Design and Implementation The digital transformation of the student clearance system for Soran University

Sarhad Baez Hasan [1], Yahqob Nader Abdullah [2], Mnir Khalil Darwesh [3]

[1] Department of Computer Science, Faculty of Science, Soran University, Iraq
[2] Department of Computer Science, Faculty of Science, Soran University, Iraq
[3] Department of Computer Science, Faculty of Science, Soran University, Iraq
*Corresponding author: Sarhad.hasan@Soran.edu.iq

ABSTRACT

This article aimed to develop and deploy a web-based interface that would enable university students to start and finish the annual course clearance procedure online rather than visiting section offices physically. The student clearance system is an online study project that will assist in streamlining the university's clearing process's queuing system. The student clearance system can handle information efficiently and is very simple for colleges to use because it is web-based and accessible from anywhere at any time, and this system or process is also performed every year at the end of the second semester by students. Students at the university in all scientific departments can register through this web application to do end-of-year cleaning work at the university. In this way, we will avoid using paper, causing a loss, and creating student crowds at the doors of departments. and facilitating students' ability to do so via the Internet. This project paper's computer-based architecture was introduced utilizing the PHP programming language, JavaScript, CSS, HTML, and the MySQL software database. The program developed would operate as a more efficient and effective manner of clearing pupils, removing any kind of delay or stress, and assisting you in understanding the procedure and how to complete your online clearance. This study effectively achieves the project paper's goal by combining data from the university with other resources, materials, and programming.

KEY WORDS: Clearance, Efficient, Information, Process, Web-Based App.

---

1. INTRODUCTION

Science is applied through technology, which can be used to address issues. But it's crucial to remember that science and technology are two distinct fields that collaborate to carry out particular tasks or address particular issues. We use technology practically constantly in our daily activities to our advantage [1].

This paper goal is to create and implement a student clearance system. Because of the Internet's growing popularity in the early 1990s, most people now use it for daily tasks such as on-line transactions, getting intonation, e-mailing friends, interactive chatting, and so on. The internet has become a fundamental component of our society as its popularity has grown. The World Wide Web (WWW) is a fantastic resource for people to access, trade, and process intonation due to its dynamic content and internet accessibility. The Internet is a contemporary information relay system that links hundreds of thousands of telecommunications networks to create a

framework. These applications open up a plethora of new research areas, causing the Internet to grow in popularity year after year [2].

In the past and now, student clearance procedures were carried out by moving from one office to the next and keeping paper records. Every clearance task is completed by hand. This results in a system that is unreliable and unclear in terms of keeping track of records, and it can be very daunting and frustrating, to say the least. A clearance form, as we know it today, is widely used at the end of the academic session. If students need to leave the university or institution, they must submit a clearance request to their particular department. This technology automates the clearance process's manual tasks [3].

A student may complete his or her clearance from anywhere at any time, and it includes all of the capabilities of the manual clearance system, plus more. In many universities, the data protection process must be automated, necessitating the creation of an automated

online clearance scheme. This will go a long way toward reducing the various challenges and stress associated with the manual clearance procedure.

The clearance of courses is a mandatory process at the University of Soran every year as the academic year draws to a close, and every student is compelled to participate. This is used to evaluate a student's standing and whether or not they owe the university any tangible debts, such as books or other study materials. As a result, clearing at the University of Soran entails allowing students to progress to the next level provided all academic requirements have been met.

1.1 Problem statement

Due to the large number of offices that students must visit and time constraints, students at the University of Soran encounter numerous obstacles when it comes to the manual or physical clearing of courses at the end of each academic year. Students frequently move from office to office in order to clear up the courses they were enrolled in during each academic year. Due to the absence of several important personnel while processing clearance, students are required to attend a specific office on a regular basis. Furthermore, the manual system leads to the loss of vital documents, just as the filing system does in the event of data loss, such as when certain lecturers instruct students to drop their clearance forms in a box to be signed during their free time, and a student is forced to go to that office to check if the form has been signed or not. As a result, the online clearance method aids in reducing the challenges students have with the manual clearing procedure by allowing students to access the online course clearing process at any time [4].

A graduating student must obtain approval from the following departments in order to complete his or her clearance:

• Exam office
• Finance
• Registry
• Library
• Department

Completing these steps by hand and visiting many locations to be certified is inconvenient and time-consuming.

1.2 Amis and Objectives

• The goal of this technology is to digitize and create an electronic system.
• Control over the documentation of stakeholder data to save time.
• Clearance for students is processed quickly and effectively.
• Students can complete the cleaning form faster.
• No overcrowding in the area where the cleaning form is carried out.

• Providing good health for students.
• Creating a direct relationship between students and administrators.
• After completing the clearing form, students will be able to see the results of their exams.
• Protecting student secrets means that only the student himself can see the results.

1.3 Significance of the Project

The design of this system primarily stores user information, promotes quicker data manipulation, provides simultaneous access to authorized users, and also ensures the integrity and consistency of the approved users' handling of the information system. The graduate student's online clearing system would relieve the students from queuing to get cleared by the university. This system causes the university to minimize expenses such as labor and stationary costs. The transmission of information becomes very quick, and delays can be stopped. Using it from anywhere at any time is very easy if there is an internet connection [10].

1.4 Literature Review

The purpose of this section is to address the issues raised in the paper. This includes issues with several of the current online clearance processes. It aims to demonstrate the significance and nature of various variables in society, as well as how they all come together in the end. In regard to the objectives, this section provides a summary of recent research and findings. It contains the project paper's core goal, which is to establish an online platform to help Soran University students clear courses at the end of the academic year. This section will go over the appropriate literature in order to determine the strengths and weaknesses of existing programs [2].

There have been many clearing system designs and implementations with different features and important specifications up to this point. By either conducting design studies or actually implementing their ideas, certain researchers have made a significant contribution to the current online clearance system. Several crucial publications in this regard will be the subject of this section.

Assisted with the practical design and implementation of a clearance system for a research paper for LMS State University [3]. The software's goal is 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 makes 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 by other authors. A system was also used to actively advance the work's

objectives. In the study article, a computer-based system for storing data was constructed employing HTML, CSS, JAVASCRIPT, APACHE, and MySQL.

Additionally, a web-based clearance system was presented that would be useful for various organizations, particularly academic institutions. The system can be used by both students and employees to complete the task clearing process after graduation or when an employee resigns from their position[5].

Another study also suggests a solution that improves on the dedicated automated ones while addressing the issues with the manual clearance process[6]. In order to replace the manual clearance system with an automated one, the University of Southwest Nigeria has performed a study using the case study methodology. The goal of the study is to continuously improve the first prototype that was produced. Improvements can be made more effectively the more the current process is understood. Finally, a new online system was developed using tools like Hypertext Markup Language (HTML), CSS for the presentation layer, PHP for the business logic layer, and MySQL for the database.

The suggested approach offers a number of advantages over the manual process, such as the fact that it took students more time and effort to complete their clearance. Another tangible benefit is the reduction in the amount of paper that institutions must purchase. The system is accessible from anywhere because it is online and commonplace. This makes it possible for students to check and keep track of their clearance status without having to travel or be present in person.

For private schools, Cadiz, Bondoc, and Estroga developed an electronic approval system[7]. The technology centralized the approval process in addition to automating it. Similar to earlier studies, the system expedited student clearance procedures and provided many of the benefits described above. Three key actors were served by the system: students, administrators, and office managers. After being created using modern technological tools, the system was given to the office executives. Office administrators have analyzed and tested the system. According to the article, office managers made a number of recommendations, including improving productivity and creating an interface that is mobile-friendly.

2. METHODOLOGY

The life cycle of the project paper is its methodology, which is the most critical aspect of the project paper and involves designing and writing paper plans from the beginning to the end. We have many styles of methodologies, such as water-fall, scrum, XP, prototype, and many other types. And we use agile methodologies for our project.

2.1 Agile methodology

Agile techniques are methods for creating products that follow the ideals and tenets outlined in the Agile Manifesto for software development. By establishing small, cross-functional, self-organizing teams that frequently deliver discrete functionalities and invite user feedback, agile methodologies seek to produce the best product possible. Agile seeks to solve issues that traditional "waterfall" methods of delivering large goods over protracted periods of time create, such as shifting customer expectations and erroneous product delivery experience.

The Agile Manifesto of Software Development presented a ground-breaking method for creating value and interacting with clients when it was originally published in 2001. Agiles four core principles are:

- It's more about people and their interactions than it is about processes and equipment.
- Thorough documentation falls short of working software.
- Contract negotiations should be replaced with customer collaboration.
- adjusting to change according to a plan.

Agile: Plan-Design-Develop-Test-Release-Feedback.

2.2 We are using an agile methodology

Before beginning a project, paper or creating a project, we must first map it out and develop an outline. As a result, there are a variety of approaches. In this case, we came to the conclusion that we should choose our system, so we did (agile method) and it is for this reason that we have chosen this method :

1. Reduced risk
2. Higher product quality
3. Increased project control
4. Better project predictability
5. Better visibility into project performance.

3. REQUIREMENTS GATHERING

In general, approaches such as brainstorming, document analysis, interviews, and questionnaires can be used to gather user requirements for a system. survey/questionnaire, and prototyping This investigation made use of a study group brainstorming session and the output of several earlier research surveys to determine the users' needs. Furthermore, as indicated in Fig. 1, both governmental and private organizations in Kurdistan and Iraq were evaluated under the current clearance method. The process necessitates the signatures of all unit leaders, including those from the department, register, library, and lodging, among others; nevertheless, the signing order might not even be important. To get all

signatures under the manual system in place, students must go to each office separately. If there were no strict requirements in the clearance paper, the student would have to go back to the unit. Finally, only students who have signed a clearance paper are eligible for examination permits and results.
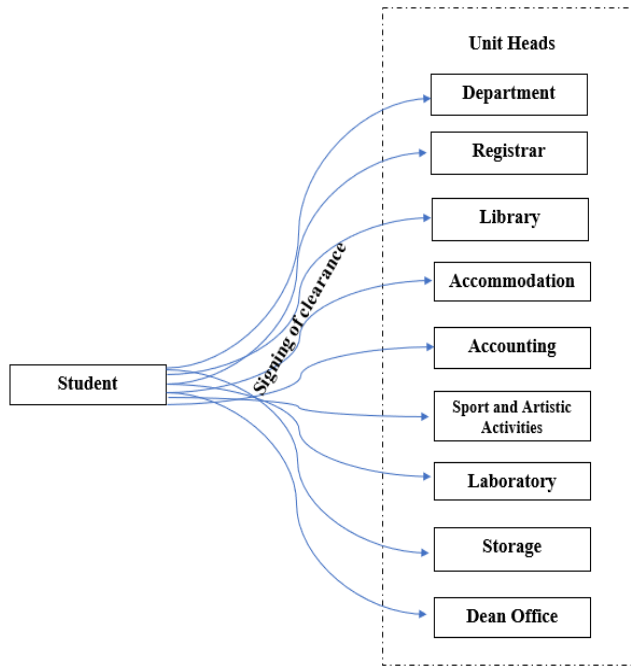

Fig. 1. Manual Clearance System

There are two primary categories of software requirements in the Software Development Life Cycle: functional requirements and non-functional requirements[8].

For the most part, functional needs are well-known, but non-functional requirements tend to represent system limits and limitations [9].

- Functional requirements: This must be supported by the system. using a CSV file to add new accounts to the database. The four different user types who will use the software are the system administrator, the exam committee, the unit head, and the student. According to their access level, it also grants privileged users the ability to add, delete, and alter records. The first user type, which can only view or print the clearing procedure, is a student. The status of clearance can be changed from not cleared to cleared or vice versa by the unit leader, who is the second authorized user in the system. A member of the exam committee is another user who has access to the clearance status of students in the clearance system. The system administrator has the most privileges overall. He or she has total control over the system and can change, add, or remove passwords.

- Non-functional requirements: Several non-functional requirements are taken into account by this system. There are a few non-functional requirements to consider. First, usability: the system needs to be simple to use and support popular browsers like Mozilla Firefox, Google Chrome, and Safari. Second, the system might receive future additions of new features. Scalability is a crucial component of this web application as a result. Last but not least, the system needs to be guarded against threats like SQL injection and cross-site scripting.

3.1 Use Case Diagram of the entire system

The criteria for creating a web-based system were based on the data acquired through the conventional clearance system and interviews with office heads regarding the system. Figure 2 shows a use-case diagram of the general architecture of the system. The technology will allow students to log in. They proceed to e-clearance after that to confirm the offices' signatures, prerequisites, and status. The status "CLEARED" denotes that all of the essential requirements have been met. Furthermore, if the status box is marked "NOT CLEARED," the prerequisites are not compiled. The status box is only updated when a criterion is met." Students only need to attend offices in order to submit a requirement. Students are saved from having to wait in a long line, waiting for the signatures to arrive, and losing the clearance slip under this proposed procedure[7].
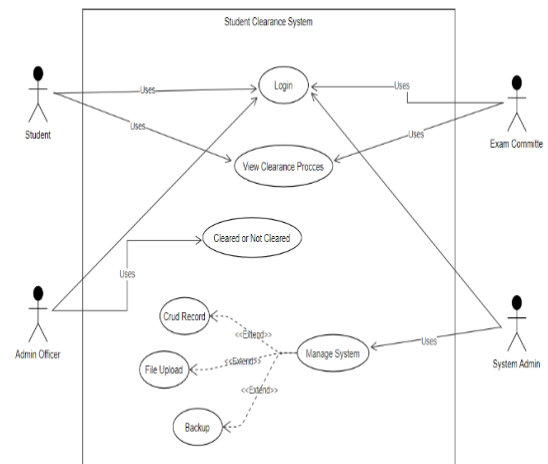

Fig. 2. Use Case Diagram of Student Clearance System

3.2 System working flow

With the login process, the developed system will encounter every type of user. The system will grant access if the username and password entered on the login page are accurate; otherwise, the system will shut down, and the user will need to reload the login page. As shown in

Fig. 2, if the consumer is a student, only the clearance status page will be shown. No alterations can be made by the pupils. If the following diamond shape determines that the user is the unit head, the system permits the user to perform CRUD operations on the records. Members of the Exam Committee are another role in this system that have access to the list of students who have passed or failed the exam. Last but not least, the system administrator has the power to add, modify, and remove users at any level.
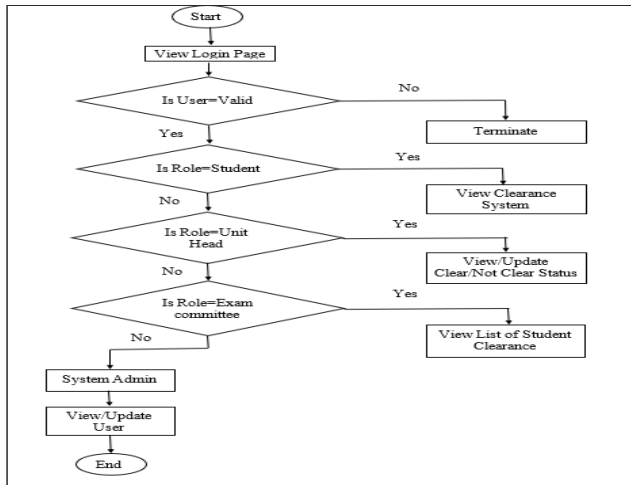
Fig. 3. Developed Flowchart of the Proposed System

3.3 Database Design

In designing the database, the relational database model was used, and the SQL database management system was used to create the database.

Table 1. Students Table

Field Name	Character Length	Data Type
Student_code	100	Varchar
Name	50	Varchar
Stage	1	Tinyint
Dep_id	11	Int
Faculty	50	Varchar

Table 2. Clearance table

Field Name	Character Length	Data Type
Id	11	Int
Student_code	100	Varchar
Dep_id	11	Int
State	10	Varchar
Note	N.a	Mediumtext

Table 3. Users Table

Field Name	Character Length	Data Type
Id	11	Int
Name	50	Varchar
Email	50	Varchar
Password	100	Varchar
Role	11	Int

Table 4. Roles Table

Field Name	Character Length	Data Type
Id	11	Int
Name	50	Varchar
Dep	50	Varchar

Table 5. Degree Table

Field Name	Character Length	Data Type
Id	11	Int
Student_code	100	Varchar
File	100	Varchar

The system consists of a number of stable tables (student, clearance, users, role, degree).

3.4 Entity-Relationship Diagram (ERD)

The entities and attributes of the database's tables are displayed in this section. This demonstrates how tables relate to one another.
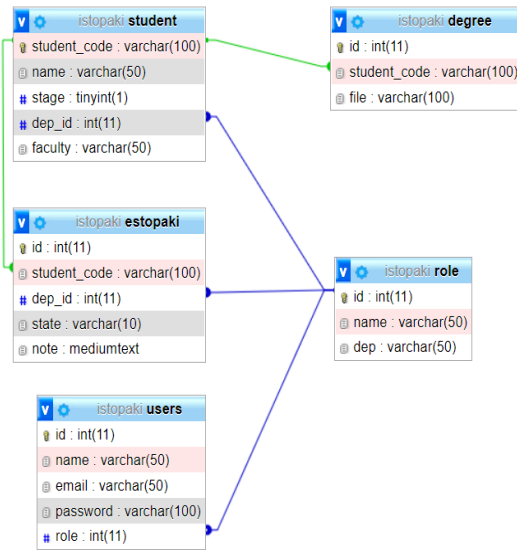
Fig. 4. ER Diagram

4. IMPLEMENTATION AND RESULTS

To implement this project, many different languages and tools have been used, including HTML, CSS, and JavaScript to show the website's layout section, PHP to manage the back-end of the website, and MySQL to save data and manage the website's database.

4.1 User Interface Design

It is very important to interface with the designed system in a simple and efficient manner. This interaction requires a good graphic user interface design because it is critical to the success of the system.

This section will describe each step that has been taken in our project, and that will be achieved by some figures that clarify and help you understand how the system worked, so this section will be a reference helping you get the idea clearly.

1.Main Form: This page is dedicated to the home page or main form, which also consists of two pages, one of which is dedicated to login, which is also where administrators can login, and one of which is dedicated to the information of students, who can access their information.
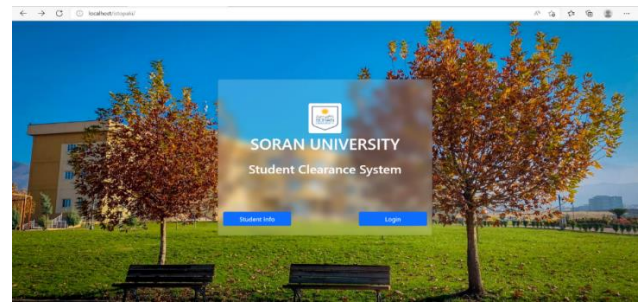
Fig. 5. Main Form

2.Admin's Login: This page is dedicated to the login of admins (Super Admin, Department Admin, Library Admin, Accounting Admin, Registrar Admin, etc.). Each admin has his or her own email and password, through which they can enter the system. And these emails are specific to Soran University, such as (computer@cs.soran.edu.iq).
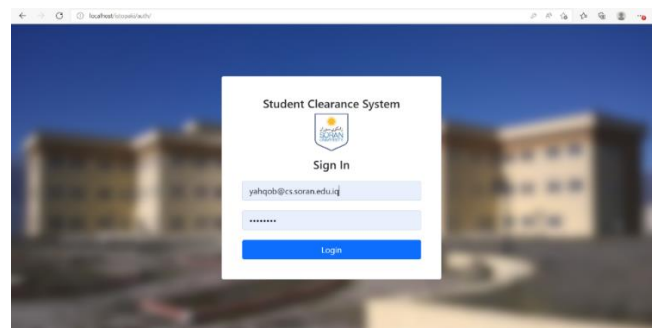
Fig. 6. Admin's login

1. **Super Admin:** This page is dedicated to Super Admin. Super Admin has three main functions in this system. The first function is to add students and delete them. And the second function is to increase the role, and this increases the role for the administrators. The third function is to add admins and delete them, also setting roles for admins.
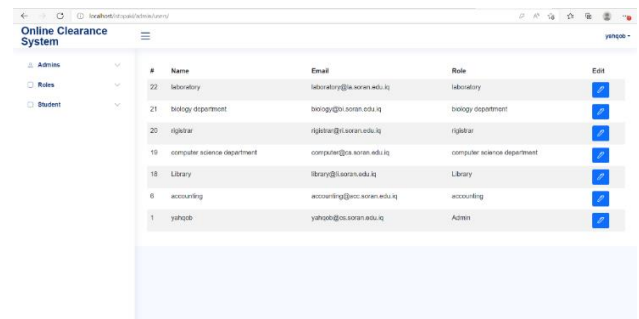

Fig. 7. Super Admin dashboard

Here, Super Admin can add students by giving a code to each student through which they can enter the system and specifying the student's name, department, stage, and faculty.

257

Fig. 8. Super Admin dashboard; Show and Create Student

Fig. 9. Super Admin dashboard; Show and Create Student

Here, Super Admin can increase the number of roles, and the role is for students to visit several sections for cleaning forms.

Fig. 10. Super Admin dashboard; Show and Create Role

Here, the super admin can add admins to the system by giving (admin name, admin email, admin password, and admin role). The role is the same as the one we had already added.

Fig. 11. Super Admin dashboard; Show and Create Admin

2. **Library Admin:** After the library administrator enters the system, this page will be opened for you. Here, the library administrator has only one function, which is the student clearing form, which the library administrator can clear or not clear to the student. If the student does not clear, the library admin will write a note to the student and send it to the student, but if the library admin has cleared the student, it doesn't need to be noted. On this page, the admin can search for the book in a number of different ways, including through the stages, department, student code, and states.

Fig. 12. Library Admin dashboard; Student Clearance Form

3. **Registrar Admin:** After the registrar administrator enters the system, this page will be opened for you. Here, the registrar administrator has only one function, which is the student clearing form, which the registrar administrator can clear or not clear to the student. If the student does not clear, the registrar admin will write a note to the student and send it to the student, but if the admin has cleared the student, it doesn't need to be noted. On this page, the admin can search for the student in a number of different ways, including through the stages, department, student code, and states.
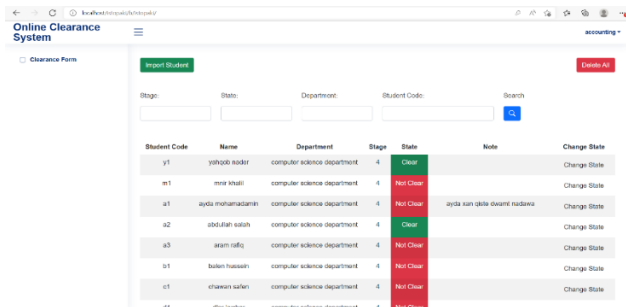

Fig. 13. Registrar Admin dashboard; Student Clearance Form

4. **Accounting Admin:** After the accounting administrator enters the system, this page will be opened for you. Here, the accounting administrator has only one function, which is the student clearing form, which the accounting administrator can clear or

not clear to the student. If the student does not clear, the accounting admin will write a note to the student and send it to the student, but if the admin has cleared the student, it doesn't need to be noted. On this page, the admin can search for the student in a number of different ways, including through the stages, department, student code, and states.

Fig. 14. Accounting Admin dashboard; Student Clearance Form

5. Department Admin: This page is dedicated to department administrators. Department administrators have two main functions in this system: the first is to insert and delate the student, and the second is a student cleaning form, which we'll discuss in the next steps.
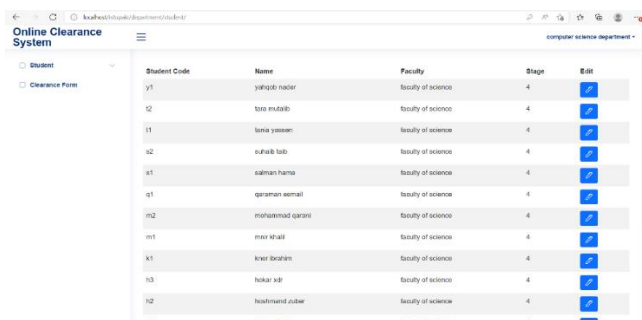

Fig. 15. Department Admin dashboard

Here department admins can add students by giving a code to each student through which they can enter the system and specifying the student's name, stage, and faculty.
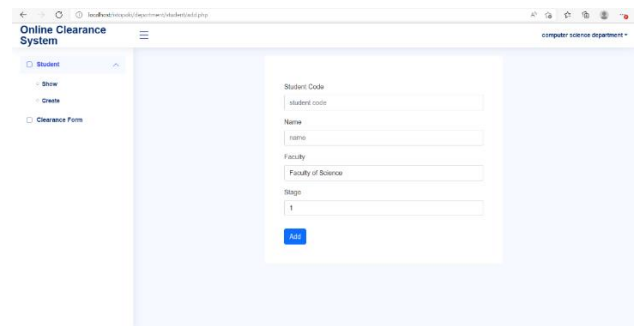

Fig. 16. Department Admin dashboard; Show and Create Student

Here's the second function of the department's admin, which is the student clearing form. which the department administrator can make clear or not to the student, If the student does not clear, the department admin will write a note and send it to the student, but if the admin has cleared the student, it doesn't need to be noted. On this page, the admin can search for the student in a number of different ways, including through the stages, student code, and states.
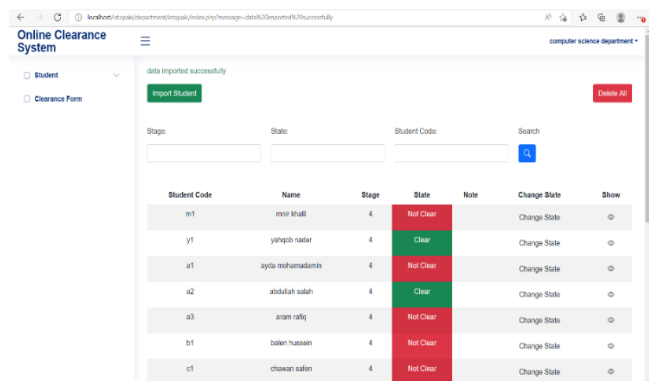

Fig. 17. Department Admin dashboard; Student Clearance Form

Here we have change state, which determines the student's condition, whether the student is not clear or clear, which is in the student clearing form, and this section contains notes if the student is clear, Admin doesn't need a note, but if the student is not clear, we will write him a note as seen in the figure, and that note goes to the student to see what's going on, and this change state is also available in all the places that students visit for clearing forms.
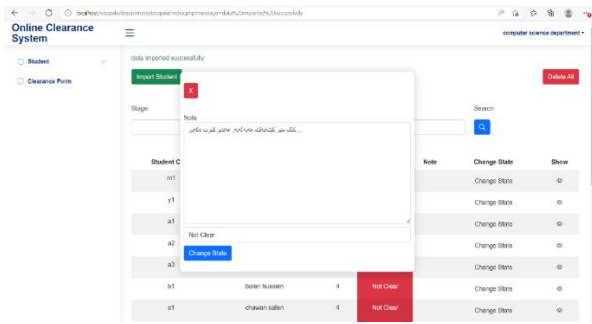
Fig. 18. Department Admin dashboard; Student Clearance Form; Note

Here we have the most important part of the student clearing form, which is the show section, which is the work of department administrators to look at student clearing forms in places where students have visited to clear their forms and determine whether the student is clear or not. If it is clear, it will be cleared by the administrators of the departments, and they will perform the results of the tests submitted. But if it is not clear, it will not be cleared by the administrators of the departments, and they will not perform the results of their tests for Submitted, and then they will write a note to him, and that note goes to the student. The student sees the note in the section or page that is specific to him.
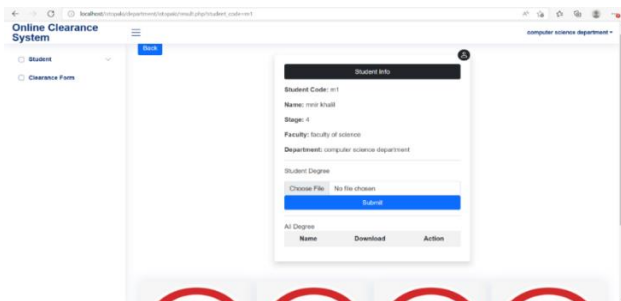

Fig. 19. Department Admin dashboard; Student Clearance Form; Show

6. **Student Login:** This page is specific to students, where students enter the system through a code, and that code is that they put the department administrators or super administrators for the students while inserting them.
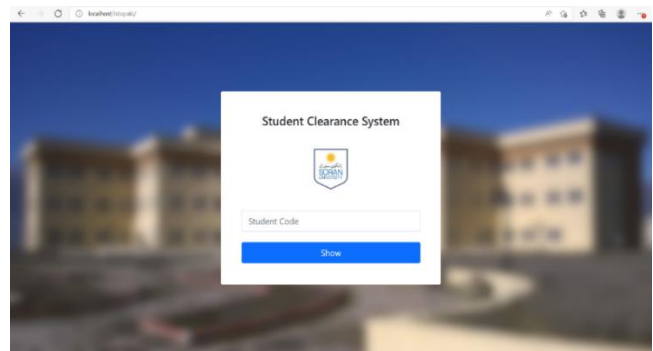

Fig. 20. Student Login

After students are able to enter the system through the code provided to them, this page will be opened for them. This page contains and displays all student information, such as name, stage, department, faculty, and code, and student clearing forms. If the student is clear in all the places he or she has visited for the clearing form, he or she will see the results of the tests. But if it is not clear, it will not see the results of its tests but only see the notes they have sent.
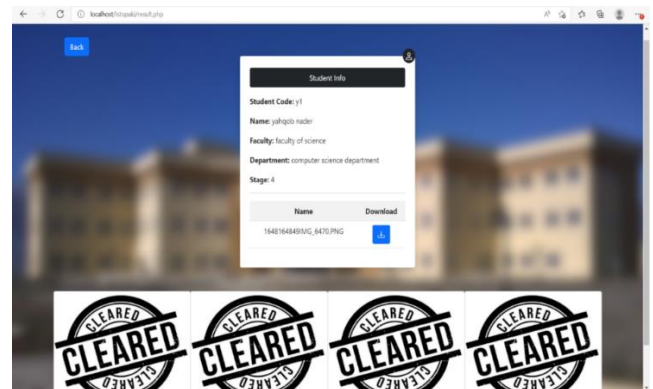

Fig. 21. Student Dashboard; Cleared Student

In this figure 22, we have a student who has problems in some of the places he/she has visited to clear his form. Because the student's form is not clean everywhere, the department administrators did not submit the results of the test for the student. So the student cannot see the results of the tests and only sees the notes written for him.
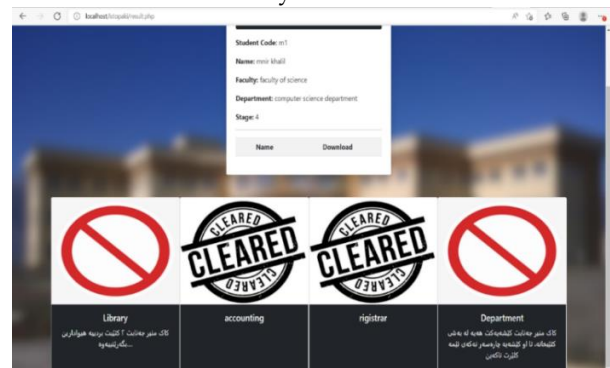

Fig. 22. Student Dashboard; Not Cleared Student

5. CONCLUSION

As a result of this study, the Clearance System now has an online open-source system. The outcomes of earlier research questionnaires and manual requirement-gathering procedures used in Iraqi colleges and institutions are substantially incorporated into the development process. By incorporating cutting-edge technologies like HTML, CSS, JavaScript, PHP, and MySQL, it was effectively constructed. Students can complete their clearing lots more quickly and easily thanks to the system. A web-based system centralizes all of the data and processes in addition to removing paper-based restrictions. The system is entirely functional, allowing each user—students, unit heads, exam committee members, and system administrators—to carry out their tasks with ease. The system has various benefits over the old approach, such as time savings, cost savings, and data loss prevention (paper could be burnt, wet, etc.).

References

1. Ramey, K. J. C. F. What is technology-meaning of technology and its use. (2013).
2. Zamri, Z. online clearance system (OC System). (2006).
3. IFEANYI, O. E. DESIGN AND IMPLEMENTATION OF ONLINE CLEARANCE SYSTEM. (2013).
4. Mwanaumo, J., Makanta, L., Nkhata, M., Munthali, W., & Mukuka, M. *ONLINE STUDENT'S COURSE CLEARANCE SYSTEM*. Retrieved from (2021).
5. Alroobaea, R. J. I. I. I. I.. Factors in the Design, Implementation and Usability Evaluation of Online Clearance System: A Case Study of Taif University. (2018). *21*(8), 2157-2168.
6. Jonathan, O., Misra, S., Makinde, F., Damasevicius, R., Maskeliunas, R., & Leon, M. *Development of Online Clearance System for an Educational Institution.* Paper presented at the International Conference on Applied Informatics. (2019).
7. Cadiz III, L., Bondoc, C. N., & Estroga, J. J. I. J. o. C. A. R. Moving Towards Global Technological Advancement: Basis for the E-Clearance Program Development. (2017). *6*(6), 171-179.
8. Vetter, D., & Kumar, P. (2017). Overview of Systems Analysis & Design (2017). In: ed.
9. Sommerville, I. J. J. o. S., & Software. Teaching cloud computing: a software engineering perspective. (2013). *86*(9), 2330-2332.
10. Nneji, G. U., Deng, J., Shakher, S. S., Agomuo, D., & Dike, I. D. *An Improved e-Clearance Management System for Graduating Students in a University Environment.* Paper presented at the 2018 IEEE 9th Annual Information Technology, Electronics and Mobile Communication Conference (IEMCON).
11. S.Baez, "Design a Web Analytics Software Tool in Order to Identify and Recognize the Behavior of Users That Visit Website," Academic Journal of Nawroz University (AJNU), Vol.11, No.4, 2022
12. Ferguson, R. Introduction to javascript. In *Beginning JavaScript* (2019). (pp. 1-10): Springer.