneba to handle clearance processes. The processes involved include the assignment of roles to clearing officers, uploading graduating students list to appropriate offices, and provisions for officers to clear or reject a clearance request. It also allows students to view and track their clearance status online in real-time.

1.4 Justification of the Study

The implementation of an online student clearance system is justified by several key reasons, including:

1. Enhanced Efficiency: The manual clearance process often involves multiple steps, paperwork, and physical visits to different offices, which can be time-consuming and prone to delays. By transitioning to an online clearance system, universities can streamline the process, automate tasks, and reduce paperwork. This leads to significant time savings for both students and administrators, improving overall efficiency.

2. Improved Accessibility: Traditional clearance processes may require students to be physically present on campus during specific office hours, which can be challenging for those with conflicting schedules, distance limitations, or other obligations. An online clearance system provides accessibility by allowing students to submit clearance requests and monitor their progress remotely, at their convenience. This flexibility enhances the student experience and ensures equitable access to clearance services.

3. Transparency and Accountability: Online clearance systems provide a transparent and accountable framework for the clearance process. All activities, including clearance requests, approvals, rejections, and communications, are documented and recorded electronically. This transparency fosters accountability among administrators and ensures that all necessary steps are completed in a fair and consistent manner. It also facilitates auditing and tracking of clearance-related activities.

4. Real-time Tracking and Communication: Online clearance systems enable students to track the progress of their clearance requests in real time. They can receive notifications and updates on the status of their requests, eliminating the need for frequent follow-ups and providing peace of mind. Additionally, the system allows for streamlined communication between students and clearance administrators, facilitating prompt resolution of any issues or concerns.

5. Data Analysis and Decision Making: An online clearance system generates valuable data and insights on clearance-related activities, processing times, and trends. Universities can analyse this data to identify bottlenecks, optimize resource allocation, and make data-driven decisions to improve the overall clearance process. This evidence-based approach enhances operational efficiency and helps in implementing targeted improvements.

6. Environmental Sustainability: Adopting an online clearance system aligns with the growing focus on sustainability and reducing paper usage. By eliminating the need for physical paperwork, universities can contribute to environmental conservation efforts and reduce their carbon footprint.

In summary, the justification for implementing an online student clearance system lies in its ability to enhance efficiency, improve accessibility, promote transparency and accountability, enable real-time tracking and communication, facilitate data analysis for decision making, and contribute to environmental sustainability. These benefits ultimately lead to a more streamlined, student-centric, and effective clearance process within the university.

Researchers in the field of education, software design, systems development, and other related fields will benefit from this project's conclusions to inspire the development of fresh concepts for an improved implementation of an online clearing system.

1.5 Methodology

In systems development, researchers are required to follow a systematic approach for developing software known as SDLC. SDLC stands for Software Development Life Cycle; it is a systematic approach or framework used to guide the development of software applications or systems. The SDLC encompasses a series of phases or stages that collectively define the entire software development process, from the initial concept and planning to deployment, maintenance, and eventual retirement of the software. It ensures that all necessary steps are followed and quality standards are maintained throughout the lifecycle of the software. It helps in managing risks, controlling costs, and delivering software solutions that meet the stakeholders' expectations.

For this research, the agile model software development method was selected for use because it embraces change and accommodates evolving requirements throughout the development process. It allows development teams to respond quickly to feedback, adapt to new information, and make adjustments as needed (Conboy, 2009), in contrast to traditional methods where the project is specified before the commencement of the project, delivery deadlines, and costs are established (Karhapää et al., 2021). Agile methodology promotes a collaborative culture which helps teams to work together and understand their individual roles in the process, which increases productivity. (Alan et al., 2012; Misra, 2012). Because testing is performed continuously during the development process, agile methodology gives developers confidence in the release of high-quality products. This offers the opportunity to adapt as necessary and notify teams of any potential problems that might arise (Paasivaara, 2017; Erickson et al., 2005). Agile methodology meets client needs by delivering valuable work on time and continuously by dividing large jobs into manageable parts.

The tools that need to be employed in creating the proposed online clearance system include the following.

- MSSQL as the Backend database.
- ASP.NET MVC5 and C# as server-side programming language.
- QUERY, a Java script module for effects.
- Complementary programming languages, HTML and CSS.

1.6 Study Deliverables

The project's final output will be an online students' clearance system that:

- allows several clearing officers to update the status of a student's clearance request.
- gives clearing officers the option of single or bulk students clearance to save time
- is secure and gives role-based access to authorized users
- provides timely information or alerts to different system users.
- provides a comprehensive user manual on its features to reduce the learning curve for users.

2.0 Literature Review

This section briefly examines some work done by authors on the subject matter. The literature review is arranged into three sections beginning with the definition of clearance systems, comparison of manual and online clearance systems and finally a review of existing clearance systems.

2.1 Definition of Clearance System

Clearance systems are processes or procedures used by organizations to ensure that individuals meet certain requirements or criteria before they can proceed with specific activities or gain access to certain resources (OpenAI, personal communication, June 1, 2023). These systems are commonly used in various contexts, such as universities, government agencies, workplaces, and security checkpoints. As the context of this study relates to academic or university clearance, academic clearance is the process used in educational institutions to make sure that students have fulfilled all prerequisites before graduating or moving on to the next stage. It may involve verifying course completion, fulfilling credit requirements, clearing all financial bills, and obtaining the necessary approvals from academic advisors and department heads (Agbo-Ajala & Makinde, 2015; Ben et al., 2015).

2.2 Manual Clearance versus Online Clearance

The manual clearance system, also known as the traditional method, uses paper forms, bureaucratic procedures, and cabinet storage systems (Ben et al., 2015; Idachaba et al., 2015). Almost all educational institutions engage in clearance, and these institutions can use alternative clearance procedures in some way, depending on the available resources, technology, and institutional choices (Zuhaib, 2013). The manual clearance system requires that students bring a signed form to each clearing office they visit for clearance officers to sign and stamp to indicate they have been cleared. This prolonged procedure, which takes several weeks to complete is stressful and has adverse effects for both the clearing officers and the students involved (Jonathan et al., 2019). The fact that students are required to walk from office to office and queue in order to be cleared will definitely have a negative impact on other academic activities and performance. Sometimes clearing officers may not be available and students will be required to visit the same office several times before they get cleared (Adamu, 2022). Due to the accessibility of the Internet and the requirement for speed and flexibility, educational institutions are now considering these web-based solutions for almost all manual transactions and operations on campus (Techie-Menson et al., 2022; Techie-Menson & Nyagorme, 2021). Some institutions use the online clearance system as a means of addressing the aforementioned problems with the manual procedure.

The online clearance system streamlines clearance procedures and guarantees rapid, effective, and transparent clearance. The online solution still retains the operational clearance processes; however, it accelerates the procedure, analyses, and stores data automatically or interactively. Additionally, the online system saves a lot of time, is simple to use, speeds up information processing, and lowers stationery costs for the institution. Because these web solutions use the Internet, anyone with an internet connection can use them at any time and from any location. It is important to keep in mind that these automated and/or web-based solutions still have significant shortcomings which includes inaccessible user interfaces, inadequate information, and a failure to prioritize processes (Jonathan et al, 2019).

2.3 Existing Clearance System

Several online or web-based clearance solutions have been created and are being used to help mitigate the difficulties associated with the manual clearance system. Despite potential changes in programming languages, platforms, and frameworks, functional and implementation details have remained consistent. Agbo-Ajala and Makinde, (2015) created a database-driven web application clearance system using PHP and MySQL. The goal was to end the delays caused by the manual student approval process. However, the offered interface was not user-friendly, making it challenging to navigate and access the required functions.

In a research paper for Imo State University, Ben et al., (2015) worked together to produce a practical design and implementation of a clearance system using PHP, MySQL, JavaScript, and Cascading style sheets (CSS) to provide for a friendly user interface to address the challenge of the Agbo-Ajala and Makinde (2015) system. The goal of the software was to handle student clearance more effectively and consistently in a way that speeds up the clearance process and lessens the stress associated with filling out a ton of paperwork. The software also made it possible for users to understand the procedures needed to complete an online clearance. This research study was completed using data gathered from the university as well as materials from similar publications, journals, and papers from other authors. A system was also used to actively advance the work's objectives. One significant flaw in their system was that users were not given notifications or feedback, particularly when students wanted to know the status of their clearance request.

Idachaba et al, (2015) created a more reliable portable clearing mechanism. The system was made so that only authorized officers could see the page for student clearance without the requirement that the student personally see the officer. The system developed using PHP with MySQL was also set up to deliver email and SMS alerts to everyone involved in the approval process.

2.4 Summary

The reviewed work shows that online clearance applications are constantly being enhanced and changed to better serve students and educational institutions. Despite their benefits, the existing methods mentioned above have several drawbacks.

First, some existing systems particularly those used by students, fail to inform or offer feedback to their users. Again, students' clearance status, the number of students cleared or rejected, and other information are typically not provided, and hence makes tracking and generation of summary information difficult.

The problem of security is yet another matter of worry as most systems do not require student users or clearance officers to be authenticated in order to access the system. This makes it possible for other students who are not in their final year to try to register and use the system.

Finally, most current systems do not allow clearing officers to choose some or all students to be rejected or cleared at once. Clearing officials continue to handle each student's clearance request individually, which takes a lot of time and work.

The proposed project aims to create an online clearance system that addresses the difficulties associated with manual clearance, as well as issues with the current online alternatives. The University of Education, Winneba will utilize the proposed project to aid students in effectively completing the clearance procedure, resulting in a successful graduation.

3.0 Analysis of the Proposed System

3.1. Overview of the System

The proposed University of Education, Winneba Students Online Clearance System (UEW-SOCS) is a web-based application that will speed up the clearance activities of the University of Education, Winneba. The system will stop manual clearance procedures and provide transparent, stress-free processes as well as quick retrieval of data and/or information about students and their clearance status for management to use in making decisions.

The suggested system is required to operate and address the flaws found in the manual clearance processes currently in use, as well as to meet the administrative requirements of the University of Education, Winneba. The system will ensure a highly user-friendly interface to enable graduating students and other users to easily operate and use the system.

There will be a provision that allows clearing officials to choose groups of students to clear or reject all at once, increasing flexibility and attaining efficiency. The system's users will have access to the notification and/or summary information. This makes the clearance request statuses known to students and clearing officers, resulting in a calm and easily understood process. The major elements of the system will consist of Student, the administration department, and clearing officers made up of Head of departments, Hall managers/ manageresses, Hall assistants, JCR finance, Library, University finance, Sports, and SRC finance.

3.2 Stakeholders

Stakeholders are people or organizations that are very interested in projects since the results will affect them (Kamalrudin & Sidek, 2012). The following are the important individuals whose businesses will be impacted by this project or the stakeholders.

The project will be primarily sponsored by the Vice Chancellor of the University of Education, Winneba. He will be in charge of monitoring and controlling to make sure that the deliverables adhere to the agreed-upon criteria and are within those limits.

The Registrar is in charge of making sure that the project's use does not conflict with the university's statutes or policy framework.

The system administrator is in charge of ensuring that all users adhere to the rules, use the system according to how it was designed, and resolve any issues that arise during system usage.

To ensure that student requests for clearance are handled equitably and quickly, clearing officers including department heads, hall managers, hall assistants, JCR finance, SRC finance, librarians, SRC sports, and school finance have a variety of duties to play.

Students in their final year are the primary audience for the services provided by a clearance system and thus constitute an essential stakeholder.

3.3 Requirement Gathering

Requirements gathering, also known as requirements elicitation or requirements capture, is the process of identifying, documenting, and understanding the needs and expectations of stakeholders for a particular system, product, or project. It is an essential step in the software development lifecycle and other domains where requirements need to be defined before initiating a project. The primary goal of requirements gathering is to collect accurate and comprehensive information about what the stakeholders expect from the system or product being developed. This process involves interacting with stakeholders, such as clients, users, subject matter experts, and other relevant parties, to gather information about their objectives, functional and non-functional requirements, constraints, and any other relevant details.
To accomplish this, the researchers interviewed several graduating students during and after their clearance process to understand their needs for this system. Clearing officers in all the offices involved with clearing were also interviewed to understand their operations and determine their requirements for an online clearing system.

3.4 Functional Requirements

The functional specifications outline the actions or behaviours that a given system should take. The proposed UEW-SOCS must act in accordance with or meet the following criteria:

- A user interface for system user authentication should be present.
- The system must maintain a user account database.
- The proposed system will provide access to many users from remote locations.
- To maintain openness, the system must be able to show which units or departments have already cleared students.
- To reduce security risks, there must be an administrative interface for managing and keeping track of users of the system.
- Enable clearing officials to choose students to approve or reject their clearance request.
- Display summary information to respective users of the system

3.5 Non-Functional Requirements

Non-functional requirements provide additional performance details or impose limitations on the operation of a system. The following non-functional requirements must be met by the proposed UEW-SOCS:

- The user interface should have a name, or identity, hall of affiliation, and or department to define specific users and be simple to use.
- Feedback on faults or successes should be clearly displayed to show the current state of the proposed system's use.
- The system should require all users and students to log in using their individual ID numbers in order to thwart malicious attempts and attacks.
- An immediate response after a request is submitted
- The system needs to have a solid fault tolerance mechanism and be easily accessible.
- MSSQL version 2014 and above will be used for the proposed system

- Along with ASP.NET MVC 5 as the primary server-side script, other platform-independent scripts including HTML, CSS, and Java scripts have to be utilized.

3.6 Major Features of UEW-SOCS

The proposed solution aims to address the issue of manual student clearance processing, which presents time-consuming and stressful processes.

The user-friendly Windows Operating System that the chosen backend MSSQL DBMS will be running on ensures greater performance and efficiency. MSSQL will maintain consistent and correct data on the details of students and clearance officers, removing any duplications that might compromise the integrity of the data. The system will be easy to use thanks to its interactive interface design.

The architectural and structural design module was built on top of platform-independent programming languages including ASP.NET MVC 5, C#, CSS, and jQuery to deliver accurate, quick, and dynamic information to system end users. The search functionality was effectively improved by using a jQuery library, sometimes known as data tables. It simplifies system searching and eliminates the need for button clicks to run search indexes or keywords (Techie-Menson et al., 2022). It uses the same format as the bootstrap framework and works by simply linking to the JavaScript files that are stored in a designated directory within the system's main or home folder. By adding the data tables' CSS and Java script files to the project folder, the system enables reports to be generated and/or extracted in a variety of formats, including PDF and Excel. The table contents can also be copied from the program and put into another program for further processing.

3.7 Advantages of the System

The proposed UEW-SOCS will augment and improve the current manual method in the following ways, in addition to the benefits already mentioned above.

- The addition of clearing procedures to lessen anxiety, cut down on manual work, and shorten the time it takes to reply to a student's clearance request.
- Improving communication among key stakeholders, including JCR Finance, Hall Assistants, and Hall Managers, to guarantee timely access to necessary data.
- Outstanding file extraction and report generation for all departmental actions, including listings of cleared, rejected, and pending requests.
- Stakeholders' remote access. For example, students can check the status of their requests online and email concerns as needed.

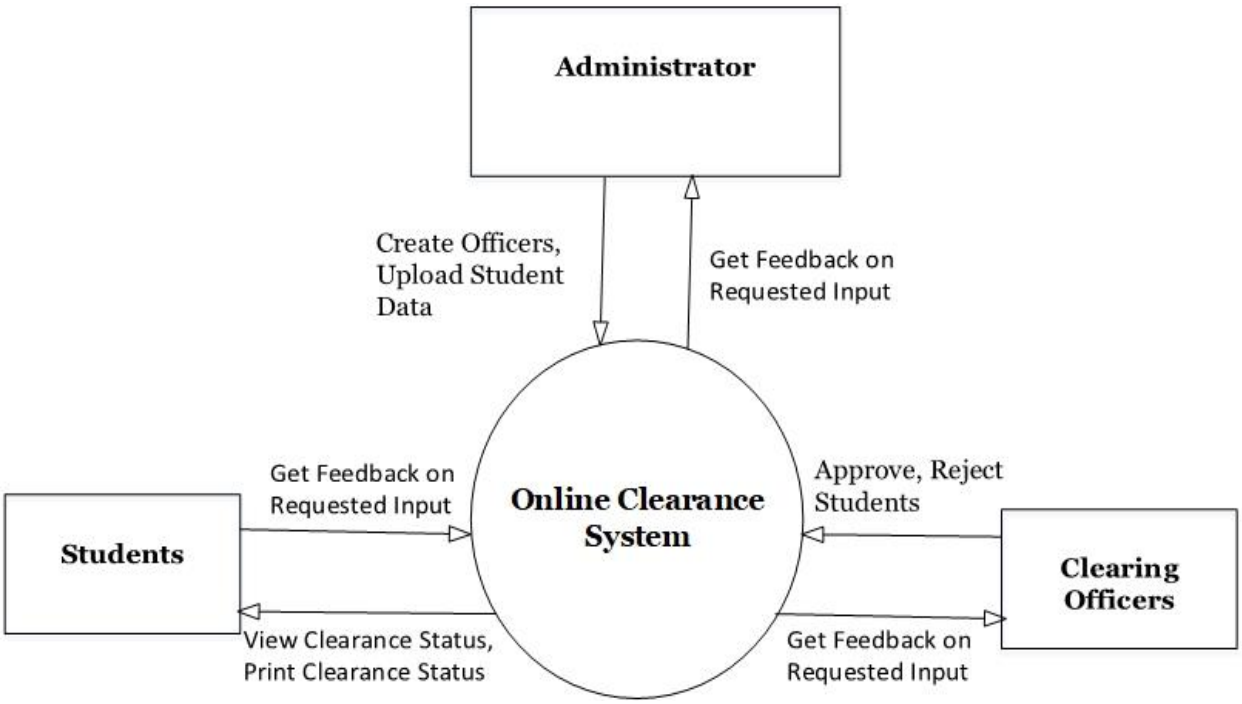


Figure 1. Context Level Diagram of the proposed online clearing system

4.0 Detailed Design of the Proposed System

In order to fulfill the needs of the system, the modules, interfaces, and the various architectures are created. With reference to the system analysis, this part goes into great details on the input, processes, and output activities of the system. The actors and their prescribed interactions with the system are also depicted, in addition to the graphical and diagrammatic perspective of the data structures in the system.

4.1 Use Case Diagram of the System

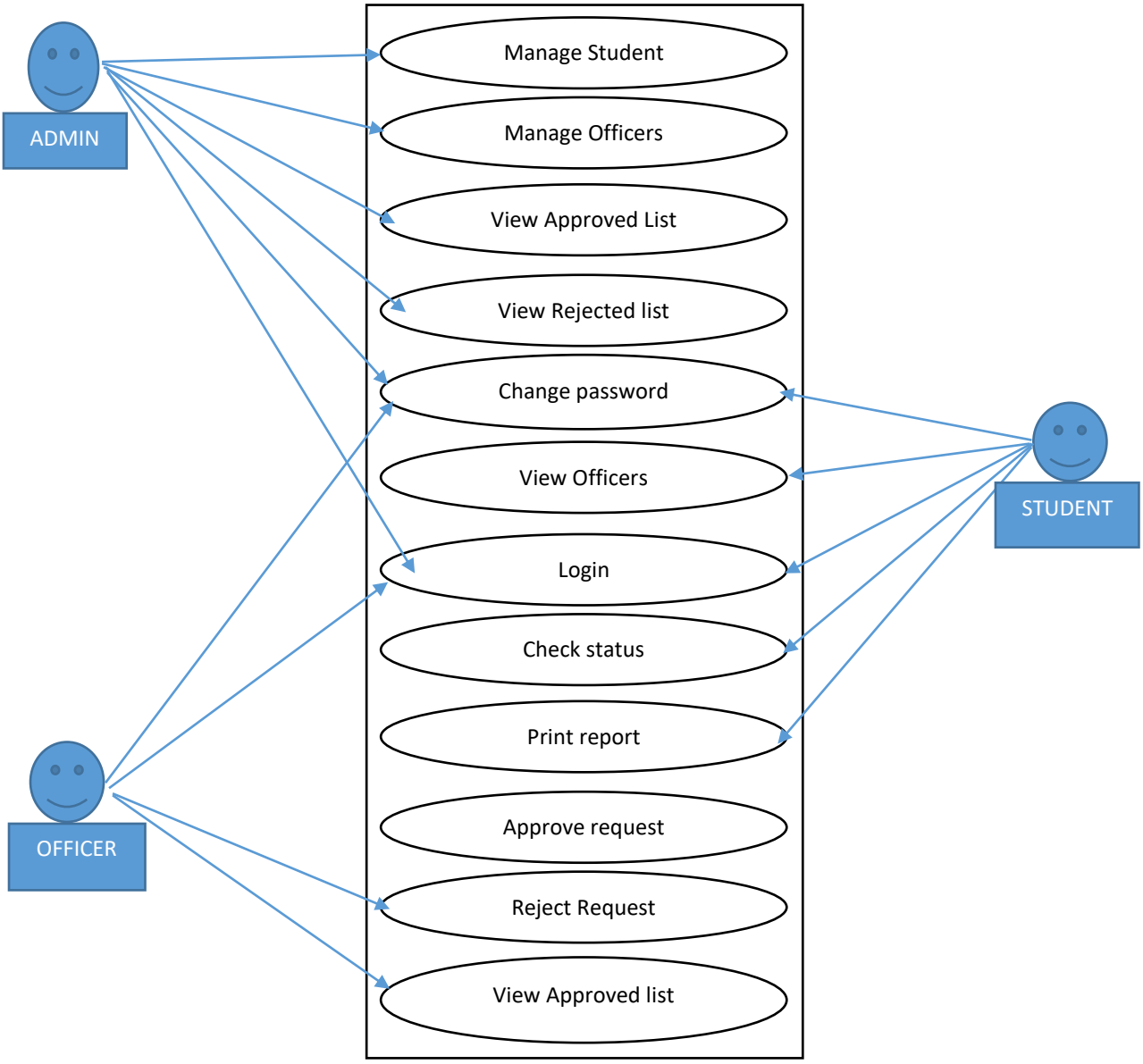


Figure 2. Use Case Diagram of the proposed Online Clearance Systems

Use case diagrams are used to provide a detailed description of actors and the limitations or range of their interactions with a system (Techie-Menson et al., 2022). Students, clearance officers, and system administrators are among the main participants. The system developer is the service provider. The University Council, Academic Board, and Student Representative Council are the governing bodies

4.2 Flow Chart Diagram

The logical and sequential processes of a system are also diagrammatically represented by the flowchart diagram. The flowchart diagram illustrates the principles for identifying and restricting unauthorised access to the system's portals and contents, as well as the assigned roles are permitted on the system.

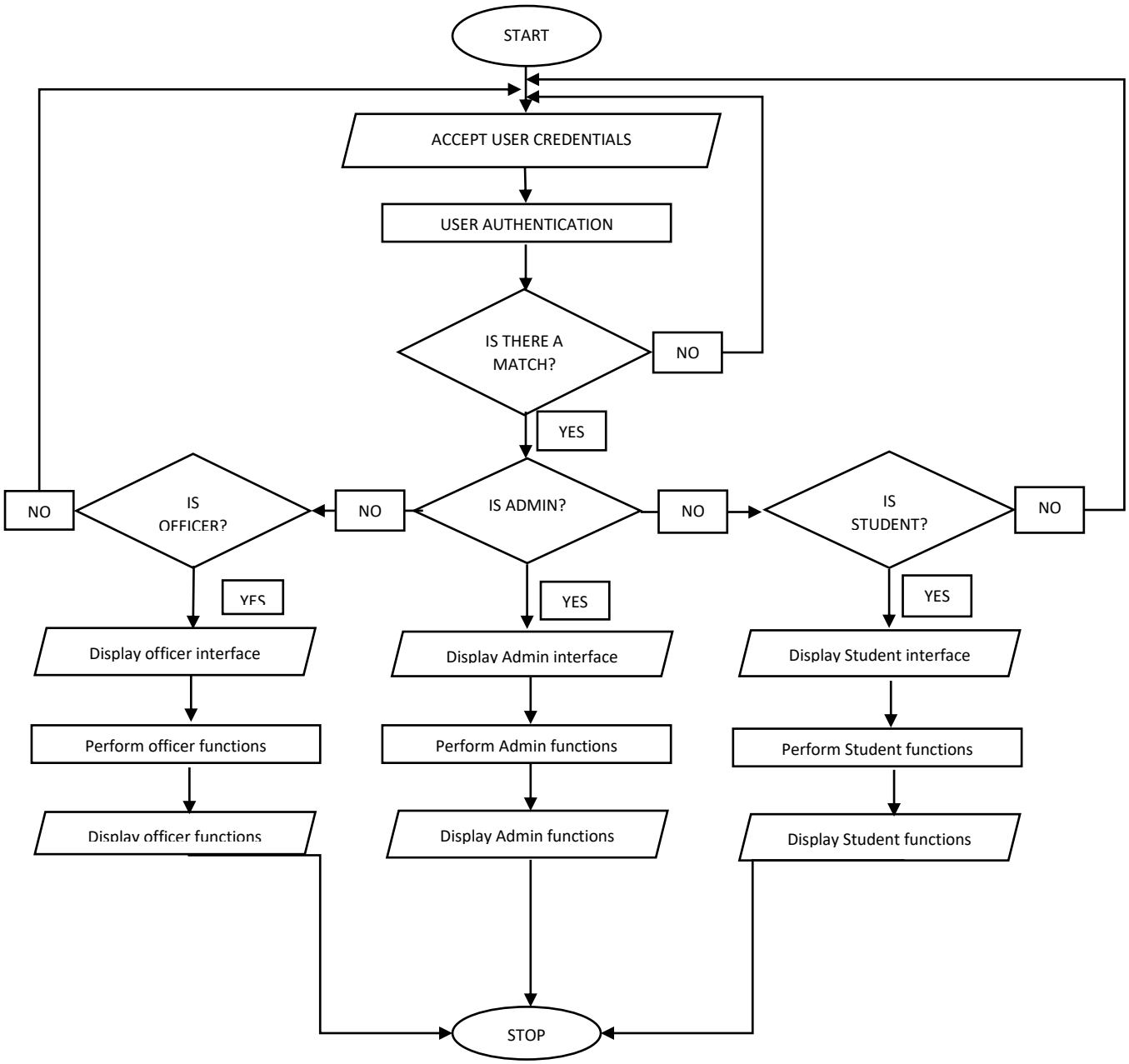


Figure 3. Flow Chart Diagram of the proposed UEW Students Online Clearance Systems (UEW-SOCS)

4.3 Class Diagram

To represent the classes, attributes, methods, and relations that exist in the system, a class diagram is used. The MVC (ASP.NET MVC 5) architecture or pattern allows for two set of classes namely the controller class and the model class. The third component contains the views or interfaces of the system. The main classes in the controller package for the proposed system are the Administrator, Head of Department (HOD), Hall manager/manageress, JCR finance, Hall assistants, SRC finance, Sports, Librarian, School finance, and Student.

The classes in the model package also include ClearingOfficer, ExcelTemplate, Login, Registration, RequestClearance, ResetPassword, Status, Student, and UploadFile.

The Head of Department (and other clearing officers) controller class, for instance, models the ClearingOfficer class and contains attributes such as ID, FIRSTNAME, LASTNAME, DESIGNATION, DEPARTMENT, HALL, PHONE, IMAGE, IMAGEPATH, USERNAME, PASSWORD, and CONFIRMPASSWORD.

The Head of Department (HOD) has access to the following methods in the controller class; HODDashboard(), HODHome(), changePassword(), getRequestClerance(), ApproveSelected(), RejectSelected(), and getApprovedClearance().

The head of department also has changePassword, getRequestClerance, getApprovedClearance, HODDashboard, and HODHome as views or interfaces.

The clearingOfficer class is associated with the student class because a single officer can be tasked with clearing several students, creating a one-to-many relationship.

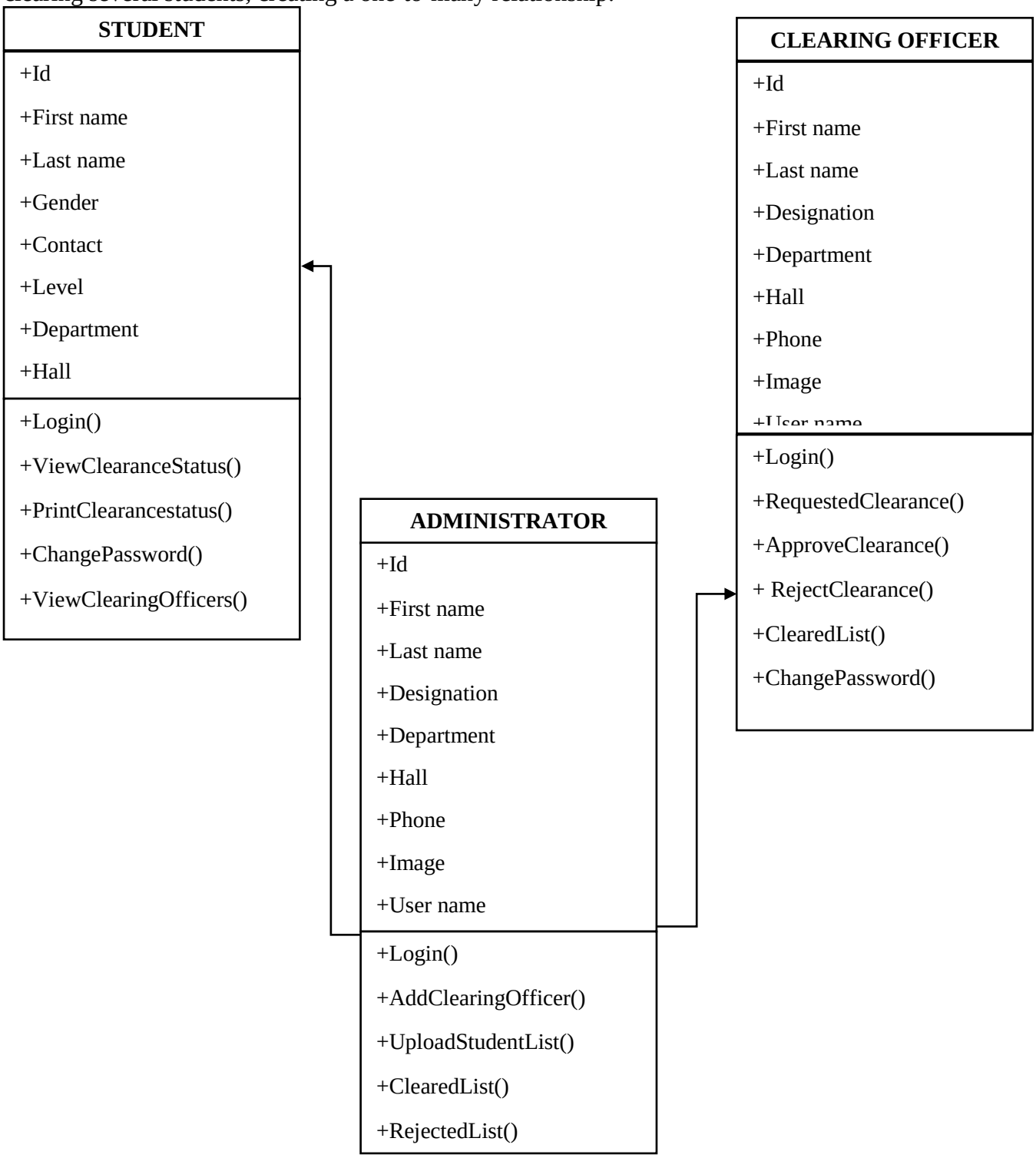
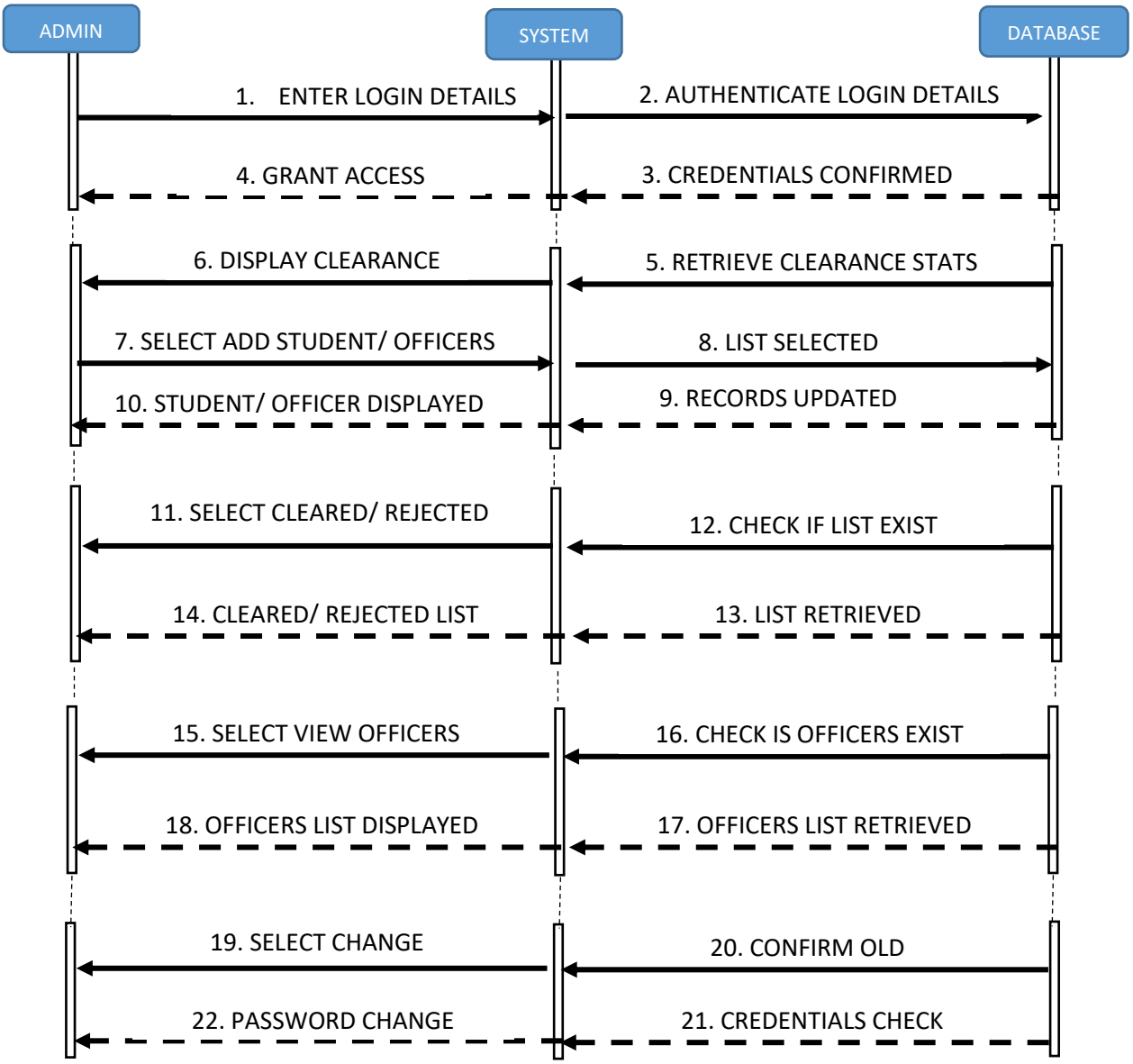


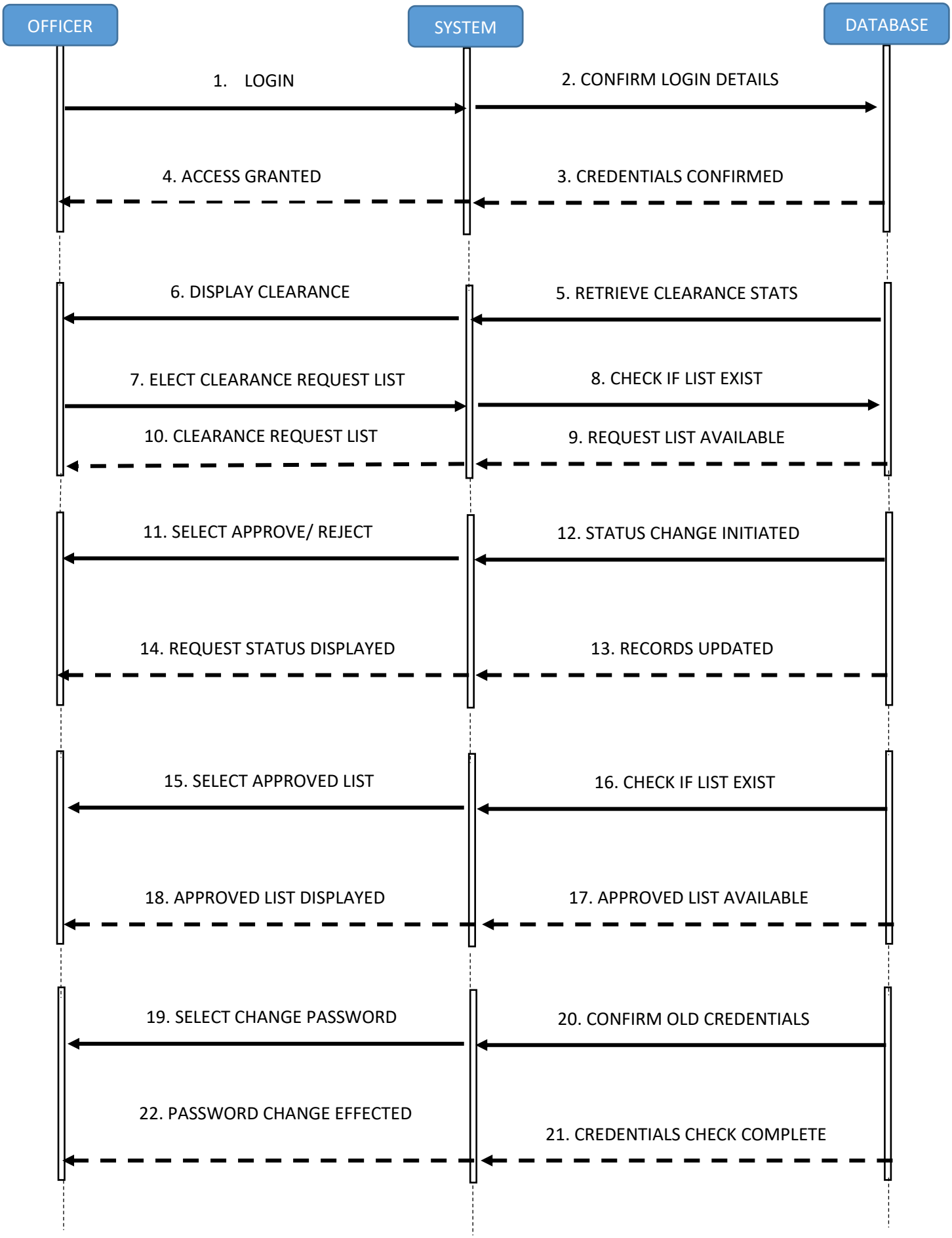
Figure 4. Class diagram of the proposed UEW Students Online Clearance Systems (UEW-SOCS)

4.4 Sequence Diagram

Message time is emphasized in a sequence diagram, which is a dynamic representation of a use case that demonstrates how classes interact over the course of a given time period.

It shows how different processes interact with one another and how they are arranged chronologically across time. The sequence diagram (student, clearance officer, and administrator) below displays the classes, object scenarios, and messages transmitted sequentially that permit objects to perform functions.




OFFICER
SYSTEM
DATABASE
1. LOGIN
2. CONFIRM LOGIN DETAILS
4. ACCESS GRANTED
3. CREDENTIALS CONFIRMED
6. DISPLAY CLEARANCE
5. RETRIEVE CLEARANCE STATS
7. ELECT CLEARANCE REQUEST LIST
8. CHECK IF LIST EXIST
10. CLEARANCE REQUEST LIST
9. REQUEST LIST AVAILABLE
11. SELECT APPROVE/ REJECT
12. STATUS CHANGE INITIATED
14. REQUEST STATUS DISPLAYED
13. RECORDS UPDATED
15. SELECT APPROVED LIST
16. CHECK IF LIST EXIST
18. APPROVED LIST DISPLAYED
17. APPROVED LIST AVAILABLE
19. SELECT CHANGE PASSWORD
20. CONFIRM OLD CREDENTIALS
22. PASSWORD CHANGE EFFECTED
21. CREDENTIALS CHECK COMPLETE

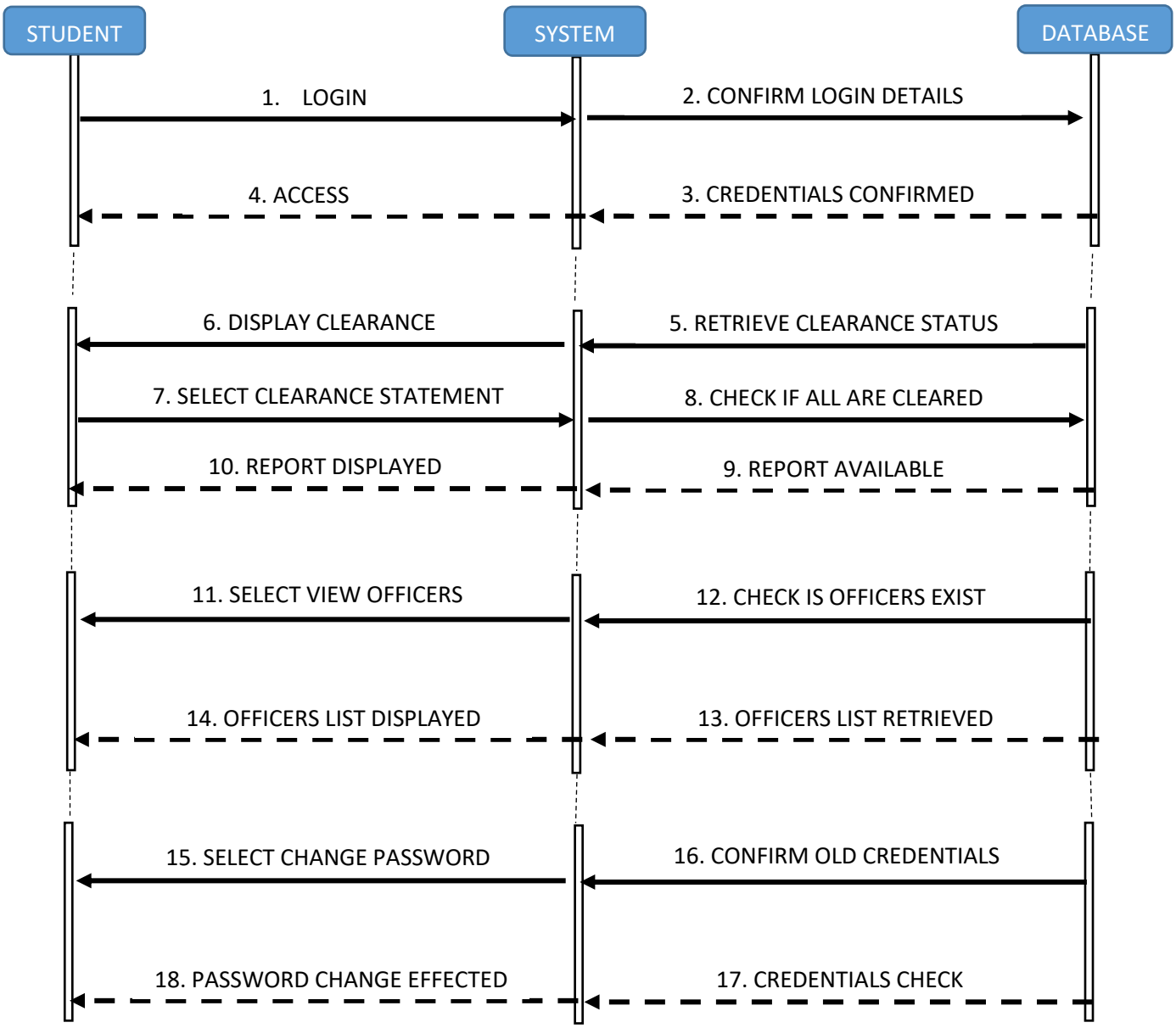


Figure 5. Sequence Diagram of the proposed UEW Students Online Clearance Systems (UEW-SOCS)

5.0 Implementation of Design and Testing of the System

5.1 Implementation

The software development life cycle includes two important elements: system implementation and testing. Performance problems or system inefficiency can be prevented by an effective system implementation. The main implementation strategy for this system has been broken down into a few distinct theme categories, as explained below.

5.2 System Requirements

The hardware and software specifications used to create and implement the application are provided in this section. Table 1 lists the program requirements, while Table 2 lists the hardware requirements.

Table 1: Hardware Requirements

Module	Hardware	Description
Input device	Mouse and Keyboard	For data input
Display unit	Monitor	For displaying the application's interfaces. The resolution is recommended to be 1024x768.
Hardcopy	Printer	Printing reports from the application
Processing	CPU	It should have a Core i3 or higher to accelerate data processing.
Temporal Storage	RAM	Random access memory (RAM) is used to increase processing power and improve application performance. It is advised to have RAM of at least 4 gigabytes.
Back up	Pen drive and hard disk.	Backup the database to protect against data loss.
Network	Network card and RJ45 cable	To connect all the departments and offices so they can access a single database.

Table 2: Software Requirements

Module	Software	Description
Interface design	ASP.NET MVC 5, HTML, Cascading style sheet (CSS), jQuery, and JavaScript.	For designing all the forms and input elements
Database design	MSSQL 2014	For designing the tables to store data
Operating system	Windows 7, 8, 8.1 ,10 or 11	For designing and accommodating the application

5.3 How to Install

The system is developed using Active server pages dot NET (MVC5 architecture) and Microsoft SQL. It is therefore prudent to rely on the Internet Information service for smooth installation of the software. The following steps guide the installation process.

- The web application must be live and hosted on a public or private web server to be installed
- For a local web server, the Internet Information Service (IIS) is activated on the Windows machine or computer.
- The application's files need to be extracted and put in the WWW root folder located in the INETPUB folder of the local disk and the right permissions granted to it.
- In order to ensure a connection between the program and the database, the database and any necessary tables must be built.
- To confirm that the setup was successful, the administrator goes to the application's URL.
- Once it has been successfully hosted and installed, the online application becomes ready for usage.

5.4 Testing

The Agile model was used for the application's development, and after the program is installed, the generated system was tested to ensure its quality. The system of the program is made up of ten components, and these ten units were tested using a variety of testing techniques, such as unit testing, system testing, integration testing, performance testing, security testing, volume and stress testing, and recovery testing.

5.5 Implementation Method

The University of Education, Winneba, expects that this system will replace its current manual clearance procedures, so the pilot changeover approach was chosen because it enables a new system's isolated testing to gauge its operational stability before being implemented throughout an entire environment.

5.6 Review and maintenance of the system

The useful life of an application can be considerably increased with appropriate and regular maintenance. To avoid the system from developing a malfunction that will require corrective maintenance, periodic maintenance should be encouraged and planned. Regular testing will also be carried out to find bugs and other problems that could impede efficient functioning and to provide advance notice of required system upgrades.

6.0 System documentation

6.1 Documentation

A thorough and user-friendly documentation or handbook is necessary for smooth and effective system implementation. The system's user guide seeks to accomplish the following things:

- Inform users and/or stakeholders about the goals and benefits of the system.
- Inform users and/or stakeholders about how to use the new system's features and functionality.
- Providing users and/or stakeholders with access to the system documentation.

Here are a few examples of simple activities for which the system can be used.

6.1.1 Launch of the Clearance System

This is a task that must be performed by all users of the system before accessing its full functionality. Please follow these steps to launch the application.

- Double-click on a web browser icon
- Locate the address bar and type https://localhost/UEWClearance
- Press the go button or press enter on the keyboard.

6.1.2 Login Using Usernames and Passwords

This function should be performed by all the users. To provide accurate validation credentials, follow these procedures.

- Find and input the correct usernames and passwords in the relevant boxes.
- Press enter on the keyboard or select the Login button.
- To use the interface, wait until the credentials have been verified.

6.1.3. Adding Clearing Officers

This function is only performed by the system administrator(s). Follow these steps to ensure the success of the function.

- Click on the “Add officer” hyperlink
- Locate and enter the required information in the relevant fields.
- Press the keyboard's enter key or the submit button.

6.1.4 Adding students

Another administrator’s function. Administrator(s) need to upload an excel document containing details of the students. A template is also provided to facilitate this role. Please follow these steps ensure success of the function.

- Click on the ‘Add Students’ hyperlink.
- Click on Upload Excel file
- Select the required excel file from the dialogue box.
- Click on OK
- The system automatically updates the database

6.1.5 Clearing Students’ Requests

This important function is performed by only clearing officers. Please take these actions to ensure success functionality.

- Click on the 'Clearance request' hyperlink.
- Select the student(s) to be cleared
- Click on APPROVE or REJECT to change the clearance status.

7.0 Recommendations and Conclusions

The University of Education, Winneba currently uses laborious and manual clearance procedures, which this project aimed to replace. By offering improved performance, being more user-friendly, and being simple to use, among other things, this work represents an upgrade over previous systems. For all system users, the proposed solution offers quick, simple, and visible clearance activities. The system's services improve the environment that allows students and other users to stay calm and have faith in the clearing procedures.

Therefore, the UEW Students Online Clearance System should be made available to other higher education institutions in order to ensure not just a quick and easy clearance procedure but also to cut down on operational expenses and downtime. To make it portable for all users, future improvements and works should incorporate mobile applications and/or USSD codes.

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