

CS3022 – Software Engineering

ASSIGNMENT - 2

Education Domain

Group No - 01

The Problem Statement

E-learning is a rapidly emerging concept facilitating learners in the field of education. Continuous advancements in information technologies are enhancing the possibilities of its growth. Developed countries have realized its strength and adopted it warmly but in developing countries it is still a new concept. There are many limitations in developing countries for its implementation and growth. However nowadays, most of the learning will be conducted through online platforms.

As a developing country there are many unsolved problems in our education system some of them are easily solvable using software engineering techniques. One such main problem is that there is not any open source platform to structuring and sharing school study materials with students, and in monitoring and assessing progress of students. Although there are Moodle facilities available in higher education institutes like in government and private Universities, these facilities are not available for schools where primary and secondary education takes place. This problem persists as these facilities are not open source at all. As schools have not got enough money on purchasing these facilities, it is hard for the students to continue their study process online.

At the same time studying through platforms like zoom is also not possible as schools need to pay for those facilities to acquire all the features in it. Although Zoom helps universities and schools improve student outcomes with secure video communication services, its Education plans are starting at 20 hosts for \$1,800 annually which is quite impossible to handle by educational institutes like schools rather than Universities. Because of that it is hard for these kinds of education institutes to carry out their study process online.

The purpose of this project is to create a simple platform with the limited resources, to structuring and sharing school study materials with students by the teachers which is similar to a Moodle Platform. Unlike university students, students in schools do not have much knowledge in handling online materials. Because of that reason this needs to be simple and also parents should be able to access it track the progress of their child which is a much-needed facility for learning procedure as most of the parents do not have an understanding about their children progress and status. We can create a simple web application for students in schools to acquire this requirement. Mostly students in grade 6 to grade 13 could be eligible to use this. In a pandemic situation like now, this platform would be so much useful for students as well as teachers to continue their learning and teaching process and all the communications can be done through this platform as well.

This kind of approach enables the teacher to focus on teaching procedure more easily than traditional teaching process. The teacher can also tailor and give students a progress according to their performance on each term. Students' reports for a term also could be handled through this platform as it would be a much easier for parents to track their child and verify the results. From the students' side, this would be easy to continue the learning procedure as all the studying materials can be managed efficiently.

Stakeholders and their relative importance

1. **Student** – Access study materials and upload assignments.
2. **Teacher** – Add study materials, evaluate student progress, and Add student grades.
3. **Parent** – Check student progress and get a grading report.
4. **Admin** – Maintain accessibility to the web application.
5. **Principle** – Maintain accessibility to administration.
6. **Ministry of education** – Maintain accessibility to school performance.
7. **Web designer** – Design the web application for the school.
8. **Maintenance technician** – Maintain infrastructure for the system.
9. **Quality and service manager** – Make sure the high-quality services are provided.
10. **System tester** – Assure the quality of the system.
11. **System architecture** – Design the system architecture.
12. **Database administrator** – Store and organize data in the database system.
13. **Security specialist** – Provide the security for the application.
14. **Content designer** – Design learning objects.
15. **Project manager** – Look after the overall day-to-day operations of the team.
16. **Trainee of admins** – Train admins to control accessibility.
17. **Investor** – Fund for eLearning project.
18. **Masters and doctoral students** – Persons who are developing doctoral or master thesis.
19. **Style editor** – Editor of learning objects. Assessor
20. **Tutor** – Tutor in distant career.
21. **Thesis advisor** – Persons whose role is to guide master or doctoral students.
22. **Technicians** – e-learning platform expert. User, assessor.
23. **Technicians counsel** – Expert in connectivity. Assessor
24. **Postgraduate student** – Product beneficiary and user.
25. **Academic affair staff** – Command the academic secretary at some university. Responsible for the execution of education and research.

Software Requirements Specification

For Online Learning Management System

Version 1.0 approved

Prepared by - SE GROUP 1

ABEYNAYAKE N.M.

DAYANANDA T.A.R.S.

GALAPPATHTHI A.G.R.P.

JAYASINGHE J.A.D.S.D.

RATHNAWEERA H.D.K.Y.

NIMALSIRI T.W.I

SATHULAKJAN T.

THIRUCHITTAMPALAM S.

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1. Introduction

1.1 Purpose

The purpose of this document is to present a detailed description of the web application for the students in schools to do their educational activities online. This web application will provide an open-source platform for structuring and sharing school study materials with students, and in monitoring and assessing the progress of students. This document will describe the purpose and features and other software specifications of the system. This document is intended for both the stakeholders and the developers of the system and will be proposed to the Ministry of Education for its approval.

1.2 Document Conventions

- System - The web application
- Client - A stakeholder who attempts to find the service of a developer.
- User - Stakeholder who receives a service from the system. The user can be a lab assistant or a patient.
- Developer - A stakeholder who develops this web application system for clients.
- Tester – A stakeholder who test the system.

1.3 Intended Audience and Reading Suggestions

This document can be used by,

1. Users (Students, Teachers, Other responsible members in schools as admins)
2. Developers
3. Testers
4. Document writers
5. Responsible persons in the Ministry of Education.

This SRS contains all System Requirements including Interfaces, user cases and ER diagrams. It is recommended to go ahead from the Scope of Project, but users can get a better understanding of this project and its structure by referring to sections 2 and 3.

1.4 Scope of Project

This platform is will be an Online platform of School because it will be designed for students and teachers to continue their educational activities when they cannot meet at school. This platform provides an efficient and easy way to register students/ teachers, grading assignments and sharing study materials. System admin is the person who can register new users to this system and update and restrict access of the users. This system allows students to enroll in a class and then view their study materials, upload assignments, and view grades.

Teachers are allowed to upload study materials, view and grade students' assignments. The system ensures the privacy of each user and accessibility. The user interface of this system is designed to be user friendly so it can attract students and teachers to online learning.

1.5 References

IEEE. IEEE Std 830-1998 IEEE Recommended Practice for Software Requirements Specifications.
IEEE Computer Society, 1998.

2. Overall Description

The overall description section gives an overview of the functionality of the system. It describes the primary requirements of the system and they this section is used to establish a context for the technical requirements specification.

2.1. Product Perspective

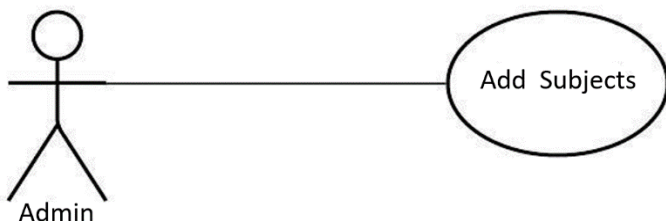
This software system is a standalone product. The main purpose of our system is to provide a platform to school children for their studies efficiently with the technology. This application helps teachers to use their ability to maximum extent by providing them a virtual interface where they can prepare study materials and distribute among students. This application helps students to acquire study materials easily and they can study in their own time without being in a dedicated class.

2.2. Product Functions

2.2.1. Admin Use Case

2.2.1.1. Use case: Add Subjects

Diagram:



Brief Description

The admin needs to add all the subjects for each of the grade levels. In that way students can see the subjects when they logged in to the system and study materials available on each subject.

Initial Step-By-Step Description

To add all the subjects, admin needs to sign in with admin privileges. After that admin can add the relevant subjects

1. Admin needs to login into the system as an admin.
2. After that admin needs to select the grade

3. Then admin needs to add the relevant subject from the drop-down list
4. After that admin needs to confirm the subjects.

XRef Section 4.1, Add subjects

2.2.1.2. Use case: **Delete user:**



Brief Description

Admin needs to delete the users when the students/teachers attached to that user left the school. In that way all the records and material related to that user will be deleted.

Initial Step-By-Step Description

Before this use case can be initiated, the Admin has already accessed the system.

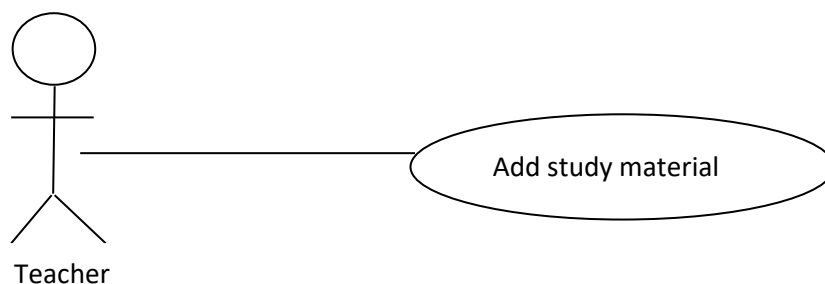
1. The admin needs to go to the delete user window.
2. The system will prompt to enter the user details .
3. Admin needs to enter the user details appropriately.
4. Then admin needs to click the delete button.
5. Then the system will ask to confirm the process.
6. Admin needs to select OK button.

XRef Section 4.2, Delete User

2.2.2. Teacher User Cases:

2.2.2.1 Use case: Add study materials

Diagram



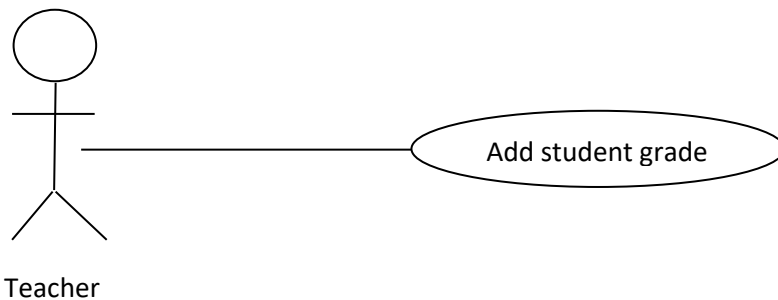
Brief Description

Teacher adds study materials to the system so that student can access the materials. Study materials consists with pdf and images.

Initial Step-By-Step Description

Before this use case can be initiated, Teacher has already logged into his/her user account.

1. Select add new study materials option
2. Teacher selects the relevant subject
3. Teacher selects relevant grade of student
4. Upload the study materials.
5. Save it in system.

XRef Section 4.3, Add study materials**2.2.2.2 Use case: Add student grades****Diagram****Brief Description**

Teacher has privilege and responsible to add marks for the students.

Initial Step-By-Step Description

Before this use case can be initiated, the Teacher has already logged into his user account.

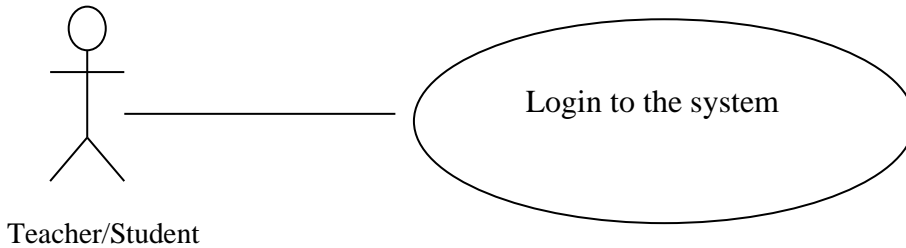
1. Teacher select add marks option.
2. Select subject and grade of student
3. Add student ID and marks

XRef Section 4.4, Add student grades

Teacher/Student Use Case

2.2.2.3 Use case: Login to the system

Diagram:



Brief Description

The teacher/student can login to the system by give inputs the username and password to the system.

Initial Step-By-Step Description

Before this use case can be initiated, the teacher/student wants to already registered.

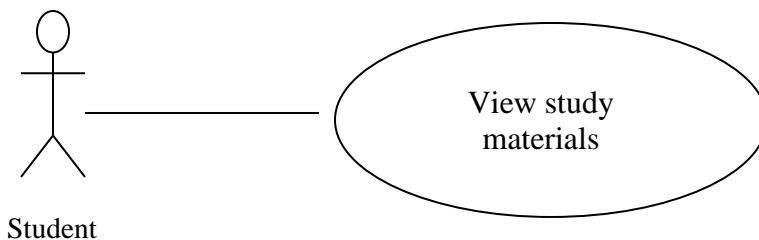
1. Teacher/student click the login button.
2. Then he/she give his/her username and password as an input and click ok.
3. System display the his/her page (teacher/student page).

XRef Section 4.5/Section 4.6, Login to the system

2.2.3 Student Use Case

2.2.3.1 Use case: View study materials

Diagram:



Brief Description

The student can login his/her account and can view his/her selected subject and can see study materials of his/her selected subject.

Initial Step-By-Step Description

Before this use case can be initiated, the student wants to already login his/her user account.

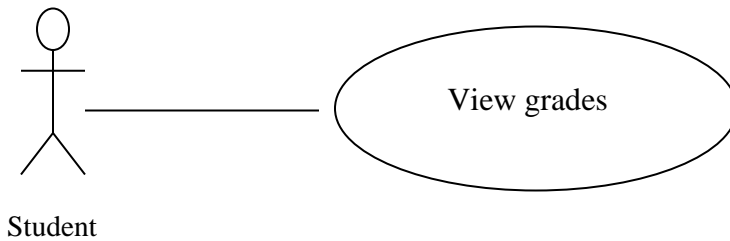
1. System displays all the subjects that currently active.
2. Student selects the subject where he wants to view study materials.

3. System displays the subject page.
4. Then click study materials link where he/she wants to view document
5. System displays the document.

XRef Section 4.7, View study materials

2.2.3.2 Use case: **View grades**

Diagram:



Brief Description

The student can login his/her account and can view his/her selected subject and can see grades of that subject.

Initial Step-By-Step Description

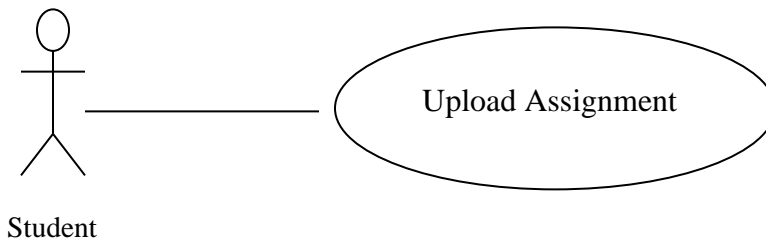
Before this use case can be initiated, the student wants to already login his/her user account.

1. System displays all the subjects that currently active.
2. Student selects the subject where he wants to view grades.
3. System displays the subject page.
4. Then click grades button on that page.
5. System display the grades table of that subject.

XRef Section 4.8, **View grades**

2.2.3.3 Use case: **Upload Assignment**

Diagram:



Brief Description

When Teachers give assignments, students can upload the answers for the assignment to the learning system.

Initial Step-By-Step Description

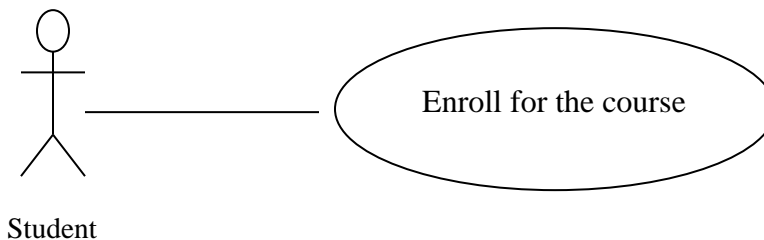
Before this use case can be initiated, the student wants to already login his/her user account.

- 1.System displays all the subjects that currently active.
- 2.Student select the subject where he needs to upload assignment
- 3.System displays the subject page.
- 4.Student clicks on assignment link
- 5.System display the page where student need to submit assignment
- 6.Student upload the assignment and press submit
- 7.System displays, submitted for grading

XRef Section 4.9, Upload Assignment

2.2.3.4 Use case: **Enroll for the course**

Diagram:



Brief Description

Students enroll for courses when a new semester begins.

Initial Step-By-Step Description

Before this use case can be initiated, the student wants to already login his/her user account.

- 1.System displays the student dashboard
- 2.Student selects enroll course
- 3.System displays the courses which the student can enroll.
- 4.Student enroll the courses.
- 5.System return to the main page.

XRef Section 4.10, Enroll for the course

2.3. User Classes and Characteristics

There are three classes of users who can interact with this system. They are admin, teacher and student.

1. Teacher
 - a. The person who can upload study materials and grades of students.
2. Student
 - a. The one who can view study materials and grade.
 - b. They are allowed to upload assignments.
 - c. They can enroll for the next grade.
3. Admin
 - a. The person who can register and delete student or teacher accounts.
 - b. They can add subjects for each grade.

2.4. Operating Environment

This is a web-based system. Therefore, it operates on a cloud server platform. The cloud service provider manages the infrastructure and platform that system and database run on. User is expected to have computer which have an internet connection and search engine option.

2.5. Design and Implementation Constraints

This section outlines the constraints imposed on our system due to various factors. Some of these constraints include:

- Interface constraints: Since, this is a Web based application so it should work on major browsers like Internet explorer, Mozilla Firefox, Google Chrome, Opera etc.
- Hardware limitations: Since this is a web based system, a stable internet connection is necessary to access our system.
- This system operates on a cloud server platform so data confidentiality depends on the clouds service providers.
- Safety and Security constraints: Since, application is intended for the authenticated users only, so anonymous person should not be able to access and operate over the user data.
- Login and password is used for the identification of users. Only registered users, corporate users and admin will be authorized to use the services.

2.6. User Documentation

- User manual will be provided for both students and teachers.

2.7. Assumptions and Dependencies

- The user must have a stable internet connection.
- The user should have a basic knowledge to interact with the user interface of the system.
- Each User must have a User ID and password

3. External Interface Requirements

External interface requirements to must be achieved by the user are described in the following section.

3.1. User Interfaces

- Admin's User Registration Interface (Figure 1.0)
- Admin's Home Page
- Admin's User Deletion Interface
- Admin's Module Management Interface
- User Login Interface
- Teacher's Module Management Interface
- Student's Module List Interface (Figure 2.0)
- Grading Report Interface (Figure 3.0)
- Study Material Interface... etc.

Figure 1.0

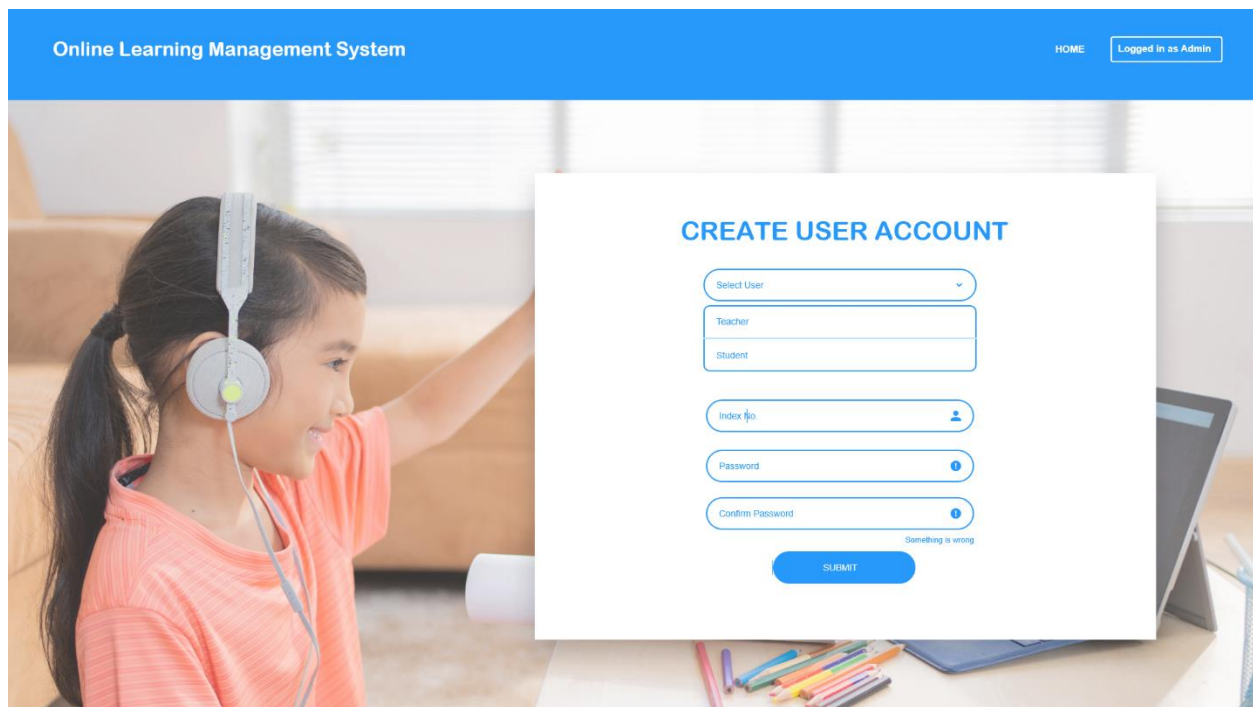


Figure 2.0

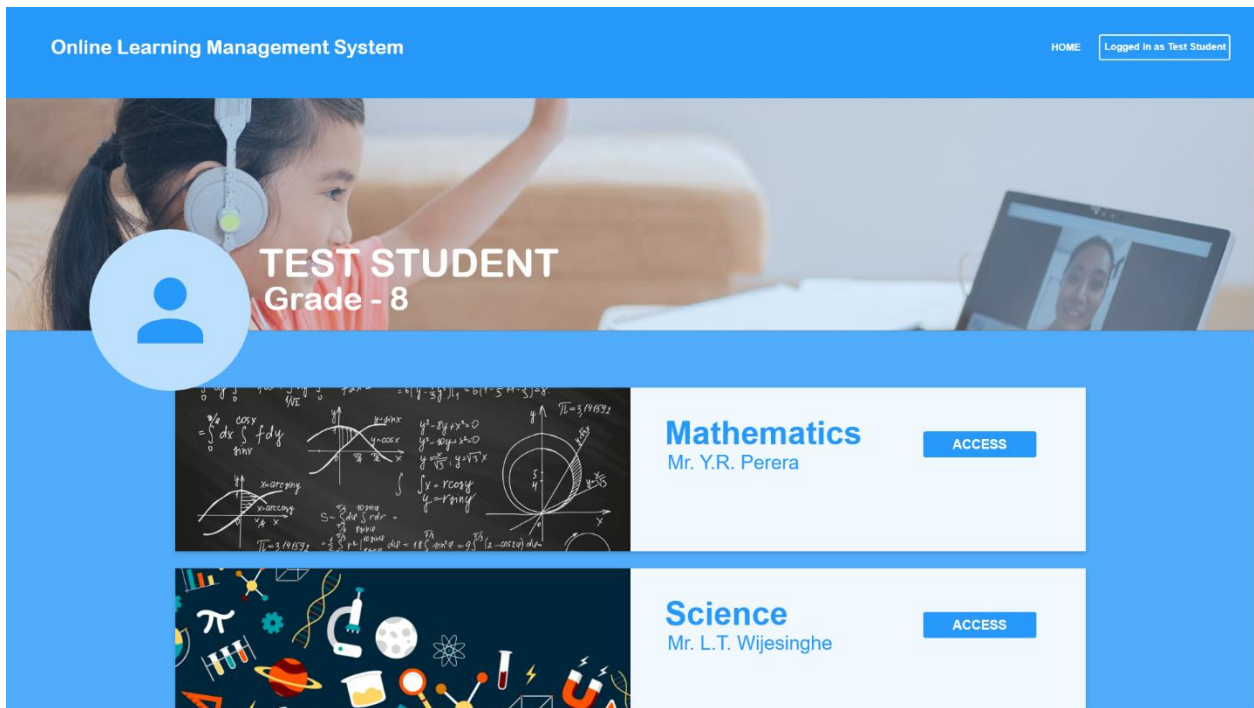
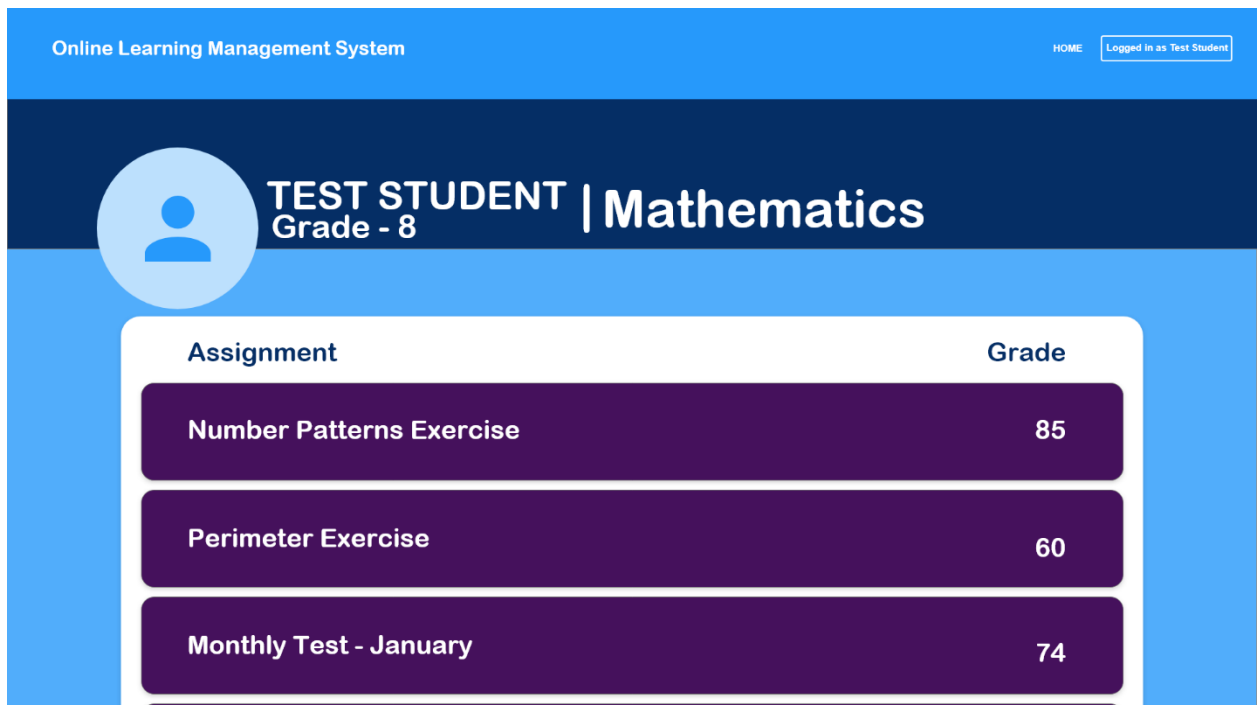


Figure 3.0



3.2. Hardware Interfaces

This is a web-based application. The system will be deployed on a cloud server from a decided cloud service and a database will be maintained parallelly. The system can be accessed from any computational device with internet access provided by an ISP and support of HTTP/HTTPS protocols. Internet Accessibility must be provided by the user end. System will be functioned consistently and independently with any supportive OS environment and with any supportive Web browser supports JavaScript.

3.3. Software Interfaces

System is functioned in any supportive OS. But, the web-based application can be well experienced with a PC OS (such as Windows, Ubuntu, Mac OS) than Mobile OS. A web browser with JavaScript supports the system. SQL is used to manipulate the data related to the system efficiently.

3.4. Communications Interfaces

Client-server architecture is implemented in the system. In normal communication, the client computing device communicates with the server computer using HTTP and HTTPS messages. Furthermore, FTP is used when the files must be transferred between the server and client.

4. System Features

4.1 Add Subjects

Use Case Name	Add subjects
XRef	Section 2.2.1.1, Add subjects
Trigger	The Admin selects to add a subject.
Precondition	Admin has accessed the system platform.
Basic Path	<ol style="list-style-type: none">1. Admin needs to login into the system as an admin.2. After that admin needs to select the grade3. Then admin needs to add the relevant subject from the drop-down list4. After that admin needs to confirm the subjects.
Alternative Paths	None
Postcondition	The subjects have been added to the database according to the grade.
Exception Paths	The admin may abandon the adding process at any time.
Other	This use case only needs in the initializing phase of the system.

Delete User

Use Case Name	Delete User
XRef	Section 2.2.1.2, Delete User
Trigger	The Admin go to the delete user page
Precondition	Admin has accessed the system platform.
Basic Path	<ol style="list-style-type: none"> 1. The admin needs to go to the delete user window. 2. The system will prompt to enter the user details . 3. Admin needs to enter the user details appropriately. 4. Then admin needs to click the delete button. 5. Then the system will ask to confirm the process. 6. Admin needs to select OK button.
Alternative Paths	When there is not any user by that index number, the system will prompt an error message saying there is no user with that index number.
Postcondition	None
Exception Paths	The admin may abandon the adding process at any time.
Other	This only needed when the user wants to leave the school.

4.3 Teacher add study material

Use Case Name	Add study materials
XRef	Add study materials, section: 2.2.2.1
Trigger	The teacher selects to add new study materials.

Precondition	The teacher has logged into his user account
Basic Path	<ol style="list-style-type: none"> 1. Teacher select add new study materials. 2. Select relevant subject, student grade and class 3. Upload materials and put a note about material. 3. Save it into the system
Alternative Paths	None
Postcondition	<ol style="list-style-type: none"> 1. Course materials save to the system. 2. Student notified about new study materials.
Exception Paths	<p>Teacher may abandon the operation at any time.</p> <p>Teacher can select many classes at once.</p>
Other	When adding material, material relevant subject mentioning is necessary

4.4 Add Student grades

Use Case Name	Add student grades
XRef	Add student grades, section: 2.2.2.2
Trigger	The teacher selects to add student grades.

Precondition	The teacher has logged into his/her user account
Basic Path	<ol style="list-style-type: none">1. Teacher select add grade option.2. Select subject and grade of student3. Using Student ID, search for a student3. Add marks to the student.
Alternative Paths	<p>All selection option are required and if any value missing, system will notify.</p> <p>When teacher needs to update marks, can follow same procedure.</p>
Postcondition	Update student grades database so that student can view his/her marks.
Exception Paths	The teacher may abandon the operation at any time.
Other	None

4.5 Teacher Login to the system

Use Case Name	Login to the system
XRef	Login to the system, section: 2.2.2.3
Trigger	Teacher goes the login page and click login
Precondition	Teacher has to registered in the system

Basic Path	<ol style="list-style-type: none"> 1. Teacher select login option in home page 2. Add user Id and password 3. press login button
Alternative Paths	No.
Postcondition	Teacher move onto his/her account
Exception Paths	If user Id or password is wrong, teacher has to contact admin and get new password.
Other	Teachers are uniquely identified by teacher id. Id is given by admin when registering a teacher.

4.6 Student Login to the System

Use Case Name	Login to the System
Actor	Teacher/Student
XRef	Login to the system, section: 2.2.3.1
Trigger	Request to login
Precondition	Teacher wants to already registered
Basic Path	<ol style="list-style-type: none"> 1. Teacher/student click the login button. 2. Then he/she give his/her username and password as an input and click ok. 3. System display the his/her page (teacher/student page).
Alternative Paths	None
Postcondition	System display his/her page.
Exception Paths	The teacher/student may abandon the operation at any time.
Other	None

4.7 View study materials

Use Case Name	View study materials
Actor	Student
XRef	View study materials, section: 2.2.3.2
Trigger	View study material request
Precondition	Student has logged into his user account
Basic Path	<ol style="list-style-type: none">1. System displays all the subjects that currently active.2. Student select the subject where he wants to view study materials.3. System displays the subject page.4. Then click study materials link where he/she wants to view document5. System display the document.
Alternative Paths	None
Postcondition	System display the document
Exception Paths	The student may abandon the operation at any time.
Other	None

4.8 View grades

Use Case Name	View grades
Actor	Student
XRef	View grades, section: 2.2.3.3
Trigger	View grades request
Precondition	Student has logged into his user account
Basic Path	<ol style="list-style-type: none">1. System displays all the subjects that currently active.2. Student select the subject where he wants to view grades.3. System displays the subject page.4. Then click grades button on that page.5. System display the grades table of that subject.

Alternative Paths	None
Postcondition	System display grades table
Exception Paths	The student may abandon the operation at any time.
Other	None

4.9 Upload assignment

Use Case Name	Upload assignment
Actor	Student
XRef	Upload assignment, section: 2.2.3.4
Trigger	Student selects upload assignment link
Precondition	Student has logged into his user account
Basic Path	<ol style="list-style-type: none"> 1.System displays all the subjects that currently active. 2.Student select the subject where he needs to upload assignment 3.System displays the subject page. 4.Student clicks on assignment link 5.System display the page where student need to submit assignment 6.Student upload the assignment and press submit 7.System displays, submitted for grading
Alternative Paths	None
Postcondition	Assignment will be submitted for grading.
Exception Paths	The student may abandon the operation at any time.
Other	None

4.10 Enroll course

Use Case Name	Enroll course
Actor	Student
XRef	Enroll course, section: 2.2.3.5

Trigger	Student selects enroll option to enroll the course
Precondition	Student has logged into his user account
Basic Path	1.System displays the student dashboard 2.Student selects enroll course 3.System displays the courses which the student can enroll. 4.Student enroll the courses. 5.System return to the main page.
Alternative Paths	None
Postcondition	Courses will be enrolled
Exception Paths	The student may abandon the operation at any time.
Other	None

5. Other Nonfunctional Requirements

In this section non-functional requirements will be explained in detail. Non-functional requirements include Performance Requirements, Safety Requirements, Security Requirements, Software Quality Attributes, and Business Rules.

5.1. Performance Requirements

The web application should be developed as a lightweight web application since it can have a low response time even with slow internet connection. System requires a powerful server machine with high band internet access. The web application is required a fast web access because many users should have access the system at same time. Extra storage is also important requirement for the web application. It can give more workspace for each user.

5.2.Safety Requirements

The safety requirements are very important because the users may make mistakes.

- When the user forgets the password, it can be solved by using forgotten password option.
- There should be a back-up option to recover mistakenly deleted reports.

5.3. Security Requirements

The privacy of user accounts are secured since the system is hosted on a cloud server. A user should not have access for other users' workspaces. Therefore each user account is restricted with a password. The user is restricted to the user rights and user is unable to harm to the system by running a program on terminal.

5.4. Software Quality Attributes

Reliability Requirements

- Application shall be available 24 hours a day, 7 days a week.
- Application shall always provide real time information about study materials.
- Application shall be able to recover from hardware failures, power failures and other natural catastrophes and rollback the databases to their most recent valid state.

Maintainability Requirements

- Application should be light weighted.

Portability Requirements

- System should be manageable in web-browsers of Internet Explorer, Google Chrome, Mozilla Firefox, Opera and Safari.

Usability

- System shall provide an easy-to-use graphical interface so that the students and parents can use the application without any specific knowledge about handling online materials.
- Any notification or error messages generated by system shall be clear, succinct, polite and free of jargon.

Integrity

- Only system administrators have the right to change system parameters. The system should be secure and must use encryption to protect the databases.
- Users need to be authenticated before having access to any personal data.

5.5. Business Rules

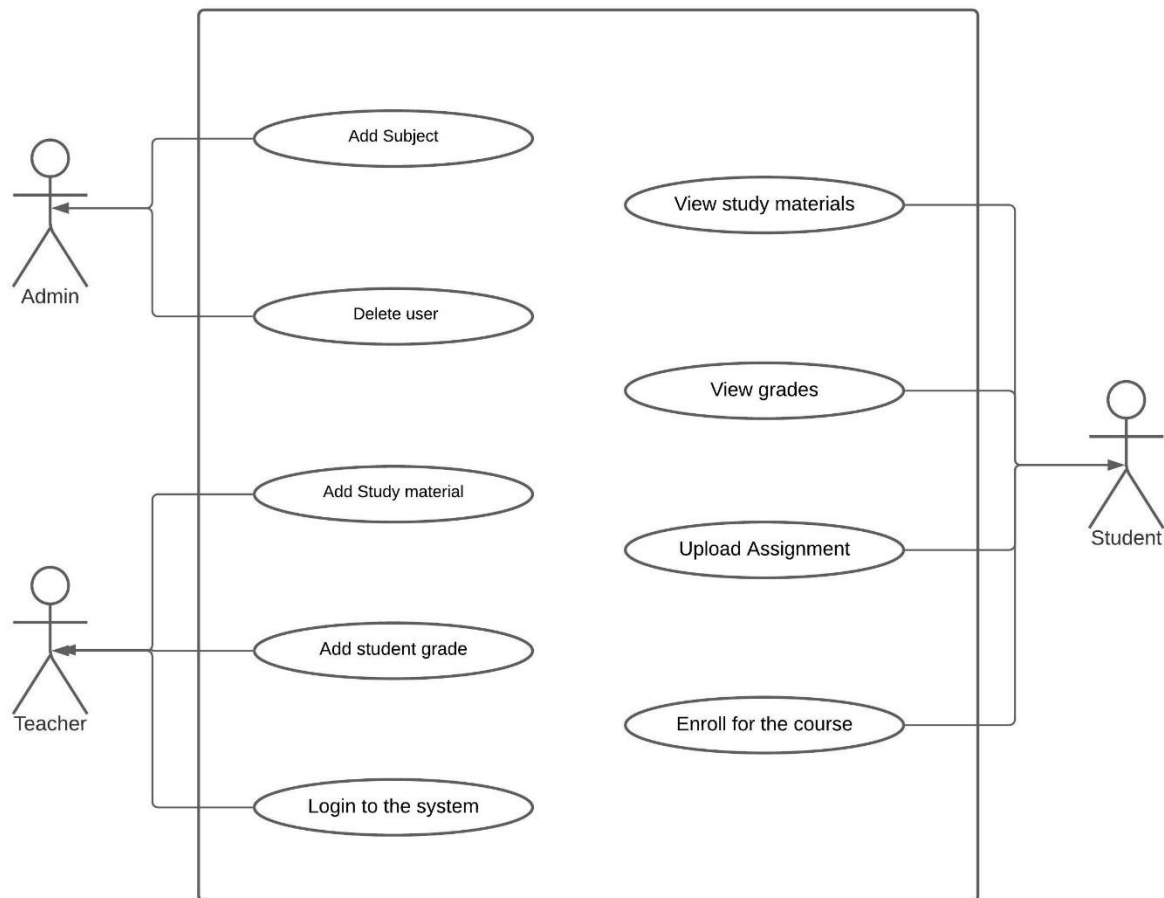
- For business purposes all terms and regulations should be explained to the users at the beginning.
- The business activities should be maintained without disturbing user activities.
- They should have a good business plan with.

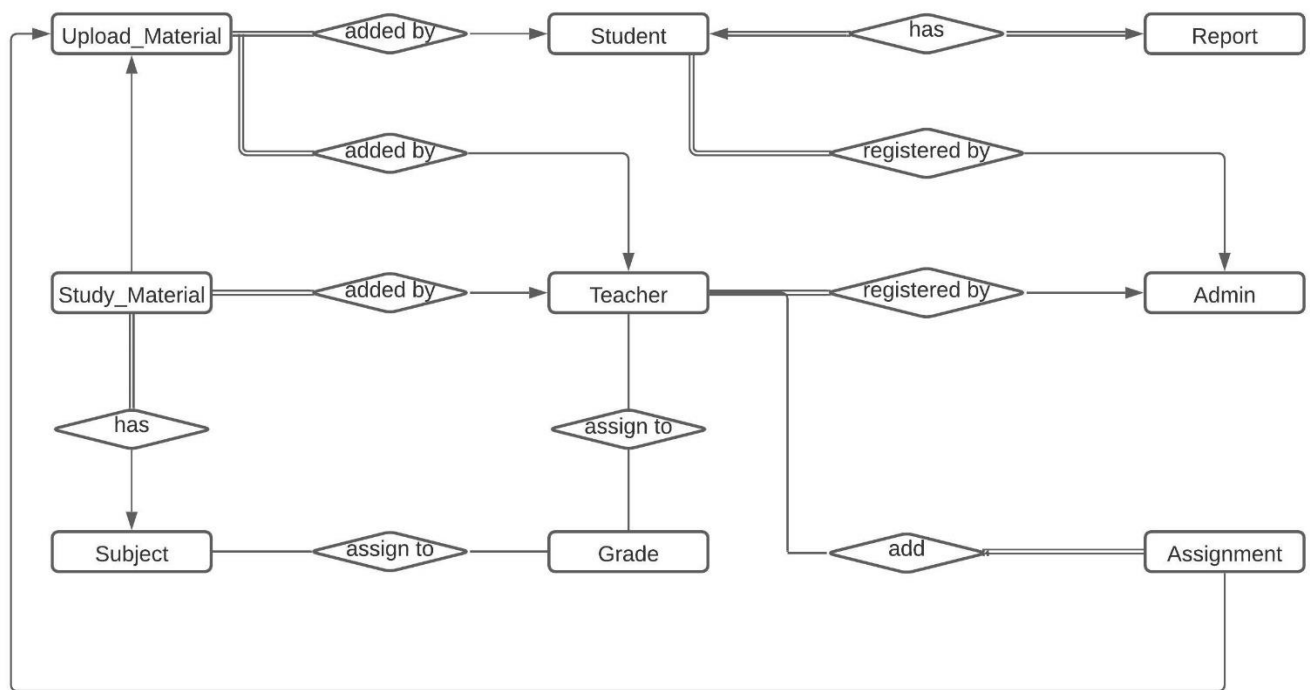
Appendix A: Glossary

Term	Definition
Admin	The person who registers students and teachers to the web application and delete their account when they leave the school. Admin adds relevant subjects to relevant grades.
Teacher	The person who adds assignments and study materials, evaluates student progress, and graded assignments.
Student	The person who can views study materials and grades for assignments. Student is allowed to upload answers for assignments which are uploaded by teacher. Student is able to enroll for next grade.
Assignment	When a teacher uploads an assignment students have to upload answers for the assignment within the given time duration.
Study material	Study material can be PDFs and images. They can be used by students for studies.
Student grade	Student grade is the marks for assignments. It can be updated by teachers. Students can only view the grades.
Grade	Grade represents the grade of students in school. Ex: grade 1, grade 2, ect.
Database	Collection of all the data in the online learning management system.
Server	Handles HTTP requests and responses. Accepts and responds for the client requests with content.

Appendix B: Analysis Models

User Case Diagram



Conceptual ER Diagram

The data descriptions of each of these data entities is as follows:

Admin Data Entity

Data Item	Type	Description	Comment
Admin ID	Integer	Admin Index Number	
Admin Name	Text	Name of the Administrator	
Email	Text	Email of the Administrator	

Teacher Data Entity

Item	Type	Description	Comment
Teacher_ID	Text	Given ID for teacher	Unique data
Name	Text	Name of teacher	
Subject	Text	Specify subjects for teacher	Can be several
Email Address	Text	Email address of teacher	
Phone number	Integer	Contact number of teacher	Can be several

Student Data Entity

Data Item	Type	Description	Comment
Student ID	INT	ID for a student generated by the system.	Unique
Student Name	Text	Name of the student.	
Email	Text	Email Address of the student.	Optional
Grade	INT	Student's Grade	
Class	Text	Student's class	

Upload material entity

Data Item	Type	Description	Comment
Upload ID	Text	Identification of upload material	Unique
Material Type	Text	Type of upload material	Assignment or study material
Upload person name	Text	Name of the person who uploads	
Upload person type	Text	Type of the person who uploads	Teacher or student

Study material entity

Data Item	Type	Description	Comment
Study material ID	Text	Identification of study material	Unique
Upload date	Date / Time	Uploaded date	
Teacher ID	Text	ID of the uploaded teacher	
Subject ID	Text	ID of the subject	
File type	Text	File type of this file	

Assignment Data Entity

Data Item	Type	Description	Comment
Assignment ID	INT	ID of the assignment	Unique
Subject ID	Text	Assignment subject name	
Upload ID	Text	ID of the uploaded submission	Unique Data
Upload document type	Text	Type of the document	Maybe Several (Pdf / doc / docx)
Upload person name	Text	Person who uploads the assignment	
Start date	Date/Time	The date from which the assignment available	
Due date	Date/Time	The date on which the submission link ends	
Grade	Text	Marks for the assignment	

Progress report data entry

Data Item	Type	Description	Comment
Report ID	Text	Identification of the progress report	Unique
Student ID	Text	Identification of the student	Unique
Overall GPA	Float	Final GPA of the student	

Grade Info Data Entity

Data Item	Type	Description	Comment
Subject	Text	Name of the subject	
Teacher In charge	Text	Name of the teacher in charge of the subject	

Authors

1. 180003L : ABEYNAYAKE N.M.
2. 180109R : DAYANANDA T.A.R.S.
3. 180183K : GALAPPATHTHI A.G.R.P.
4. 180276A : JAYASINGHE J.A.D.S.D.
5. 180424D : NIMALSIRI T.W.I.
6. 180525M : RATHNAWEERA H.D.K.Y.
7. 180573G : SATHULAKJAN T.
8. 180645F : THIRUCHITTAMPALAM S.