CS 319 / Object-Oriented Software Engineering Term Project:

"Mastering Bilkent"

Analysis Report

Project Group 1.A:
Ertan ADAY
Furkan Arif BOZDAĞ
Rümeyza DİNÇER
Course Instructor:
Bora GÜNGÖREN
Teaching Assistant:
Gülden OLGUN

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1. Introduction

Mastering Bilkent is intended to develop a virtual environment which is a study tool for students in general. It is a desktop application that offers an open online courses for Bilkent University and this project will be implemented in Java language.

1.1 Purpose:

Main purpose of this application is to help students to understand course material better by studying documents, watching videos, listening audio files, solving quizzes. Furthermore, Mastering Bilkent allows instructors to deliver out-of-class materials to their students in a well-organized and planned manner.

1.2 Other Details

Further details about the Mastering Bilkent will be given in the overview section below. In this report, after overview section there are functional, non-functional and pseudo requirement sections of the system. There are also scenarios, use cases models, object models, dynamic models, and user interface instances about *Mastering Bilkent.* There is also a glossary section so as to help the reader to understand important terms about the project in a better way.

2. Overview

Mastering Bilkent is an educational desktop application that allows academic staffs and students to share different kinds of information and documentation related to particular courses. Students are not always in their best moods to fully focus on the lectures, or they might miss some lectures due to some inadvertent inconveniences. Same conditions go for instructors and lecturers too. Nevertheless they have followed the lectures completely, students might need some extra work to fully comprehend, and lecturers might want to upload some extra documentation related to course for students who prefer to enroll. Mastering Bilkent aims to bring innovative solutions and opportunities up for users.

2.1 User Options

There are 2 different sign up options to *Mastering Bilkent:* Sign up as Instructor or Student. For signing up, both options have common features such as name, age, phone number and location. However, they are different than each other in terms of e-mail confirmation. In the student option, any valid e-mail address is accepted by the system, and confirmation mail will be sent to there by the system. But in the Instruction option, only Bilkent Webmail e-mail addresses are accepted and confirmation code will be sent to that mail, so as to make sure that instructor signing up is an academic staff of the Bilkent University.

2.2 Courses

One of the essential features of *Mastering Bilkent* are courses.

2.2.1 Course Visibility

An instructor can open a course with public and private options. Public course is a course that can be seen and also registered by any user of *Mastering Bilkent.* As for private course, the instructor sets a class key to the course, and sends this key to the students that s/he wants to. Private courses can be seen by any user, however, only those who have the correct class key can register to these courses.

2.2.2 Course Contents

A course's instructor is able to add videos, audio files, text files or quizzes to the course page. S/he can also delete them too. A student can view the text based documents, attend the quiz and watch videos which will be described later in this report.

Quiz: An instructor can put a quiz with two modes: Exercise and assignment. In the exercise mode, students can solve the quiz any number of times they want, and their score will not be sent to the instructor. However, in the assignment mode, the instructor will decide the number of times the quiz can be solved, and also can set a prescription time too. Further, the scores of quizzes that are in assignment mode will be sent to the instructor.

Documents: Instructor can upload text based documents and students can view/ download.

Video/Audio File: Video and audio files are supplementary materials which are uploaded by instructor and viewed by students.

3. Functional / Nonfunctional / Pseudo Requirements:

3.1 Functional Requirements:

3.1.1 All users shall have a profile page which they can update or modify:

Profile pages shall have profile pictures, contact addresses, departments, and other information specified by the user. Additionally, if it is a student's profile page, it shall show the courses taken by that student. Otherwise if it's an instructor's profile page, it should show the courses given by that instructor.

3.1.2 Instructors shall be able to start/finish a course and set the course to private or public mode:

A public course shall be seen and be registered by any student. A private course shall also be seen by any student but shall not register without the key which is determined by the instructor.

3.1.3 Instructors shall upload video, audio, or text files to course pages that they have created:

Instructors also shall be able to prepare a quiz using *Mastering Bilkent*'s own quiz-preparation system. Instructors shall also be able to delete the aforementioned files that s/he uploaded to course page. Students shall attend the quiz according to quiz's mode.

3.1.4 Quiz preparation system shall have three subsections:

3.1.4.1 One of the subsections is textual question part, in which the instructor types the question in.

3.1.4.2 Another subsection is answer part. Answer part shall have two options to be selected by instructor: text or multiple choice. If the instructor selects the text option, the student should give a text-based answer. If the instructor selected the multiple choice option, s/he shall fill in the choices as s/he desires, and specify the correct answer. The student shall give an answer by choosing one of the choices.

3.1.4.3 Lastly, the third subsection of quiz preparation system shall be mode selection section. This section contains two modes: assignment quiz and exercise quiz. If the instructor sets the quiz to assignment mode, which is eligible only if the course is private, instructor will be allowed to set the due date, and also the scores of students shall be sent to the instructor. Also, if the instructor sets the quiz to exercise mode, which is doable whether the course is public or private, there shall not be a due date and the scores of students shall not be sent to the instructor.

3.1.5 Users can view all courses by clicking "View All Courses" button, and search for courses with the search bar

3.2 Non-functional Requirements

3.2.1 The system shall be updated in real-time:

This means, for instance, whenever an instructor uploads a document to his/her course page, the course page shall be updated coherent with real-time.

3.2.2 User interface shall be user-friendly so that students and instructors will have no struggle to communicate with the system.

3.3 Pseudo Requirements

3.3.1 The database server shall work with SQL and MySQL.

3.3.2 Java shall be used as programming language.

3.3.3 UI shall be intended to implement with JavaFX library.

3.3.4 English shall be the main language of *Mastering Bilkent.*

4. Scenarios

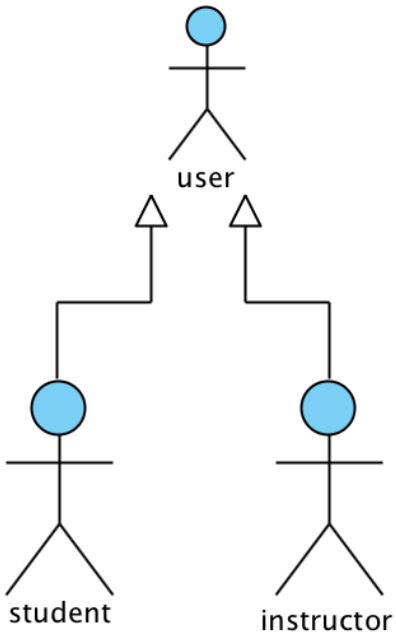
4.1 Bora (Instructor) decides to open a new course. He does so by entering the course name and setting the course to the public mode. Then he starts to fill up his course page. Uğur (Instructor) decides to open a new course. He also enters the course name but sets the course to private mode, and sets a class key. Then he sends this key to the students that he wanted to see, excluding Ertan (Student). He too starts to fill the course page as he desired. Ertan looks for courses to register. He sees the courses opened by Bora and Uğur. He can see the course contents opened by Bora but cannot see the contents of the course opened by Uğur. He registers to the course opened by Bora without any problems. However, when he also attempts to register to the course opened by Uğur, he realizes that he can't register since he doesn't have the class key.

4.2 Bora (Instructor) uploads a quiz to his course by setting it to the assignment mode, and entering the questions and due date. The course page sends notification to all students who are registered to that course. Students take the quiz. After that, their results are sent to the instructor. After due date, the assignment quiz automatically turns into an exercise quiz. So after, due date the students can still take the quiz, but their results will not be sent to the instructor and they will not be graded. If instructor wishes she/he can delete the quiz at any point.

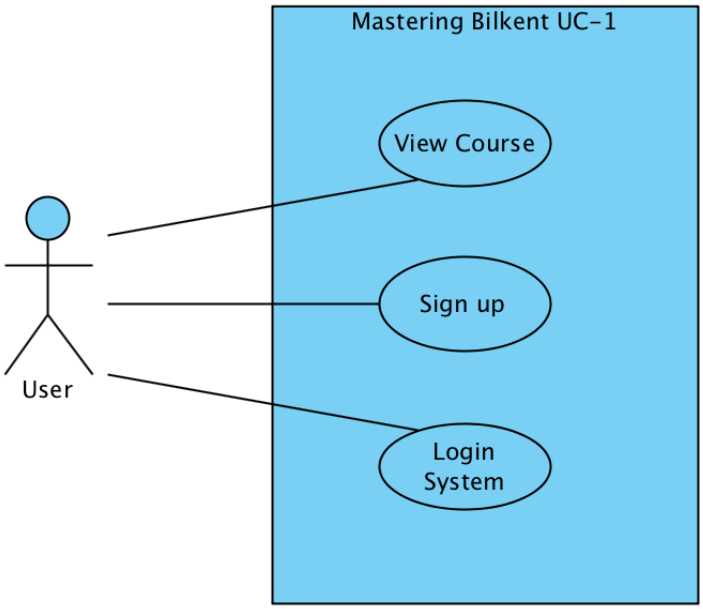
4.3 Arif (Student) decides to watch a video that solves a problem. Arif logs in the system after opening the desktop application and clicking the button of login where the application will remember Arif's login information and directing him to the main page where all the registered courses of the Arif is listed. Arif then clicks one of listed courses and gets into it. Now Arif is observing a list of contents of that course which instructor of that course has uploaded and set visible. By scrolling down Arif finds the video which Arif wants to study and by clicking on the name of the video Arif open and watches it. At any point Arif can decide and close the video player and keep browsing the other contents it that course.

5. System Models

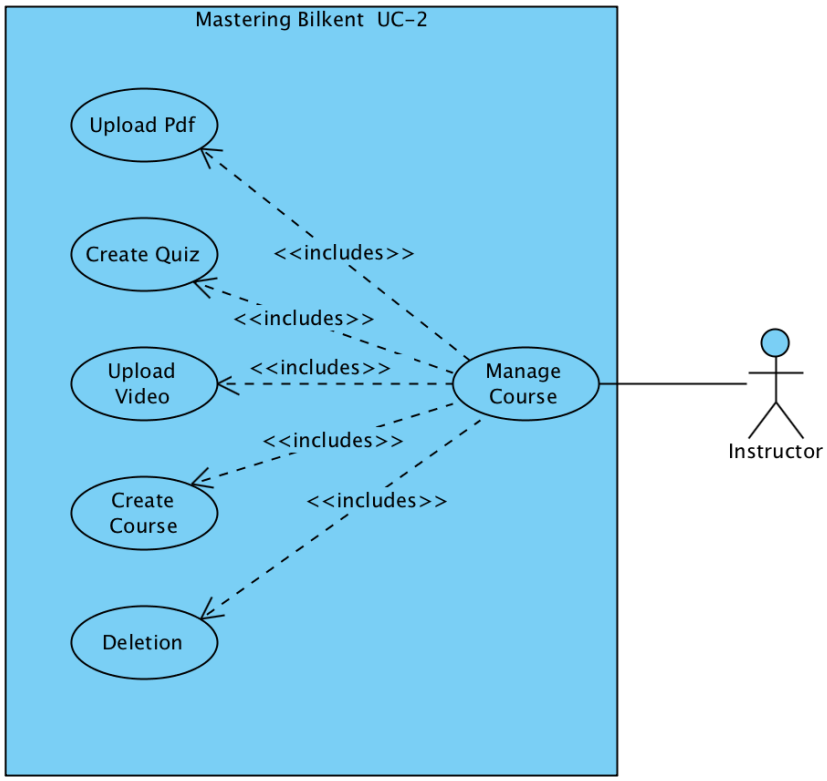
5.1 Use Case Model



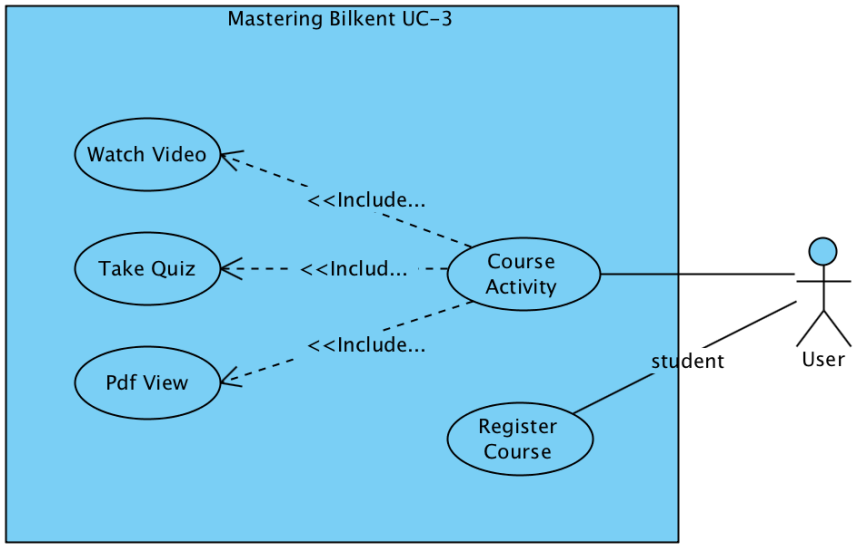
Student is a user. Instructor is a user.



User (both student and instructor) shall “View Course”, “Sign Up” to the system and after signing up user shall “Login System”.



Instructor shall access the “Manage Course” system and in this system s/he shall “Upload Pdf”, “Create Quiz”, “Upload Video”, “Create Course” or “Deletion(delete the course created by same instructor before)”.



User (both student and instructor) shall both use the “Course Activity” system. User shall “Watch Video” that instructor uploaded course, “Take Quiz”, and “View the PDF” files. Student shall “Register Course”.

5.1.1 Use Case 1

Actors: User (Students / Instructors)

Event: Sign Up

Entry Condition: Push Sign Up Button

Exit Condition: Push Save Button

Main Flow Events:

* Participant pushes sign up button in order to register system.
* Participant actor enters his/her name, surname, e-mail, password, and institution and address.
* Sign Up checks e-mail and password validity and sends the participant information to the database.
* Database sends the confirmation to Sign Up.

5.1.2 Use Case 2

Actors: User (Students / Instructors)

Event: Login

Entry Condition: Push Login Button

Exit Condition: Push Logout Button

Main Flow Events:

* Participant pushes login button in order to log in to system.
* Participant enters his e-mail or user name, and password.
* Login sends participant information to the database.
* Database sends confirmation to Log in.

5.1.3 Use Case 3

Actors: User (Students / Instructors)

Event: Viewing Course Contents

Entry Condition: Push View Course Button

Exit condition: Push Home, Profile, Settings, Explore Other Courses or Go to Course Contents which is determined by the instructor

Main Flow Events:

* Participant pushes View Course button in order to go to the Course Main Page
* Main Page requests course contents with content's ID.
* Database returns course content list to Main Page.
* Main Page directs User to Course Page.

5.1.4 Use Case 4

Actors: User (Students)

Event: Register Course

Entry Condition: Push Register Course Button

Exit Condition: System will exit after registering relevant course or display warning message

Main Flow Events:

* Participant searches for the course and go to its home page by Use Case 3.
* In home page of the relevant course there appears a "Register" button if course is not be enrolled yet.
* Student shall register a course by just clicking the register or after registering s/he enter the class key and then enroll.
* If it is a public course, Register Course system shall respond and student's enrollment will be stored in the course's database.
* If it is a private course. Student enters class key and confirms.
* Course Registration sends entered class key to request confirmation.
* Database sends confirmation to Course Registration.
* Course Registration updates Student List in database.

5.1.5 Use Case 5

Actors: User (Students / Instructor)

Event: Course Activity

Entry Condition: Viewing Course Contents (Use Case 3)

Main Flow Events:

∗ Course Activity System shall respond to the user according to the requirements below:
∗ Participant can view the text based documents of the course by clicking to the link.
∗ Participant can watch videos related to the course by clicking to the link.
∗ Participant can take a quiz by clicking, and the Course Page then will request the quiz by quizId.
∗ Database will enable Course Page, and Course Page will direct participant to Quiz Page.
∗ Student will answer the questions and then confirms.
∗ Quiz page will send the completed quiz to the database, and let the participant see his/her results.

5.1.6 Use Case 6

Actors: User (Instructors)

Event: Manage Course

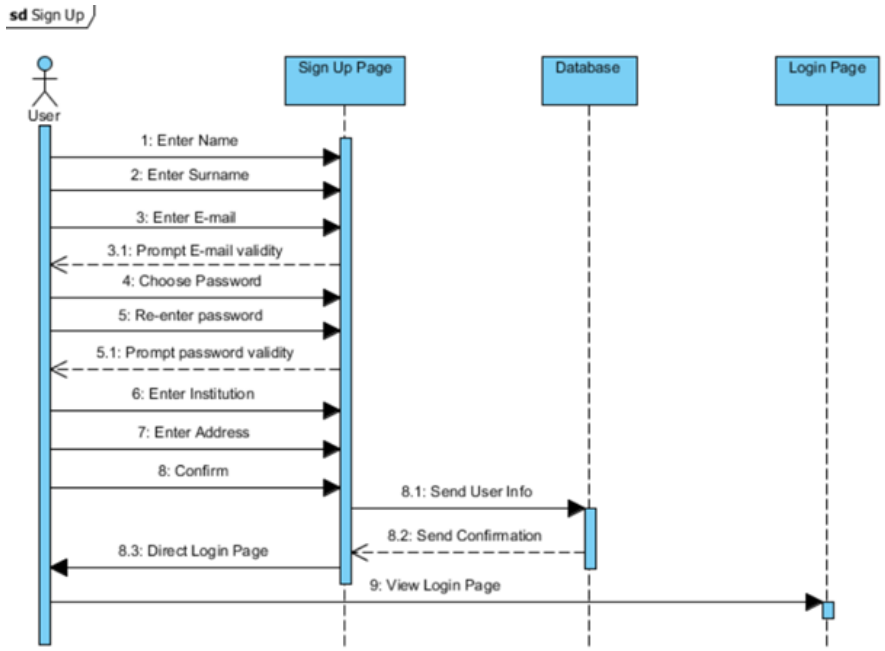
Entry Condition: Push Manage Courses Button

Main Flow Events:

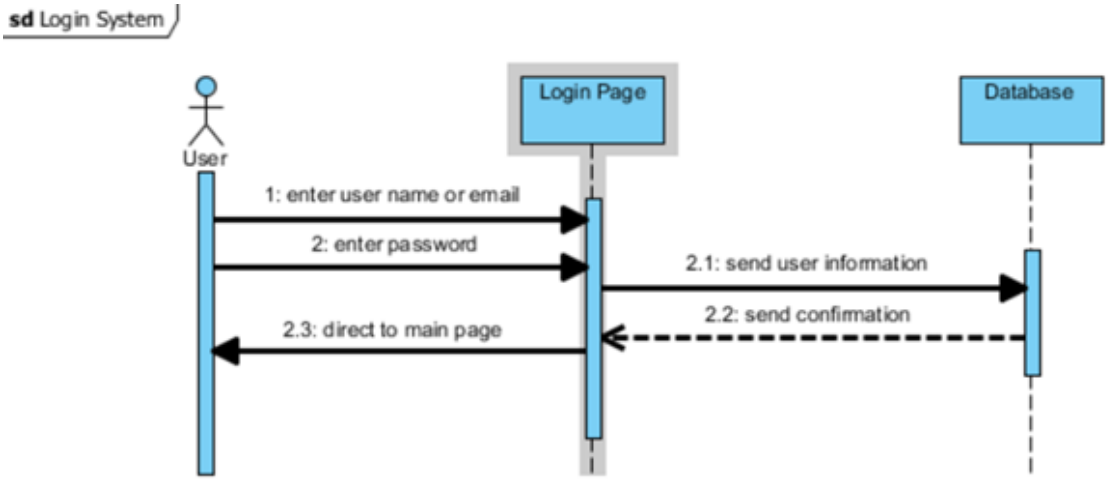
∗ An instructor shall:
∗ Create a brand new course
∗ Delete an existing course that s/he created
∗ Upload text based documents to the course's home page
∗ Upload video to the course's home page
∗ Create a quiz by entering the question count, quiz option (multiple choice or written), and quiz type (exercise or assignment), and confirm.
∗ Then Quiz Preparation will show the instructor a quiz draft to fill in.
∗ Instructor will enter the question, enter possible true answers, enter the correct answer, and then confirm again.
∗ Then Quiz Preparation will send the quiz to the Database.
∗ Database will save the quiz with quizID.
∗ Quiz Preparation will direct Instructor to Manage Course page again.

5.2 Dynamic Model

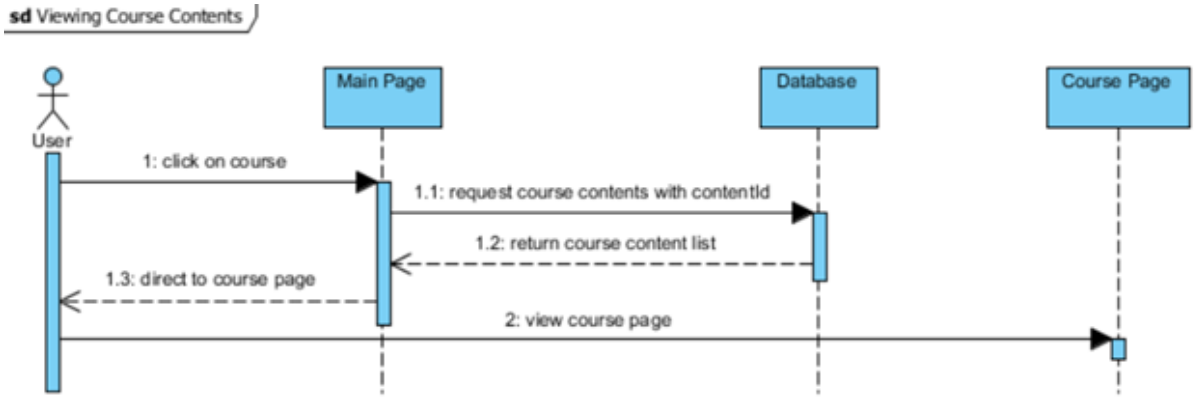
5.2.1 Sign Up



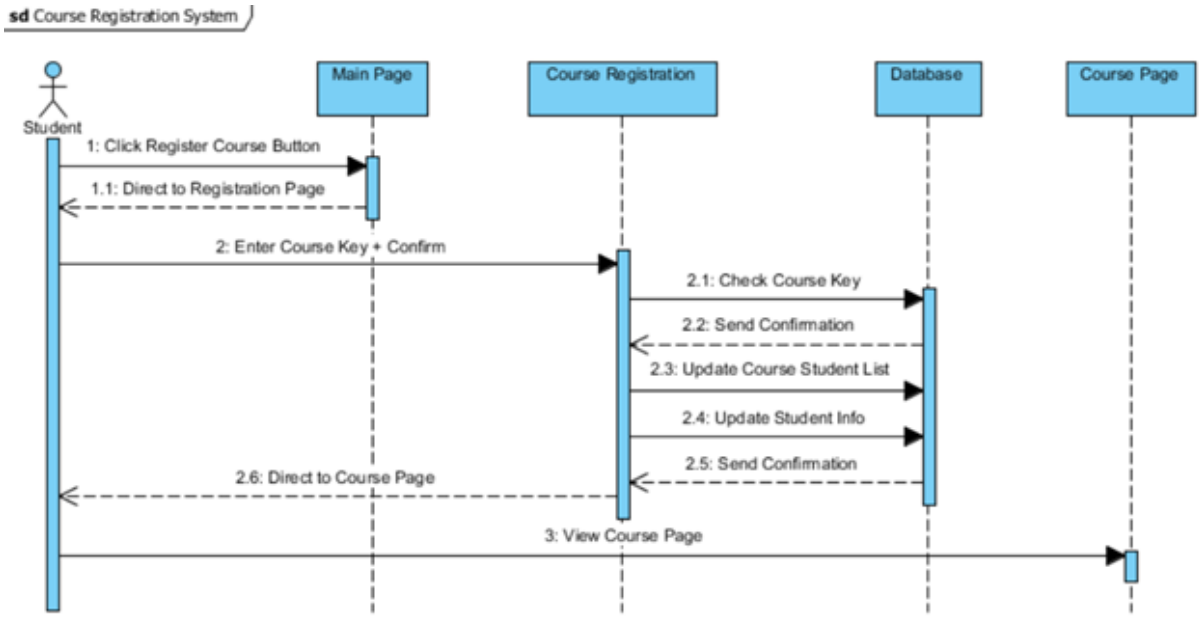
5.2.2 Login



5.2.3 View Course Content

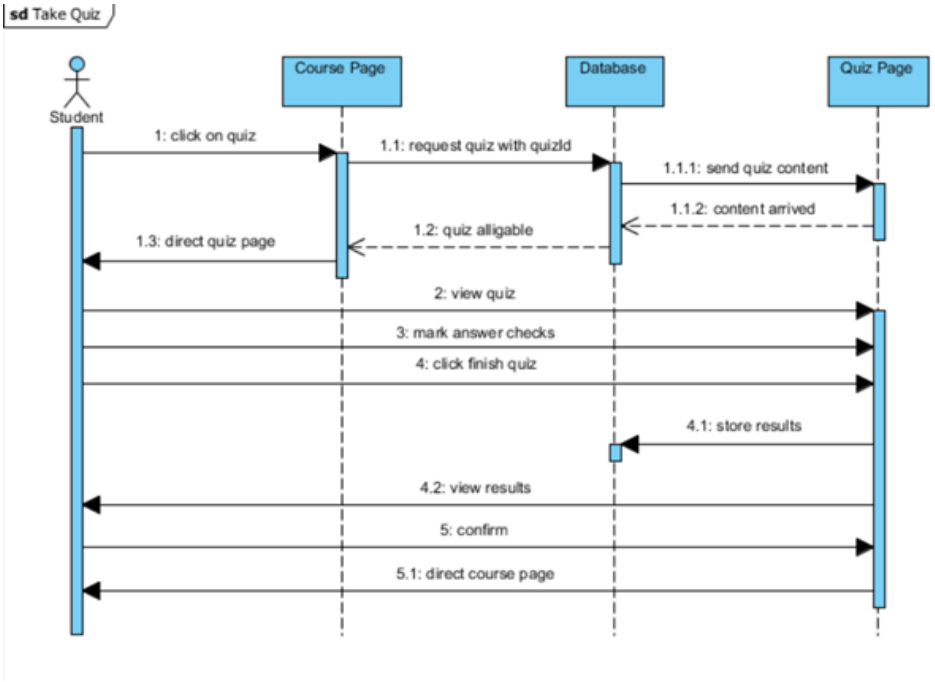


5.2.4 Register Course



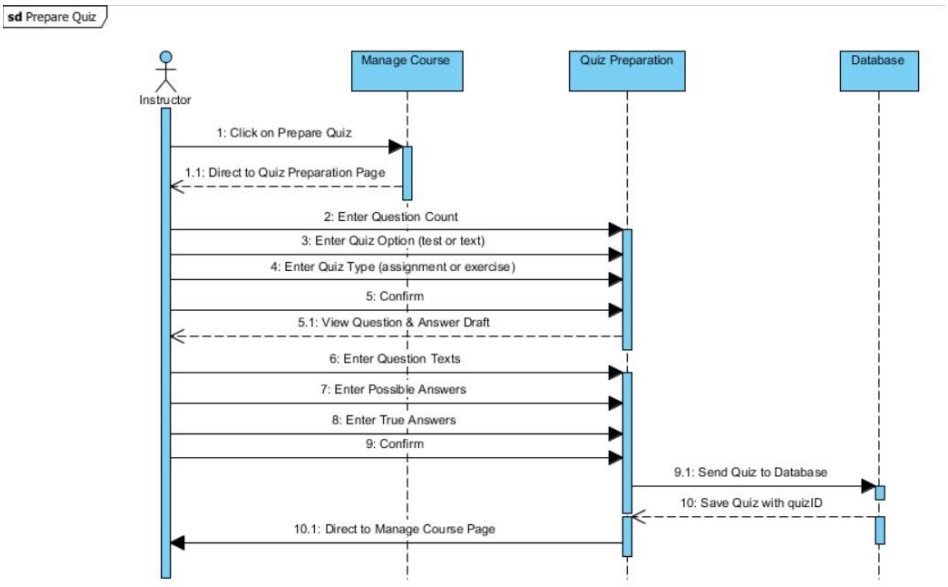
5.2.5 Course Activity

5.2.5.1 Take Quiz



5.2.6 Manage Course

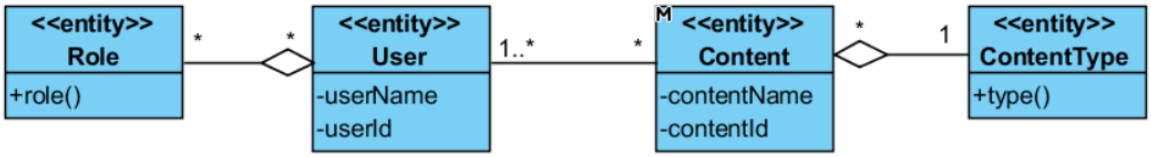
5.2.6.1 Quiz Preparation



For Dynamic Model of Manage Course activities we chose Quiz Preparation diagram as an example in order to show how Manage Course activities will be implemented.

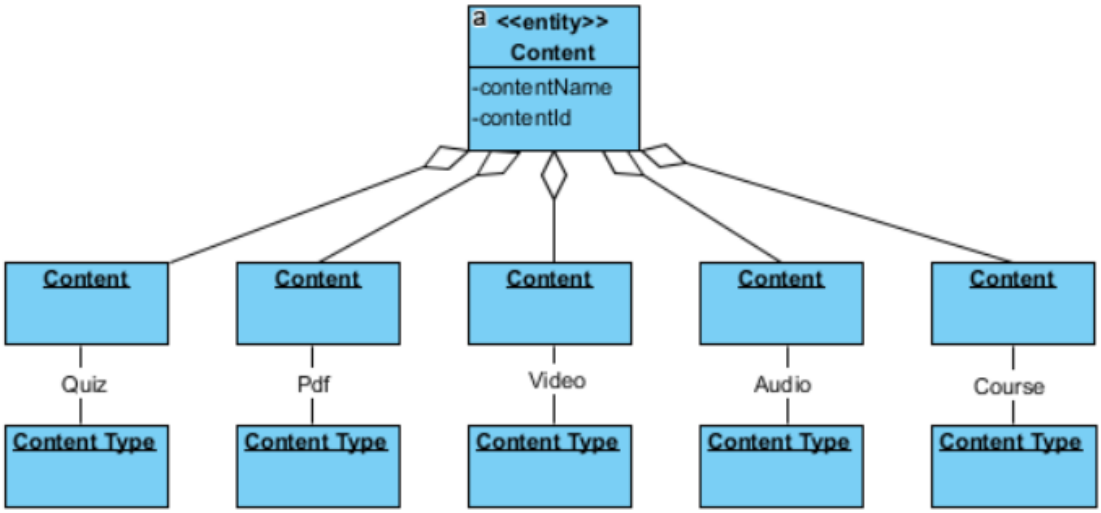
5.3 Class and Object Model

5.3.1 Class Model

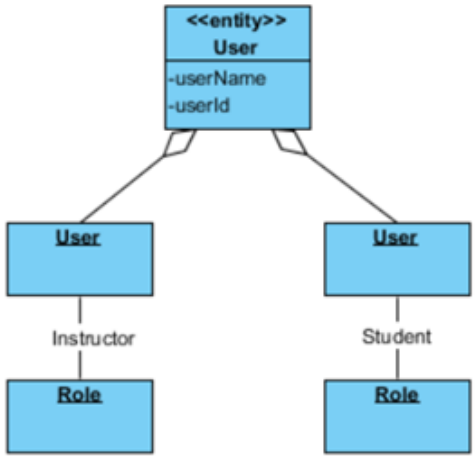


In our program all user objects are created by the User class and their functional capabilities are determined by Role object. Each User Class object will have its Role object assigned with creation. The same is correct for the Content and ContentType classes.

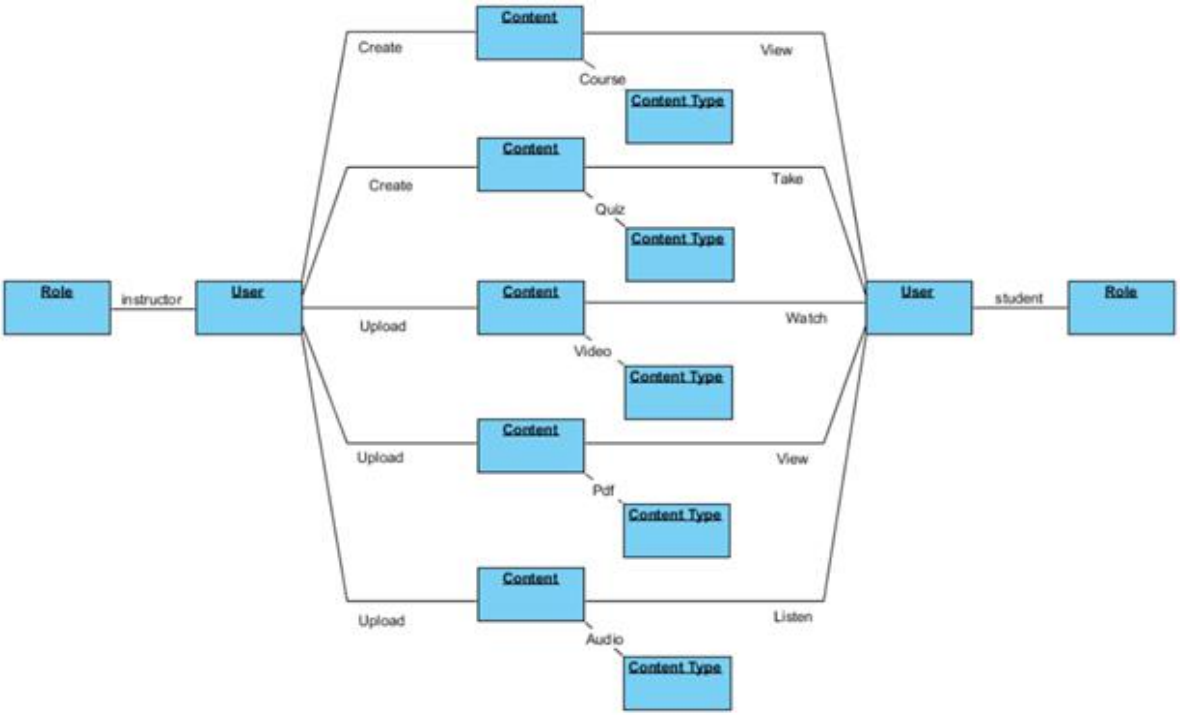
5.3.2 Object Model



All of activities in the application that depends on data stored in the database uses Content Class objects. These activities performed by the Users with student Role. Instructor user creates or uploads all these contents.



Users are of 2 types that are Student and Instructor. A users objects activity capabilities depend on its role and determined by its role object.



6 Glossary

User: User is a member of the system that can have one of the below roles.

Student: Student is a member of *Mastering Bilkent* that can register the courses, see the content of the registered courses, and solve the quizzes in those courses.

Instructor: Instructor is responsible for starting courses and managing them. An instructor can set the course to private or public. Instructor is able to put audio, video, and text files to the course, and also prepare quizzes for the course.

Course: Course is responsible for holding course contents that is uploaded by Instructor. It also displays course contents to registered students and instructor.

Public: A public course is a course that can be seen and registered by any user of *Mastering Bilkent.*

Private: A private course is a course that can be seen but cannot be registered by any user. In order for a user to register a private course, s/he must have the enrollment key which is specified by the Instructor.

Enrollment Key: Enrollment key is a tool for private courses to let only those who have it enroll to course. It is specified by the instructor and sent to the students who are desired to be seen in the course by instructor via e-mail.

Content: Content is a course material that is uploaded/prepared by the instructor to the course. There are four sort of content that can be uploaded/prepared to the course.

Quiz: Quiz is a course content that is prepared inside the system (not uploaded from outside). It's purpose is to let instructor evaluate students' success and let students exercise about the course.It can be set into exercise or assignment modes by instructor.

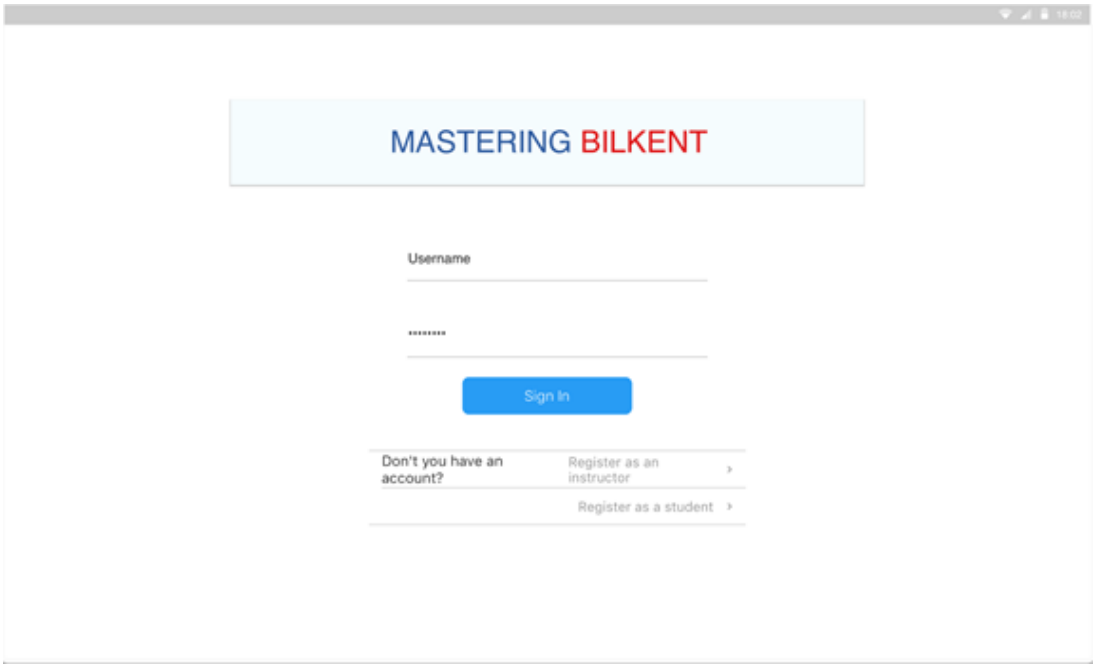
Text Based Document: A document uploaded into course by Instructor. It can be in .pdf, .docx, or .odt formats.

Audio & Video Files: These files too uploaded into course by Instructor. They use certain APIs to show their contents to the students.

Notification: This is a system that is responsible for notifying students when one of their instructors uploaded a content to their course.

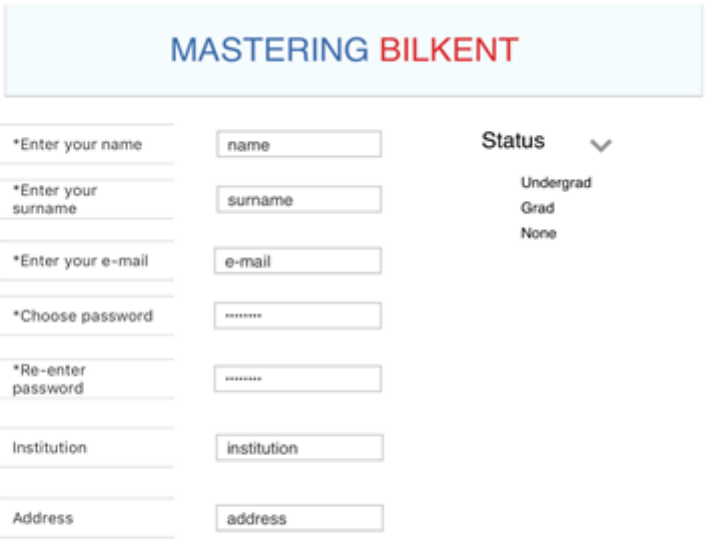
7. User Interface

7.1 Login Page:



7.2 Register as an instructor:

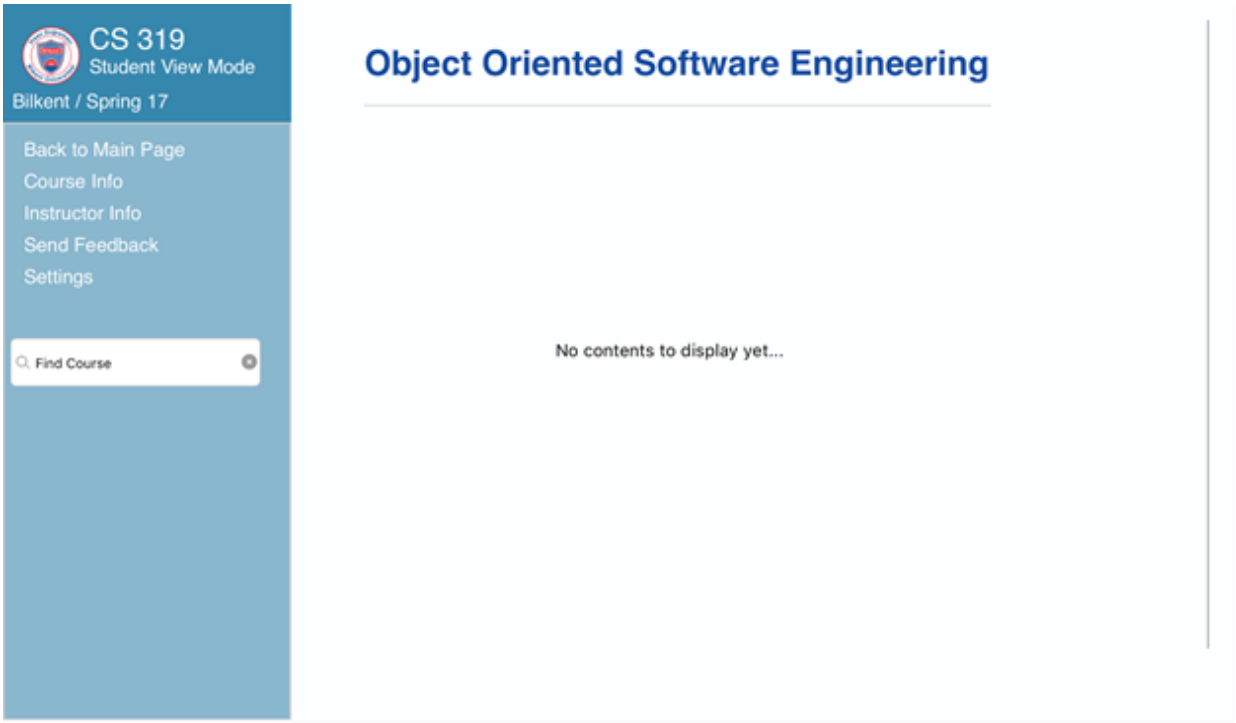
7.3 Register as a student:



7.4 Student Main Page:

7.5 Instructor Main Page:

7.6 Course View/Student Mode:



8 References

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* www.coursera.com
* Bilkent Moodle System