

The University of Sheffield
International Faculty, CITY College

FINAL YEAR INDIVIDUAL PROJECT

Digital Badges in Education

This report is submitted in partial fulfilment of the requirement for the degree of
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Digital Badges in Education

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ABSTRACT

CITY College allows students to develop various skills and qualities through their courses. Consequently, every unit contributes to different kinds of graduate attributes. This paper will demonstrate a digital badging system that records and builds every student's skills profile according to the courses they have participated in, their experience, and other extracurricular activities. This system aims to give a more customized look at each student's profile, enhancing future interviews and strengthening their job applications. The general idea of this project and the system is to create a tool that will make students feel recognizable and apprehend that their hard effort and achievements are rewarded with a tool that can also support them in their professional lives. This concept will motivate them to achieve more, start new activities, and aim for higher grades.

DECLARATION

All sentences or passages quoted in this thesis from other people's work have been specifically acknowledged by clear cross referencing to author, work and page(s). I understand that failure to do this, amounts to plagiarism and will be considered grounds for failure in this thesis and the degree examination as a whole.

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Signed:Date:

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Chapter 1

1.Introduction

During the first semester of the Computer Science department, academic badges were introduced to students. Every unit's syllabus had a collection of those badges, each representing a skill that a specific lesson through its projects and the study material would offer students. Some examples of the Sheffield graduate attributes are critical thinker, knowledgeable, confident in authentic challenges, and more. The description of those badges refers to the student and how the experience they gained through their courses shaped them so that they can contribute to their professional lives. When the student graduates, they have a list of these graduate attributes along with their degree. It can benefit their onward careers because the skills are also required and widely applicable in other contexts and the workplace.

The thought behind this project is how a system can make an already existing idea more personalized and authorized. This project is about Digital Badges in Education and how they can help students be more devoted, focused, healthy competitive in the classroom and through their studies. The Digital Badges system will give a customized look at every student's effort with the help of their lecturers and will be immensely valuable for their future job applications and interviews.

1.1 Aims and Objectives

The Digital Badges System will allow students and lecturers to engage more throughout their studies and help students' future employment. This project aims to create an inviting environment so that each student discovers courses and other activities they may enjoy. It drives them to achieve more during their studies to have a better professional future. Furthermore, the system allows lecturers to provide feedback and express their thoughts on each student and their effort in class and the units. It is essential to understand what the system this report will demonstrate is offering;

- Students have the opportunity to add units.
- Lecturers can remove units.
- Lecturers see a visualization of the list of units a student added.

- Lecturers upload badges and leave feedback.
- Students see a list of badges and feedback.
- Lecturers can edit and change feedback.
- Students can change and edit personal information on their profile.
- Students see a list of badges and feedback each lecturer provided them.

1.2 Overview of the Report

In the following chapters, the reader will start to understand the system and its purpose better. The first chapter includes the introduction and has the system's aims and objectives. The second chapter is a deep research or literature review that introduces the digital badges and analyzes all the aspects of these systems and their purpose. The third chapter overviews the digital badging system's analysis and design. It includes the system's requirements, use cases, success scenarios, and a UML diagram. This stage is vital for the following phase of the report, which is the implementation part of the system. In the implementation language and tools chapter, the reader will see a presentation of the programming language used to create the design and a platform presentation. Finally, the report ends with the evaluation/ testing of the system and a conclusion that consists of the learning experience gained and possible future enhancements.

Chapter 2

2. Literature Survey

Digital badging is a critical factor that helps develop the goal of effective learning and the support of achieving different academic certificates in the form of digital badges. The digital badges' goals effectively support the credibility to learn different subjects with the help of the web. The digital open badge represents the accomplished goals, skills, and credibility of the students in higher education. The advantages are there in developing the goal of student retention through practical online courses and the certification with a digital badging system. In addition, the students can get the opportunity to develop different skills and accomplishments with the help of the digital badging system.

The advantages of digital badges make it more challenging as the metadata and the artifacts can impact confidentiality, affecting students' personal information. Different countries have started the digital open badging system initiative to support informal learning in higher education. Digital badges are valid indicators of student skills, interests, and accomplishments. Digital badges in education have become valued as they represent the student's learning journey. This chapter aims to analyze diverse literature on digital badges and how they can benefit the field of education.

2.1 Digital Badges

The term "badge," or "digital badge," has become a general term for any digital credential. However, this can be mistaken and is often a basis for confusion. Digital badges are a set of digital certificates and are part of a larger credentialing ecosystem. There are many ways to acknowledge action and plenty of varieties of proof for varied needs. For example, a digital badge acknowledges learning or achievement and gives digital proof of that accomplishment [1].

2.2 Defining Digital Credentials

Digital credentials are digital forms of any formation of the physical document. These can range from driver's licenses, passports, and tickets to membership certificates, online certifications, coaching completion certificates, and numerous other examples. Digital credentials are digital versions of those historically paper credentials that offer evidence of some qualification, completion, clearance, or competence. These digital credentials should be verifiable, similar to their paper counterparts. All should contain the individual's name, what the credential is for, who issued it, and, if necessary, when it expires [1]. There are three varieties of digital credentials: test-based digital credentials, digital certificates, and digital badges.

Digital badges are in their early stages of growth, and as a result, they are more ambiguous in their applications. Generally, they are awarded for higher stakes accomplishments and value finishing a rigorous examination or passing a course. On the other hand, they are given out for low-stakes tasks such as observing a video or looking at a sixty-minute coaching program at different times. Whereas test-based digital credentials and digital certificates are designed to appear equivalent to their physical counterparts, digital badges have a diverse look [1].

2.3 The Anatomy of a Digital Badge

Badges have meta-data that show the details of the badge to anyone wishing to verify it or learn more concerning the context of the action it signifies [15]. Those details offer all the knowledge required for what the badge indicates;

1. Who received the badge?
2. Who issued the badge?
3. What were the factors for giving the badge?
4. Will it expire?

This data will be depicted in a visual format where the badge is displayed. Still, it is additionally kept among the digital badge's meta-data, so it is often verified at any time, though one only has the image. Additional information such as tags, expiration date,

and whether the document was withdrawn is nonobligatory fields that will or might not be displayed with the badge image and will forever be enclosed within the meta-data if they apply to the badge [1].

Therefore, for a digital badge to be Open Badge Compliant, it must have specifically needed meta-data;

- What is the badge called?
- What is the badge's description?
- When was it issued?
- Who is the issuer of the badge? (Lecturer's or organization's name.)
- Who gained the badge? (The recipient.)

Other meta-data is nonobligatory but extremely helpful to assist and enlighten anyone viewing the badge, its context, and its current state [1];

- Alignment (Standards adhered to).
- Additional Information about the Issuer.
- Expiration Date.
- Revocation reason.

2.4 Principles for Recognizing Learning

Rehak and Hickey [2] present nine regulations for identifying learning with digital badges. The principles emerged from a project titled "Introducing the DML Design Principles Documentation Project," which was posted by Hickey [2]. He describes that digital badges are credentials that can be received in various ways. As a digital badge is achievement-proof, it is straightforward that motivation, assessment, and learning are related factors that should not be ignored. The following nine principles are summarized below;

1. How badges can assist with understanding courses.

Digital badges motivate students to accomplish and learn more throughout their studies. In addition, badges offer the opportunity for a better understanding of what each level, program, and course teach and encourage students to participate more in class.

2. Badges and standards.

Aligning standards to the badges provide transparency within the credentialing system and improves the proof they give. Therefore, this badge-standards relationship formalizes the credibility of any assessment and the related badge.

3. When an expert, lecturer, or organization issues the badge.

When a lecturer or organization issues the badge, it builds the credibility and authorization of the badge. Therefore, an issuer is vital for the badge to be recognized and valued.

4. Badges should have external backing.

External backing is essential for the recipient. For example, suppose a lecturer issues a badge to a student and the University as an organization approves it. In that case, it gives a more authorized and professional look at the accomplishments proof that the badge offers.

5. Recognize diverse learning.

Every student has a different learning experience and diverse preferences in studies and courses. Badge credentialing options meet a broad spectrum of learning needs and give a clearer picture of students' skills.

6. Use badges for the external communication of knowledge and skills.

Conveying how badges can be shared with other individuals and institutions is vital as this conveys the importance to the student that organizations are seeking candidates to fill programs or employment positions.

7. Make badges permanent.

Technologies and processes change, and standards and assessments will change over time. Although badge expiration guidelines are a precise and legitimate judgment by the issuer, making a badge permanent seems essential. This information should be essential both to the recipient as a part of his or her learning development and to the employer, who may value the individual's past accomplishments.

8. Recognize educator learning.

Students recognize that lecturers can help them by rewarding them with credible badges for every accomplishment they have during a project or course. Therefore, they see them as role models and learning partners.

9. Award formal academic credit for badges.

A high-level badge obtained from completing an educational program's competency that results in academic credit would likely empower all students. Students can focus on following badges as a goal while learning that multiple milestones sum to a more significant and recognized badge or credit.

2.5 Digital Badges in Education

Digital badges provide an online educational activity experience certificate. It is one of the critical factors for learning outcomes as it supports the accomplishment affiliation of any student, which is available online [3]. Digital badges also showcase the creativeness of the award, which is displayed online while showcasing a person's knowledge and achievements. Displaying badges plays a significant part in enhancing a person's identity and capability in particular subjects. In this factor, the usefulness of digital badges in education points out the effectiveness of a student, their success skills and abilities, and interest in different fields of learning. Learning and management have become essential parts of the educational program in this highly developing digital era.

On the other hand, digital badges are open digital image files that contain different origins of inseparable metadata and open-source code, which are software protocols. The badge shows the owner's credibility and the validation of educational accomplishment obtained outside or inside the University [4]. It is one of the most innovative steps to enhance students' interest in higher education while deploying effective technology in the name of digital badges. Furthermore, it is an influential factor in discovering different progressive maps in the educational career while achieving milestones beyond the contemporary curriculum framework.

Digital badges are a new trending subject to implement the educational goal of indulging the students' interests while rewarding them for their success and accomplishments. It is an innovative visual representation of award accomplishment and skills characterized as physical merit-based badges while providing validation linked with the artifacts or metadata [10].

2.6 The Advantages of Digital Badges

Digital badges are essential in education as they represent a student's quality and compatibility with any subject, while the symbols represent a particular community [5]. Digital badges have different advantages as they support the students' entrust to achieve different learning goals, which are essential in higher education. Additionally, digital badges provide long-term career benefits, which are crucial in enhancing the motivation of any particular student in higher education to focus on the quality of digital academic badges. A digital badge is a symbol that represents any metadata and information about the person who is the issuer. It also provides information on the particular standards achieved and certified by the student, along with the details of artifacts, situations, or activities that the student has undertaken.

The quality of experience and performance of any particular factors are also the core of the digital badges, effectively showing the student's credibility. Moreover, the artifacts and the metadata embossed in the digital badges are valid enough to provide easily accessible information to verify arguments. Digital badges are also open and transferable along with evidence-based, and many countries have taken this initiative to enhance the motivation of students to use these digital badges. Student engagement is the main target of the digital open badges, which is helpful for the informal learning environment and effectively developing the knowledge of the digital educational factors.

Digital badges are efficient in maintaining student retention in higher education. Student retention is a critical part of higher education to continue this study and develop the compelling opportunity to develop different skills [7]. Digital badges allow students to receive personalized feedback to enhance their profiles and become successful in their studies. The advancement of digital badges showcases symbols to encourage students to use their analytical skills to create a positive learning environment. It is also beneficial to enhance the competencies on web-based platforms through learning different things while getting certified for their skill improvement and knowledge development which is an excellent part of increasing the learning capabilities. The development of generic skills is also represented as digital badges, which are essential for the analytical skills of any student's future success while providing personal suggestions for improvement. It is one of the effective educational models that help develop the research through indulging in different digital educational platforms, which also hand the motivation for achieving different digital badges in higher education.

2.7 The Issues with Digital Badges

Apart from all the advantages, digital badges also have various disadvantages, which reduce their significance to some extent. One of the main issues of digital badges is the double-loop learning process. The double-loop process is the action of implementing digital badges within a short time. As a part of this process, professors produce any particular hypothesis for which they adjust necessary changes and make the assessment again, which becomes an issue for the students to provide their credibility tested numerous times to reduce the assumption of the tutors [11]. It is challenging if evolution does not support the initial assumption for which the process needs repetition.

Open badges are also challenging as many institutions experiment with these systems. The flooding of badges becomes one of the most significant issues in assessing any particular student adequately. In addition, specific communities cannot view badges as a meaningful and regular assessment tool because they consider that they will eventually fade away from the educational environment [4]. Another challenge can be the lack of acknowledgment of the open digital badges outside the ecosystem of the educational environment. Finally, it focuses on the fact that sometimes digital badges are not accepted internationally, which can also impact the student's career effectively if they want to study or work abroad.

Moreover, in additional research, it has been proven that badges create a lack of confidentiality of the information of the badge holder [6]. Digital badging can lack the potential capabilities to support the privacy and confidentiality of the information, as anyone can access the information through the metadata and artifacts. In this factor, it can be said that digital badges are good enough as long as the evidence persists. This means that the sustainability of the digital open badges can be lost if the link is broken or archived by any chance, which can lead to the loss of the digital scholarship of the student. It is a significant challenge that can reduce student engagement with any online educational program. The credibility of digital open badges has become low due to the high chances of data theft and the breaching of information due to the lack of security [16].

2.8 Existing Digital Badging Systems

USA has taken the initiative for digital badging, which supports the development of digital professional learning for students in higher education. In this respect, different supporting badging policies have been developed which support the goal of the digital badging system. The Open Badges project is an excellent initiative of the USA that effectively supports the digital badging system. Moreover, The Mozilla Open Badges Platform is also relevant for developing the connectivity of the earners and the issuers from different corners of the web [12]. In other countries, the digital badging system has also been developed, like Digital in the UK, which helps manage badges to

enhance the digital presence and utilize different organizations to provide scholarships and certificates through online courses [2].

GO2B is also one of the digital badging systems in Europe, which supports intercultural learning facilities for many students around the EU. The developed badges are relevant for the development of learning and increasing the amount of credibility. On the other hand, EBA (European Badging Alliance) is also one of the supportive, open badging systems that helps in providing the identity and validity to many students to showcase their talents and skills online and get certification [3]. In Europe, the OBN (Open Badge Network) is also a practical system that facilitates the ecosystem of open badging within the EU [9]. In the USA, LRNG is also a significant part of the open badging system that supports the movement of effective technology to support learning for different people. This platform helps enhance integrity among people from different cultures while assembling digital educational goals.

2.9 Literature gap

The literature has focused on the importance of digital badging systems and their relevance to academic performance. However, the different pieces of literature on the disadvantages of digital badging in education were less, making an excellent literature gap to focus on the different perspectives of the research. Moreover, there was also a lack of information and research on the existing countries that have taken the initiative of digital academic badging.

2.10 Summary

The above literature review focuses on the different factors which support the goal of achieving the digital badges for the development of learning certification. Different advantages are also related to the digital badging system as it helps enhance the teacher's responsibility to develop the motivation among the students with the help of the digital courses and appreciation with badges. It is an influential factor in supporting students' capabilities to enhance the goal of success effectively. Moreover, the digital plans support the fulfillment of the qualities and skills of a student through the continuous focus on the learning system. However, apart from the different advantages, there are challenges too. The metadata and the artifacts used to access the information of the earner can easily be corrupted due to data breaching or technical glitches. The reassessments are also linked with the double-loop learning process. The assumption of the teachers can also lead to reassessments which can be a significant issue in the accomplishment of the digital badging system. However, many countries have already taken initiatives to showcase the innovative and creative change in the modern educational system.

Chapter 3

3. Analysis and Design

Before the implementation of the system, it should be taken into consideration the product life cycle. The first step is analyzing and designing the product, developing, testing, and finally deploying it. Therefore, the first step is to analyze the problem. Next, the developer must understand the system's requirements to start designing it. The primary part of this chapter is a presentation of the requirements, followed by the analysis that includes use case diagrams, use case scenarios, and success scenarios.

3.1 Functional Requirements

This report's part is separated into two sections of requirements: the student requirements and the lecturer requirements. Below are two tables for the student and the lecturer, including a short description—followed by a more analytical description of those functional requirements.

3.1.1 Student Functional Requirements

Student Requirements No.	Description
1	Create Account
2	Log in to Account
3	Add Lesson
4	Edit Profile
5	Save Changes

Table 1 Student Requirements

S.R 1 - The student has to create an account by entering their full name, registration number, and email, creating a password, and entering their enrollment date.

S.R 2 - To be able to start using the system, the student needs to log in with their email and password.

S.R 3 - After entering the system, the student has to enter some details so that they can add a lesson. The course details that the student user has to type are the title, the professor's name, the credits of the lesson, and the degree type.

S.R 4 - During their studies, the student can change personal information on their profile based on the skills they gained, the experience they have, the titles and the coursework that they have made progress or enjoyed the most, and some personal information about them. The only part of their profile that cannot change is the achievement badges, which include the subject of the earned badge, the professor's name, the feedback, and the badge image.

S.R 5 - The final student functional requirement is to be able to edit and save the changes on their profile.

3.1.2 Lecturer Functional Requirements

Lecturer Requirements No.	Description
1	Create Account
2	Log in to Account
3	Upload Badge IMG.
4	Leave Feedback
5	Edit Feedback
6	Remove Lesson

Table 2 Lecturer Requirements

L.R 1 - Such as a student user, the lecturer has to create an account by typing their full name, email, and password and selecting the lecturer role.

L.R 2 - The next step is to log in with their email and password so that they can start using the system.

L.R 3 - After the lecturer logs in to the system, they will see a visualization/ a list of all the courses students added. The course's information includes the title, the name of the professor that teaches it, the credits, and the degree type. Then, for each lesson, the lecturer can upload a badge image.

L.R 4 - Next to the badge, the lecturer can leave feedback describing why the student earned the badge, their accomplishments, and progress. This description/ feedback will make the badge more credible and valuable.

L.R 5 - The lecturer can also edit the feedback they have already typed.

L.R 6 - Finally, the lecturer can remove the lessons that the students added.

3.2 Non-Functional Requirements

The word non-functional would mean "does not work." In the world of Information Technology, non-functional requirements express conditions that any application or any component of the application, including the people using it, must abide by, regardless of what it is doing. Non-functional requirements are things that do not work and express conditions such as how many, how often, and how fast. Functional requirements represent what the application has to do, and non-functional requirements describe how well it should do them. Fundamentally, non-functional requirements define criteria, properties, or conditions that the individual functions of an application or the application as a whole have to meet to be sufficient and meet the business needs.

The table below contains the most critical parts of the non-functional requirements and a description of what the digital badging system delivers in terms of performance, usability, and compatibility.

Non-Functional Requirements	Description
Performance	<ol style="list-style-type: none">1. The system throws an error if the user enters the wrong password or email during the login process.2. The system throws an error if the user does not enter all the required fields to add a lesson.3. The system throws an error if the user does not upload the badge.
Usability	The system's interface is user-friendly and easy to use
Compatibility	The student can share their profile with other people and systems.

Table 3 Non-Functional Requirements

3.3 Analysis

The analysis is the critical phase. This phase of the project includes who will use the product, how the customer will use the product, and specific information, including any special customer requirements. After the customer provides the requirements for the product, the project manager and the project team members begin to analyze the requirements. Finally, the business managers analyze each requirement to ensure the requirements can be included in the software without causing breaks or problems with system functionality. This part of the report consists of use case diagrams, use case scenarios, and success scenarios.

3.3.1 Use Cases

There are two formats commonly used in this phase of the analysis process. One is a use case, and the other is a use story. The essential parts of the use case are the title describing the system's goal and the scenario, which is the series of steps needed to accomplish the goal. These steps represent a complete encounter between the actor and the system and can have multiple possible results.

The most suitable title for a use case is a short phrase with an active verb so that it can define distinct goals for the system. Another part of the use case is the actor. It is called actor rather than user because it is essential to identify who is having this interaction that the title depicts. For example, it could be a generic user, customer, member, administrator, or another computer system interacting with the system. The scenario, an additional part of the use case, is a short and easy-to-read description that presents the details of achieving the goal. Finally, more specific details are included in the use case's precondition and postcondition.

- Use Case - Student adds lesson

In the use case table displayed below, the student has already created their account and logged in to the system. The student then visualizes the fields they must fill to add a lesson. The fields required to add a lesson are the title, the professor's name, the credits, and the degree type. Finally, the student can see a list of the added lessons.

Title:	Use Case 1: Add Lesson
Description:	The student adds a lesson that he or she has passed in order to receive a badge and feedback from the lecturer.
Primary Actor:	Student
Preconditions:	<ol style="list-style-type: none"> 1. The student has registered on the system. 2. The student is logged in to the system. 3. The student types the needed fields of the lesson.
Postconditions:	<ol style="list-style-type: none"> 1. The student has added a lesson. 2. The student will see a visualization of the added lessons.

Table 4 Use Case - Add Lesson

Main Success Scenario		
#	Actor	System
1	The student types all the necessary fields to add a lesson.	
2		The system displays all the added lessons.
3	The student passes a lesson.	
4		The system displays the badges and the feedback on each lesson.

Table 5 Main Success Scenario - Student

- Use Case - Student edits profile

Another part of the system is the student being able to edit their profile, such as editing their biography. The student profile includes personal information, skills, experience,

and titles. It is followed by the achievement badges given by the lecturer, which is a field that students are not able to change or edit.

Title:	Use Case 2: Edit Profile
Description:	The student edits the profile, which includes information about them, their skills, their experience, and the titles, and courseworks that they studied.
Primary Actor:	Student
Preconditions:	<ol style="list-style-type: none"> 1. The student has registered on the system. 2. The student is logged in to the system. 3. The student goes to the profile section. 4. The student edits the information on the profile.
Postconditions:	<ol style="list-style-type: none"> 1. The student has edited the profile. 2. The student will see a visualization of the edited profile.

Table 6 Use Case - Edit Profile

- Use Case - Lecturer types feedback

In the use case below, the actor is the lecturer and aims to type the feedback successfully. Firstly, the lecturer will create an account and log in to the system. Then they will see a list of the courses that the student added, and they will be able to upload a badge and provide feedback.

Title:	Use Case 3: Type Feedback
Description:	The lecturer will see a visualization of all the lessons the student added, and they will type the feedback along with the appropriate badge.
Primary Actor:	Lecturer
Preconditions:	<ol style="list-style-type: none"> 1. The lecturer has registered on the system. 2. The lecturer is logged in to the system. 3. The lecturer uploads a file with the badge.
Postconditions:	<ol style="list-style-type: none"> 1. The lecturer has uploaded the badge. 2. The lecturer has typed the feedback. 3. The lecturer will see a list of the lessons, their unique badges, and feedback.

Table 7 Use Case - Type Feedback

Main Success Scenario		
#	Actor	System
1	The lecturer uploads a file with the badge.	
2		The system displays the badge corresponding to a lesson.
3	The lecturer leaves feedback.	
4		The system displays the feedback corresponding to a lesson.

Table 8 Main Success Scenario - Lecturer

3.3.2 Use Case Diagrams

The use case diagram figures displayed below, is a graphical representation of what this system must execute. It uses simplified terms so that the reader can easily understand it, and they are dynamic or behavior diagrams in the unified modeling language. They highlight what must happen in the system to be modeled contrary to the structural UML use case diagram. The use case diagrams shown below are for the student and the lecturer.

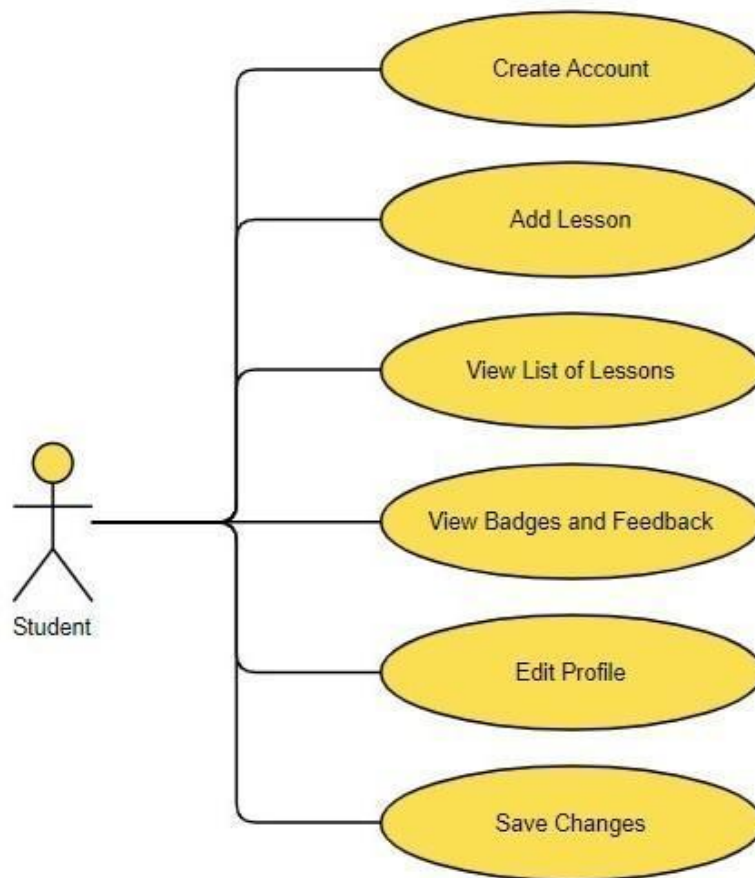


Figure 1 Use Case Diagram - Student

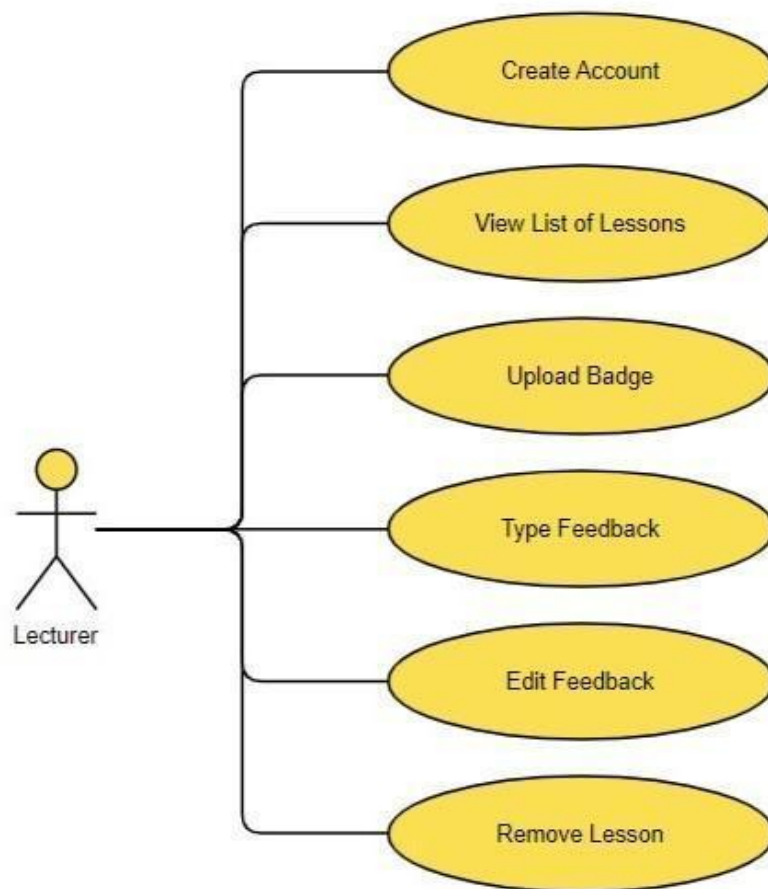


Figure 2 Use Case Diagram - Lecturer

3.3.3 UML Diagram

UML, which stands for Unified Modeling Language, is an industry-standard graphical language for specifying, visualizing, constructing, and documenting the artifacts of software systems. Therefore, before getting the software implemented and tested, it is required to gather and present all the requirements on this graphical tool.

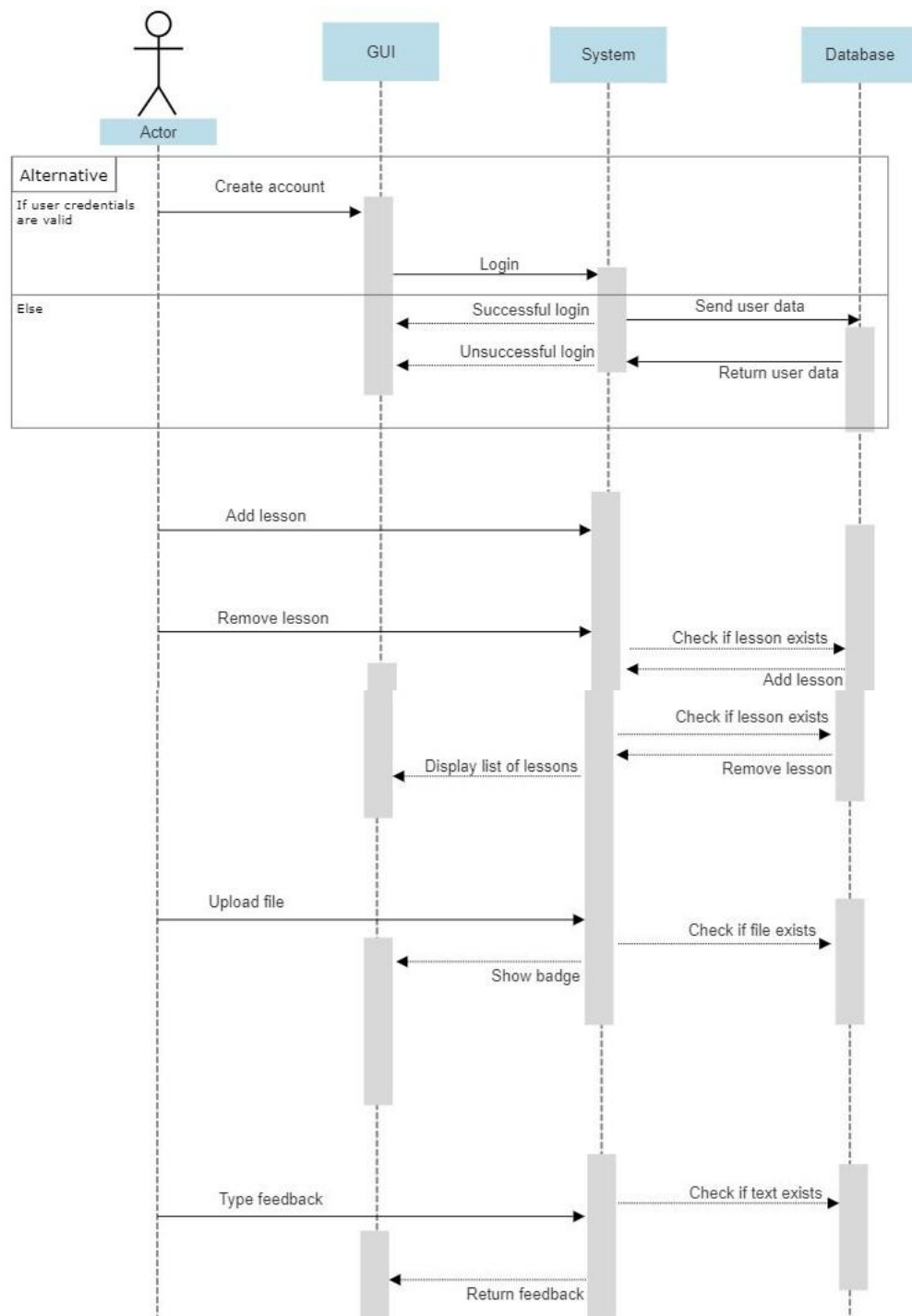


Figure 3 UML Diagram

3.4 Summary

This chapter was about the analysis and design of the system. It represented the most fundamental part that should be analyzed and considered before the implementation. Moreover, it covered the requirements, followed by use case scenarios and diagrams so the reader could better understand the system's purpose. The student and the lecturer are the two primary users of the system. The main interaction between them is the addition of the courses, which are subsequently provided with a badge and feedback. The primary purpose of this system is to offer students an authenticated and personalized view of their biography, created by them and their lecturers.

Chapter 4

4. Implementation

This chapter includes the implementation language, and tools used in this project. As the code cannot be provided as a whole, there will be code blocks explaining what is done and their purpose for the system. In subchapter 4.2 the reader will find a presentation of the system.

4.1 Implementation language and tools

This subchapter begins with a short presentation of PHP before presenting the reasoning for choosing this language for implementing the system in this project. Subsequently, there will be a discussion about PHP's challenges and the tools used.

PHP powers eighty percent of the internet runs on every server and is one of the most straightforward programming languages to learn. Moreover, PHP gives access to creating simple and small projects, such as CMS development, for example, WordPress and Drupal, to the most complex enterprise systems with the help of other frameworks. The flexibility that comes from using PHP and the fact that PHP performs sufficiently with other languages is the primary reason it was selected for this project. PHP is an approachable language, and it is very widely used. During the past few years, PHP has evolved, and it is not only practical in building web applications but also for big data and cloud solutions. PHP's latest versions, 7, 8, and the most recent, 8.1, with the new asynchronous and serverless features, make it possible to achieve reliable software development.

Although PHP has many advantages and was chosen for this project for the reasons stated above, it also comes with disadvantages, such as every other programming language. One of the perks is the freedom this language offers, but it can also lead to a poor system design as PHP adapts its syntax from many different programming languages. Therefore, while PHP does not have its own identity, it can be easy to write cluttered code. However, this does not mean that the system will not work because, as mentioned earlier, PHP is a flexible language, but the design may be poor and problematic. Furthermore, PHP is also weakly typed. While that makes things easier, it can also lead to bugs and issues. Finally, while PHP has evolved and can be used for multiple projects, it is still not preferred for big applications that use big data. It is more suitable for small to medium size applications and websites. Big applications that are used by millions of users and have thousands of pages become difficult for PHP to manage because it is not modular while it was created for dynamic websites.

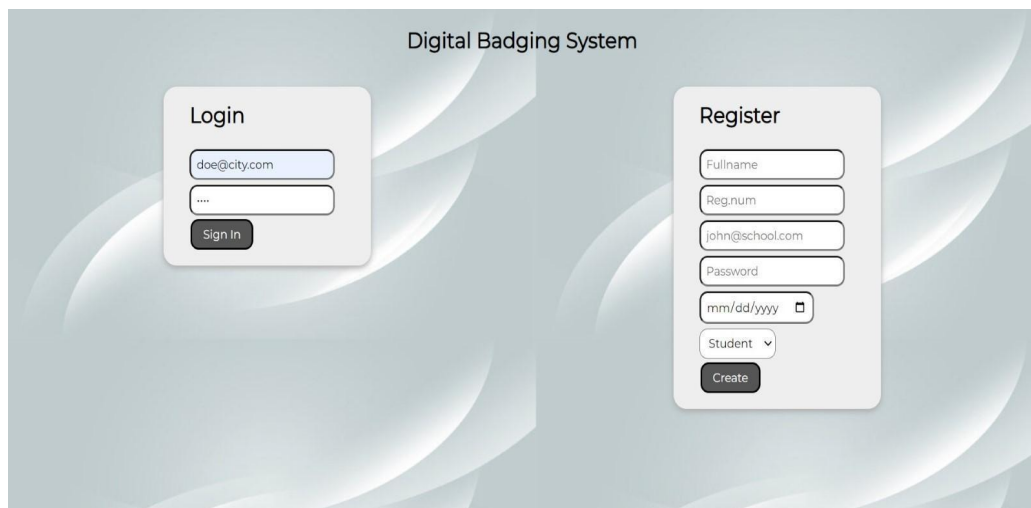
The digital badging system is a small to medium size application. The system users are the lecturer and the student, and the requirements are straightforward. Therefore, the chosen language is PHP with the help of a front-end open-source development framework. The front-end framework is called Bootstrap and is demonstrated in subchapter 4.2.6 Visual Studio Code and XAMPP Control panel are the tools needed to write PHP.

4.2 Presentation of the system

This section presents the system's GUI, which is simple and can be straightforward for people with no computer experience to understand. The figures shown below are screenshots of the lecturer and the student user view and start with the creation of their account, followed by other actions on the system. Below almost every page view, there will be code blocks with a short description of what they represent.

4.2.1 Login Page

The figure shown below is a visualization of the login page. From this page, the lecturers and the students can create their accounts and log in to start using the system. But, first, the users must select the appropriate role on the selection option in the register box.



The screenshot displays the 'Digital Badging System' interface. It features two main forms: a 'Login' form on the left and a 'Register' form on the right. The 'Login' form includes a text input for 'Email' (containing 'doe@city.com'), a password input (masked with dots), and a 'Sign In' button. The 'Register' form includes inputs for 'Fullname', 'Reg.num', 'Email' (containing 'john@school.com'), 'Password', and a date of birth input (formatted 'mm/dd/yyyy' with a calendar icon). Below these is a role selection dropdown menu currently set to 'Student', and a 'Create' button. The background is a light blue gradient with abstract white wave-like patterns.

Figure 4 Login Page

4.2.2 Student's Dashboard

From this page, students can add lessons by typing the title, the professor's name, the credits, and the degree type. Assuming that the user presses the add lesson button without filling in one of the needed fields, the system will throw an error and display a message to try again.

The screenshot shows a dark header bar with the user's name 'Katherine McOne' and navigation links 'Dashboard', 'Profile', and 'Logout'. Below the header, the page is titled 'Student's Portal'. The main content area features a form with six columns: 'Title', 'Professor Name', 'Credits', 'Degree Type', 'Badge', and 'Feedback'. The 'Title' column contains the placeholder 'e.g: Artificial Intelligence'. The 'Professor Name' column contains 'e.g: Dr. Jane Doe'. The 'Credits' column contains 'e.g: 4'. The 'Degree Type' column contains 'e.g: BSc, MSc'. The 'Badge' column contains the text 'Only a professor can change these properties.' The 'Feedback' column is empty. To the right of the form is a dark button labeled 'Add New Lesson'.

Title	Professor Name	Credits	Degree Type	Badge	Feedback
e.g: Artificial Intelligence	e.g: Dr. Jane Doe	e.g: 4	e.g: BSc, MSc	Only a professor can change these properties.	

Figure 5 Student's Dashboard

The code block shown below takes all the information the student typed, and when the button "Add Lesson" is pressed, it adds a new lesson to the list on their dashboard.

```

1. <form action="core/add_lesson.php">
2.     <input type="hidden" name="uid" value="<?=$_SESSION['u']['id'] ?>">
3.     <td><input type="text" name="title" placeholder="e.g: Artificial Intelligence"/></td>
4.     <td><input type="text" name="pname" placeholder="e.g: Dr. Jane Doe" /></td>
5.     <td><input type="number" name="creds" placeholder="e.g: 4"/></td>
6.     <td><input type="text" name="degtype" placeholder="e.g: BSc, MSc"/></td>
7.     <td colspan="2">Only a professor can change these properties.</td>
8.     <td><input type="submit" value="Add New Lesson"></td>
9. </form>

```

Code Block 1 Add Lesson

4.2.3 Lecturer's Dashboard

After the student adds a list of lessons, the lecturer will visualize all the courses. Then, the lecturer can either upload a badge, leave feedback, or remove the added lesson.

The screenshot shows a web interface titled "Professor Portal". At the top right, there are buttons for "Dr. Doe" and "Logout". Below the header is a table with the following columns: Title, Professor Name, Credits, Degree Type, Badge, Feedback, and Action. The table contains two rows of data:

Title	Professor Name	Credits	Degree Type	Badge	Feedback	Action
Maths	Dr. Doe	10	BSc	No badge uploaded yet. <input type="button" value="Choose File"/> No file chosen <input type="button" value="Upload Image"/>	No feedback yet. <input type="text"/> <input type="button" value="Leave Feedback"/>	<input type="button" value="Remove Lesson"/>
Artificial Intelligence	Dr. Doe	10	BSc	No badge uploaded yet. <input type="button" value="Choose File"/> No file chosen <input type="button" value="Upload Image"/>	No feedback yet. <input type="text"/> <input type="button" value="Leave Feedback"/>	<input type="button" value="Remove Lesson"/>

Figure 6 Lecturer's Dashboard

The code block 4.2.3 shown below presents the `mysqli_query()` function, which performs a query to “delete a lesson” against the database. If it is successful, the lecturer will see the revised list of courses on their dashboard. Otherwise, the system will throw an error.

```

1. <?php
2.
3. include 'config.php';
4.
5. $lid = $_GET['l'];
6.
7. $query = "delete from lessons where id = " . $lid;
8. $res = mysqli_query($con, $query);
9. if ($res) {
10.     header('location: ../prof_dashboard.php');
11. } else {
12.     header('location: ../error.php');
13. }
```

Code Block 2 Delete Lesson

4.2.3.1 Lecturer's Dashboard – After uploading the badge and feedback

Dr. Doe Logout

Professor Portal



Title	Professor Name	Credits	Degree Type	Badge	Feedback	Action
Maths	Dr. Doe	10	BSc	 <div>Choose File No file chosen</div> <div>Upload Image</div>	Katherine was always present and very confident in authentic challenges. <input type="text"/> <div>Leave Feedback</div>	<div>Remove Lesson</div>
Artificial Intelligence	Dr. Doe	10	BSc	 <div>Choose File No file chosen</div>	Katherine worked really well in group projects. <input type="text"/>	<div>Remove Lesson</div>

Figure 7 Lecturer's Dashboard after uploading the badge and feedback

The code block shown below presents the `mysqli_query()` function, which performs a query to “set feedback” for each lesson. If it is successful, the lecturer will see the revised list of courses and the feedback they typed. Otherwise, the system will throw an error.

```

1. <?php
2.
3. include 'config.php';
4.
5. $lid = $_GET['lid'];
6. $fd = $_GET['feed'];
7.
8. $query = "update lessons set feedback = '$fd' where id = " .
    $lid;
9. $res = mysqli_query($con, $query);
10.     if ($res) {
11.         header('location: ../prof_dashboard.php');
12.     } else {
13.         header('location: ../error.php');
14.     }

```

Code Block 3 Set Feedback

The code below shows how to check whether the file the lecturer is trying to upload is an actual image.

```

1. if(isset($_POST["submit"])) {
2.     $check = getimagesize($_FILES["fileToUpload"]["tmp_name"]);
3.     if($check !== false) {
4.         echo "File is an image - " . $check["mime"] . ".";
5.         $uploadOk = 1;
6.     } else {
7.         echo "File is not an image.";
8.         $uploadOk = 0;
9.     }
10. }
```

Code Block 4 Check if the file is an image

The code below presents the setting of the badge for each lesson. The lecturer will see the badge next to the lesson if everything is successful. If not, the system will throw an error.

```

1. if ($uploadOk == 0) {
2.     echo "Sorry, your file was not uploaded.";
3. } else {
4.     if (move_uploaded_file($_FILES["fileToUpload"]["tmp_name"],
        $target_file)) {
5.         echo "The file ".
            htmlspecialchars( basename( $_FILES["fileToUpload"]["name"])). "
            has been uploaded.";
6.         include 'config.php';
7.         $res = mysqli_query($con, "update lessons set badge = ' " .
            $target_file . "' where id = " . $lid);
8.         header('location: ../prof_dashboard.php');
9.     } else {
```

```

10.         header('location: ../error.php');
11.     }
12. }

```

Code Block 5 Upload the image

4.2.4 Student's Dashboard – After the lecturer uploads the badge and feedback

The student will see a list of all their courses, followed by the earned badge and the feedback provided by the lecturer.




Student's Portal					
Title	Professor Name	Credits	Degree Type	Badge	Feedback
e.g: Artificial Intelligence	e.g: Dr. Jane Doe	e.g: 4	e.g: BSc, MSc	Only a professor can change these properties.	
Artificial Intelligence	Dr. Doe	10	BSc		Katherine worked really well in group projects.
Maths	Dr. Doe	10	BSc		Katherine is a skilled communicator
Programming	Dr. Doe	20	BSc		Katherine is a team player and time manager.

Figure 8 Student's Dashboard after lecturer uploads the badge and feedback

4.2.5 Student's Profile

The final part of the system is the student's profile which was designed to appear as a biography. The student types and edits personal information and can also view the achievement badges that they have earned. Finally, they can save the changes.





Experience			
Front-end developer			
Titles & Coursework			
Software Engineering			
Achievement Badges			
Subject	Feedback	Professor	Badge
Artificial Intelligence	Excellent.	Dr. Doe	
Programming	Great.	Dr. Doe	
Maths	Good job.	Dr. Doe	
Software Engineering	Bravo.	Dr. Doe	

Figure 9 Student's Profile

The code block 4.2.5 below displays the achievement badges and the lecturers' feedback on the student's profile, and this section cannot be edited by the student user.

```

1. <?php foreach($badges as $b): ?>
2.     <tr>
3.         <td style="width: 25%;"><?= $b['title'] ?></td>
4.         <td style="width: 25%;"><?= $b['feedback'] ?></td>
5.         <td style="width: 25%;"><?= $b['prof_name'] ?></td>
6.         <td style="width: 25%;"></td>
7.     </tr>
8. <?php endforeach; ?>

```

Code Block 6 Show Achievement Badges

4.2.6 Front-End

The system's front-end on this report uses Bootstrap. Bootstrap is a free front-end framework for web development that is fast and manageable. Bootstrap includes

HTML and CSS base-design templates for typography, forms, buttons, tables, navigation bars, and more. It also includes several JavaScript plugins. Bootstrap was developed by two engineers who used to work for Twitter before it was released in 2014, and it has been one of the most widespread projects on GitHub. This front-end framework offers several advantages, the most important being that it is easy to use, has several responsive features, and is compatible with all the latest browsers. In addition, this front-end framework adds responsivity to the website to adapt to the user's device. Bootstrap is also the most popular front-end CSS framework and is used by over 20% of the top one million websites. The framework consists of two files, Bootstrap.js and Bootstrap.css, and including them on an HTML page or website enables the HTML components and features.

1. `<link
href="https://cdn.jsdelivr.net/npm/bootstrap@5.1.3/dist/css/bootstrap.min.css" rel="stylesheet">`
2. `<script
src="https://cdn.jsdelivr.net/npm/bootstrap@5.1.3/dist/js/bootstrap.bundle.min.js"></script>`

Code Block 7 Bootstrap files

The first significant advantage is its responsive grid that can quickly lay out the web page using the bootstrap grid by creating columns and rows. The second noteworthy advantage is the extensive collection of pre-made HTML components imported with Bootstrap. A few are buttons, navbars, cards, drop-downs, and more. Another of Bootstrap's advantages is cross-browser compatibility. Furthermore, this framework is manageable for web design beginners since it does not require extensive coding skills, excluding basic HTML and CSS knowledge. When it comes to software, a critical thing to consider is how often the software gets upgraded and bugs-fixed. While Bootstrap is under active development, new features with bug fixes and improvements are released frequently. Moreover, default bootstrap components are another advantage of this framework as they provide flexibility to new developers. Last but not least, the community of users and websites formed around Bootstrap since its original creation has made it easy to find great third-party themes, templates, snippets, and JavaScript plugins built explicitly for Bootstrap.

4.3 Summary

This chapter was about the implementation of the system, the language, and the tools used. The system uses PHP for the back-end development along with Bootstrap front-end framework. The design is simple and user-friendly so that the users can understand it, and the system's operation is straightforward. First, the students add lessons so the lecturers can view them and upload badges and feedback. Then, the lecturers' badges and feedback are saved and transferred to the student's dashboard page and their profiles. The students' profile is designed to appear as a biography that allows students

to edit personal information and view all the achievement badges they have earned during their studies.

Chapter 5

5. Evaluation

Software systems are integral to our daily lives, from business applications to customer products. Unfortunately, most people have experienced software that does not function as expected. Therefore, software failure can prove expensive and result in time loss, effort, and reputation loss. Proper software testing can help reduce the risk of problems occurring during software usage and contribute to product quality. Testing is the last step after the system's deployment, and it needs to check if everything is functioning correctly without any errors and bugs. Therefore, this step is crucial to having a well-functioning and well-built system. In this chapter, there will be a presentation of the testing and how a JSON file may look after the system has performed particular actions.

5.1 Testing

The testing occurred through the online tool called TestProject:

1. The tool provides the option to create a "new test" and copy-paste the application's URL.
2. It records the screen, and while the user goes through all the steps of registering and logging in and types their information, the tool documents the steps.
3. After a specific action is completed, the tool saves the information documented in a YAML file.

The next step is to convert the YAML file to a JSON file so the testing can start catching all the system's operations. The code shown below in subchapter 5.2 results from the operation mentioned above, which is converted to a JSON file.

5.2 Results

While the whole file is too long to be provided here, below are two snapshots of the code in the JSON file, which occurred during the testing of the user creating an account and logging in. This testing method shows that the system is operating sufficiently and without issues.


```

{
  "id": "c96e1d9be8575019eb5bb1",
  "created": "2022-09-04T14:24:13.553Z",
  "projectId": "yLi5CCk-bkGlEnFKBoRJvA",
  "projectName": "My first Project",
  "owner": "Emmanouela Siougkari",
  "protocol": 1,
  "tests": [
    {
      "id": "529d7ca3839dfe747e29fb",
      "name": "Dissertation",
      "description": "",
      "platform": "Web",
      "type": "Web",
      "driverType": "Chrome",
      "version": "0.1",
      "creationDate": "2022-09-04T14:24:13.553Z",
      "modificationDate": "2022-09-04T14:49:55.720Z",
      "settings": {
        "appId": "XbDEu2ejLEScXkxblMqZ6w",
        "automationAssistant": true,
        "stepSleepTime": 500,
        "stepTimeout": 15000,
        "stepSleepTiming": "Before",
        "stepFailureBehaviorType": "Abort",
        "stepTakeScreenshotConditionType": "Failure"
      },
      "application": {
        "id": "XbDEu2ejLEScXkxblMqZ6w",
        "name": "Login",
        "platform": "Web",
        "url": "http://localhost/dissertation/digital\_badges/index.php"
      },
      "steps": [
        {
          "id": "1b6341cde867871a475c61",
          "comments": "Navigates the specified URL (Auto-generated)",
          "enabled": true,
          "invertResult": false,

```

```

"order": 1,
"repeat": 1,
"type": "Action",
"settings": {
  "sleepTime": -1,
  "timeout": -1,
  "sleepTiming": "Inherit",
  "failureBehaviorType": "Inherit",
  "takeScreenshotConditionType": "Inherit"
},
"action": {
  "source": "System",
  "id": "49c5d8d8-4ba8-42f0-823d-702e6acfb23a"
},
"parameterMaps": [
  {
    "direction": "Input",
    "name": "url",
    "value": "{{ApplicationURL}}"
  }
]

```

Code Block 8 JSON file - Steps

```

{
  "id": "1145fb81a24724401f643f",
  "name": "email",
  "description": "",
  "type": {
    "id": "jUwODgyNjAyNzk2NTk1NDY",
    "name": "Textbox",
    "source": "System"
  },
  "locators": [
    {
      "name": "CSSSELECTOR",
      "value": "#email",
      "priority": 0
    },
    {
      "name": "XPATH",
      "value": "//input[3][@placeholder = 'john@school.com']",
      "priority": 1
    }
  ]
}

```

```
    },  
    {  
      "name": "XPATH",  
      "value": "//div[2]/input[3]",  
      "priority": 2  
    },  
    {  
      "name": "XPATH",  
      "value": "/html/body/div[2]/form/input[3]",  
      "priority": 3  
    }  
  ]  
}
```

Code Block 9 JSON file - Login

5.3 Summary

This chapter examined the testing phase of the system and the importance of this step, which must be considered before the application's deployment. During this project, many issues were faced before the implementation. Furthermore, as digital badges are relatively new to the market, after the literature research, the author still had many gaps regarding how the development of the system can make an image seem credible and valuable. Therefore, the basic idea was to have lecturers "collaborate" with the system and construct the student's profiles with feedback and badges.

Chapter 6

6.Conclusion

In conclusion, this project's concept came to mind during the first semester in the Computer Science Department when students were introduced to badges. Those badges were images with short descriptions, which were included in every unit's syllabus. The main idea started with the questions, "How can a biography appear more valuable and certified?" and "How can the studies and the lecturers contribute to this concept?". While online education and the increasing availability of open online courses are at their peak, more and more people will choose to gain new skills outside of colleges and universities. The diplomas that those institutes offer will not be the only valued certificate. In addition, employers would like to evaluate and notice the individual's achievements and learn more about their skills and what makes them stand out from other potential applicants. Therefore, digital badges have become more and more widespread. However, after this project's literature review, the author noticed that digital badges are still in their early stages of growth. Nevertheless, specific details make digital badges useful and extremely valuable to students who can benefit from them.

6.1 Learning Experience

This project has undoubtedly been a remarkable learning experience. Skills in the technologies used, such as creating use cases and UML diagrams, were already acquired through other modules. The knowledge developed while researching this topic and finding out how digital badges can improve the field of education. However, the most significant learning experience was accomplishing such a substantial project alone. Making most decisions related to the project alone differs from all substantial projects done earlier, as most of them have been group projects. It requires good insight into the problem to make a decision, and equally well, it requires determination and self-discipline to keep up with the work during the project. Nonetheless, the supervisor and her guidance during this project suggested solutions to problems, reducing the burden of having to make all the decisions.

6.2 Future Enhancements

The digital badging system would have been more secure if the University provided students and lecturers with a unique code so that the only users of the system would be individuals who have registered already in the University. The system could also allow lecturers to select badges from an already existing list and have the option to place them under each lesson. In addition, the students' profiles can be improved by making them shareable with other platforms or having the option to download them as a file to send via email. Although during the project, many setbacks and issues had to be faced while creating the system, it has the potential to be an excellent tool for both the students and the lecturers who can benefit from it for various reasons.

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Appendix A

System

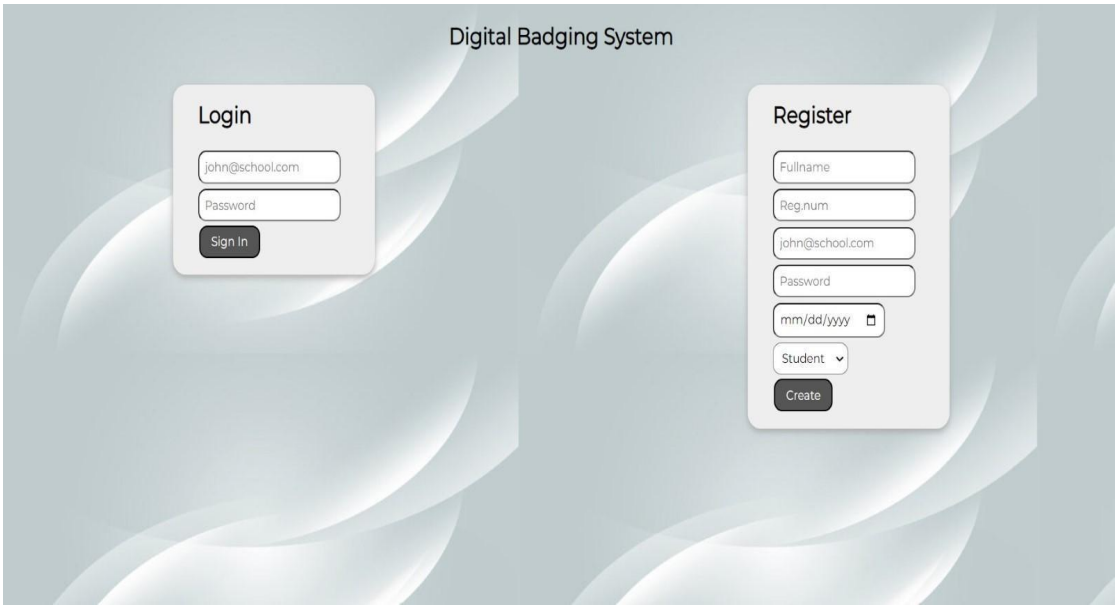


Figure 10 Index Page

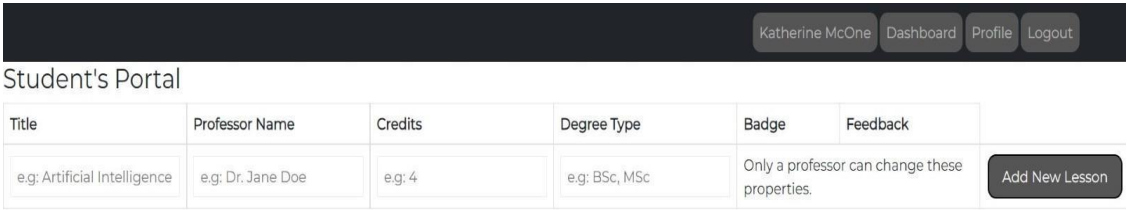


Figure 11 Student's portal before the addition of lessons

Dr. DoeLogout

Professor Portal

Title	Professor Name	Credits	Degree Type	Badge	Feedback	Action
-------	----------------	---------	-------------	-------	----------	--------

Figure 12 Professor's portal before the addition of lessons

Katherine McOneDashboardProfileLogout

Student's Portal

Title	Professor Name	Credits	Degree Type	Badge	Feedback	
e.g: Artificial Intelligence	e.g: Dr. Jane Doe	e.g: 4	e.g: BSc, MSc	Only a professor can change these properties.		Add New Lesson
Artificial Intelligence	Dr. Doe	10	BSc	The lesson's not passed yet.	Not yet reviewed by a professor.	
Programming	Dr. Doe	10	BSc	The lesson's not passed yet.	Not yet reviewed by a professor.	
Maths	Dr. Doe	10	BSc	The lesson's not passed yet.	Not yet reviewed by a professor.	
Software Engineering	Dr. Doe	10	BSc	The lesson's not passed yet.	Not yet reviewed by a professor.	

Figure 13 Student's portal after the addition of lessons

Dr. Doe
Logout

Professor Portal

Title	Professor Name	Credits	Degree Type	Badge	Feedback	Action
Artificial Intelligence	Dr. Doe	10	BSc	No badge uploaded yet. <input type="button" value="Choose File"/> No file chosen <input type="button" value="Upload Image"/>	No feedback yet. <input type="text"/> <input type="button" value="Leave Feedback"/>	<input type="button" value="Remove Lesson"/>
Programming	Dr. Doe	10	BSc	No badge uploaded yet. <input type="button" value="Choose File"/> No file chosen <input type="button" value="Upload Image"/>	No feedback yet. <input type="text"/> <input type="button" value="Leave Feedback"/>	<input type="button" value="Remove Lesson"/>
Maths	Dr. Doe	10	BSc	No badge uploaded yet. <input type="button" value="Choose File"/> No file chosen <input type="button" value="Upload Image"/>	No feedback yet. <input type="text"/> <input type="button" value="Leave Feedback"/>	<input type="button" value="Remove Lesson"/>
					No feedback yet.	

Figure 14 Professor's portal before uploading badge and feedback

Dr. Doe
Logout

Professor Portal




Title	Professor Name	Credits	Degree Type	Badge	Feedback	Action
Artificial Intelligence	Dr. Doe	10	BSc	 <input type="button" value="Choose File"/> No file chosen <input type="button" value="Upload Image"/>	Excellent. <input type="text"/> <input type="button" value="Leave Feedback"/>	<input type="button" value="Remove Lesson"/>
Programming	Dr. Doe	10	BSc	 <input type="button" value="Choose File"/> No file chosen <input type="button" value="Upload Image"/>	Great. <input type="text"/> <input type="button" value="Leave Feedback"/>	<input type="button" value="Remove Lesson"/>
Maths	Dr. Doe	10	BSc	 <input type="button" value="Choose File"/> No file chosen <input type="button" value="Upload Image"/>	Good job. <input type="text"/> <input type="button" value="Leave Feedback"/>	<input type="button" value="Remove Lesson"/>

Figure 15 Professor's portal after uploading badge and feedback





Katherine McOne Dashboard Profile Logout					
Student's Portal					
Title	Professor Name	Credits	Degree Type	Badge	Feedback
e.g: Artificial Intelligence	e.g: Dr. Jane Doe	e.g: 4	e.g: BSc, MSc	Only a professor can change these properties.	
Artificial Intelligence	Dr. Doe	10	BSc		Excellent.
Programming	Dr. Doe	10	BSc		Great.
Maths	Dr. Doe	10	BSc		Good job.
Software Engineering	Dr. Doe	10	BSc		Bravo.

Figure 16 Student's portal with badge and feedback





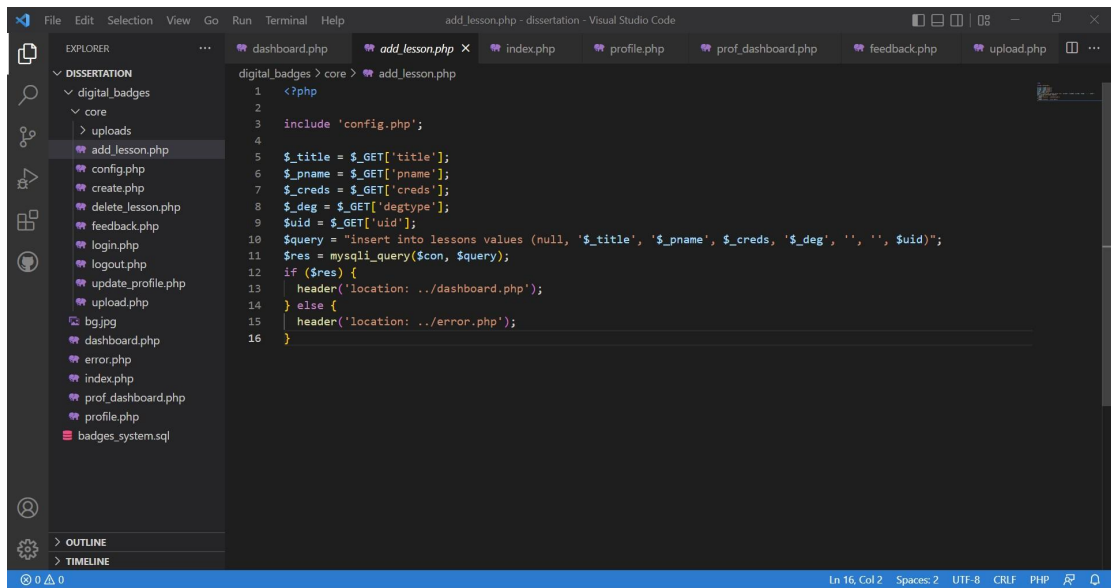
Experience			
Front-end developer			
Titles & Coursework			
Software Engineering			
Achievement Badges			
Subject	Feedback	Professor	Badge
Artificial Intelligence	Excellent.	Dr. Doe	
Programming	Great.	Dr. Doe	
Maths	Good job.	Dr. Doe	
Software Engineering	Bravo.	Dr. Doe	

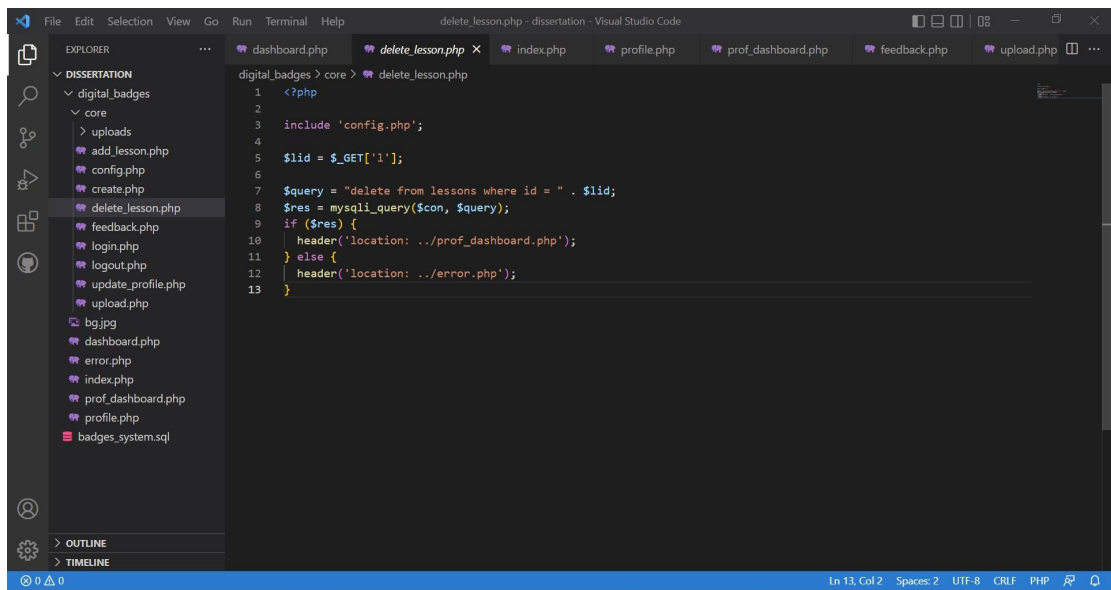
Figure 17 Student's profile



The screenshot shows the Visual Studio Code editor with the 'dissertation' project open. The Explorer sidebar on the left shows the file structure: 'digital_badges' > 'core' > 'uploads' > 'add_lesson.php'. The main editor window displays the code for 'add_lesson.php'.

```
1 <?php
2
3 include 'config.php';
4
5 $title = $_GET['title'];
6 $pname = $_GET['pname'];
7 $creds = $_GET['creds'];
8 $deg = $_GET['degtype'];
9 $uid = $_GET['uid'];
10 $query = "insert into lessons values (null, '$title', '$pname', '$creds', '$deg', '', '', $uid)";
11 $res = mysqli_query($con, $query);
12 if ($res) {
13     header('location: ../dashboard.php');
14 } else {
15     header('location: ../error.php');
16 }
```

Figure 18 add_lesson.php



The screenshot shows the Visual Studio Code editor with the 'dissertation' project open. The Explorer sidebar on the left shows the file structure: 'digital_badges' > 'core' > 'uploads' > 'delete_lesson.php'. The main editor window displays the code for 'delete_lesson.php'.

```
1 <?php
2
3 include 'config.php';
4
5 $lid = $_GET['l'];
6
7 $query = "delete from lessons where id = " . $lid;
8 $res = mysqli_query($con, $query);
9 if ($res) {
10     header('location: ../prof_dashboard.php');
11 } else {
12     header('location: ../error.php');
13 }
```

Figure 19 delete_lesson.php

```

1 <?php
2 $target_dir = "uploads/";
3 $target_file = $target_dir . basename($_FILES["fileToUpload"]["name"]);
4 $uploadOk = 1;
5 $imageFileType = strtolower(pathinfo($target_file,PATHINFO_EXTENSION));
6 $lid = $_REQUEST['lid'];
7 // Check if image file is a actual image or fake image
8 if(isset($_POST["submit"])) {
9     $check = getimagesize($_FILES["fileToUpload"]["tmp_name"]);
10    if($check !== false) {
11        echo "File is an image - " . $check["mime"] . ".";
12        $uploadOk = 1;
13    } else {
14        echo "File is not an image.";
15        $uploadOk = 0;
16    }
17 }
18
19
20 // Check file size
21 if ($_FILES["fileToUpload"]["size"] > 500000) {
22     echo "Sorry, your file is too large.";
23     $uploadOk = 0;
24 }
25
26 // Allow certain file formats
27 if($imageFileType != "jpg" && $imageFileType != "png" && $imageFileType != "jpeg"
28 && $imageFileType != "gif" ) {
29     echo "Sorry, only JPG, JPEG, PNG & GIF files are allowed.";
30     $uploadOk = 0;
31 }

```

Figure 20 upload.php

```

1 <?php
2
3 include 'config.php';
4
5 $data = $_REQUEST;
6
7 $query = "update users set fullname = '" . $data['sfullname'] . "',
8         en_date = '" . $data['sen_date'] . "',
9         email = '" . $data['semail'] . "',
10        description = '" . $data['sdescription'] . "',
11        skills = '" . $data['sskills'] . "',
12        experience = '" . $data['sexperience'] . "',
13        titles = '" . $data['stitles'] . "' where id = " . $data['suid'] . " ";
14
15 $res = mysqli_query($con, $query);
16 if ($res) {
17     header('location: ../profile.php');
18 } else {
19     header('location: ../error.php');
20 }

```

Figure 21 update_profile.php