Final Year Project Report
(Batch SP12)

E-Classroom for Interactive and Connected Learning

[Web + Desktop]

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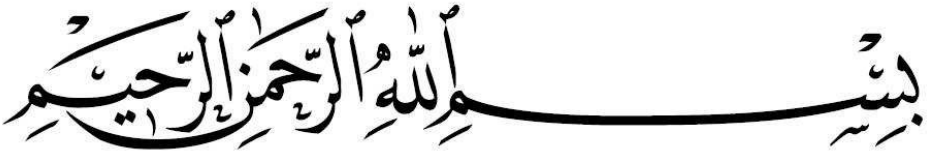
(2016)



In the Name of Allāh, the Most Gracious, the Most Merciful

A dissertation submitted to the Department of Computer Science, COMSATS Institute of Information Technology, Wah Campus, as a partial fulfillment of the requirements for the award of the degree of Bachelors in Computer Sciences

Evaluation

Project Group Members (To be filled by students)				**A**	**B**	**C**	**D**	**A+(B+C+D)/3**
Sr. #	Reg. #	Student Name	*Signature	10	5	5	5	15
(i)	SP12-BCS-021	Inzamam Mashood Nasir						

*The candidates confirm that the work submitted is their own and appropriate credit has been given where reference has been made to work of others

A. (Supervisor) Name: _____ Signature: _____

Remarks (if any): _____

B. (Committee Member 1) Name: _____ Signature: _____

Remarks (if any): _____

C. (Committee Member 2) Name: _____ Signature: _____

Remarks (if any): _____

D. (Convener) Name: _____ Signature: _____

Remarks (if any): _____

Dedication

I dedicate all my efforts and struggles of the educational life to my dear parents; without them I'm meaningless. Also I devote the work of this project to respectable and honorable teachers who taught and supported me in developing my personality as a competent professional.

Declaration

I hereby declare that this Website and Desktop App, neither as a whole nor as a part thereof has been copied out from any source. It is further declared that I have developed this Website and Desktop App entirely on the basis of my personal efforts made under the sincere guidance of my teachers and supervisor. No portion of the work presented in this report has been submitted in support of any application for any other degree or qualification of this or any other university or institute of learning.

Inzamam Mashood Nasir

SP12-BCS-021

Acknowledgement

All praise to Almighty Allah, who gave me the understanding, courage and patience to complete this project.

I express my gratitude to my kind Project supervisor **Mr. Majid Mumtaz,** who provided me opportunity to learn and enhance my knowledge. As my project supervisor, he has been ready to help and guide me throughout the project development.

I would also like to thank all of my teachers in the department for their moral support.

And last but not the least, I would like to acknowledge the support of my family members. I would like to admit that I owe all my achievements to my truly, sincere and most loving parents, brother and friends whose prayers are a source of determination for me.

Inzamam Mashood Nasir

SP12-BCS-021

Project in Brief

Project Title:	E-Classroom for Interactive and Connected Learning
Objective:	Develop a web application of E-Classroom for Interactive and Connected Learning of students in a well-managed, organized and controlled environment, where the access to the teacher is easy, saving the notes and documents is just a click away and using them during the class only require a login to your account. To create a system where asking the queries to teachers or fellow students for a support, suggestions and help is easy and always available.
Undertaken By:	Inzamam Mashood Nasir
Supervised By:	Mr. Majid Mumtaz Lecturer, Department of Computer Science COMSATS Institute of Information Technology, Wah Cantt.
Date Started:	June 20, 2015
Date Completed:	November 13, 2015
Tools Used:	PHP 5.5. Notepad++, Apache Server, MySQL Management Studio Microsoft Office 2013 Microsoft Visio 2013
System Used:	Core i5

Abstract

Web application is very popular in the modern age. Now in present a large number of organization use web applications to manage their databases. Our project is built on the idea that includes the online help and management of students in the integrated and connected environment. This web application provides students and teachers an easy way for managing documents, notes, asking for help and profile management along with role distribution. There are large number of web applications available over the internet relating to electronic class management systems. My basic aim is to introduce an idea of providing online help related with student and teacher information system. This web application provides an easy way for asking questions, managing documents and notes and allows teachers to create quick quizzes from the already asked questions. E-Classroom for Interactive and Connected Learning is a time saving system which keeps the record of all questions, documents, notes, accepted notes, accepted questions and current quiz.

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Chapter 1

Introduction

1 Introduction

1.1 Introduction

E-classroom refers to computer-enhanced learning environment, which means a traditional classroom space with students and teacher using computers. In other words, a regularly-scheduled class where students use computers for some portion of the class period.

An e-Classroom can help teaching and learning in many aspects. Firstly, it can help teachers demonstrating abstract ideas more clearly, like in Computer Language lessons, the compilation of the program can be shown in large animations rather than just looking small pictures in textbooks.

Moreover, having developed an e-classroom that is able to show multimedia material, for example enable interactions in class. Teachers and students can exchange their views towards things and foster understanding of learning material, increasing student's ability to elaborate it in examinations because it has been discussed thoroughly in class.

Using advanced technology can also increase student's concentration in class. It is because students nowadays usually feel comfortable using hi-tech goods rather than writing. Therefore, including computers as a means of learning can raise their initiative in encountering classroom activities. Since students are more involved in class, this on the other hand help teachers to judge students' understanding in the knowledge taught, and teacher will be able to adjust their teaching approach, such as deciding whether it is necessary to clarify certain points again or to go into another topic. On the whole, having an e-Classroom is helping to increase efficiency in teaching and learning in schools.

1.2 Objectives

The aim of this project is to help the sector increase capability and capacity to generate high quality blended learning through the innovative development of a new qualified environment and shared content for training a new workforce of e-classroom using a new web and desktop application. The lack of capability to create high quality e-

classroom impacts on the sector and industry's capability to radically change the delivery of teaching.

The main idea was to create a new qualified environment and online content to train the next generation through e-classroom. The Project developed a new unit based skills qualification program for young people who want to gain individual units of skills or a full. Alongside the development of a new qualified environment, the system was developed to tackle all of the curriculum content for the specific subject and all problems, questions and necessities regarding it through co-creation and co-operation of both students and teacher. It required the sharing of best practice to enable rich content to be available for anyone who is requiring help.

Alongside with this, following are the main objectives of this project:

- Providing an environment where class participation is less prioritized
- Providing a chat messenger to students for interacting with the tutor and class
- Designing a responsive Chatbot to ensure all answers regarding a specific question after the class timing
- Sharing the slides on the projector on the screens of all students
- Creating a quiz on run-time
- Allowing the tutor to broadcast a single question or topic to access the views of students
- Creating a mechanism to rate the students on the basis of the questions asked during or after the class timing
- Providing a survey tool to allow students to give tutor, course and system feedback

1.3 Problem Statement

The main purpose of developing this web application is the idea of automating the manual class proceedings. The theme focuses on helping the students and teachers to automate the whole process including saving and retrieving documents and notes without having any external source i.e. USB or memory device and asking and answering the questions anytime, anywhere instead of waiting for a class time. Earlier than this the method followed for this was to wait for the specific class, then wait for the turn to ask your question. Most of the time in that process, students did not get the satisfied answer

or the answer is so limited or incomplete. If there is holiday on the next day, the student might not get any help while having the assignment's submission day on Monday. Manual class proceedings are also sometimes unpleasant under few teachers who are not interested in student's involvement or they do not encourage the student's asked questions.

1.4 Project Scope

This project can be used in many educational institutes to provide an interactive learning with a lot more student activities, participation and involvement. The users of this application will be the Students, Teachers, Class Representatives (CR) and Teacher Assistants (TA). The main admin of this system will be the owner of the institute, however they can assign different roles to the students, teachers etc. The Teachers will use the system as the admin of their own course and student will have the very limited access regarding their own profile and activities only.

1.5 Tools and Technologies

As it is said that the right, accurate and problem specific tool can solve a problem in quite efficient way, it is important to pick the right development tools for the development of website. The basic platform used for this web and desktop application development is Windows 8.

As the application is a web based application, the frontend of this application is based on Bootstrap technology, an enhanced version of HTML5, CSS3, JavaScript and JQuery. In order to develop the frontend, the HTML editor, Notepad++ is used. To acquire the backend functionality, PHP is used and as PHP is server side language, XAMPP Server is used.

MySQL is used for database management, as it provides a powerful database engine based on SQL. It is a reliable and secure system to manage the databases. XAMPP's build-in MySQL support is used for this purpose.

The desktop application of this project is developed in C#. C# provides a powerful platform for windows form applications known as C# WPF. To develop the desktop application, Microsoft Visual Studio 2013 (VS2013) is used. As the website and desktop

application share the same database, C# is also connected to the same database using MySQL.

1.6 Overview

Main functionalities available in this project includes:

- Maintaining records of teachers, students and admins
- Maintaining a list of user's documents
- Maintaining the user's custom notes created during or after the class timing
- Asking question regarding the specific subject
- Answering a specific question
- Teacher's responsibility to approve or reject an asked question or submitted answer
- Teacher can upload the documents or quick notes
- Teacher can make one of the student a CR of the class to accept/reject new questions, answers and add questions and answers
- Teacher's role to assign or delete students from a specific subject
- Teacher can create a quick quiz from the already asked questions
- Admin's role to assign teacher to a specific subject, add new teachers and students

1.7 Block Diagram

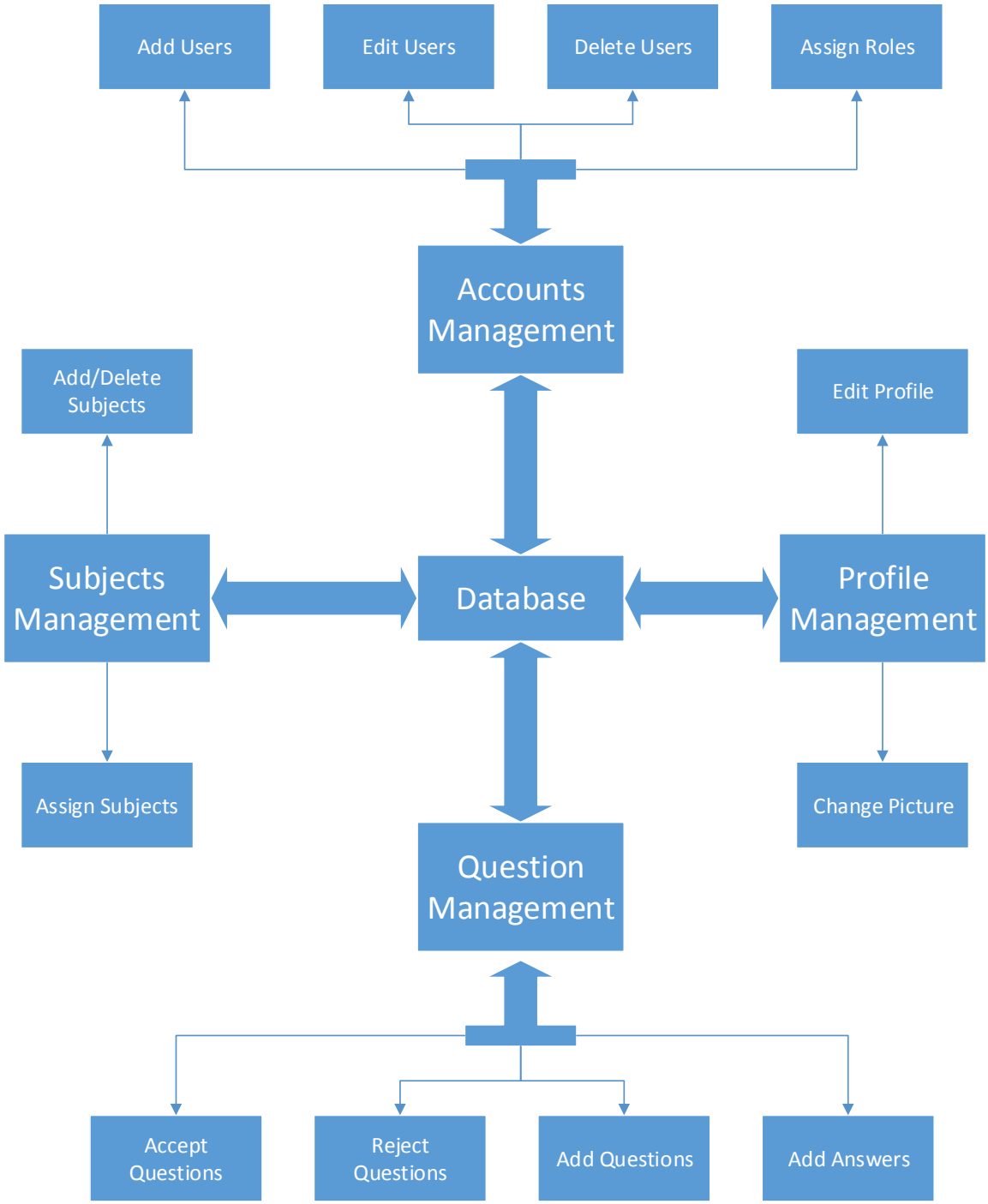

Figure 1.1 Block Diagram

Chapter 2

Requirements Analysis

2 Requirements Analysis

2.1 Existing System

Over years, teaching and learning have occurred in a variety of environments, ranging from home tutoring, to outdoor education, to the "traditional" classroom with blackboard and chalk, to the computerized classroom, also known as the electronic classroom. Each of these environments offers a unique perspective on learning and each has been found to be a valid forum for education. However, as we move into the 21st century, we find ourselves equipped with an abundance of computerized tools including electronic classroom, which are available for education, and these are found to be very useful under the present conditions.

2.2 Actors

An actor is an external agent which interacts with the system and causes an event that initiates the corresponding use case.

2.2.1 Admin:

Admin is an actor who has the highest access level in the project. He can manage all the users, manages roles, assigns users to roles, assign subjects to teachers and see all the activities generated by the users of the E-Classroom for Interactive and Connected Learning.

2.2.2 Teacher:

Teacher is an actor who can add or delete the students in specific subjects. He/she can also accept, reject or add new questions and answers. He/she can upload documents or notes.

2.2.3 Student:

Student is actor who askes new questions, add answers to questions and upload the documents and notes.

2.3 Stakeholders and Interests

Stakeholder	**Admin**
Interests	Wants to improve the system. Add new Teachers, Students, and Subjects. Also assign subjects to teachers.

Stakeholder	**Teacher**
Interests	Wants to assign students to specific subject, which is already assigned to him/her. Also wants to filter the related questions and related answers by adding questions or answers as well as accepting or rejecting the questions and answers.

Stakeholder	**Student**
Interests	Wants to get the relevant and quick help regarding their problem. Also can upload documents and notes for the later use. Student can add new question to get a diversity of answers from other students or teacher. They can also answer the other questions asked by other students or teachers regarding a specific subject.

2.4 Requirements Elicitation

2.4.1 Functional Requirements

2.4.1.1 Chatbot

1. **Description:**
   If the student is having any problem, issue or any question regarding the course, then a question can be asked and a Chatbot will answer the question in the most possible efficient and desired way.
2. **Criticality:**
   This is the main requirement of the system.
3. **Technical issues:**
   The Chatbot have to be developed in such a way that it effectively understands the question of the student and provide the best possible and more suitable answer to them.
4. **Cost and schedule:**

It does not cost much as doing so will only require a deep knowledge of MySQL, JSON and AJAX tools and implementation.

5. **Risks:**
   The Chatbot may answer the initial questions wrong or may show that the answers are not available because it will populate its database with all the questions being asked and the answers to those questions. So initially it may not provide the best answer but it will learn with the passage of time.
6. **Dependencies with other requirements:**
   This requirement Interact with students who can ask the question. It will be dependent on the data which will be collected during the classes from the student's questions.

2.4.1.2 Runtime Quiz Creation

1. **Description:**
   If the tutor wishes to create a quiz on the spot, the quiz will be one click away. The system will automatically select the question and will generate the quiz on the runtime
2. **Criticality:**
   This is the key requirement of our system as it will make the system more interesting and helpful.
3. **Technical issues:**
   The issue will be that all the questions which will be included in the quiz will be from that data which is collected from student's questions. So that data needs to be accurate to be asked as quiz later and teacher will be key factor for this as teacher will accept or reject all the questions.
4. **Cost and schedule:**
   Again, this functionality will also cost nothing as the data needs to be populated in database from the questions being asked by students.
5. **Risks:**
   The quiz will be created from the question being asked by the students and approved by the teacher. The risk here will be if teacher by mistake accepts a question which is not valid, then the quiz may create some issues for both teacher and class.
6. **Dependencies with other requirements:**
   This requirement will depend upon the questions which will be asked from the students. If the students do not ask anything about a specific topic, no quiz will be created.

2.4.1.3 Instant Messenger

1. **Description:**
   The Instant Messenger allows students to be able for peer-to-instructor communication, while the student is working through a course.
2. **Criticality:**
   This messenger should only allow the student to chat with the teacher else the students will start the gossiping in that.
3. **Technical issues:**
   The messenger needs to be fast, responsive and it should look like a messenger rather than a web page with scrolling.

4. **Cost and schedule:**
   Again, this functionality will also cost nothing as students will ask the questions in that messenger and the teacher will answer those queries.
5. **Risks:**
   The questions being asked by the student(s) needs to be specific and targeted to the topic else it will lead the debate to some other point and the whole class including the teacher will be off-topic.
6. **Dependencies with other requirements:**
   It will not depend on any of the other requirement as it will be an optional thing for the students giving them a choice either they can ask anything or not.

2.4.1.4 Main Server

1. **Description:**
   The main server hold all the existing and previous records in the database and if the user want to know anything about the previous proceedings of the class, they will made a request to the main server and then the main server will be able to entertain the request of user.
2. **Criticality:**
   As the user has to request to main server through a website to be able to view their query and its response, so it is a much essential to our system.
3. **Technical issues:**
   We need to make sure that our main server will never go down.
4. **Cost and schedule:**
   It does not cost much because nowadays the web servers are available cheaply.
5. **Risks:**
   The only possibility of not displaying query and its result, is that the internet is disconnected because only then the website or desktop application will be not able to contact to main server to update information. If the main server goes down, the web page will not be displayed on the screen anymore until the main server start working properly again.
6. **Dependencies with other requirements:**
   The student or teacher has to interact with the main server.

2.4.1.5 User End: A website to interact:

1. **Description:**
   A website needs to be developed for the user to interact with the system.
2. **Criticality:**
   This is also very essential to the system to work properly.
3. **Technical issues:**
   No such technical issue is present so far.
4. **Cost and schedule:**
   It does not cost anything at first until we buy any domain for the business purpose.
5. **Risks:**
   After implementation and testing of web interface there will be no risk of any unsatisfactory occurrence.
6. **Dependencies with other requirements:**

A website or the user end is the main source for the interaction of user and system.

2.4.2 Non-Functional Requirements

2.4.2.1 Performance Requirements:

Performance should not be an issue because all the information involve small pieces of data i.e. Name, lecture slides, asked questions and remaining time of class/quiz/assignment. Processing on these items will require very little processing and thus will occur very quickly. The speed of our system will be fast because the information we received from user and it is only saved in the database and processed for some formatting for the badge printing. Also our system will consume a moderate amount of memory in our database because we have to save all the information from the beginning of the time to maintain secure record and to avoid security concerns.

2.4.2.2 Safety Requirements:

E-Classroom is a website so there are no major confusions and queries regarding any topic of the related course. This website will not access any data from user's mobile phone or email addresses.

2.4.2.3 Security Requirements:

This E-Classroom assumes that only the student or whoever they allows will have access to their user accounts. With that being said, only the provided username and password is required to verify the identity of the user upon opening the website. It is password protected, and user can login using their username with the password to enter the E-Classroom.

2.4.2.4 Software Quality Attributes:

The graphical user interface of E-Classroom is to be designed with usability as the first priority. This system will be presented and organized in a manner that is both visually appealing and easy for the user to navigate. There will be feedbacks and pop-ups to provide users with information they need. To ensure reliability and correctness, there will be zero tolerance for errors in entering and using the system.

2.5 Use Case Diagram

Use case Diagrams are created to visualize the relationship between actors and Use cases. A use case diagram is also used to capture the system functionality as seen by the User.

2.5.1 Use Case Diagram

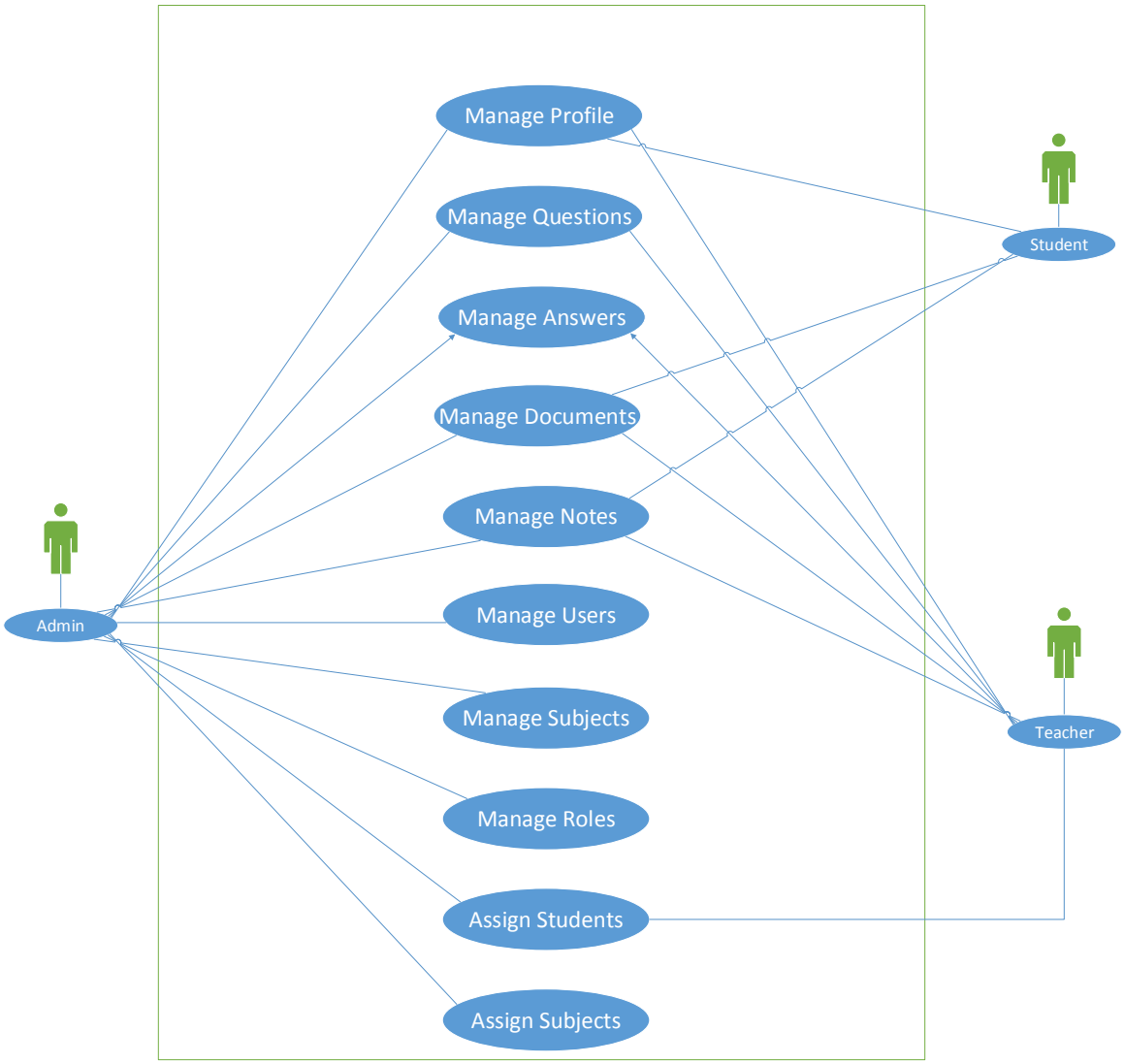

Figure 2.1 Use Case Diagram of E-Classroom

2.6 Business Use Case and Diagram

2.6.1 Manage Profile

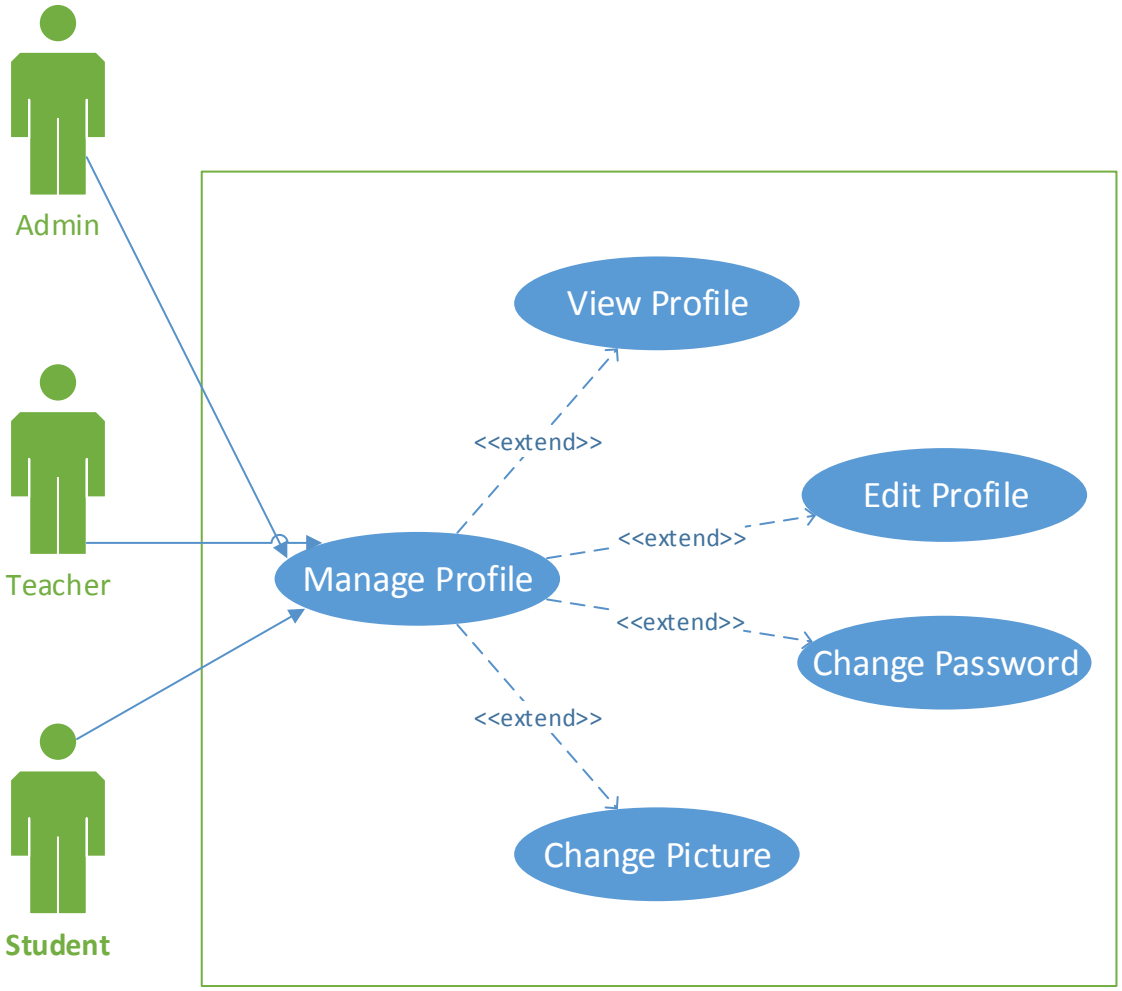

Figure 2.2 Manage Profile

Use Case	**Manage Profile**
Actor	Admin, Teacher, Student
Type	Primary
Description	All the users of this system can manage their profile by either updating the basic information or by changing the profile picture.

2.6.2 Manage Questions

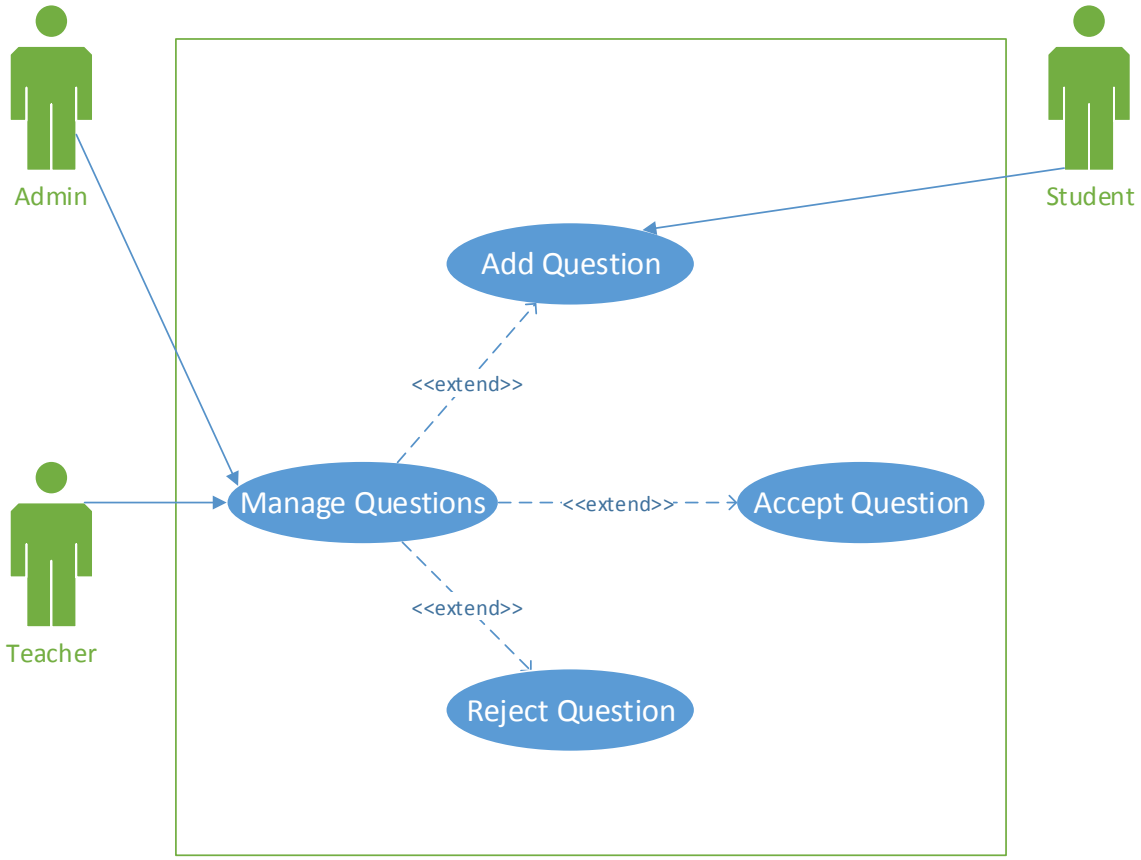

Figure 2.3 Manage Questions

Use Case	**Manage Questions**
Actor	Admin, Teacher
Type	Primary
Description	All the users expect student can manage the question by accepting or rejecting the asked questions or submitted answers. The Class representative can only manage answers and question submitted by students. Students can only ask new questions.

2.6.3 Manage Answers

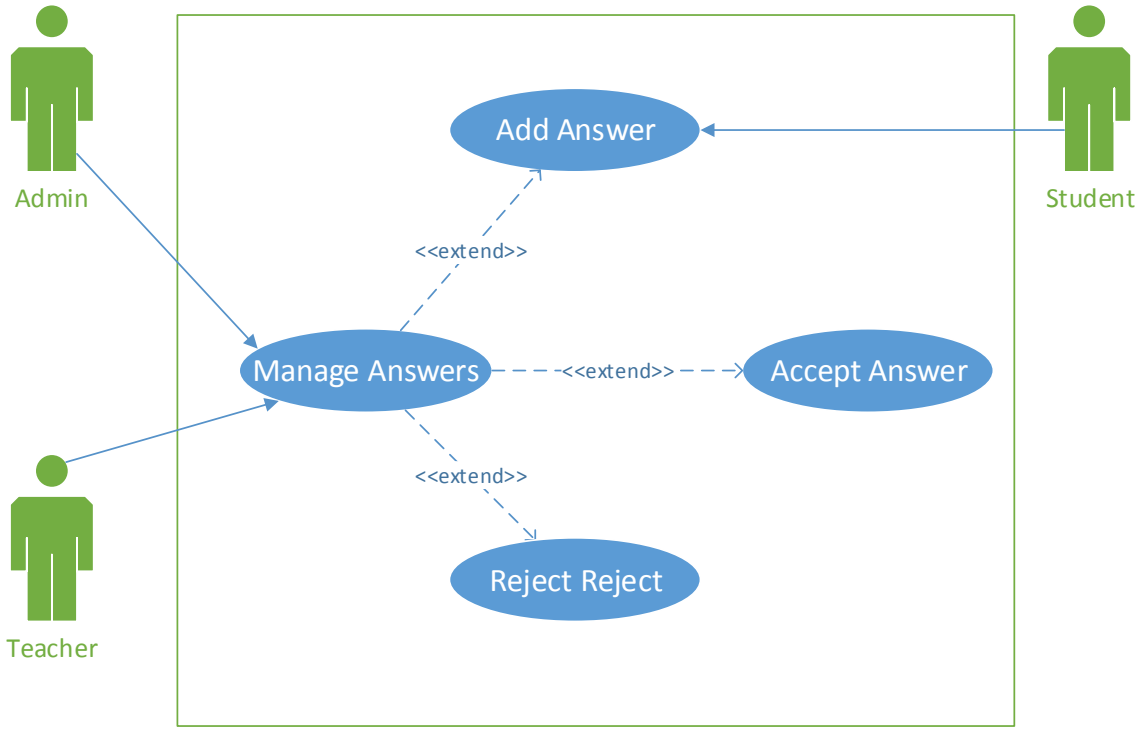

Figure 2.4 Manage Answers

Use Case	**Manage Answers**
Actor	Admin, Teacher
Type	Primary
Description	All the users expect student can manage the question by accepting or rejecting the asked questions or submitted answers. The Class representative can only manage answers and question submitted by students.

2.6.4 Manage Documents

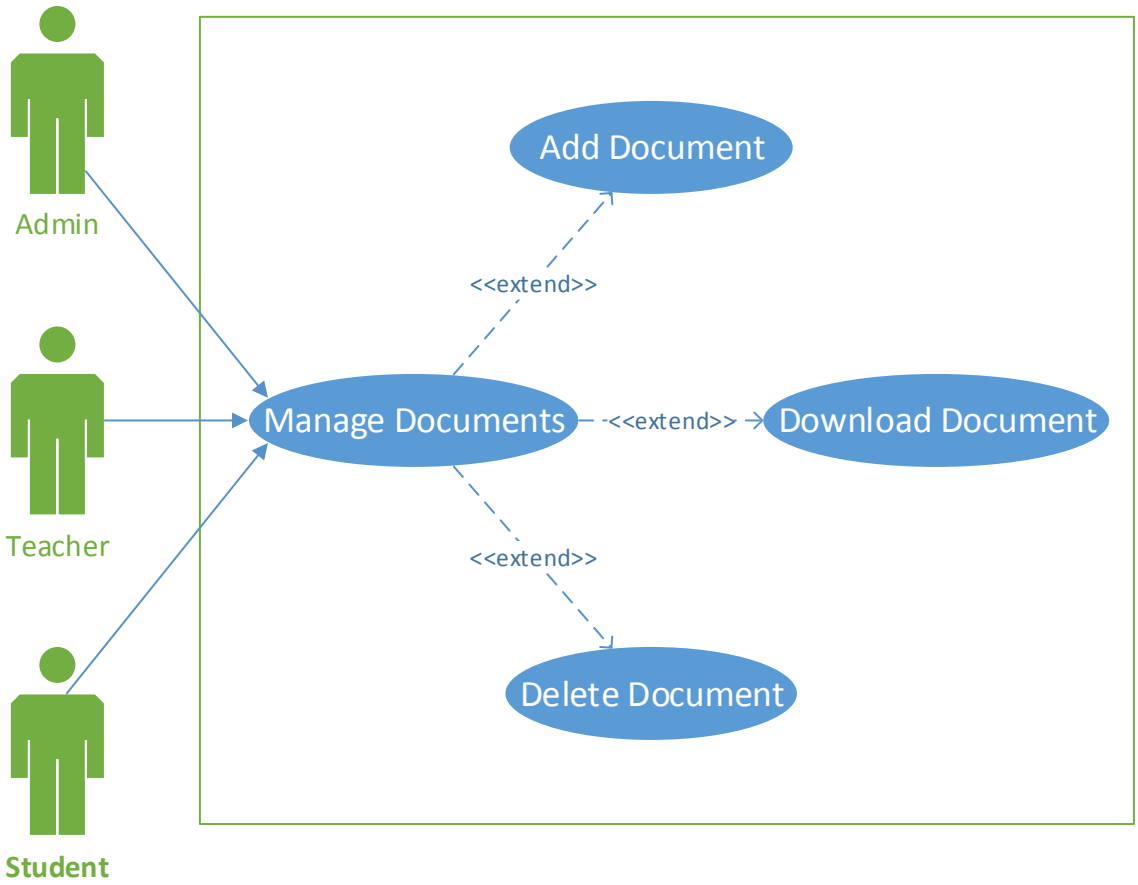

Figure 2.5 Manage Documents

Use Case	**Manage Documents**
Actor	Admin, Teacher, Student
Type	Primary
Description	All users can upload, download or delete the documents the download. Only admin can download or delete any document by any user.

2.6.5 Manage Notes

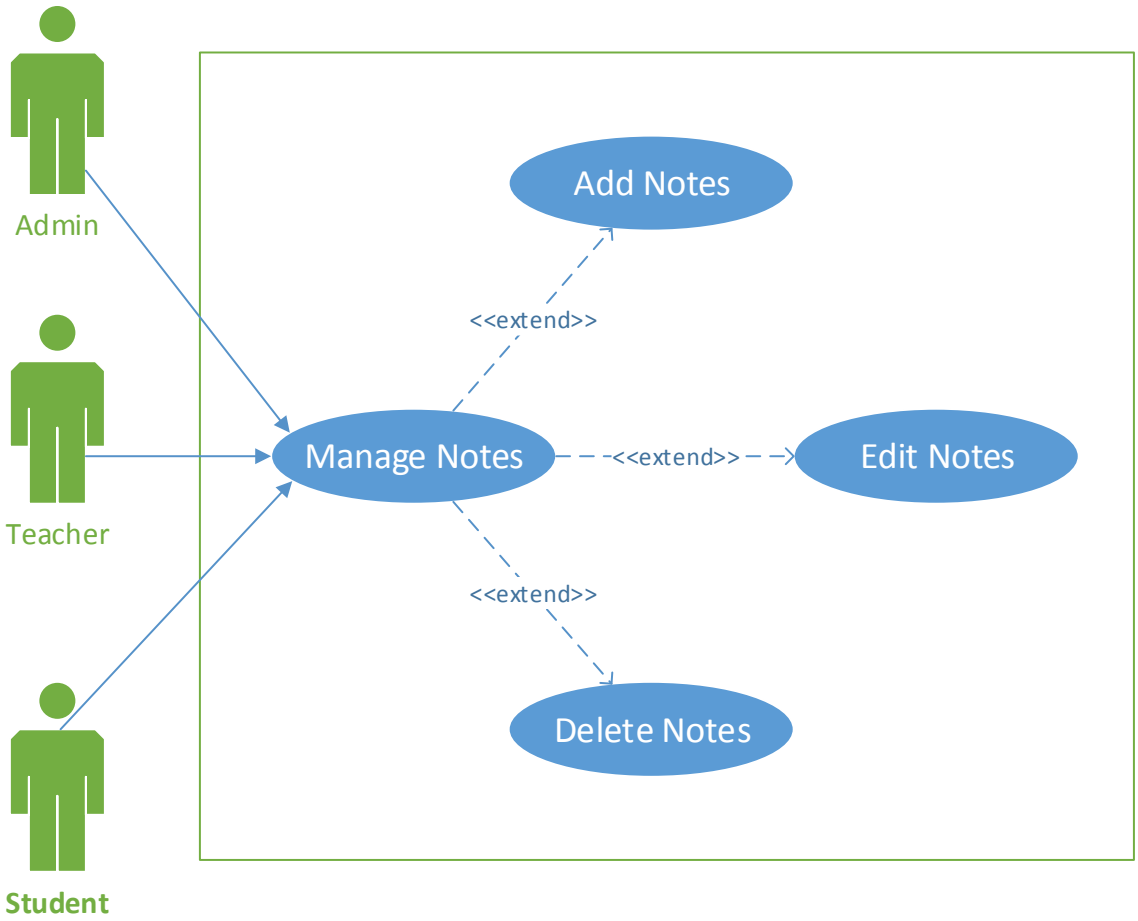

Figure 2.6 Manage Notes

Use Case	**Manage Notes**
Actor	Admin, Teacher, Teacher Assistant, Student, Class Representative
Type	Primary
Description	All users can upload, edit or delete the notes the download. Only admin can edit or delete any notes by any user.

2.6.6 Manage Users

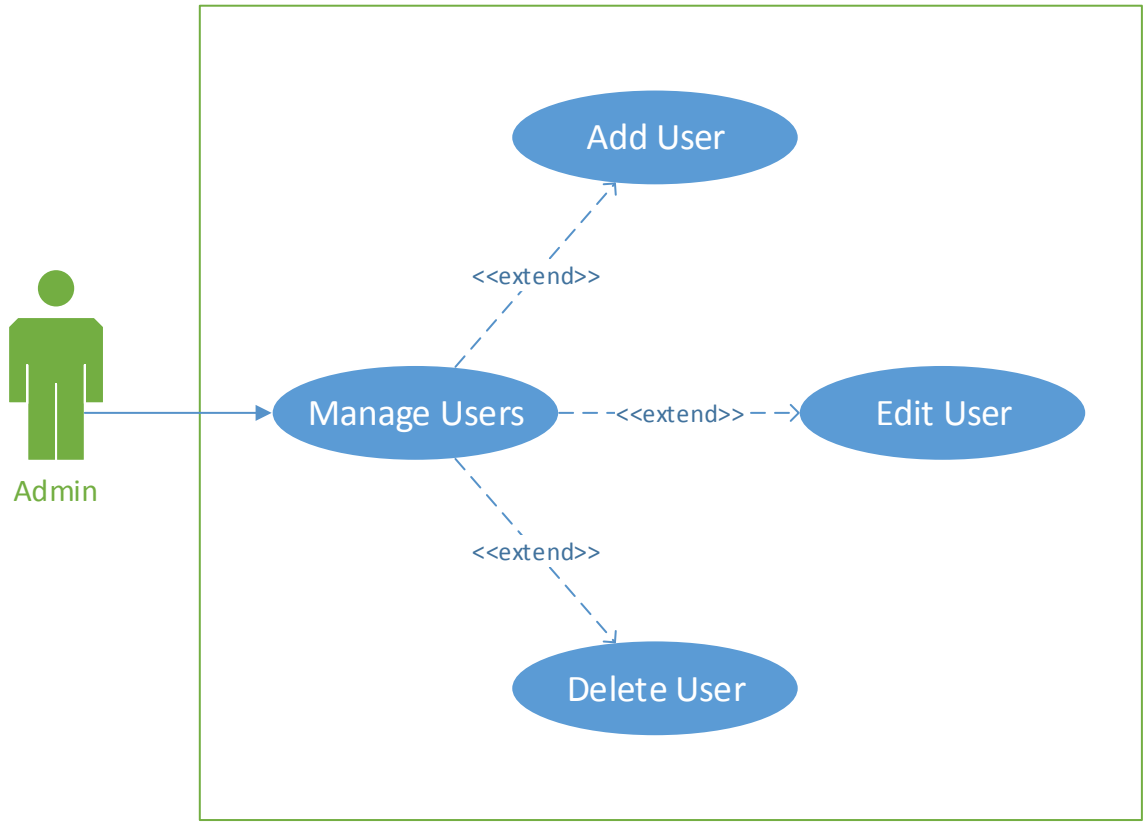

Figure 2.7 Manage Users

Use Case	**Manage Users**
Actor	Admin
Type	Primary
Description	Admin can add, edit or delete any user in the system.

2.6.7 Manage Subjects

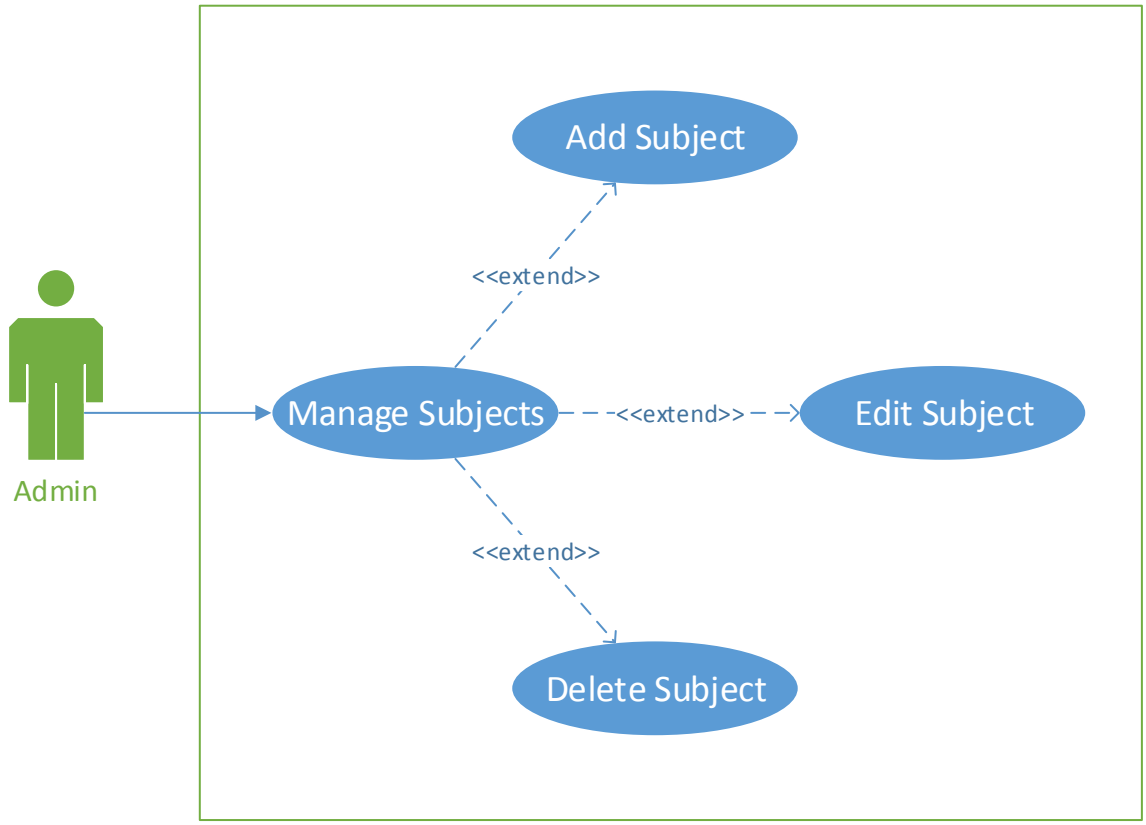

Figure 2.8 Manage Subjects

Use Case	**Manage Subjects**
Actor	Admin
Type	Primary
Description	Admin can add or delete any specific subject.

2.6.8 Manage Roles

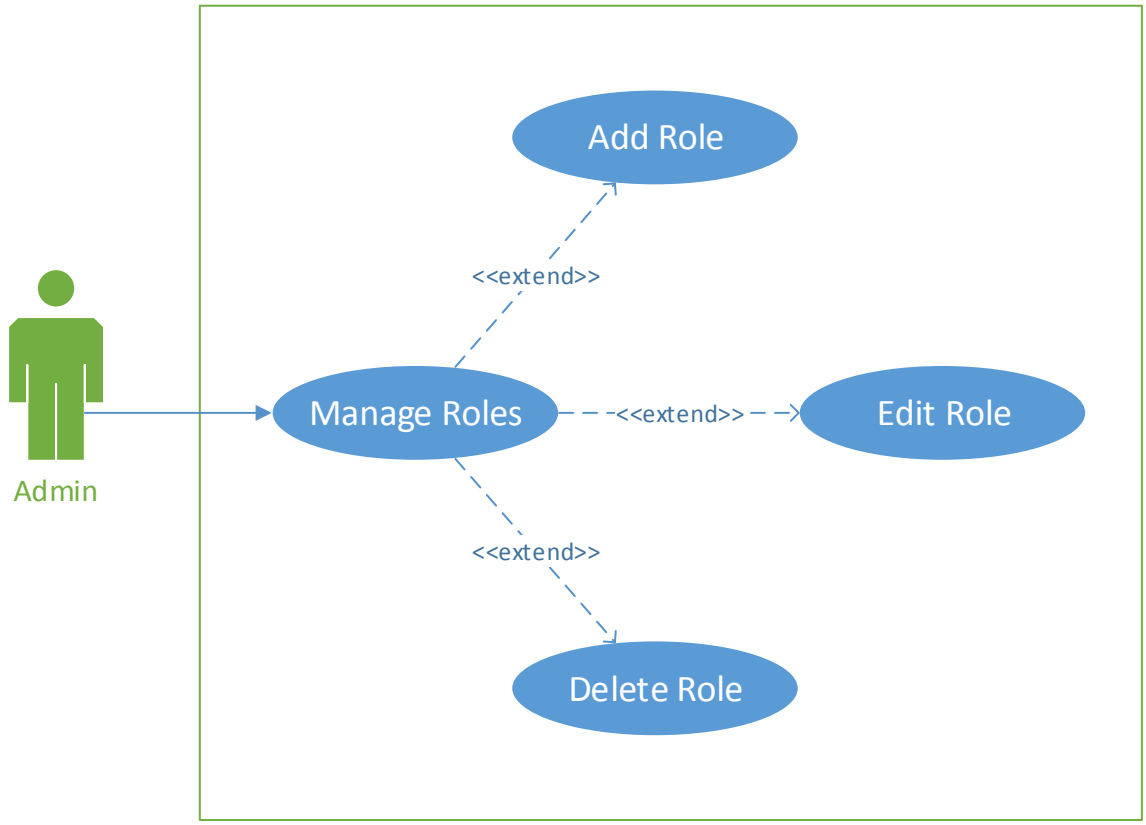

Figure 2.9 Manage Roles

Use Case	**Manage Roles**
Actor	Admin
Type	Primary
Description	Admin can assign any role to any user.

2.6.9 Assign Students

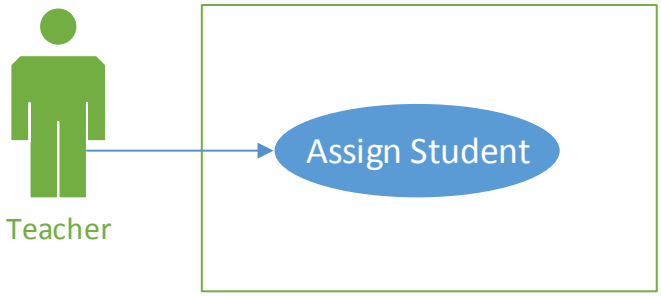

Figure 2.10 Assign Students

Use Case	**Assign Students**
Actor	Teacher
Type	Primary
Description	Teacher can assign or delete students from any subject they are already assigned.

2.6.10 Assign Subjects

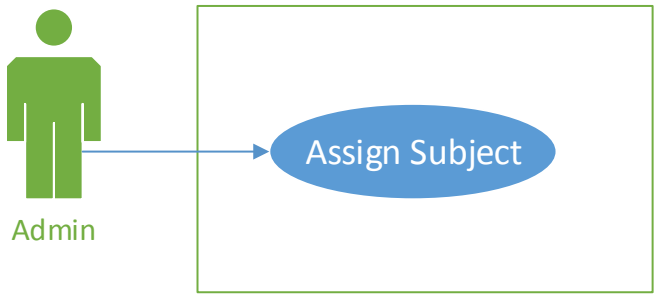

Figure 2.11 Assign Subjects

Use Case	**Assign Subjects**
Actor	Admin
Type	Primary
Description	Admin can assign or delete any subject to any teacher.

2.7 Use Cases in Expanded Format

2.7.1 Login

Use case name: Login

Actors: Admin, Teacher, Student.

Purpose: To log in the system.

Precondition: Web and Desktop Application is ready for running.

Post condition: Connection to server establishes, and user logs in successfully.

Overview: Every user is required to login before using the system. To login, user is required to provide username, password. Login information is sent to server, server verifies the login information, and the application window is displayed to the user.

Typical course of Actions

Actor's Actions	System Response
1. User enters login information (Username and Password) and clicks on Login button.	2. Following 2 responses will be generated: **i.** The system will connect to Database and check the user name and password against their user type for validity. **ii.** The system will display the application window to user.

Extensions:

1a. User left the both fields empty, or any of one left empty and press the login button

1. User enter username and password than press login button

1b. User writes any of the information wrong

1. User writes correct info and press the login button. User is login into system

2.7.2 Logout

Use case name: Logout

Actors: Admin, Teacher, Student.

Purpose: To Logout.

Precondition: Authorized user must be logged in.

Post condition: User will be successfully logged out.

Overview: To Logout the User who have been logged in.

Typical course of Actions

Actor's Actions	System Response
3. The User Presses the Logout button.	4. User logged out successfully and log in Page is shown.

2.7.3 Manage Questions

Use case name: Manage Questions

Actors: Admin, Teacher.

Purpose: To accept, reject or add new question or answer.

Precondition: Authorized user must be logged in.

Post condition Scenarios:

2.7.3.1 Add Question

Success Guarantee: New question successfully added.

Main Success Scenario:

Actor Actions	System Response
1. This use case begins when user selects add new question	2. System displays add new question form
3. User selects subject and enters the text of the required question	4. System saves the question and this use case ends

2.7.3.2 Add Question's Answer

Success Guarantee: New answer successfully added for selected question.

Main Success Scenario:

Actor Actions	System Response
1. This use case begins when user selects add new answer	2. System displays add new answer form
3. User write down the answer and select the save button	4. System saves the answer and this use case ends

2.7.3.3 Accept Question

Success Guarantee: New question asked is successfully accepted and listed in the suggested questions.

Main Success Scenario:

Actor Actions	System Response
1. This use case begins when user selects manage questions	2. System displays table with all pending questions and buttons to accept or reject
3. User selects the accept link	4. System saves the question's status as accepted and this use case ends

2.7.3.4 Accept Answer

Success Guarantee: New answer is successfully listed under the specific question

Main Success Scenario:

Actor Actions	System Response
1. This use case begins when user selects manage answers	2. System displays table with all pending answers and buttons to accept or reject
3. User selects the accept link	4. System saves the answer's status as accepted and this use case ends

2.7.3.5 Reject Question

Success Guarantee: New question is rejected and will not be listed in the suggestions

Main Success Scenario:

Actor Actions	System Response
1. This use case begins when user selects manage questions	2. System displays table with all pending questions and buttons to accept or reject
3. User selects the reject link	4. System saves the question's status as rejected and this use case ends

2.7.3.6 Reject Answer

Success Guarantee: New answer is rejected and will not be listed under a specified question

Main Success Scenario:

Actor Actions	System Response

1. This use case begins when user selects manage questions	2. System displays table with all pending answers and buttons to accept or reject
3. User selects the reject link	4. System saves the answer's status as rejected and this use case ends

2.7.4 Manage Profile

Use case name: Manage Profile

Actors: Admin, Teacher, Student.

Purpose: To manage the profile

Precondition: Authorized user must be logged in

Post condition Scenarios:

2.7.4.1 View Profile

Success Guarantee: New profile viewed

Main Success Scenario:

Actor Actions	System Response
1. This use case begins when user selects view profile	2. System displays profile and this use case ends here

Extensions:

2a. New profile is not added

1. User adds new profile

2b. Database connection loss

2.7.4.2 Edit Profile

Success Guarantee: Profile updated

Main Success Scenario:

Actor Actions	System Response
1. This use case begins when user clicks on edit profile	2. System displays edit profile form
3. User edits his profile, changes info and submits as update	4. System saves the profile new info and this use case ends

Extensions:

4a. Database connection loss

1. Do step 1 to 3

2.7.4.3 Change Profile Picture

Success Guarantee: Profile picture updated

Main Success Scenario:

Actor Actions	System Response
1. This use case begins when user clicks on change profile picture	2. System displays change profile picture form
3. User selects new profile picture and submits as update	4. System saves the new profile picture and this use case ends

Extensions:

4a. Database connection loss

2. Do step 1 to 3

2.7.4.4 Change Password

Success Guarantee: Password updated

Main Success Scenario:

Actor Actions	System Response
1. This use case begins when user clicks on change password	2. System displays change password form
3. User changes the password and submits as update	4. System saves the new password and this use case ends

Extensions:

4a. Database connection loss

3. Do step 1 to 3

2.7.5 Manage Documents

Use case name: Manage Documents

Actors: Admin, Teacher, Student.

Purpose: To add, edit or delete the document.

Precondition: Authorized user must be logged in.

Post condition Scenarios:

2.7.5.1 Add Document

Success Guarantee: New document successfully added.

Main Success Scenario:

Actor Actions	System Response
1. This use case begins when user selects add new document	2. System displays add new document form
3. User selects subject and upload the required document	4. System saves the document against the user and this use case ends

2.7.5.2 Download Document

Success Guarantee: Document is successfully downloaded

Main Success Scenario:

Actor Actions	System Response
1. This use case begins when user selects download document	2. System displays download document confirm box
3. User confirms the download operation	4. Document is successfully downloaded and this use case ends

2.7.5.3 Delete Document

Success Guarantee: Document is successfully deleted

Main Success Scenario:

Actor Actions	System Response
1. This use case begins when user delete document	2. System displays delete document confirm box
3. User confirms the delete operation	4. Document is successfully deleted and this use case ends

2.7.6 Manage Notes

Use case name: Manage Notes

Actors: Admin, Teacher, Student.

Purpose: To add, edit or delete the notes.

Precondition: Authorized user must be logged in.

Post condition Scenarios:

2.7.6.1 Add Notes

Success Guarantee: New notes successfully added.

Main Success Scenario:

Actor Actions	System Response
1. This use case begins when user selects add new notes	2. System displays add new notes form
3. User selects subject and write the notes content	4. System saves the notes against the user and this use case ends

2.7.6.2 Edit Notes

Success Guarantee: Notes are successfully updated

Main Success Scenario:

Actor Actions	System Response
1. This use case begins when user selects edit notes	2. System displays edit notes form to user
3. User updates the required fields of the notes	4. Notes are successfully edited and updated and this use case ends

2.7.6.3 Delete Notes

Success Guarantee: Notes is successfully deleted
Main Success Scenario:

Actor Actions	System Response
1. This use case begins when user delete notes	2. System displays delete notes confirm box
3. User confirms the delete operation	4. Notes are successfully deleted and this use case ends

2.7.7 Manage Users

Use case name: Manage Users

Actors: Admin.

Purpose: To add, edit or delete the users in the system.

Precondition: Authorized user must be logged in.

Post condition Scenarios:

2.7.7.1 Add User

Success Guarantee: New user successfully added.

Main Success Scenario:

Actor Actions	System Response
1. This use case begins when admin selects add new user	2. System displays add new user form
3. Admin fill the required form and select create user	4. System saves the user and this use case ends

2.7.7.2 Edit User

Success Guarantee: User is successfully updated.

Main Success Scenario:

Actor Actions	System Response
1. This use case begins when admin selects edit user	2. System displays edit user form
3. Admin updates the information of a specific user and select update	4. System updates the information against the selected user and this use case ends

2.7.7.3 Delete User

Success Guarantee: User is successfully deleted

Main Success Scenario:

Actor Actions	System Response
1. This use case begins when Admin selects delete user option	2. System displays delete user confirm box
3. Admin confirms the delete operation	4. User is successfully deleted and this use case ends

2.7.8 Manage Subject

Use case name: Manage Subjects

Actors: Admin.

Purpose: To add, edit or delete the subjects in the system

Precondition: Authorized user must be logged in.

Post condition Scenarios:

2.7.8.1 Add Subject

Success Guarantee: New subject is successfully added.

Main Success Scenario:

Actor Actions	System Response
1. This use case begins when admin selects add new subject	2. System displays add new subject form
3. Admin fill the form with the required data and select add subject	4. System saves the subject and this use case ends

2.7.8.2 Edit Subject

Success Guarantee: Subject is successfully updated.

Main Success Scenario:

Actor Actions	System Response
1. This use case begins when admin selects edit subject	2. System displays edit subject form
3. Admin updates the information of a specific subject and select update	4. System updates the information against the selected subject and this use case ends

2.7.8.3 Delete Subject

Success Guarantee: Subject is successfully deleted

Main Success Scenario:

Actor Actions	System Response
1. This use case begins when Admin selects delete subject option	2. System displays delete subject confirm box
3. Admin confirms the delete operation	4. Subject is successfully deleted and this use case ends

2.7.9 Manage Roles

Use case name: Manage Roles

Actors: Admin.

Purpose: To add, edit or delete the roles in the system

Precondition: Authorized user must be logged in.

Post condition Scenarios:

2.7.9.1 Add Role

Success Guarantee: New role is successfully added.

Main Success Scenario:

Actor Actions	System Response
1. This use case begins when admin selects add new role	2. System displays add new role form
3. Admin fill the form with the required data and select add role	4. System saves the role and this use case ends

2.7.9.2 Edit Role

Success Guarantee: Role is successfully updated.

Main Success Scenario:

Actor Actions	System Response
1. This use case begins when admin selects edit role	2. System displays edit role form
3. Admin updates the information of a specific role and select update	4. System updates the information against the selected role and this use case ends

2.7.9.3 Delete Role

Success Guarantee: Role is successfully deleted

Main Success Scenario:

Actor Actions	System Response
1. This use case begins when Admin selects delete role option	2. System displays delete role confirm box
3. Admin confirms the delete operation	4. Role is successfully deleted and this use case ends

2.7.10 Assign Student

Use case name: Assign Student

Actors: Teacher.

Purpose: To assign a new student into a specific subject.

Precondition: Authorized user must be logged in.

Post condition: Connection to server establishes, and user logs in successfully.

Typical course of Actions

Actor's Actions	System Response
1. This use case starts when teacher selects the assign student button	2. System displays the assign new student in a subject form
3. Teacher selects the subject from the dropdown list	4. System takes the subject ID
5. Teacher selects the student from the dropdown list	6. System takes the student ID
7. Teacher selects the assign button	8. Student is assigned against the selected subject and this use case ends

2.7.11 Assign Subject

Use case name: Assign Subject

Actors: Admin.

Purpose: To assign a new subject to a specific teacher.

Precondition: Authorized user must be logged in.

Post condition: Connection to server establishes, and user logs in successfully.

Typical course of Actions

Actor's Actions	System Response
1. This use case starts when Admin selects the assign Teacher button	2. System displays the assign new teacher to a subject form
3. Admin selects the subject from the dropdown list	4. System takes the subject ID
5. Admin selects the teacher from the dropdown list	6. System takes the teacher ID
7. Admin selects the assign button	8. Teacher is assigned against the selected subject and this use case ends

Chapter 3
System Design

3 System Design

3.1 Domain Model

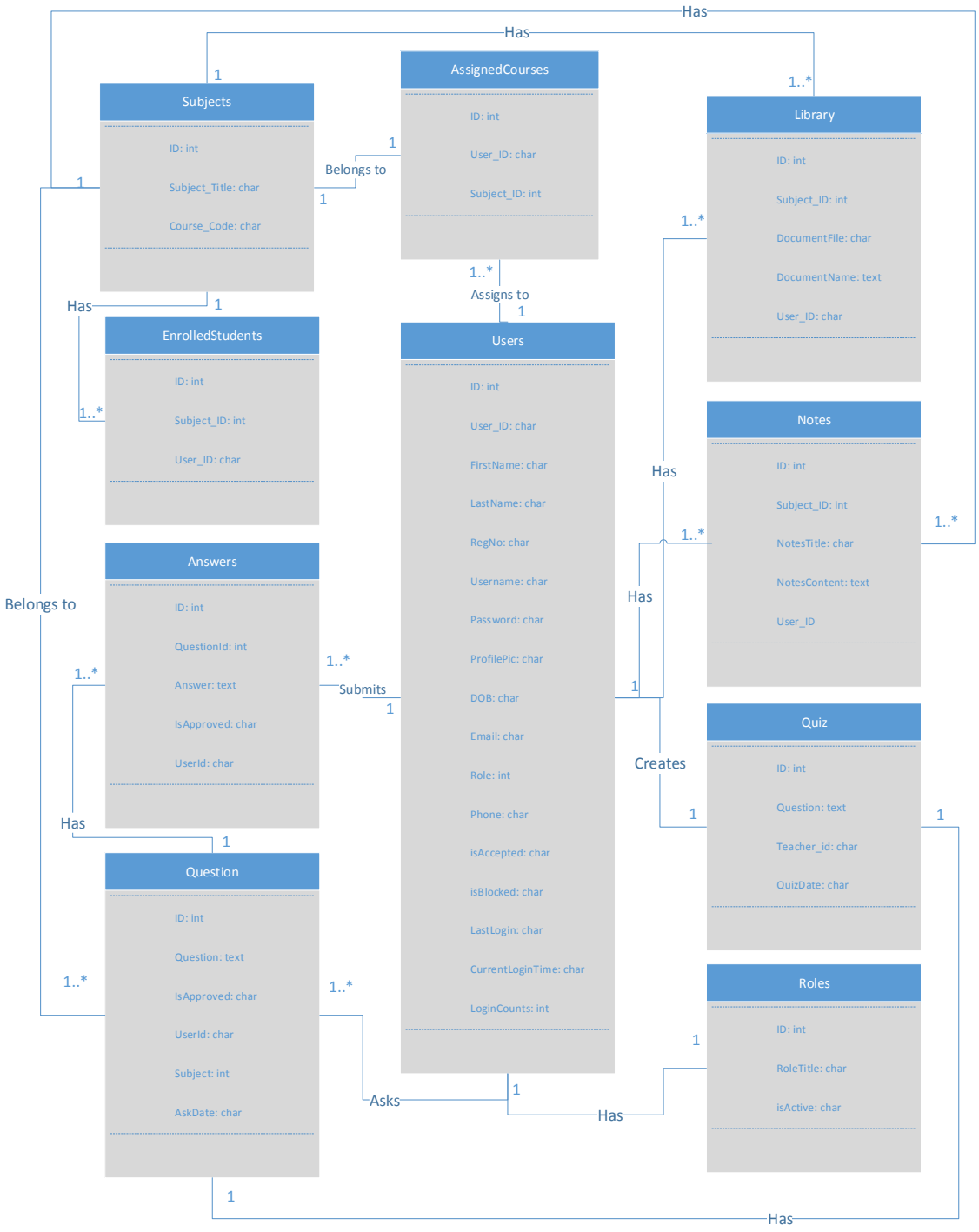

Figure 3.1 Domain Model

3.2 Entity Relationship Diagram

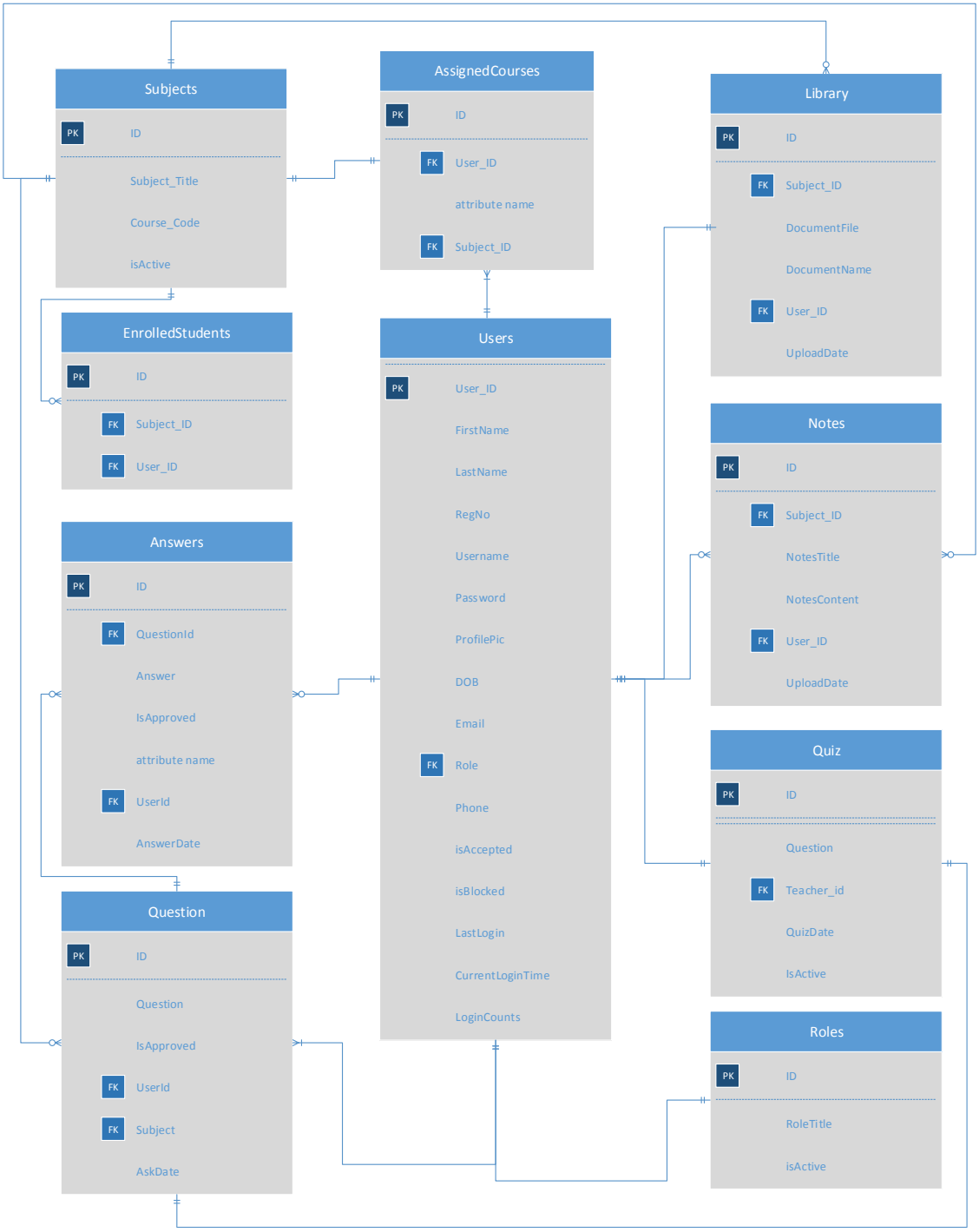

Figure 3.2 Entity Relationship Diagram

3.3 Work Breakdown Structure (WBS)

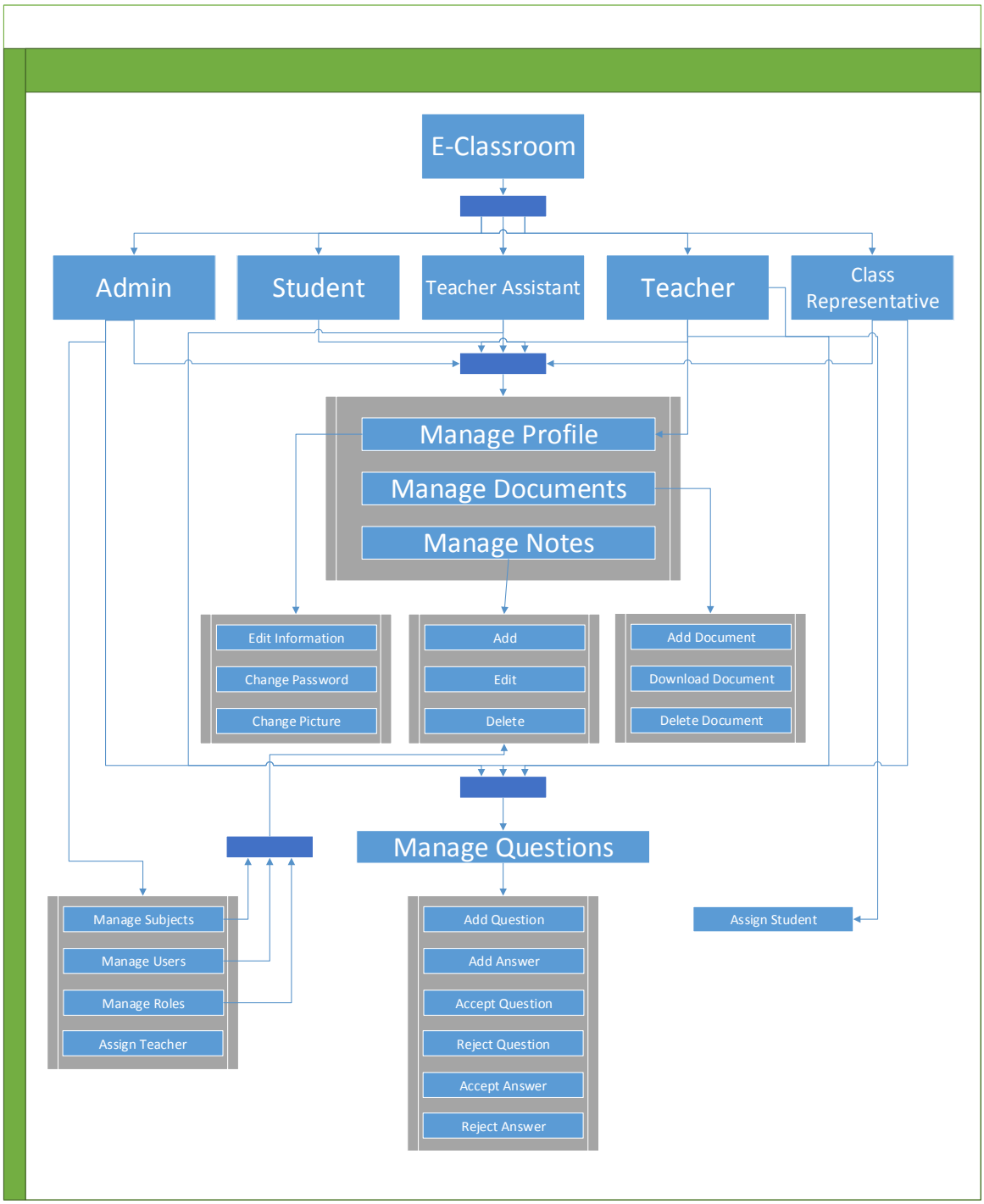

Figure 3.3 Work Breakdown Structure (WBS)

3.4 Network Diagram

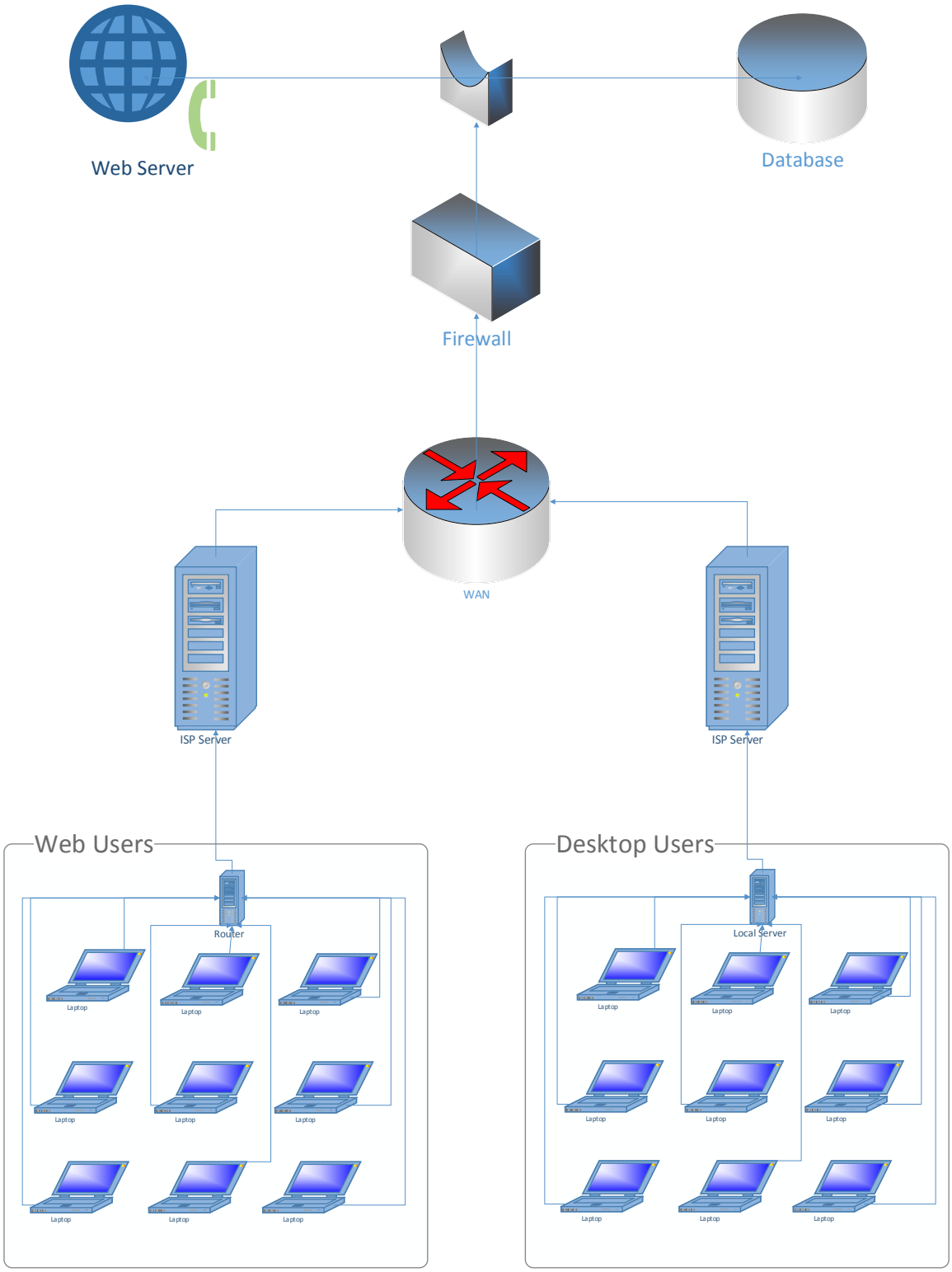

Figure 3.4 Network Diagram

3.5 Class Diagram

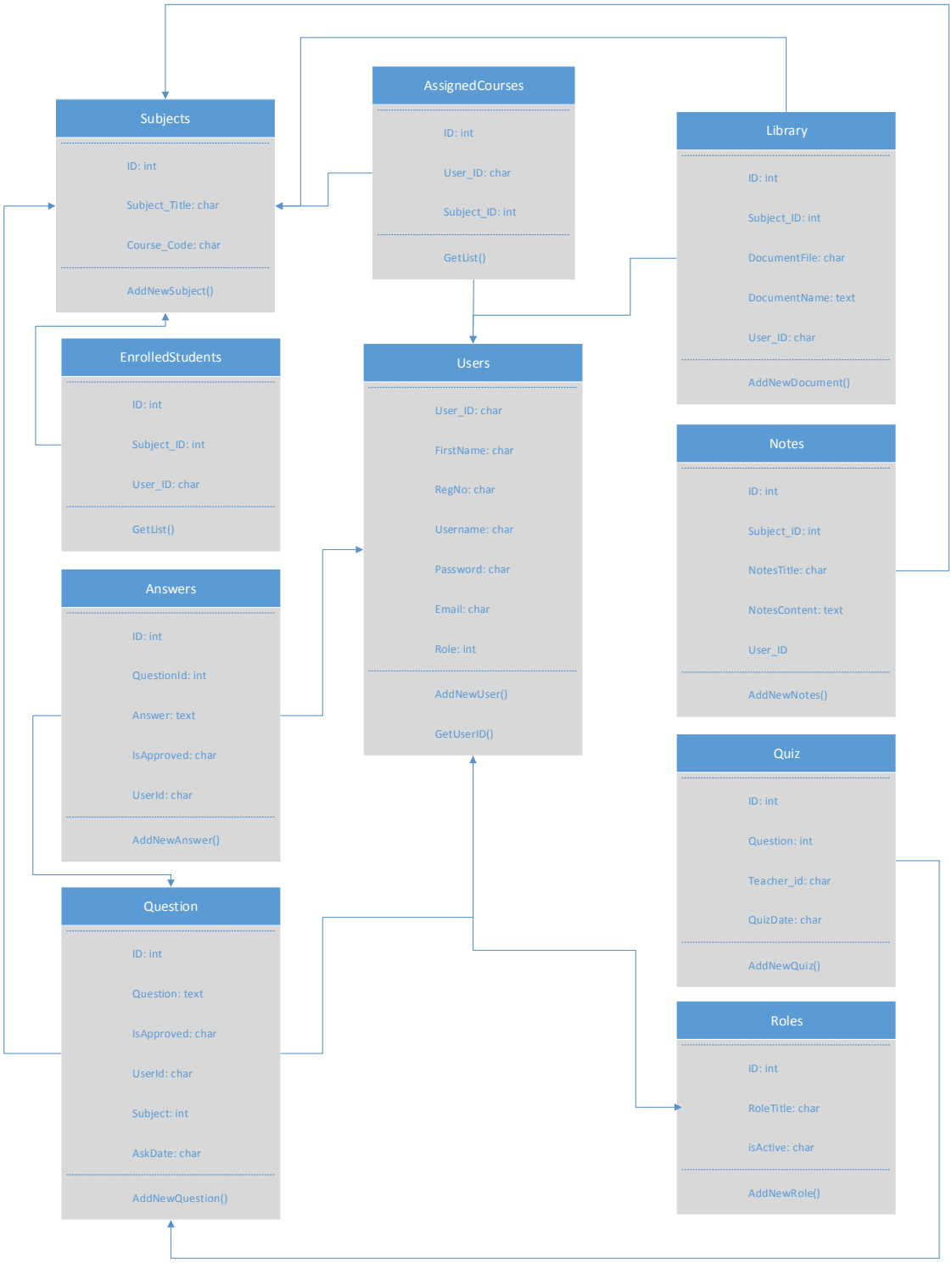

Figure 3.5 Class Diagram

3.6 Sequence Diagrams

3.6.1 Manage Questions

3.6.1.1 Add New Question

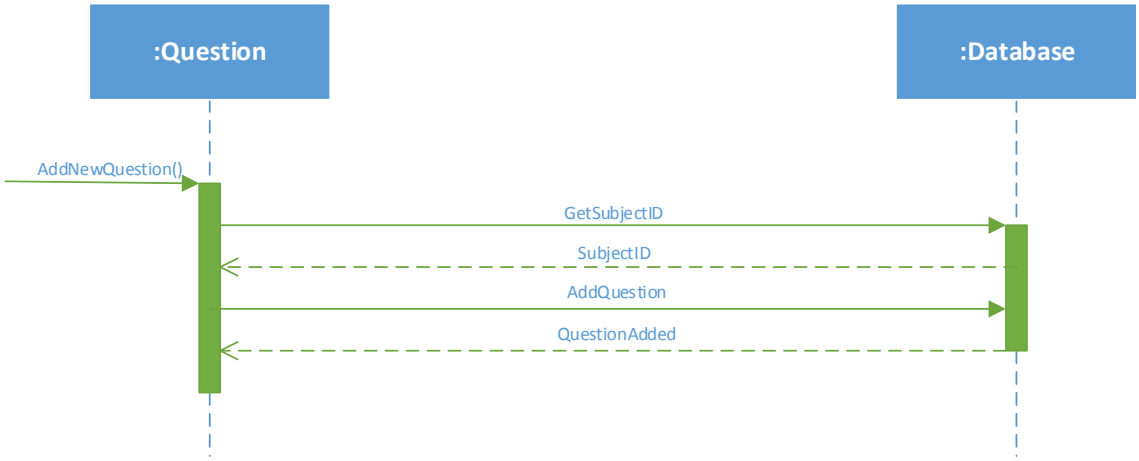

Figure 3.6 SD: Add New Question

3.6.1.2 Edit Question

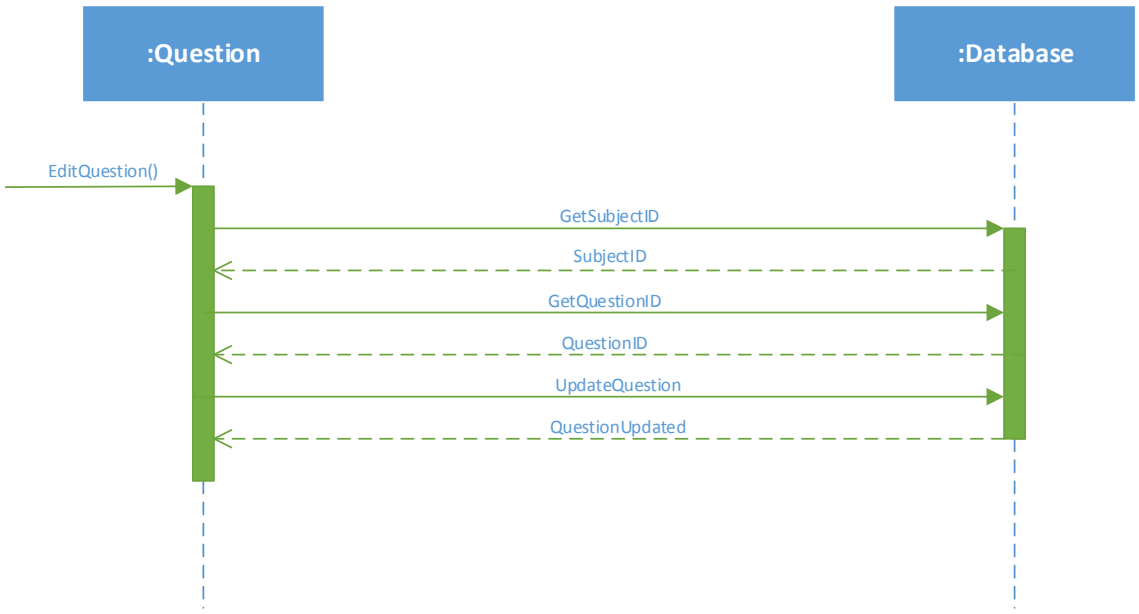

Figure 3.7 SD: Edit Question

3.6.1.3 Approve Question

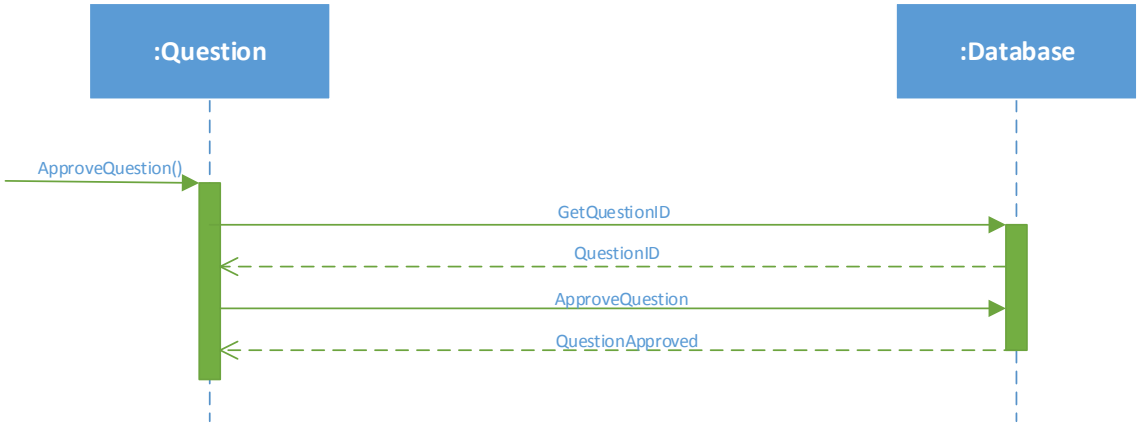

Figure 3.8 SD: Approve Question

3.6.1.4 Reject Question

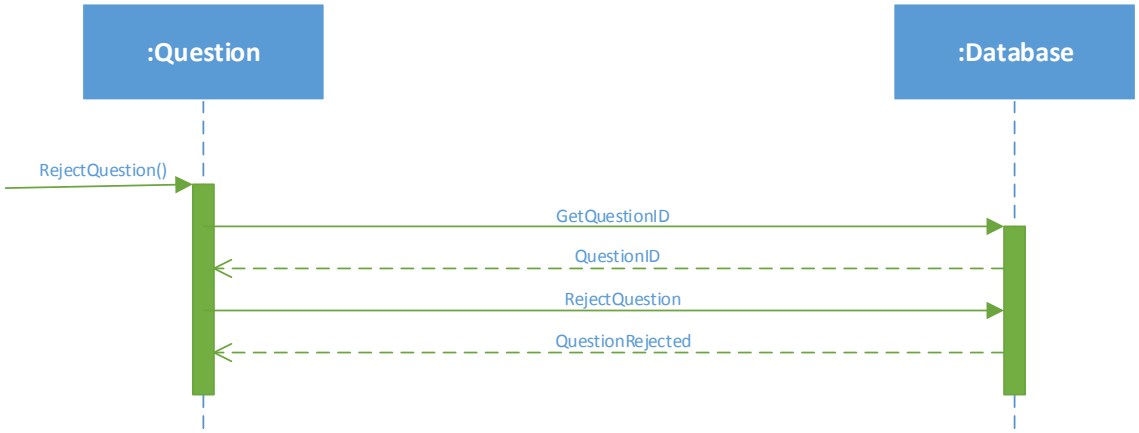

Figure 3.9 SF: Reject Question

3.6.2 Manage Answers

3.6.2.1 Add New Answer

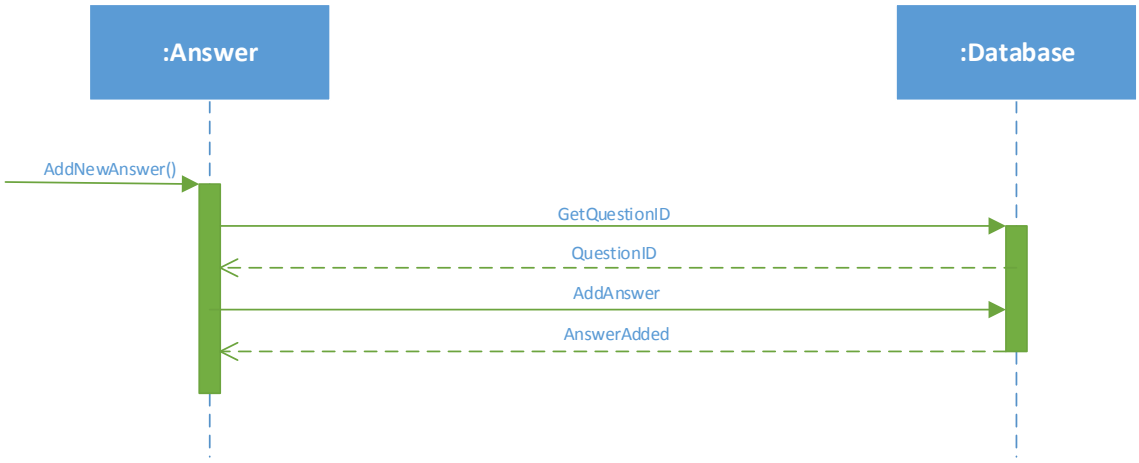

Figure 3.10 SD: Add New Answer

3.6.2.2 Approve Answer

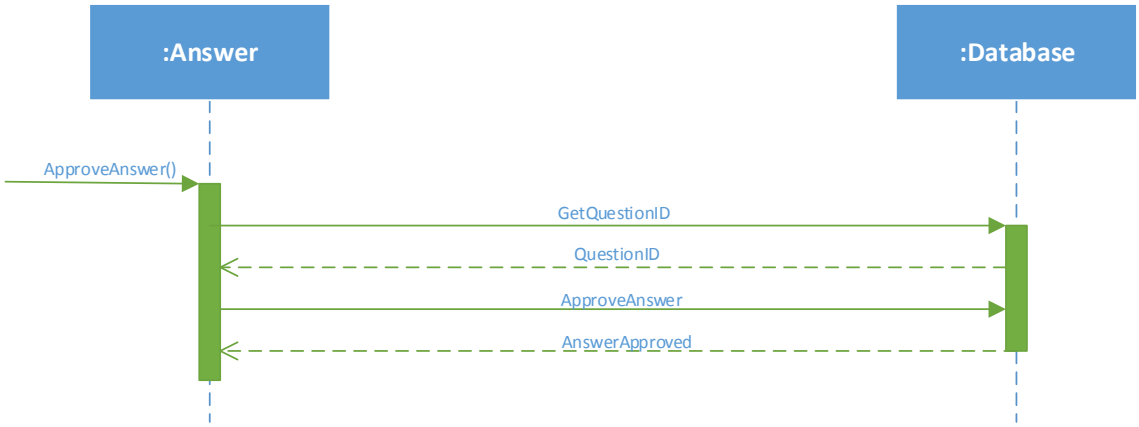

Figure 3.11 SD: Approve Answer

3.6.2.3 Reject Answer

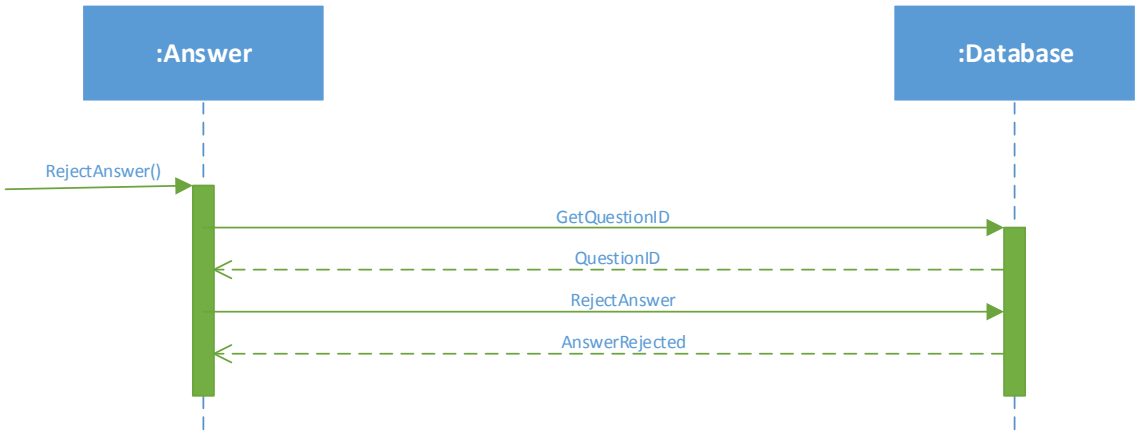

Figure 3.12 SD: Reject Answer

3.6.3 Manage Profile

3.6.3.1 Update Profile

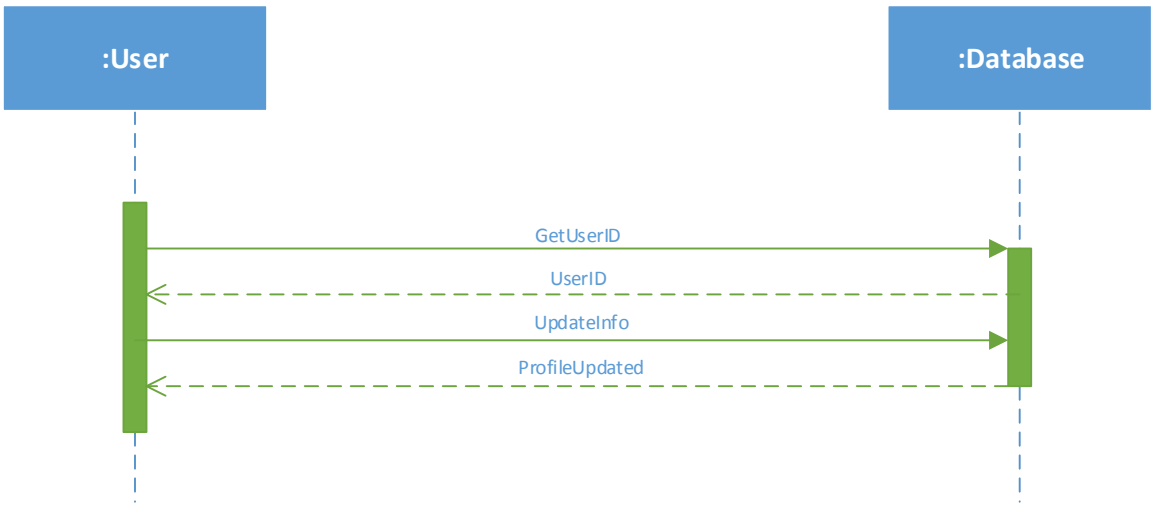

Figure 3.13 SD: Update Profile

3.6.3.2 Update Password

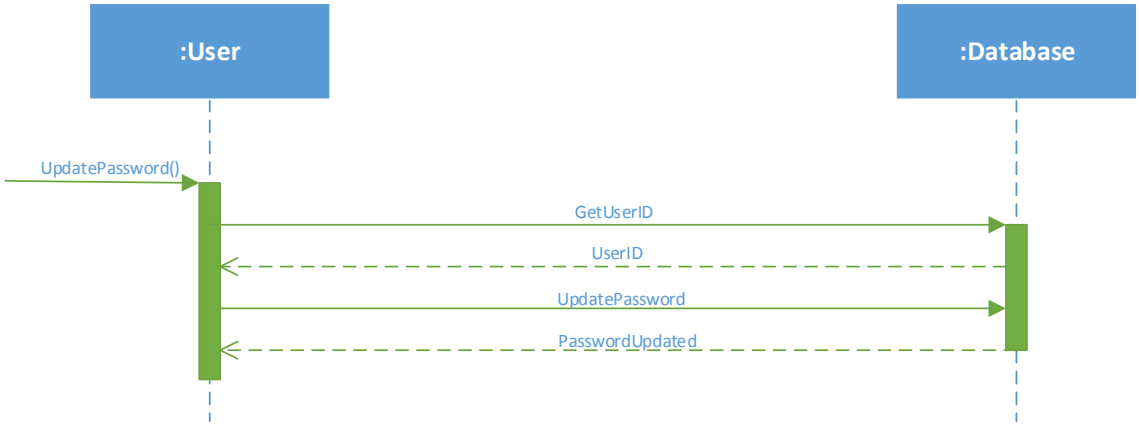

Figure 3.14 SD: Update Password

3.6.3.3 Change Profile Picture

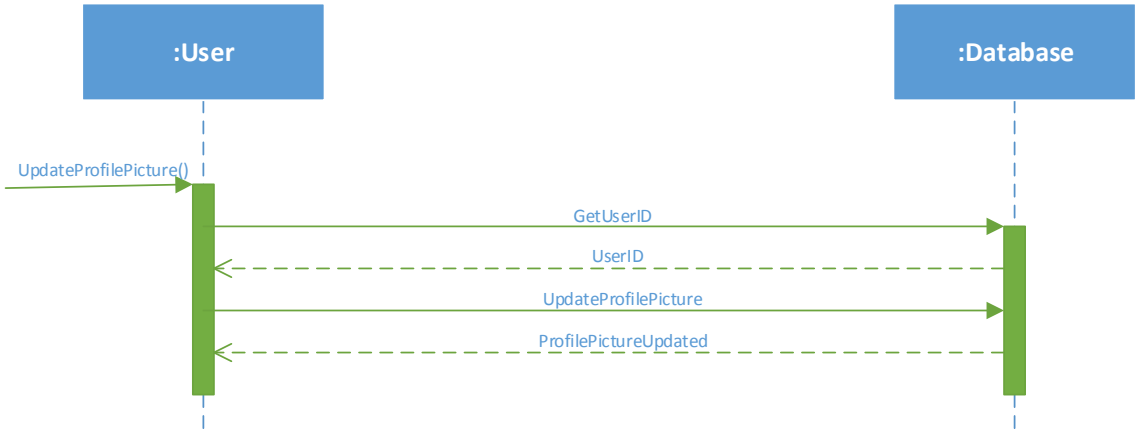

Figure 3.15 SD: Change Profile Picture

3.6.4 Manage Documents

3.6.4.1 Add New Document

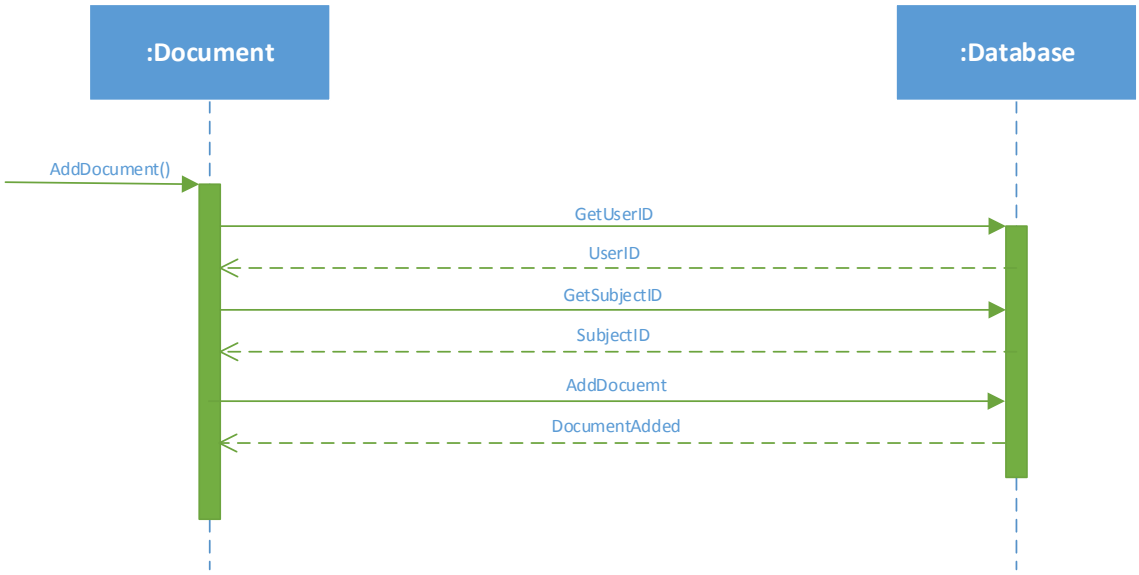

Figure 3.16 SD: Add New Document

3.6.4.2 Download Document

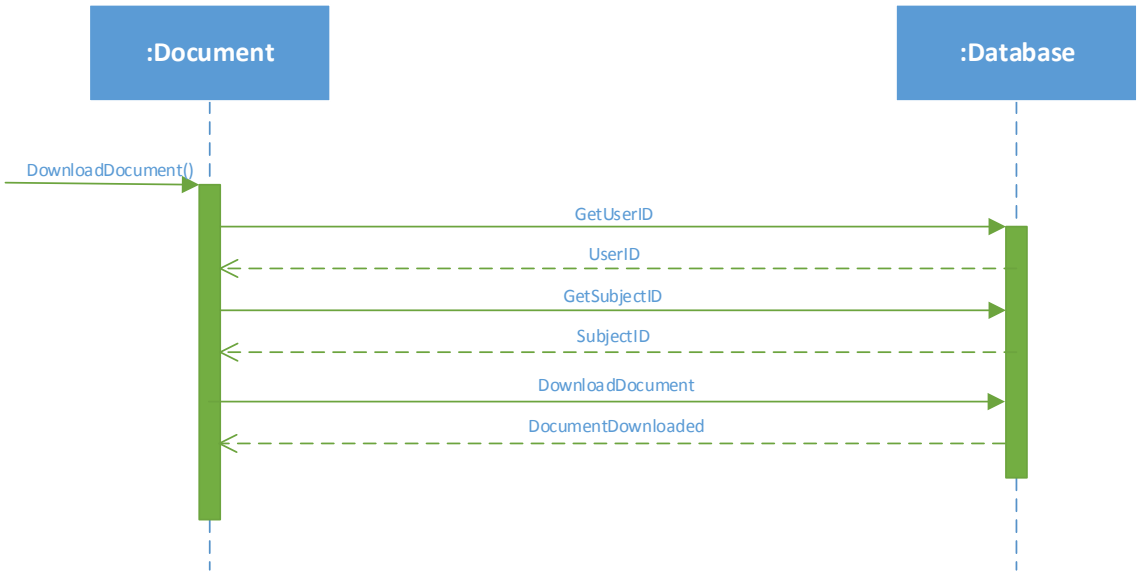

Figure 3.17 SD: Download Document

3.6.4.3 Delete Document

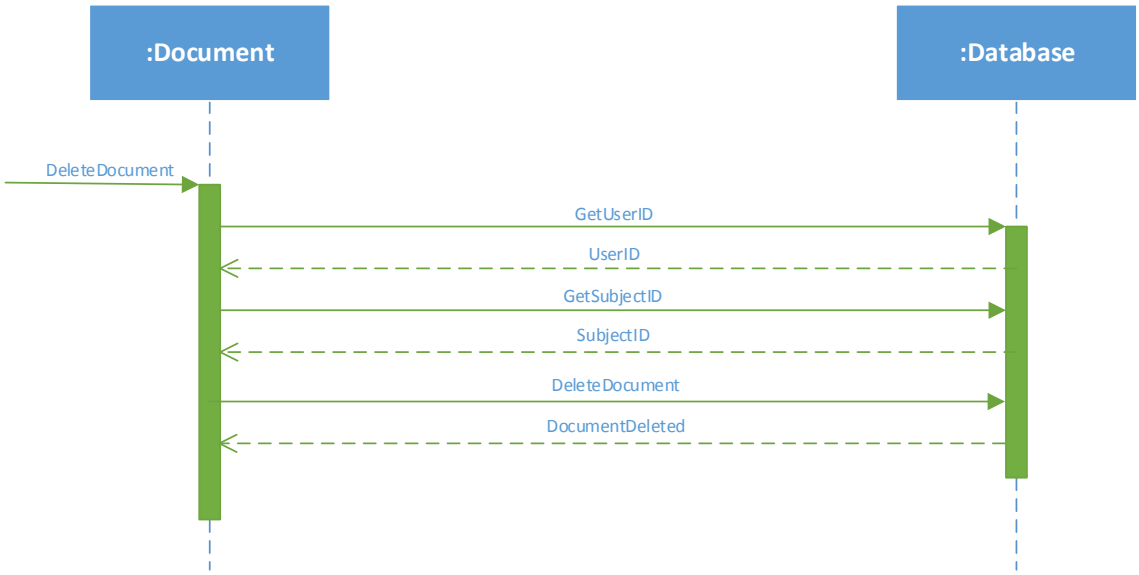

Figure 3.18 SD: Delete Document

3.6.5 Manage Notes

3.6.5.1 Add New Notes

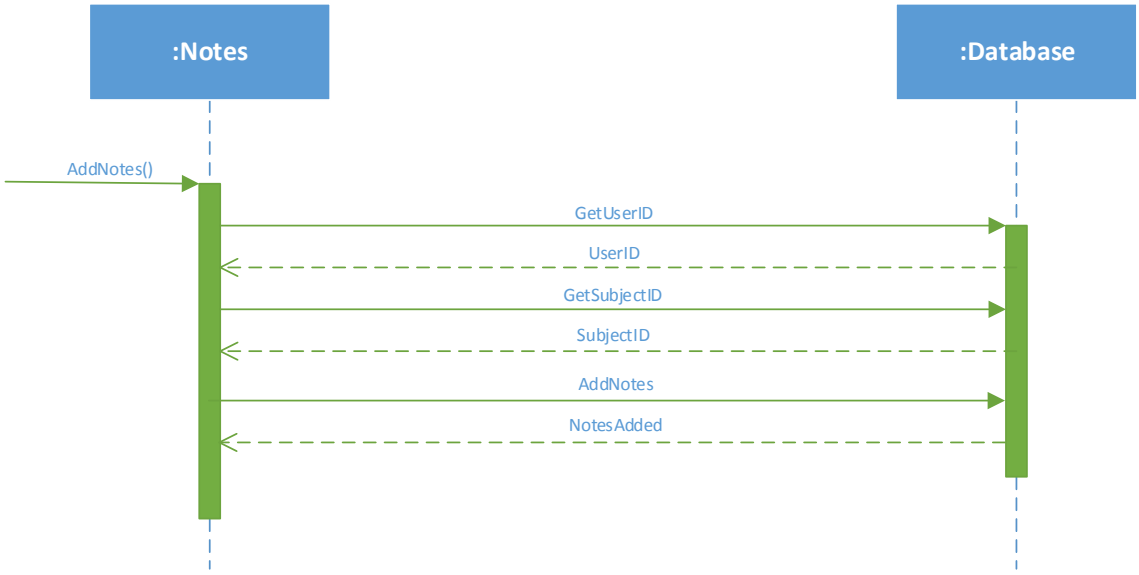

Figure 3.19 SD: Add New Notes

3.6.5.2 Edit Notes

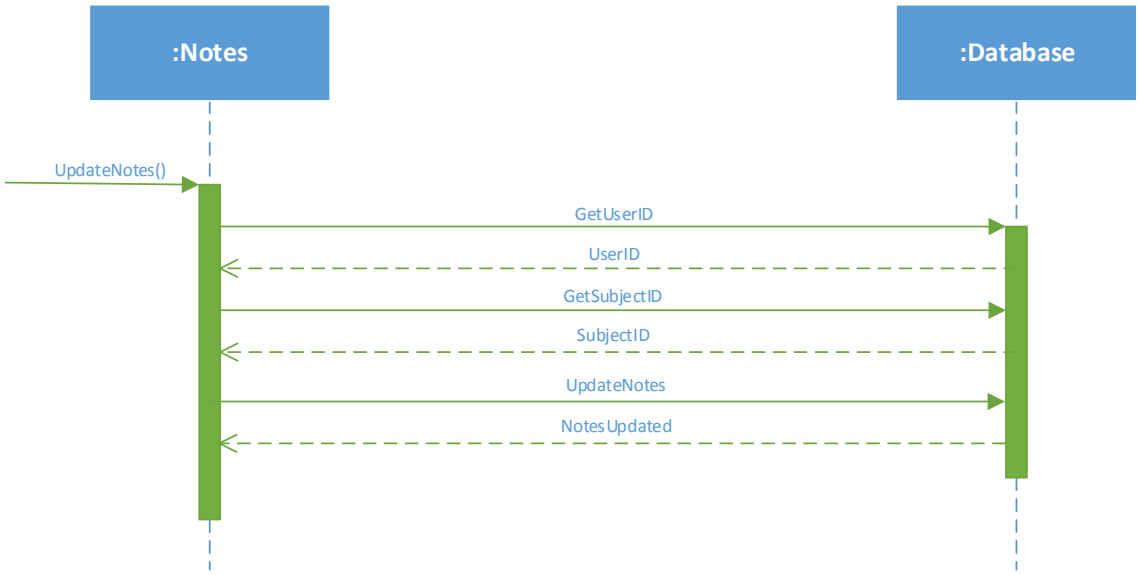

Figure 3.20 SD: Edit Notes

3.6.5.3 Delete Notes

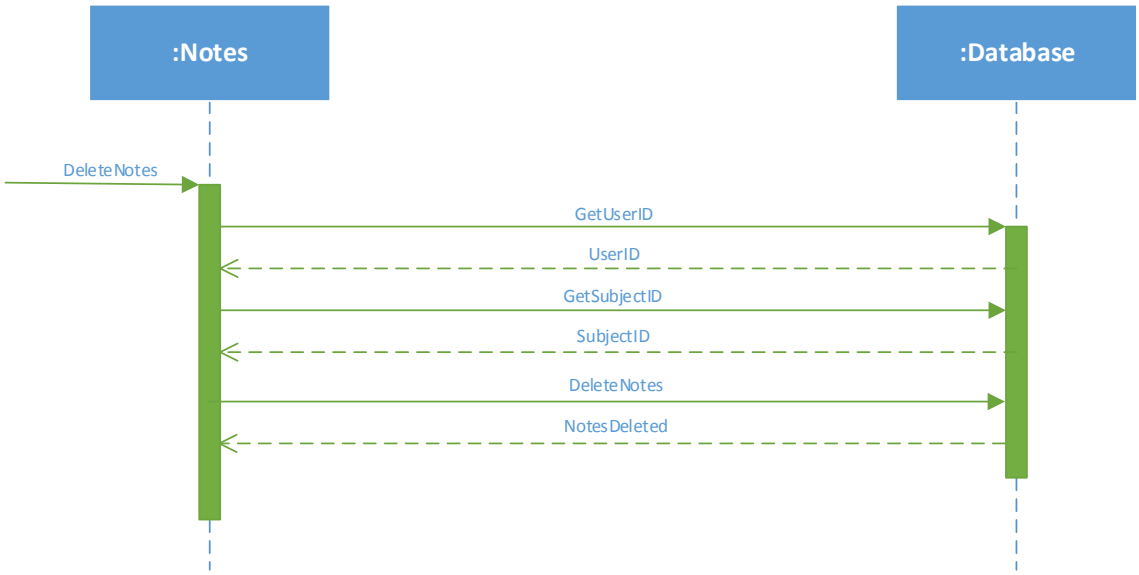

Figure 3.21 SD: Delete Notes

Chapter 4

System Implementation

4 Implementation

This chapter is about the overview of the technologies used to develop this project. Implementation is the important phase of software development life cycle where the thoughts and ideas are given a physical existence. It is just like making your dreams true. It is the time when software development progress in a full swing manner. An application is a result of a successful implementation.

During implementation, developers translate the object model in to source code. This includes implementing the attributes and methods of each object and integrating all the objects such that they function as a single system. The implementation activity span the gap between the detailed object design model and a complete set of source code files that can be compiled together.

4.1 Purpose

System implementation is the important stage of project when the theoretical design is tuned into practical system. The main stages in the implementation are as follows:

1. Planning
2. Training
3. System testing and

Changeover Planning is the first task in the system implementation. At the time of implementation of any system people from different departments and system analysis involve. They are confirmed to practical problem of controlling various activities of people outside their own data processing departments. The line managers controlled through an implementation coordinating committee. The committee considers ideas, problems and complaints of user department, it must also consider:

1. The implication of system environment
2. Self-selection and allocation for implementation tasks
3. Consultation with unions and resources available

Standby facilities and channels of communication E-Classroom for Interactive and Connected Learning will implement user details, subject's details, separate login details, and asked question details. It will used to answer subject specific questions .This application elaborate asked questions and their answers, and show them in a forum type view to the end user. Mostly this application will get the data from users of different roles.

4.2 System Maintenance

Software maintenance is far more than finding mistakes. Provision must be made for environment changes, which may affect either the computer, or other parts of the computer based systems. Such activity is normally called maintenance. It includes both the improvement of the system functions and the corrections of faults, which arise during the operation of a new system.

It may involve the continuing involvement of a large proportion of computer department recourses. The main task may be to adapt existing systems in a changing environment.

Back up for the entire database files are taken and stored in storage devices like flash drives, pen drives and disks so that it is possible to restore the system at the earliest. If there is a breakdown or collapse, then the system gives provision to restore database files. Storing data in a separate secondary device leads to an effective and efficient maintains of the system. The nominated person has sufficient knowledge of the organization's computer passed based system to be able to judge the relevance of each proposed change.

4.3 Tools & Technologies

Following are the tools & technologies are used in these projects:

1. PHP
2. Bootstrap 3
3. XAMPP Server
4. MySQL Management Studio
5. C# WPF
6. HTML
7. CSS
8. JQuery
9. JavaScript
10. JSON
11. AJAX

Chapter 5
System Testing

5 Testing

Software testing is an empirical investigation conducted to provide stakeholders with information about the quality of the product or service under test. Software Testing also provides an objective, independent view of the software to allow the business to appreciate and understand the risks at implementation of the software. Test techniques include, but are not limited to, the process of executing a program or application with the intent of finding software bugs.

Testing is the process of detecting errors. Testing plays a critical role in assuring quality and reliability of software. The results of testing are used later on during maintenance also.

5.1 Psychology of Testing

The aim of testing is often to demonstrate that a program works by showing that it has no errors. The basic purpose of testing phase is to detect the errors that may be present in the program. Hence one should not start testing with the intent of showing that a program works, but the intent should be to show that a program doesn't work. Testing is the process of executing a program with aim of finding errors.

5.2 Testing Objectives

The main objective of testing is to uncover a host of errors, systematically and with minimum effort and time. Stating formally, we can say;

- Testing is process of executing a program with intention of finding an error.
- A successful test is note that uncovers an as yet undiscovered error.
- A good test case is one that has a high probability of finding error, if it exists.
- The tests are inadequate to detect possibly present errors.
- The software more or less confirms to the quality and reliable standards.

5.3 TYPES OF TESTING

- Unit testing
- Link testing

- Integration testing
- System testing
- Acceptance testing

5.3.1 Unit Testing

Unit testing focuses verification effort on the smallest unit of application i.e. write notes. Using the detailed design and the process specifications, testing is done to uncover errors within the boundary of the module. All modules must be successful in the unit test before the start of the integration testing begins. In this project each service can be thought of a module. There are modules like schedule, budget, plans, to-do list, calculator, Giving different sets of inputs has tested each module. When developing the module as well as finishing the development so that each module works without any error. The inputs are validated when accepting from the user. In this application developer tests the programs up as system. Software units in a system are the modules and routines that are assembled and integrated to form a specific function. Unit testing is first done on modules, independent of one another to locate errors. This enables to detect errors. Through these errors resulting from integration between modules initially avoided.

5.3.2 Link Testing

Link testing does not test software but rather the integration of each module in system. The primary concern is the compatibility of each module. The programmer tests where modules are designed with different parameters, length, type etc.

5.3.3 Integration Testing

After the unit testing we have to perform integration testing. The goal here is to see if modules can be integrated properly. The emphasis being on testing interfaces between modules. This testing activity can be considered as testing the design and hence the emphasis on testing module interactions. In this project integrating all the modules forms the main system. When integrating all the modules we have checked whether the integration effects working of any of the services by giving different combinations of inputs with which the two services run perfectly before integration.

5.3.4 System Testing

Here the entire system is tested. The reference document for this process is the requirements document, and the goal as to see if software meets its requirements.

5.3.5 Acceptance Testing

Acceptance test is performed with realistic data of the client to demonstrate that the software is working satisfactorily. Testing here is focused on external behavior of the system. The internal logic of program is not emphasized. Test cases should be selected so that the largest number of attributes of an equivalence class is exercised at once. The testing phase is an important part of software development. It is the process of finding errors and missing operations and also completes verification to determine whether the objectives are met and the user requirements are satisfied.

5.3.6 Criteria Satisfied By Test Cases

Test cases that reduced by a count that is greater than one, the number of additional test cases that much be designed to achieve reasonable testing. Test cases that tell us something about the presence or absence of classes of errors, rather than an error associated only with specific test at hand.

5.4 Test Cases

The tests cases are performed during the project development which is verified successfully as follows;

5.4.1 Verification of Login Fields

Test Case ID: 001		**Test Engineer:** Inzamam Mashood
Test Date: 20-Jan-2016		**Test Case Version:** Ver.: 1.0
Reviewed By: Project Supervisor		**Use Case Reference(s)** N/A
Objective:	Verify that none of the fields remain empty	
Product/Version/Module Environment:	The user is currently using any Operating System.	
Pre-Requisite:	User must know the Inputs of login Form.	
Step No.	**Execution Description**	**Procedure Result**
1	Submit a form with a number of fields remaining empty	Error message displayed indicating the missed fields
◙◙◙ **Comments:**	The Test Passed successfully.	
◙ **Passed** □ **Failed** □ **Not Executed**		

Table 5.4.1

5.4.2 Login to E-Classroom with customized privileges

Test Case ID: 002		**Test Engineer:** Inzamam Mashood
Test Date: 20-Jan-2016		**Test Case Version:** Ver.: 1.0
Reviewed By: Project Supervisor		**Use Case Reference(s)** N/A
Objective:	To login to the E-Classroom with specific privileges	
Product/Version/Module Environment:	The user is currently using any Operating System	
Pre-Requisite:	Local database must be running	
Step No.	**Execution Description**	**Procedure Result**
1	Fill the login information and press login.	User is now logged in to the E-Classroom with pre-defined privileges
◘◘◘ **Comments:**	The Test Passed successfully.	
◘ **Passed** □ **Failed** □ **Not Executed**		

Table 5.4.2

5.4.3 Manage Profile

Test Case ID: 003		**Test Engineer:** Inzamam Mashood
Test Date: 20-Jan-2016		**Test Case Version:** Ver.: 1.0
Reviewed By: Project Supervisor		**Use Case Reference(s)** N/A
Objective:	To manage the profile of the user	
Product/Version/Module Environment:	The user is currently using any Operating System	
Pre-Requisite:	Local database must be running, and user must be login	
Step No.	**Execution Description**	**Procedure Result**
1	Update profile	User profile is successfully updated
2	Change Profile Picture	
3	Change Password	
◙◙◙ **Comments:**	The Test Passed successfully.	
◙ **Passed** □ **Failed** □ **Not Executed**		

Table 5.4.3

5.4.4 Manage Questions

Test Case ID: 004		**Test Engineer:** Inzamam Mashood
Test Date: 20-Jan-2016		**Test Case Version:** Ver.: 1.0
Reviewed By: Project Supervisor		**Use Case Reference(s)** N/A
Objective:	To assess the newly asked questions and submitted answers	
Product/Version/Module Environment:	The user is currently using any Operating System	
Pre-Requisite:	Local database must be running, and user must be login	
Step No.	**Execution Description**	**Procedure Result**
1	Open newly asked questions list	Action against the new question or answer is taken successfully.
2	Open newly submitted answers list	
3	Accept new question	
4	Reject new question	
5	Accept new answer	
6	Reject new answer	
◘◘◘ **Comments:** The Test Passed successfully.		
◙ **Passed** □ **Failed** □ **Not Executed**		

Table: 5.4.4

5.4.5 Manage Documents

Test Case ID: 005		**Test Engineer:** Inzamam Mashood
Test Date: 20-Jan-2016		**Test Case Version:** Ver.: 1.0
Reviewed By: Project Supervisor		**Use Case Reference(s)** N/A
Objective:	To add, download or delete the documents	
Product/Version/Module Environment:	The user is currently using any Operating System	
Pre-Requisite:	Local database must be running, and user must be login	
Step No.	**Execution Description**	**Procedure Result**
1	Open Document List	Action against the document processed successfully
2	Upload new document	
3	Download the existing document	
◙◙◙ **Comments:** The Test Passed successfully.		
◙ **Passed** □ **Failed** □ **Not Executed**		

Table 5.4.5

5.4.6 Manage Notes

Test Case ID: 005		**Test Engineer:** Inzamam Mashood
Test Date: 20-Jan-2016		**Test Case Version:** Ver.: 1.0
Reviewed By: Project Supervisor		**Use Case Reference(s)** N/A
Objective:	To add, edit or delete the notes	
Product/Version/Module Environment:	The user is currently using any Operating System	
Pre-Requisite:	Local database must be running, and user must be login	
Step No.	**Execution Description**	**Procedure Result**
1	Open notes List	Action against the notes processed successfully
2	Upload new notes	
3	Update the existing notes	
◙◙◙ **Comments:** The Test Passed successfully.		
◙ **Passed** □ **Failed** □ **Not Executed**		

Table 5.4.6

5.4.7 Manage Users

Test Case ID: 007		**Test Engineer:** Inzamam Mashood
Test Date: 20-Jan-2016		**Test Case Version:** Ver.: 1.0
Reviewed By: Project Supervisor		**Use Case Reference(s)** N/A
Objective:	To manage all the existing or new users	
Product/Version/Module Environment:	The user is currently using any Operating System	
Pre-Requisite:	User must be login, and that user needs to be only Admin	
Step No.	**Execution Description**	**Procedure Result**
1	View List of all users	The new user is successfully added or existing user is successfully updated
2	Add New User	
3	Edit Existing User	
4	Assign Roles	
◙◙◙ **Comments:** The Test Passed successfully.		
◙ **Passed** □ **Failed** □ **Not Executed**		

Table 5.4.7

5.4.8 Manage Subjects

Test Case ID: 008		**Test Engineer:** Inzamam Mashood
Test Date: 20-Jan-2016		**Test Case Version:** Ver.: 1.0
Reviewed By: Project Supervisor		**Use Case Reference(s)** N/A
Objective:	To manage all the subjects	
Product/Version/Module Environment:	The user is currently using any Operating System	
Pre-Requisite:	User must be login, and that user needs to be only Admin	
Step No.	**Execution Description**	**Procedure Result**
1	Add new subject	Subject is successfully added, updated or deleted
2	Edit Subject	
3	Delete Subject	
◙◙◙ **Comments:** The Test Passed successfully.		
◙ **Passed** □ **Failed** □ **Not Executed**		

Table 5.4.8

5.4.9 Manage Roles

Test Case ID: 009		**Test Engineer:** Inzamam Mashood
Test Date: 20-Jan-2016		**Test Case Version:** Ver.: 1.0
Reviewed By: Project Supervisor		**Use Case Reference(s)** N/A
Objective:	To manage the user roles	
Product/Version/Module Environment:	The user is currently using any Operating System	
Pre-Requisite:	User must be login, and that user needs to be only Admin	
Step No.	**Execution Description**	**Procedure Result**
1	View list of all roles	Role is added, edited or deleted successfully
2	Add new role	
3	Edit exiting role	
4	Delete role	
◙◙◙ **Comments:** The Test Passed successfully.		
◙ **Passed** □ **Failed** □ **Not Executed**		

Table 5.4.9

5.4.10 Assign Subject

Test Case ID: 010		**Test Engineer:** Inzamam Mashood
Test Date: 20-Jan-2016		**Test Case Version:** Ver.: 1.0
Reviewed By: Project Supervisor		**Use Case Reference(s)** N/A
Objective:	To assign subject to a specific teacher	
Product/Version/Module Environment:	The user is currently using any Operating System	
Pre-Requisite:	User must be login, and that user needs to be only Admin	
Step No.	**Execution Description**	**Procedure Result**
1	Select Subject from a subject's dropdown list	Subject is successfully assigned to a specific teacher
2	Select Teacher from teacher's dropdown list	
3	Click assign	
◙◙◙ **Comments:** The Test Passed successfully.		
◙ **Passed** □ **Failed** □ **Not Executed**		

Table 5.4.10

5.4.11 Assign Students

Test Case ID: 011		**Test Engineer:** Inzamam Mashood
Test Date: 20-Jan-2016		**Test Case Version:** Ver.: 1.0
Reviewed By: Project Supervisor		**Use Case Reference(s)** N/A
Objective:	To assign students into a specific subject	
Product/Version/Module Environment:	The user is currently using any Operating System	
Pre-Requisite:	User must be login, and that user needs to be only Teacher	
Step No.	**Execution Description**	**Procedure Result**
1	Select Subject from a subject's dropdown list	Student is successfully assigned to a specific subject
2	Select Student from student's dropdown list	
4	Click assign	
◙◙◙ **Comments:** The Test Passed successfully.		
◙ **Passed** □ **Failed** □ **Not Executed**		

Table 5.4.11

Chapter 5

Conclusion and Future Work

6 Conclusion and Future Work

6.1 Conclusion

The project E-Classroom is for computerizing the working in a classroom. The application takes care of all the requirements of an average class and is capable to provide easy and effective storage of information of students, teachers, class representatives and teacher assistants that is related to the class proceedings. It saves documents, notes, questions, answers, subjects, students enrolled and teachers assigned to a subject. It also provides the facility of asking question from the teacher or other students. Here are some key features and advantages of this system:

1. Anyone can use our system easily.
2. People can use system anywhere at any time whenever they want.
3. You just have the access to the internet and you can use the system.
4. To use the desktop application, you must have the desktop application in your system.

E-Classroom for Interactive and Connected Learning's web and desktop application is developed using Custom PHP, MySQL and C# WPF. The purpose of creating this project is to make it possible for students to avail help and manage their contents, i.e. documents and notes, very easily.

6.2 Scope and Future Development

The project has a very vast scope in future. The project can be implemented on general method in future. Project can be updated in near future as and when requirement for the same arises, as it is very flexible in terms of expansion. With the proposed software of database Space Manager ready and fully functional the client is now able to manage and hence run the entire work in a much better, accurate and error free manner. The following are the future scope for the project:

1. General System to run for a whole university or institute
2. A much powerful Chatbot to provide a more accurate and fast help
3. Attendance record and Assessment record for teachers
4. Allowing the Heads of institute to interact with the system

5. User's profile with the complete educational record, from marks to attendance and other extra circular activities