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An Improved e-Clearance Management System for Graduating Students in a University Environment

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Abstract— Clearance for graduating students is necessarily a continual process in every University. Clearance has always been manual processes over the past years. This paper aims at improving the existing system by exploring its weaknesses. Front-End Languages used are HTML for building the web pages, CSS for styling the web pages, JavaScript for programming web pages, Sublime Text 3 for code editor, PHP for the Back-End, MySQL for the database and the XAMPP servers are used for the design and implementation of the proposed system. The methodology used in this paper is Structured System Analysis and Design (SSADM). The proposed system reduces process time, loss of documents, document forgery and physical presence by eliminating paper work which makes it more efficient, secure and reliable over the existing method. It also incorporates payment options for convenience. The results in this paper show that electronic clearance processing time was reduced significantly that gave rise to an efficient and reliable electronic clearance system for graduating students.

Keywords— *electronic clearance, payment, graduating student, database, management system, university environment*

I. INTRODUCTION

A final year enhanced e-clearance system is an online based system that allows graduating students do their final year clearance electronically or online. The term “Clearance is a status granted to individuals”, typically members of the police, military, university graduates and employees of Government and other large establishments allowing them access to a certain document or information. Many higher institutions have chosen to pursue the dynamic educational options online [1]-[3]. The advantages of online resource are many, as people of almost all ages and background now become increasingly reliant on the internet for information [4]-[6]. Online learning has become more convenient and efficient thus, the need for a web-based student management system [7], [8]. This system is an alternative to the usual manual or traditional approach. It permits the graduating students to do his/her clearance with the saved information in the database against their individual’s account. There is

need for web-based methods of keeping data more so a greater need for graduating students e-clearance system. This would go a long way in alleviating the various problems involved in the automated process.

A. Methods of Clearance

1) Manual Method

This is the normal traditional method of clearance known from the etymology of mankind. It is wholly paper based and involves physical presence. It involves the graduate student filling the necessary information about him/her and then going to various offices: Financial department, Library, laboratory, etc. This method obliges that students maintain physical presence in all the clearance units.

2) Automated Method

This method allows the graduate student to register or do their clearance through an automated application. It involves students logging into the web application with their unique identifier which is usually the matriculation/registration number. The major requirements are the front-end web interface, back-end and internet connection.

TABLE I. DIFFERENCE BETWEEN MANUAL AND AUTOMATED METHOD OF CLEARANCE

Characteristics	Manual	Automated
Internet Requirement	Does not require internet connection	Requires internet connection
Deployment Time	Does not take much time to set up	It takes a bit longer time to set up
Processing time	Clearance takes much longer time	Clearance takes much shorter time
Area of Coverage	It is done within the institution	It is done anywhere in the world
Web browser Requirement	Does not require web browser	Requires web browser

II. GENERAL ANALYSIS OF THE EXISTING SYSTEM

A. Existing System

In this existing system, it is wholly paper based and involves physical presence. It involves the graduate student filling out the clearance form and then going to various clearance sections: Financial office, Library, laboratory and department etc. This method obliges that students maintain

physical presence in all the clearance sections. Other limitations of manual system are:

- It involves a lot of paper work
- Delay of processing clearance forms.
- There is high risk of information getting to unauthorized or wrong hand who may manipulate the information.
- Unavailability of the key staffs in some clearance units may lead to students repeatedly visiting the clearance unit before proceeding to other units.
- Due to this system, some students' files are lost.
- Loss of vital documents due to rain or fire incident.
- Lot of time to retrieve a particular clearance form.

B. Existing System Flowchart

This is a workflow of the existing system showing the step by step process of the clearance. Figure 1 shows the existing system flowchart.

The student checks his or her graduation status. If the student is shortlisted for extension, the student is not allowed to proceed with the graduation clearance, else clearance starts. The student picks the clearance forms from the School Administration Office.

Firstly, the student goes to the Financial Department to check and get cleared based on tuition and dormitory fee. If indebted, the student pays the debt.

Secondly, the student goes to the Library to submit the Hard Copy of his/her Thesis also the student is checked if in possession of Library books. If still in possession, he pays for the overdue charge stipulated by the school library.

Thirdly, he goes to clear with the coordinator, likewise with the Supervisor. The supervisor of the student will check if the student has submitted all laboratory materials in his or her possession. Furthermore, the student goes to the Campus E-Card Centre to deactivate his E-card.

Finally, the student returns to the School Administration office for student ID card for cancellation and also for certificate collection.

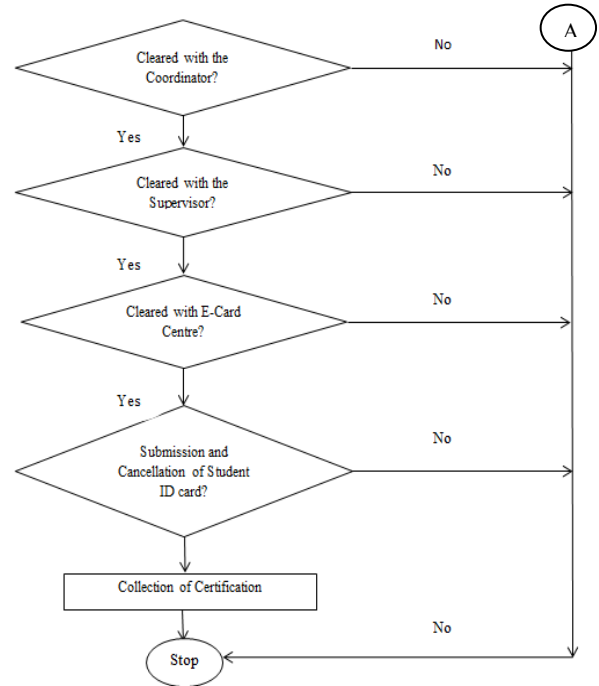
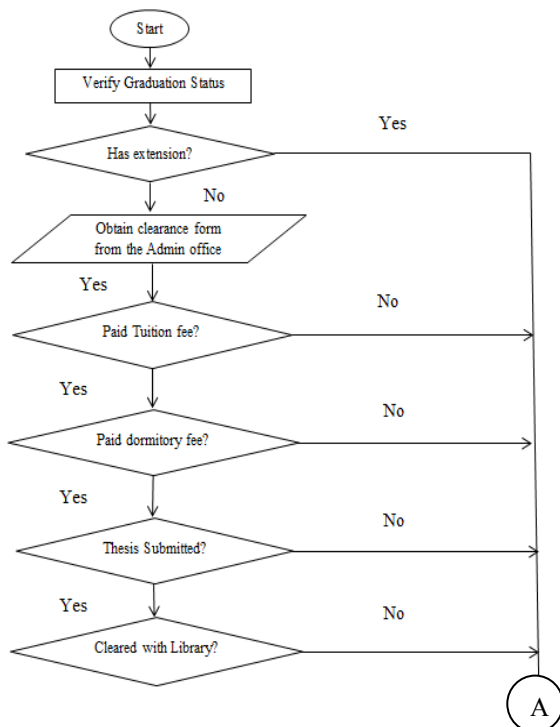


Fig. 1. Existing System Flowchart

III. PROPOSED SYSTEM

The proposed system is designed to solve the limitations associated with the existing system. The improved system comes very handy in replacing human operators in tasks that involve hard physical or monotonous work. The system does the creating, reading, updating and deleting of redundant data automatically. Some features that will be possessed by the proposed system include:

- Incorporation of quality checks and verification to reduce the number of mal-activities from the end of the students.
- Economic improvement on both the students and the Institution.
- Fast rate of operation and excellent response time.
- Flexibility in accessing the system.
- Efficient storage and faster retrieval of data.
- The system can be accessed world-wide.

IV. PROPOSED SYSTEM FLOWCHART

This is a workflow of the proposed system showing the step by step process of the clearance.

Before a student graduates, the student must have taken all the course examination for the degree of study. So, it's expected that the student must have completed all required course registration for the duration of study, passed all the examinations taken and also must have fulfill the student project defense requirements leading to the award of degree conferment which also applies to masters and PhD graduating students as the case maybe. Firstly, the student gets the clearance link from the graduate school and login by entering the "student ID" and "password" details. Information about the student will pop up on the left side of the screen as well as the text view icons. The details of the Proposed System flowchart are illustrated below and Figure 2 shows the Proposed System Flowchart.

1) *Graduation Status*: The graduation qualification page shows details about the student's graduation status. If the student status is qualified, the student moves on to the next stage, else the student is directed to see the coordinator. The school coordinator disseminates the list of the graduating students to the graduate school and all concerned units (financial department, library, research laboratory, and E-card operation unit) where the name list is uploaded to the portal. Students can check if they meet all requirements for graduation.

2) *Tuition Fee*: If the student has completed all payment on the tuition fees with the respect to the number of years spent in the school, the student proceeds to the next stage else the student is directed through a link to finish up all outstanding payments.

3) *Dormitory Fee*: If the student has completed all payment on the dormitory fees with the respect to the number of years spent in the school, the student proceed to the next stage else the student is directed through a link to finish up all outstanding payments.

4) *University Library*: If the student's book borrowing record is cleared, the student proceeds to the submission of thesis else the student is directed through a link to finish up all outstanding payments.

5) *Research Laboratory*: If the student's laboratory access record is cleared, the student proceeds to the next stage else the student is directed by a pop up message to see the school coordinator. The school coordinator through the student's supervisor will have to check with the laboratory to ensure that all laboratory materials (workstation, lab key etc.) assigned to the student are returned in good shape, before the student can be cleared.

6) *Campus E-card*: This allows the student to deactivate the E-card and get refunded in a case where the student still has money left on the e-card. The refund could be via bank card, mobile money or cash collection at the E-card operation unit. After a successful clearance completion, a notification message pops up instructing the student to proceed to the Academic and Administration Units with the student ID card for certificate collection.

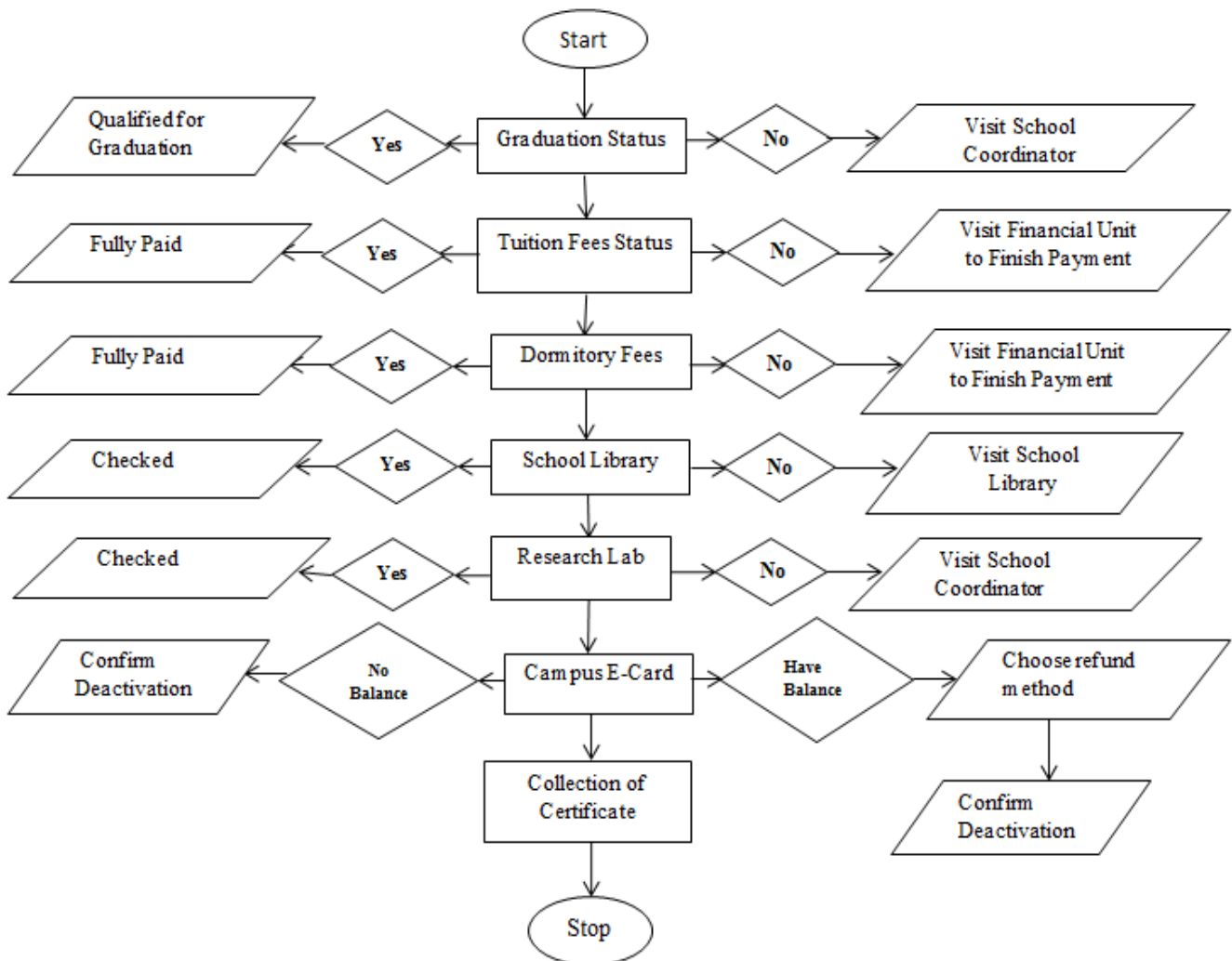


Fig. 2. Proposed Model Flowchart

V. METHODOLOGY

The methodology applied here is the structured system analysis and design methodology (SSADM). This is a waterfall method (sequential design method) used for the analysis and design of an information system.

A. Waterfall Methodology

This model is referred to as sequential life cycle model. In waterfall model, each phase must be completed before the next phase can begin and there is no overlapping in the phases. This means that any phase in the development process begins only if the previous phase is completed. The diagram below is a representation of the waterfall model.

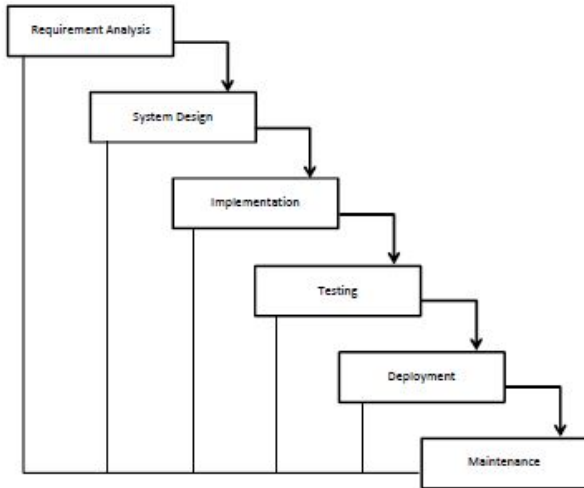


Fig. 3. Waterfall Model

1) *Requirement Analysis*: At this stage of the waterfall model, the possible requirements of the proposed system are captured and documented. The requirements gathered includes; research of the existing system, fingerprint technology, data collection (Students details), etc.

2) *System Design*: In this system design stage, we studied the requirement specifications from the first stage and the design was prepared. Here also this paper considers the two levels of system design: Logical design and Physical design. Logical design produces a specification of the major features of the new system. While the physical takes the blueprint of the logical design to produce the program specifications, physical file or database definition, and user interface.

3) *Implementation*: With inputs from the system design, the design was implemented in small programs called units, which are integrated in the next phase.

4) *Testing*: All the units developed in the implementation phase are at this stage integrated into a system after testing each unit. After which the entire system was tested for any fault and failure.

5) *Deployment*: After the system has undergone the functional and non-functional testing, the product was deployed to the user environment.

6) *Maintenance*: To enhance the performance of this new system, it may be debugged on a regular base.

VI. SYSTEM REQUIREMENT

A. Software Requirement

This lays out functional and non-functional requirements. It includes a set of use cases that the system describes. The system is designed to be implemented with the following software requirements.

- Android OS, Symbian OS, windows OS, iOS or any other mobile devise OS (for mobile devices)
- A suitable browser.
- Any major Os such as Windows, Mac and Linus
- HTML
- CSS
- JavaScript
- MySQL
- Sublime Text 3
- XAMPP Server
- Photo editor

B. Hardware Requirement

For the effective operation of the newly designed system, the following minimum hardware specifications are recommended

- The computer system
- The Random Access Memory (RAM) in use should be at least 512megabyte.
- The system should have a hard Disk of at least 50GB and at least a diskette drive of high density of 1.44MB (3.5 inches).
- The system should be equipped with an E.G.A/V.G.A color monitor with an uninterrupted power supply.
- A visual display unit.
- A standard keyboard and mouse

VII. DESIGN TOOLS

In the development of this proposed system, various tools were adopted. These tools range from PHP, XAMPP server, MYSQL database and HTML, CSS, JavaScript.

- Hypertext Markup Language (HTML)
- Cascading Style Sheet (CSS)
- Hypertext Preprocessor (PHP)
- My Structured Query Language (MYSQL)
- JavaScript libraries like jQuery
- Sublime Text 3

VIII. SYSTEM DESIGN AND IMPLEMENTATION

This paper introduces the result gotten when the system was tested, how the test was carried out and the language used to achieve the system. The web server used in this implementation is XAMPP server. This server is an open source, powerful and works on major OS such as Windows, Mac, Linus and uses MYSQL database and PHP scripting engines. HTML is the backbone of the website. It is used in creating web pages. The paper uses it to format texts as titles and headings, to arrange graphics on the web page, to link to different pages within the website and to link to other websites of need. Cascading style sheet is adopted to format the layout of Web pages. The main aim of CSS is to

separate the content of a web document from its presentation. It is used to define styles for documents, including the design, layout and variations in display for different designs and screen sizes. The paper uses it to define the text styles and other aspects of Web pages that previously can be defined in a page's HTML. CSS gives the option of selecting various style schemes and rules according to the requirements. Furthermore, it helps to avoid duplication, makes maintenance easier and also allows making site wide change in one place. JavaScript makes the web pages dynamic and interactive by implementing custom client – side scripts. PHP is compatible with various web servers like Apache and the Microsoft's IIS as well. All PHP scripts are executed on the server and it supports various databases like MySQL, Oracle, but it is mostly used with MySQL. MySQL is a free available open source relational Database Management System that uses Structure Query Language. It is the most popular language for adding, accessing and managing content in a database. A database is a collection of data. The paper implemented MySQL as a relational database management system help stores data in separate tables rather than putting all the data in one big storeroom.

IX. RESULT AND DISCUSSION

Output design gives a feedback of the result processes within the system. This description is made relative to the user or operator of the proposed system. The outputs for the proposed system are presented in form of web pages as follow

1) *Student's Login Page:* The prospective graduating student is expected to input his basic information such as username and password, for formal registration from which a login access is permitted as shown in figure 4.

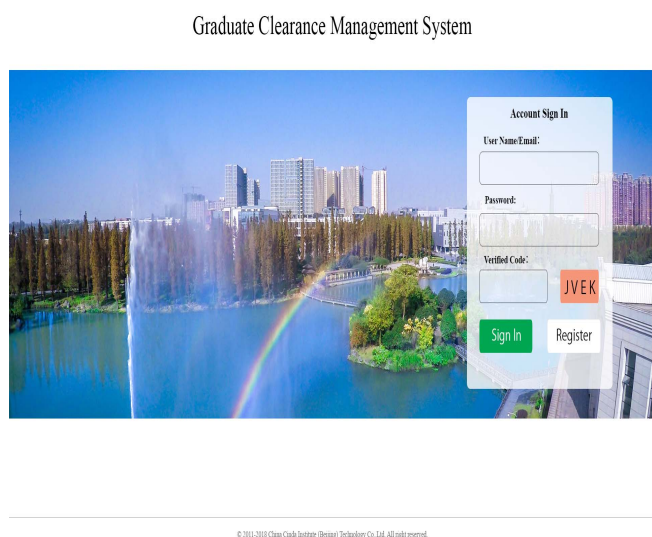


Fig. 4. Graduating Student's Login Page

2) *Graduating Student's Information Page:* After a successful login completion, the system retrieves the graduating student's information from the database of the university and displays it on the left side of the web page as shown in figure 5. Figure 6 shows the student's information

database structure and Figure 7 shows the current action of the system by highlighting the text view with an orange box colour.

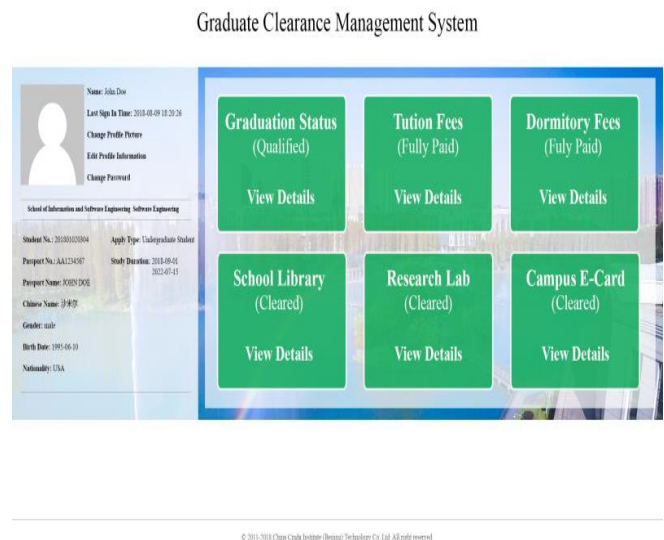


Fig. 5. Graduating Student's Information Page

#	Name	Type	Collation	Attributes	Null	Default
<input type="checkbox"/>	1 NAME	varchar(50)			No	None
<input type="checkbox"/>	2 NATIONALITY	varchar(50)			No	None
<input type="checkbox"/>	3 PASSPORT NUMBER	varchar(10)			No	None
<input type="checkbox"/>	4 SEX	varchar(10)			No	None
<input type="checkbox"/>	5 MARITAL STATUS	varchar(10)			No	None
<input type="checkbox"/>	6 DATE OF BIRTH	date			No	None
<input type="checkbox"/>	7 PLACE OF BIRTH	varchar(50)			No	None
<input type="checkbox"/>	8 HOME AND TELEPHONE	varchar(20)			No	None
<input type="checkbox"/>	9 OCCUPATION	varchar(20)			No	None
<input type="checkbox"/>	10 HIGHEST ACADEMIC DEGREE OBTAINED	varchar(50)			No	None
<input type="checkbox"/>	11 FIELD OF STUDY	varchar(50)			No	None
<input type="checkbox"/>	12 DURATION	date			No	None
<input type="checkbox"/>	13 STUDENT STATUS	varchar(10)			No	None
<input type="checkbox"/>	14 SOURCE OF FUNDING	varchar(20)			No	None
<input type="checkbox"/>	15 STUDENT ID	int(10)			No	None
<input type="checkbox"/>	16 STUDENT DORMITORY ADDRESS	varchar(200)			No	None
<input type="checkbox"/>	17 STUDENT ROOM NUMBER	varchar(10)			No	None
<input type="checkbox"/>	18 SCHOOL	varchar(100)			No	None
<input type="checkbox"/>	19 SUPERVISOR	varchar(50)			No	None
<input type="checkbox"/>	20 PROGRAM OF STUDY	varchar(100)			No	None
<input type="checkbox"/>	21 EMAIL	varchar(50)			No	None

Fig. 6. Graduating Student's Database Structure



Fig. 7. Current Action of the System

3) *Graduation Status*: This stage determines if the student is eligible to proceed with the clearance process or not as shown in figure 8. All minimum graduation requirements must be satisfied including all fee payment.

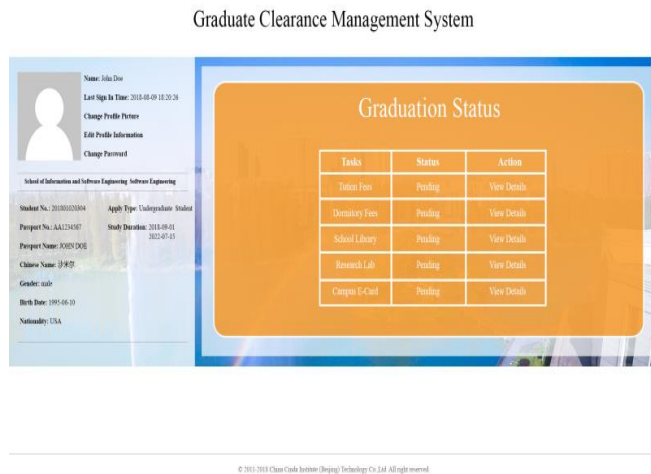


Fig. 8. Graduating Student's Status

4) *Tuition Fee*: The graduating student is expected to finish up all payment regarding tuition fee before granting access to proceed with clearance process. A student still indebted can view all outstanding payments and also make payment at the same time by clicking on the payment link as shown in figure 9 below.



Fig. 9. Graduating Student's Tuition Fee Status

5) *Dormitory Fee*: The graduating student is expected to finish up all payment regarding dormitory fee before granting access to proceed with clearance process. A student still indebted can view all outstanding payments and also make payment at the same time by clicking on the payment link as shown in figure 10 below

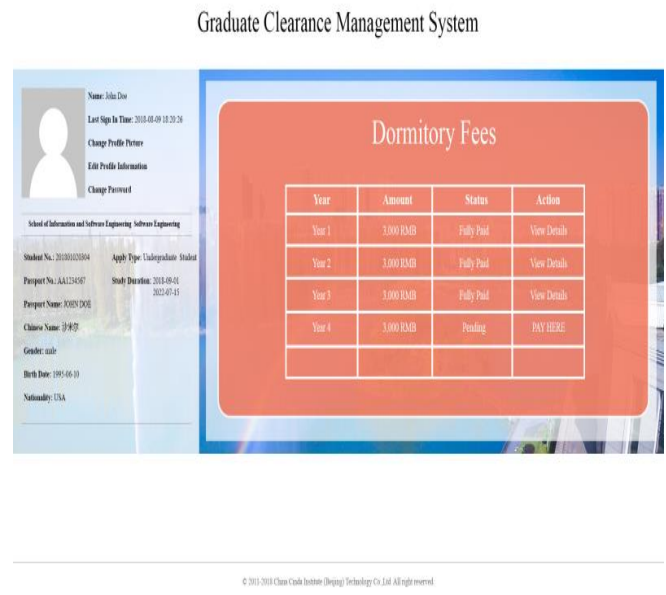


Fig. 10. Graduating Student's Dormitory Fee Status

6) *School Library*: All the books borrowed and return by the graduating students can view on this page as shown in figure 11. If the student has a pending book yet to be returned, it will reflect indicating the student to either return it or pay for overdue. The amount will be calculated automatically based on overdue period charge. In this case, the student is directed through a link to make payment in order to proceed to the next stage.

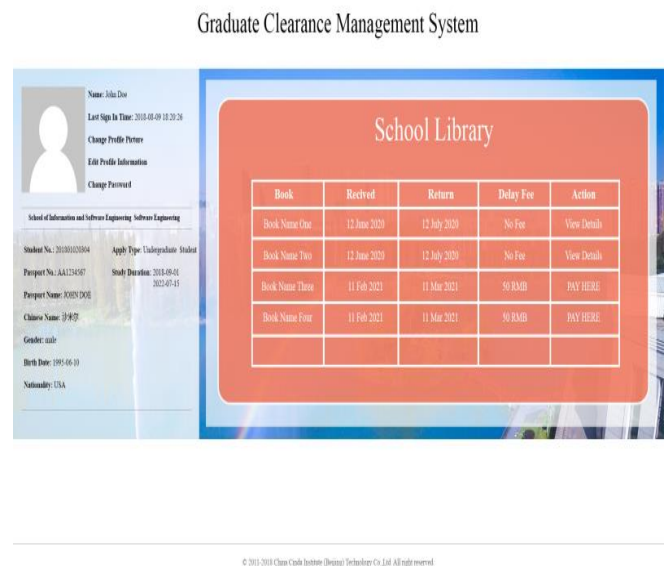


Fig. 11. Graduating Student's Library use Status

7) *Research laboratory*: Every student is assigned a work space in the laboratory with a work station. It is expected that all laboratory materials assigned to every student are returned in good shape and duly signed with the consent of the student's supervisor. This information can be viewed on this page as shown in figure 12. In a case where the student's status is pending, the student will be directed to see the school coordinator before proceeding to the next stage.

Graduate Clearance Management System

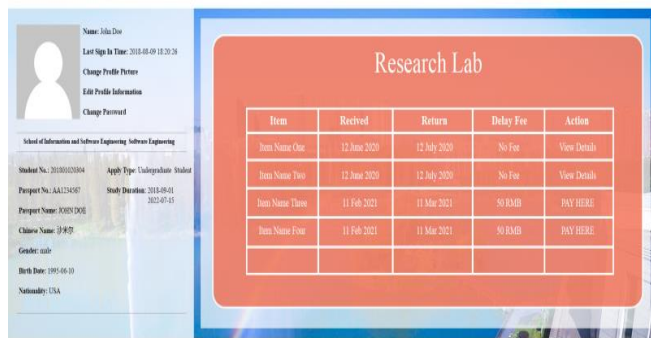


Fig. 12. Graduating Student's Research Lab Status

8) *Campus E-Card*: Graduating students are expected to return the campus E-card and get a refund for available balance on the card as shown in figure 13. The student can view the available balance on the card and gets a refund by choosing a withdrawal method either via bank card or mobile money.

Graduate Clearance Management System



Fig. 13. Graduating Student's Campus E-Card Status

X. DISCUSSION

The results show that the improved method presented in this paper has a high degree of efficiency and reliability. The introduction into the problem is known; the aim and objectives are explained. A review of the existing method of clearance and a new improved system is proposed. The implementation of the design is carried out with the help of some programming language tools. A flowchart is used to show a step by step process in performing the task in the system. Figures are shown to demonstrate the structural view of the processes within the system. This system allows the admin to print out a list of successful clearance

processes by students on the backend. Data integrity is ensured by the use of password and ID for authenticating user and to avoid unauthorized access.

XI. CONCLUSION

In this paper, an improved electronic clearance management system is presented. The system will offer graduating students a hitch free clearance experience. The implementation of the proposed system presented in this paper by replacing the manual and semi manual methods will reduce cost and save time consumed during the whole process of clearance. It is observed that this improved system, if implemented will increase efficiency and reliability for both the students and the university.

XII. FUTURE WORK

The paper has a very vast scope. In the future, the research can be extended across different sectors of economy and industries with an existing database system to improve clearance processes. I strongly endorse the future development of this work.

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