



# Online Student Clearance Management System

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## ABSTRACT

This Online Student Clearance Management System addressed the challenges in the manual process of signing student clearances in one of the academic institutions in Pagadian City, Zamboanga del Sur, Philippines, as a prerequisite before the release of a final permit which is a requirement to take the final period examinations. The current process of signing a student clearance involves a piece of paper indicating the office names, and office heads or representatives must affix their signatures. The students will carry this paper and submit it to various offices for signing. This system has eliminated the challenges present in the current process through a web-based approach where clearance signing will now be processed online. This system integrates into the existing online portal of the institution, where students may view their clearance status. The office heads or representatives will approve or disapprove student clearances through the existing portal as a new mechanism for signing the clearance. This system also features QR code technology as a mechanism for the finalization of clearance signing, whereby students will only have to present the code instead of the signed piece of paper as evidence of the accomplishment of the clearance. These new approaches transformed the current processes into a complete paperless transaction.

**Key words:** Clearance management, clearance system, online clearance, online system

## 1. INTRODUCTION

The transformation of manual processes and transactions into digitized versions is just one of the significant capabilities of Information and

Communications Technology in bringing efficiency and convenience to organizations like academic institutions. Academic institutions do not solely utilize Information Technology in the teaching and learning process but also in administering administrative tasks such as signing student clearances [1]. A clearance is a status that grants or authorizes individuals to access certain information or proceed to a specific step in accomplishing something [2]. An academic institution in Pagadian City in the province of Zamboanga del Sur, Philippines, required students to obtain an appropriate clearance for a particular purpose, such as in the final examination. The institution's current process of allowing its students to secure a final examination permit is achieved manually. Students are given a clearance form that indicates all the individuals required to sign, which denotes that the student is already cleared [3]. Afterward, the students will be allowed to settle their final examination bill to secure a final permit. This permit grants a student to take the final examination. Particular challenges are encountered since the entire final examination permit clearance is performed manually.

The manual process is stressful to the students as it requires them to move from one office to another to be cleared, other than being time-consuming. A process like this makes the clearance form vulnerable to fraud [4]. The clearing officers may also be absent, which wastes time and delays since that would mean the students will have to revisit the same office again next time [5]. It is also possible to lose the documents due to fire or rainfall. Hence, there is a need for an automated method to overcome these challenges [6]. In doing so, an online student clearance management system was designed and developed to automate the process of

obtaining clearance on the students' part and signing these clearances on the part of the office heads or personnel, or an academic institution. Because it is online, the students can now process their clearance electronically over the web. In this case, the students can process it using an existing web portal from the abovementioned academic institution. A portal is a website that allows visitors to retrieve information [7].

An electronic clearance system becomes more necessary, given that people nowadays use computers for a productive and more efficient experience [8]. This computing solution transforms any manual process into an electronic and paperless mechanism. A paperless system sends data via automated means. Therefore, using paper media will now be unnecessary [9]. A paperless transaction also promotes efficiency and is environment-friendly.

Further, it also supports better documentation management [10]. The entire clearance process is then facilitated online through the institution's existing web portal, where students can retrieve updates regarding the status or progress of their clearance. The concerned individuals who must sign the clearance will simply approve or reject a clearance by clicking a button instead of affixing their digital signatures to simulate the manual process. An office head may reject clearances for special reasons, such as when a student has yet to accomplish a pre-requirement like a pertinent document that had initially been required.

Several studies were conducted on online clearance systems development. Alroobaea [11] developed a clearance system that is designed for educational institutions to help students, including staff members, in processing clearance to settle pending dues or belongings after graduating or after an employee was terminated. An open-source web-based clearance system for Iraqi educational institutions was proposed by Ramadhan et al. [12] to reduce time, effort, and cost and increase the speed of the entire process. Seezi et al. [13] developed a reliable, effective, efficient, and transparent online clearance system that enables students to monitor the progress and status of their clearance forms online, eliminating the manual process. Another related project was designing and developing an online clearance system for a university by Ahurira et al. [14]. This system eliminated the university's long queues at the offices when the students are clearing, which consumes time, the inadequate number of staff who will process the clearance, and the collision of two

or more students who will visit the office to process their clearance. AlSideiri et al. [15] also developed a software system that replaced the manual method of clearance processing for students, which eventually served as a reliable and effective means of eliminating delays, a common reason for developing a better clearance system.

Specifically, this software development dealt with the following concerns:

1. How may the Online Student Clearance Management System be developed using the Waterfall Model:

- 1.1 Requirements Specification;
- 1.2 Planning
- 1.3 Designing;
- 1.4 Development/Implementation;
- 1.5 Testing;
- 1.6 Deployment;
- 1.7 Maintenance;

2. How may the Online Student Management System be evaluated by the IT Experts and the End-Users who are the students of an academic institution based on the following attributes or criteria:

- 2.1 Functional Suitability;
- 2.2 Performance Efficiency;
- 2.3 Compatibility;
- 2.4 Usability;
- 2.5 Reliability;
- 2.6 Security;
- 2.7 Maintainability;
- 2.8 Portability

## 2. METHODOLOGY

### 2.1 Research Design

The Waterfall Model is used as the basis for developing this system. This model has been adapted as a research design methodology due to its structured and systematic approach. As a research design, the waterfall model involves a sequential or linear progression through different phases, akin to a cascading waterfall. In addition, the development of this system also adopted the IEEE (Institute of Electrical and Electronics Engineers) Recommendation in software engineering. This recommendation refers to a set of standards and

best practices established by the IEEE for developing, documenting, and maintaining software projects. These recommendations cover various aspects of software engineering, including requirements analysis, design, coding, testing, and documentation. By adhering to IEEE guidelines, software engineers ensure that their projects are developed with high quality, reliability, and maintainability. These standards help in promoting consistency and interoperability in software development, making it easier for different teams to collaborate and understand each other's work. Additionally, following IEEE recommendations in software engineering enhances software products' credibility and trustworthiness, benefiting developers and end-users alike.

### 3. RESULTS

#### 1. Design and Development of an Online Student Clearance Management System

The Online Student Clearance Management System was completed through the waterfall software development model and by adopting the IEEE recommendation in software engineering. The phases involved in the entire development process are outlined and discussed below.

##### 1.1 Requirements Specification

The requirements specification plays a crucial role in the development of software systems. It defines and documents the software's functional and non-functional requirements to meet the intended purpose and user expectations. In this phase, the developers have gathered data in one of the academic institutions in Pagadian City, Zamboanga del Sur, concerning the entire process that students and office heads must follow regarding the manual signing of clearance. Ultimately, the collected data will be used and become the basis for the succeeding phases of the development process.

##### 1.2 Planning

The planning phase is fundamental in the entire development process. It is where project objectives, requirements, resources, and constraints are further defined and organized to ensure the successful execution of the software project. In this phase, the developers prepared a comprehensive plan that will serve as a guide throughout the project. This plan also serves as a blueprint that outlines the steps to be taken,

resources to be used, and potential risks to be managed. Changes may occur during the development process. Hence, reviews and updates are essential should a new set of requirements arise during the course of the project.

##### 1.3 Designing

This phase is another crucial step in the software development process as it transforms the requirements gathered in the earlier phases into a detailed design that will produce another blueprint for developing the software system. The system is a web-based application that enables students to process clearance online. The system is also designed to enable the office heads or authorized personnel to approve or disapprove a clearance.

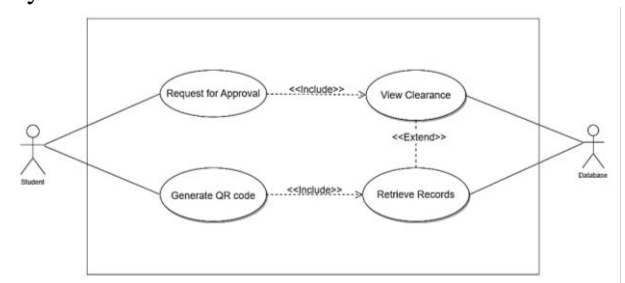
###### a. Technical Specification

This system is composed of the following components: a website portal which is already existing where this system is integrated; the necessary required hardware, which is a PC or a smartphone; the office administrators who will approve or disapprove the clearance; and the students who are the end-users. The following components also serve as the building blocks of the system:

- HTML5
- PHP
- MySQL
- JavaScript
- Bootstrap

###### b. Use Case Diagram

A use case diagram visually represents the functional requirements and the interactions of a system from the perspective of the end users. Its primary purpose is to provide a clear and high-level overview of how the end users interact with the system.

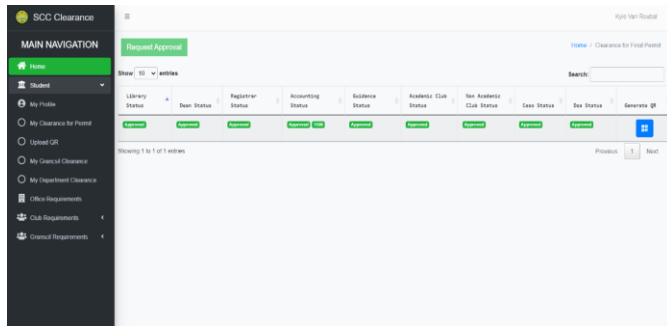


**Figure 1:** Use Case Diagram of the Developed System

Figure 1 depicts the functional requirements and the interactions of a system from the perspective of the end users by showing that a student can request for his clearance to be approved and also generate a QR code. The QR code generation is simply a feature in the system when the entire clearance signing process is already completed. This special code is then shown to the final office, where students can settle their final examination bill in order to acquire a final examination permit to take the final examination.

### c. Interface Design

A system's interface design refers to the graphical user interface (GUI) or the command-line interface (CLI) that users interact with to perform relevant tasks or to access system functionalities. The design itself provides users with a seamless and efficient experience while interacting with the system.



**Figure 2:** Clearance Approval Interface

Figure 2 shows the interface of the online student clearance management system where the status of a student's clearance for each office is shown, whether it is approved or rejected.

### 1.4 Development/Implementation

The software or system's actual construction and coding occur in this phase. The planning and design phases were critical steps as this phase follows it. The developers in this phase wrote the code based on the detailed design specifications defined in the previous phase. Hence, this is the actual implementation of the outlined functionalities and features. As already specified, this system is a web-based application, and the actual development involved the technologies HTML5, PHP, MySQL, JavaScript, and Bootstrap as the underlying building blocks of the system.

### 1.5 Testing

This phase ensures that the system adheres to the requirements specified in the planning phase. Software

testing is performed in other phases to regularly identify and manage issues to ensure the software meets the desired quality standards. The testing for the functional requirements yielded an overall positive and acceptable result. Requesting clearance, tracking clearance progress, submitting further requirements, and approving and disapproving the clearance requests were found satisfying by end users. The system was also considered user-friendly, with satisfactory user feedback.

### 1.6 Deployment

Deployment is a phase that prepares the system to be integrated into the intended environment so it is available for use by the intended end-users. Like the other phases, deployment is also a critical step in the system development life cycle which will require planning, coordination with the client, and further testing to ensure its successful use. Currently, the academic institution where this system will be installed is already in the process of integrating it into their operations for the use of their students for the upcoming clearance signing. Certain considerations have been considered so the system will be successfully integrated into the institution's existing student portal. During this phase, the system developers are constantly collaborating with the institution's personnel so integration will become a success.

### 1.7 Maintenance

This phase refers to continuously managing the system's performance and functionality throughout its operation. It is also a crucial aspect of the system because it ensures that the system will continuously perform. According to the deployment plan, maintenance is performed by the IT Department of the concerned academic institution as soon as the system integrates.

#### 1. IT Experts and Students Evaluation of Online Student Clearance Management System

Overall, thirty-nine (39) respondents were a combination of IT Experts and Students. These respondents rated the system using the same criteria, with 5 as the highest rating and 1 as the lowest rating. The results are the following:

#### 2.1 Functional Suitability

- 25 out of 39, or 64.1%, respondents rated 5 for functional completeness under the criteria of functional suitability.

- 24 out of 39, or 61.5%, respondents rated 5 for functional correctness under the criteria of functional suitability.
- 24 out of 39, or 61.5%, respondents rated 5 for functional appropriateness under the criteria of functional suitability.

### 2.2 Performance Efficiency

- 27 out of 39, or 69.52%, respondents rated 5 for time behavior under the criteria of performance efficiency.
- 25 out of 39, or 64.1%, respondents rated 5 for resource utilization under the criteria of performance efficiency.
- 24 out of 39, or 61.5%, respondents rated 5 for capacity under the criteria of performance efficiency.

### 2.3 Compatibility

- 22 out of 39 respondents, or 56.4%, rated 5 for co-existence under the compatibility criteria.
- 21 out of 39 respondents, or 53.8%, rated 5 for interoperability under the compatibility criteria.

### 2.4 Usability

- 25 out of 39, or 64.1%, respondents rated 5 regarding appropriateness recognizability under the usability criteria.
- 25 out of 39, or 64.1%, respondents rated 5 in learnability under the usability criteria.
- 24 out of 39, or 61.5%, respondents gave a rating of 5 in the aspect of operability recognizability under the criteria of usability.
- 23 out of 39 or 59% of respondents rated 5 regarding user error protection under the usability criteria.
- 25 out of 39, or 64.1%, respondents rated 5 regarding accessibility under the usability criteria.

### 2.5 Reliability

- 25 out of 39 respondents, or 64.1%, rated 5 regarding maturity under the reliability criteria.

- 24 out of 39, or 61.5%, respondents rated 5 in the aspect of fault tolerance under the reliability criteria.
- 23 out of 39 or 59% of respondents rated 5 in the aspect of recoverability under the reliability criteria.

### 2.6 Security

- 24 out of 39, or 61.5%, respondents rated 5 regarding confidentiality under the security criteria.
- 26 out of 39, or 66.7%, respondents rated 5 regarding integrity under the security criteria.
- 23 out of 39 or 59% of respondents rated 5 regarding non-repudiation under the security criteria.
- 25 out of 39, or 64.1%, respondents rated 5 in the aspect of accountability under the security criteria.
- 23 out of 39 or 59% of respondents rated 5 in the aspect of authenticity under the criteria of security.

### 2.7 Maintainability

- 26 out of 39 respondents, or 66.7%, rated 5 in modularity under the maintainability criteria.
- 23 out of 39 or 59% of respondents rated 5 regarding reusability under the maintainability criteria.
- 26 out of 39 respondents, or 66.7%, rated 5 regarding analyzability under the maintainability criteria.
- 26 out of 39 respondents, or 66.7%, rated 5 in modifiability under the maintainability criteria.
- 24 out of 39 respondents, or 61.6%, scored 5 in testability under the maintainability criteria.

### 2.7 Portability

- 27 out of 39 respondents, or 69.2%, rated 5 regarding adaptability under the portability criteria.
- 25 out of 39, or 64.1%, respondents rated 5 regarding installability under the portability criteria.
- 26 out of 39, or 66.7%, respondents rated 5 regarding replaceability under the portability criteria.

#### 4. CONCLUSION

In conclusion, the test results confirm the success of the development of the system, integrating all desired features effectively. It ensures security by granting authorized personnel access to the system. The system's efficiency lies in its paperless approach, cloud storage, and online accessibility. Usability is prioritized, providing a user-friendly interface for executing all necessary functions.

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