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Developing a website for students

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APPLIED SCIENCES

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Developing a website for students to rate course

For future students, the curriculum is one of the most important criteria when choosing study programs as well as universities. However, the information available on most universities' websites is rather limited and could not reflect relevant aspects such as students' feedback, ratings, teaching methods, etc. Suppose several institutions offer the same study program, e.g., Information Technology, with similar curriculum/courses, e.g., basic programming, and networking fundamentals; knowing learners' experience while taking these courses would greatly help future students to decide which university and study program are more suitable according to their career objectives. Faced with the above need, which was something that Do and Phu have experienced themselves, they wished to build a website for previous students to contribute ideas and ratings on courses from universities worldwide. Not only does the website provide a solid foundation to support future students' decision-making, but it also serves as a useful tool for institutions and teachers to adjust and improve their curriculum and teaching methods to match the needs of students as well as the work market.

The website was built on full-stack Node.js, React.js, MySQL, and Firebase. The back-end server uses Node.js for REST APIs, front-end side is a React.js client with React Router, Axios, and Boostrap. MySQL is for the database and Firebase helps save images and files.

The website's primary features include (i) rate and review courses, (ii) CV creation, and (iii) a job-seeking website.

The thesis has been implemented by a pair where Chau Pu is responsible for creating the website and Truong Do for writing the thesis.

Keywords:

Course review, student assessment, job seeking, CV creation, CV review, student profile, student clubs.

Content

Figures

List of abbreviations

Ajax	Asynchronous JavaScript And XML
API	Application Programming Interface
CRUD	Create, Read, Update, Delete
CV	Curriculum vitae
DOM	Document Object Model
GB	Gigabyte
JS	JavaScript
JSON	JavaScript Object Notation
JSX	JavaScript XML
MB	Megabyte
MySQL	Structured Query Language
NET	Network
NPM	Node Package Manager
REST	Representational State Transfer
UI	User Interface
URL	Uniform Resource Locator
UX	User Experience

1 Introduction

Choosing the right study programs as well as universities is crucial to prospective students as it directly affects their future careers. The consequences of pursuing a wrong degree would be the waste of time, money, and effort. Understanding curriculum-related information is one of the key determinants that drive learners' decision-making regarding their education, Do Truong and Phu Chau created a website where students can rate university courses and give authentic feedback about their personal experiences taking those courses. The website will be a powerful tool for prospective students in finding the most suitable study programs that best fit their goals and objectives, as well as teachers and educational institutions to enhance their competitive advantage by creating more practical curricula tailored to the needs of students as well as the work market.

To enhance the website's applicability, Do conducted a survey with 100 students to learn more about the functions that they are looking for in these types of websites.

The primary function of the website allows students to rate (1-5 stars) and review courses they have taken or are currently taking. Users can view and/or create discussions and leave comments on courses. It is basically similar to reviews on online shopping websites.

Additionally, the website supports students in CV creation. Students can easily build their CVs based on templates available on our website. They can post their CV on the forum for other students to consult and contribute ideas on how to improve them. Moreover, finding a job is a necessity for many students who want to earn money for living expenses. To solve that problem, the website acts as a job market where companies can post job vacancies, and university students can send their CVs directly to employers.

Table 1. Division of work during the thesis process.

Chapter	Do Truong	Phu Chau
Abstract	writing	
1 Introduction	writing	
2 Similar systems and tools	writing	find the source, choose the important part
3 Theoretical background	writing	find the source, choose the important part
4 Preliminary survey	creation, distribution, analysis, writing	
5 Design process	create the figure 3, writing	find the source, draft the figure 3, write preliminary description
6 Results	writing	screenshot and list the steps
7 Conclusion	writing	
References		finding, writing

The website and thesis were created by Do Truong and Phu Chau. Do is responsible for survey creation, distribution, and analysis; User Interface and User Experience design; writer; thesis documentation and review. Phu built the source code for BE and FE; query database; and integrated API. Table 1 shows the division of work in more detailed level.

2 Similar systems and tools

The websites of other international organizations and universities have been inspected by Phu and Do, before creating the main functions of the website. Websites with the same main functions are listed in this chapter.

2.1 Student courses review

Student courses review is a page dedicated to reviewing courses offered by some universities in the United States, Australia, and New Zealand, supporting the following functions: (Gibson et al., 2013)

- Searching for courses by course codes.
- Filtering courses by region, university, faculty, and semester.
- Sorting out reviews by the newest or the most popular.
- Reviewing courses, writing comments, and saving the performance related to such courses.
- Sharing reviews (via popular social networks like Facebook, Twitter, Reddit, etc., and links).
- Interacting with reviews by giving like or dislike and discussing a review.

Advantages:

- The website is simple and user-friendly.
- The information about universities and courses is correct and diverse.
- There are many review criteria: Popularity level, quality of lectures, difficulty level of courses, and overall assessment.
- There is storage for the performance of the students who provide reviews, it is required for any student to enter his/her score and confirm that he/she has studied a course before writing a review on that course.

Limitations:

- There is not any notification when no search results are found.
- There are no login and user management functions, so anyone can post the same review, dislike, or like multiple times (after reloading the page).

2.2 Rate My Professors

Rate my professors is a website that allows users to evaluate universities and professors with the following functions:(Swapceinski, 1999)

- Searching universities and professors: looking up universities quickly by university name, area, etc., and finding any professor quickly by the professor's name, university name, etc.
- Assessing any university according to the following criteria: location, food, facilities, 5-point rating scale; posting reviews.
- Assessing professor: evaluating professor with a 5-point rating scale and posting reviews.
- Showing the rating of each professor filtered by the courses that the professor has instructed.
- Voting on reviews and adding flags: Students can also like any review to show their agreement. Besides, they also can add any flag to report a review when they find that review incorrect or offensive to the professor.
- Allowing professors and lecturers to post their blogs: Professors and lecturers can post articles to share new and useful knowledge. And students can also interact with those articles.
- Saving your favorite teachers.
- There are functions of sign up, log in, account management, your reviews, and saved professors.

Advantages:

- Has a clear interface and graphic effects.
- Has a broad coverage: allowing users to assess both universities and professors.
- Allows both students and professors to see reviews: the professors can rely on the students' reviews to improve their teaching quality. The students can rely on reviews to determine suitable courses and professors.

Limitations: Offers limited data on universities and professors.

2.3 Student Vip

Student Vip is one of the most popular websites for students in Australia with the following functions: (Student Services Australia Pty Ltd., 2012)

- Searching universities by area.
- Buying and selling books: The website links to the website of the Book Depository (https://www.bookdepository.com/) to allow users to obtain information about books for sale. Students can also resell books. Any student can buy books by contacting sellers through the messaging function of the website.
- Buying and selling documents, notes, etc. regarding each course: this function operates in the same way as the function of reselling books. Those who want to buy documents just need to find desired documents, select and add the documents to their cart, and then complete payment.
- Tutoring: Any student can register for offering tutorial services and students can also find tutors by course.

- Assessing courses: Students can create their courses, rate the courses according to the 5-point rating scale, and leave their reviews.
- Composing and saving information about courses: reviews, tutorial courses, course materials, etc.
- Viewing maps and photos of the universities as well as nearby services and public areas contributed by students; raising questions and discussing places around each university.

Advantages: Its functions are interesting and useful, and its interface is simple and user-friendly.

Limitations: It is so easy for any user to add courses that some courses might be repeated or unreal, or information about courses contributed by former students might be incorrect and prevent students from accurately assessing their courses to be learned.

2.4 Course talk

Course talk is a site that allows users to create online courses, register for joining, and rate any available courses. The followings are its available functions: (DigiCert Inc., 2019)

- Creating courses.
- Registering for joining any available course and managing learning paths.
- Reviewing courses: students can post reviews on any course without logging in to the website.
- Interacting with reviews: students can like, add a flag, or get the embed code of any review.
- Recommending courses: Based on options and reviews of students with similar interests.

Advantages: Its interface is simple and user-friendly. Reviews on the courses can be used for the course recommendation system.

Limitations: Students can leave reviews on any course no matter whether they have joined that course or not, so the reviews may be questionable. Besides, it is not allowed to edit any review.

3 Theoretical background

The website is built on supporting technologies for Back-end (Nodejs, MySQL, and Firebase Storage) and Front-end (ReactJS). This chapter discusses the technologies that Phu has used in the back-end and Front-end of the website.

3.1 NodeJS

NodeJS is a packaged compilation of Google's V8 JavaScript engine, which is itself primarily written in JavaScript. Node.js uses the "Single Threaded Event Loop" architecture to handle multiple clients at the same time. (Khare, 2022)

NodeJS is simple and suitable for web applications. However, NodeJS also has limitations such as NodeJS often falls into the case of bottlenecks when working with large files. The support community is still small compared to other websites. (OpenJS Foundation., n.d)

3.2 Firebase Storage

Firebase Storage is a standalone solution for uploading users' content such as photos and videos from iOS and Android devices as well as the Web. Firebase Storage uses the system's simple file/directory for its data structure. There is a 10GB free plan with a data transfer rate of 360 MB/day However, there are also some limitations e.g. Firebase not working in many countries (Frederic, 2014).

Cloud Storage for Firebase stores files in a Google Cloud Storage bucket, making them accessible through both Firebase and Google Cloud. This allows the flexibility to upload and download files from mobile clients via the Firebase SDKs for Cloud Storage. In addition, supports server-side processing such as image filtering or video transcoding using the Google Cloud Storage APIs. Cloud Storage scales automatically, meaning that there's no need to migrate to any other provider. The Firebase SDKs for Cloud Storage integrate seamlessly with Firebase Authentication to identify users, providing a declarative security language to set access controls on individual files or groups of files, so one can make files as public or private as one wants (Firebase Inc., 2013).

3.3 ReactJS

ReactJS is a JavaScript library for building web interfaces and enables rapid user interface creation. ReactJS helps with writing JavaScript code by using JSX syntax. Along with many support libraries on ReactJS. One of the limitations of ReactJS is that it only serves the view layer, helping to render the view. React also doesn't have 2-way binding or Ajax. (Meta Platforms Inc., 2022b)

Virtual DOM

The virtual DOM (VDOM) is a programming concept where an ideal, or "virtual", representation of a UI is kept in memory and synced with the "real" DOM by a library such as React DOM. This process is called reconciliation. Virtual DOM updates synchronize the real DOM when you tell React what state you want the UI to be in. This abstracts out the attribute manipulation, event handling, and manual DOM updating that you would otherwise have to use to build an app. (Meta Platforms Inc., 2022c)

Components

Components are the primary concept of React, which encourages developers to separate the complicated user interfaces into reusable and independent parts. React components are classified into two types: class-based components and functional components. The functional component is considered the most straightforward method to construct the website as it can be implemented as a JavaScript function to return JSX. (Meta Platforms Inc., 2022a)

Hooks

When React 16.8 was released officially in early February 2019, it shipped with an additional API that lets you use state and other features in React without writing a class. This additional API is called Hooks and they're becoming popular in the React ecosystem, from open-sourced projects to being used in production applications. React Hooks are completely opt-in which means that rewriting existing code is unnecessary, they do not contain any breaking changes, and they're available for use with the release of React 16.8. React Hooks are in-built functions that allow React developers to use state and lifecycle methods inside functional components, they also work together with existing code, so they can easily be adapted into a codebase. (Akintayo, 2020).

3.4 NPM

Npm stands for Node Package Manager. It is a package manager for the Node JavaScript website. Npm is known as the world's largest software registry. Open-source developers all over the world use npm to publish and share their source code. (JavaScript Tutorial Website, 2021)

Npm consists of three components:

1. The website allows you to find third-party packages, set up profiles, and manage your packages.
2. The command-line interface or npm CLI runs from a terminal to allow you to interact with npm.

3. The registry is a large public database of JavaScript code.

3.5 MySQL

MySQL is an open-source relational database management system. As with other relational databases, MySQL stores data in tables made up of rows and columns. Users can define, manipulate, control, and query data using Structured Query Language, more commonly known as SQL. A flexible and powerful program, MySQL is the most popular open-source database system in the world. As part of the widely-used LAMP technology stack (which consists of a Linux-based operating system, the Apache web server, a MySQL database, and PHP for processing), it's used to store and retrieve data in a wide variety of popular applications, websites, and services. (Drake, 2020)

Its name is a combination of "My", the name of co-founder Michael Widenius's daughter, and "SQL", the abbreviation for Structured Query Language. (Oracle, n.d)

A client computer will communicate with a server in a given network. Each client can send a request from the graphical user interface (GUI) on the screen, and the server will return the desired result. As long as you both understand each other. The main operation in the MySQL environment is the same: (Hai, 2019)

1. MySQL creates tables to store data, defining relationships between those tables.
2. The client sends the SQL request with a special command on MySQL.

3. The application on the server will respond to the information and return the results to the client.

4 Preliminary survey

4.1 Objective

Do conducted a small survey with the aim to find out if there is a potential need for some type of platform that can be used to rate, review and create discussions revolving around university/college courses.

4.2 Target group

The ultimate purpose of the website is to create a worldwide platform where learners can have open and informative discussions about courses from university/college courses all around the globe, not just at Turku University of Applied Sciences or Finland. Thus, the target group for the survey is anyone who has participated or is participating in university/college courses.

The survey was distributed via different channels, e.g., to friends and acquaintances (students in Finland and Vietnam) via instant messaging and email, posts on social media student groups, and through intermediate channels such as friends of friends.

The objective was 100 participants and the survey was closed after the target number is reached.

4.3 Survey Questions

As the survey is not a major component of the thesis, Do decided to keep it simple with two straightforward questions:

1. Have you ever wondered which course to choose when the semester starts?

○ Yes

○ No

2. Is it important to read course's review before registering it?

○ Not important

○ Depend on which course

○ Important

○ Yes

Figure 1. Survey questions.

The first question aims to investigate whether learners still think about which courses to take before a semester regardless of the school's predefined study plan (if available). The second question examines how important course review is from the learner's point of view regardless of whether the course is compulsory or not.

4.4 Survey Results and Analysis

In question 1, out of 100 answers, 81 participants chose Yes. This indicates that although most schools have a recommended study plan with compulsory courses, students still wonder what courses to choose before each semester. This might happen for many reasons, there could be various modules to choose from (e.g., most study programs only require students to choose 2-3 compulsory modules out of all available modules), and each module contains various courses (e.g., students are usually only required to study 3-4 courses out of all available courses within one module), selective courses, some students might want to take compulsory/selective courses in different semesters from what the study plan recommends (to, e.g., serve their work), etc. So, even though the study guide is a very useful tool to help students select which courses to take, various other factors need to be taken into account, for example, choosing the right modules, as well as the right courses within one module, is very important as it affects the students' professional knowledge and skills that will define their career, reading reviews by alumni about how the courses they took during university influence their work might help students understand better which modules/courses are more suitable.

In question 2, only 5 participants found course review not important. Even though some courses are compulsory and students will have to take them regardless, more than half of the participants still think it is important to read the course review. As briefly mentioned above, the website is different from e.g., a university's study guide in that it provides the students' perspectives and experiences on courses, for example, where the course is difficult and why, and useful tools that could be applied in the course, which subjects to focus on, were the skills and knowledge acquired in the course practical and applicable in real-life and how, etc. As students themselves, Do and Phu have found that this information is rarely discussed on universities' official websites or to the extent that students are looking for, which might be the reason why most responders still want to read the review before enrolling in a course according to the survey.

Have you ever wondered which subject to choose when the semester starts?

100 responses
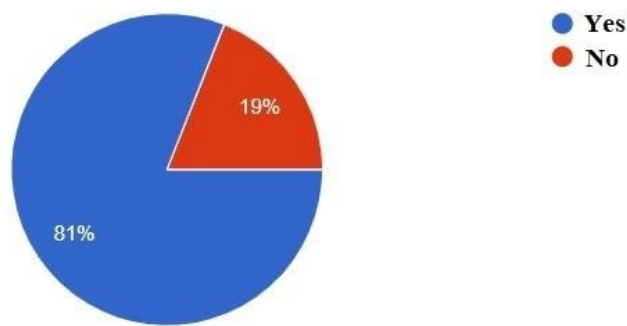
Is it important to read course's review before registering it?
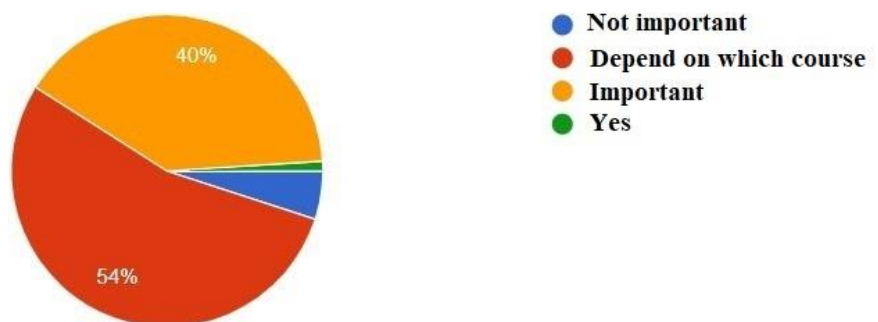
100 responses

Figure 2. Survey analyst.

4.5 Reflection

The survey has helped Do and Phu understand better which problems to solve and which functions to add to fulfill students' needs, for example, based on the answers to the second question, Do and Phu have decided to add a specific filter function according to the desired

courses. As the information students look for in a course review can vary widely, the website is geared toward free-form, open discussions where users can discuss/ask/answer any type of question/topic.

5 Design Process

The design process consists of the concept of the website, system structure, usecase, and system design that help to structure the work and understand the relationships and exchanges between the application and tables in the database.

5.1 Concept of the website

The website is the solution for any student who is about to register for courses at university. They will not struggle to determine which content is offered by a certain course, which courses to focus on, which courses are suitable for their orientation, etc. when they get the answers from those who have studied such courses. Furthermore, the website can help students in job seeking such as creating a CV, improving CV, and applying for a job.

5.2 System structure

The structural system includes a database and MySQL2 for the data. For the back-end, there are models, routes, Google Cloud, Websocket, and authentication. For the front-end, there is a Web Application Home page.
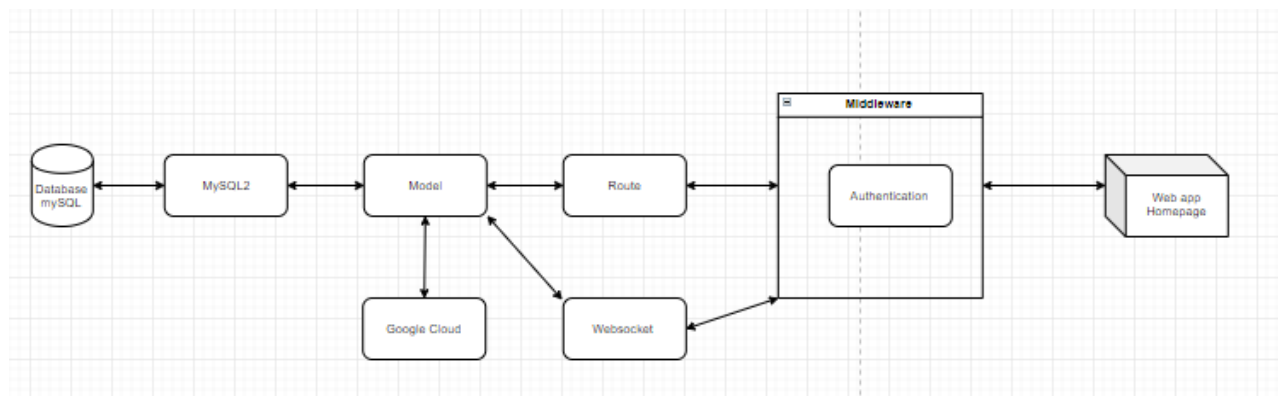

Figure 3. Overview of the system structure.

Database (Mysql) offers data storage for the system. Mysql2 writes and receives data from the Database. The model handles the data returned from the database and processes the data sent to the database, and then returns the necessary data to the user. Each model will handle data related to the tables in the database. Google Cloud stores images, videos, and files sent from users; and the paths to the sent files will be saved in the database. Route receives users' requests through the sending URL and methods; each route will correspond to a function of the model. WebSockets are used for real-time communication between the browser and a server. Middleware filters users' requests before they reach the Route layer (to prevent unauthorized access and to format the requests before they are processed by the server). Web App which is

the front-end side allows students to access website features such as view reviews, profiles, jobs, etc.
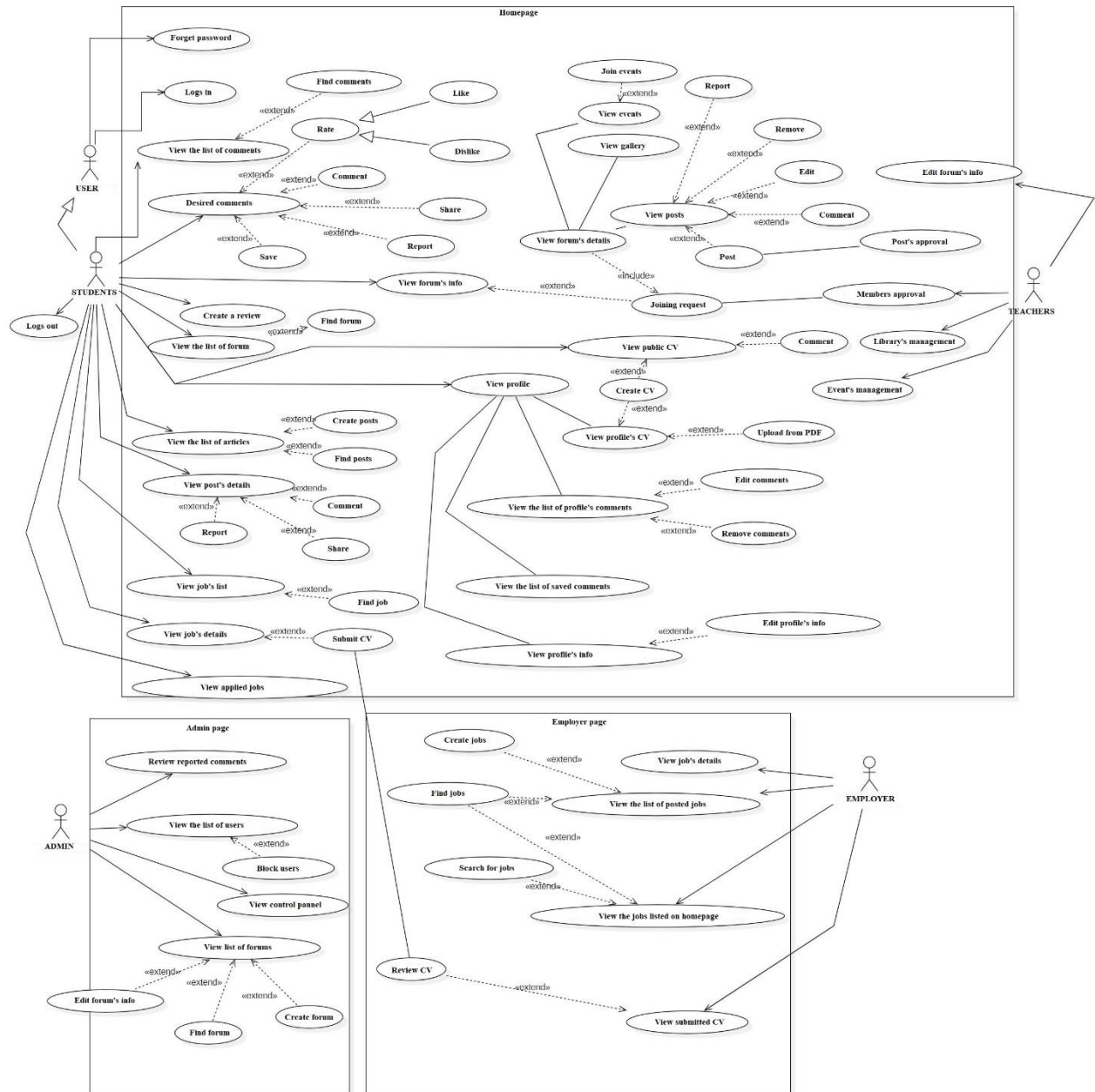
5.3 Usecase description

Figure 4. Usecase chart.

Students' Homepage has ten usecases and three actor roles (Figure 4).
1. Usecase: View the list of comments
   Description: Users can see the list of comments posted on the homepage

Actor: Students

Event stream:

- The user logs in
- The user is redirected to the homepage
- The user views the comments

Extension Points:

- The user can search for desired comments by (Specialty, Faculty, Contents to be posted as comments)
- Rate the reviews by choosing like/dislike
- Comment on the reviews
- Save comments to view them later
- Share comments to other users

2. Usecase: Create a review

   Description: Post a review on the homepage

   Actor: Student

   Event stream:

   - The user logs in
   - The user is redirected to the homepage
   - The user selects 'Create a review'
   - The user selects a Faculty, Specialty, Course, Year
   - The user writes the content of the comment
   - The user chooses to post the comment

   Extension Points:

   - Any unsatisfactory review can be deleted

3. Usecase: View the list of articles (Forum)

   Description: The forum is for posting discussions about learning issues

   Actor: Student

   Event stream:

   - The user logs in
   - The user is redirected to the homepage
   - The user selects the 'Forum' tab with the Extension Points:
   - The user searches for posts
   - The user upvotes/downvotes the posts (To assess the credibility of the posts)
   - The user comments on the posts
   - The user shares the posts

4. Usecase: View post details (Forum)

   Description: Users can view the content of each post and related comments as well

   Actor: Student

   Event stream:

   - The user logs in
   - The user is redirected to the homepage
   - The user selects the 'Forum' tab - Selects the post to see the content

Extension Points:

- The user upvotes/downvotes the posts (To assess the credibility of the posts)
- The user comments on the posts
- The user shares the posts

5. Usecase: Create a post (Forum)
   Description: Users can create new posts to discuss and contribute opinions
   Actor: Student
   Event stream:

   - The user logs in
   - The user is redirected to the homepage
   - The user selects the 'Forum' tab
   - The user selects 'Create Discussion'
   - The user enters the topic and content of the post
   - The user selects 'Post'

   Extension Points:
   Any unsatisfactory post can be deleted

6. Usecase: View the job list
   Description: Users can search for job opportunities and apply for desired positions
   Actor: Student
   Event stream:

   - The user logs in
   - The user is redirected to the homepage
   - The user selects the 'Recruitment' tab

   Extension Points:

   - The user searches for jobs by (name, industry, workplace)
   - The user views the list of applied jobs

7. Usecase: View job details
   Description: Users can see further details about each job when choosing to view job details
   Actor: Student
   Event stream:

   - The user logs in
   - The user is redirected to the homepage
   - The user selects the 'Recruitment' tab
   - The user selects the job to see further details

   Extension Points

   - The user submits his/her CV to employers

8. Usecase: View the CV list
   Description: Users can post their CVs so that others can comment and give advice on how to make the CVs better.
   Actor: Student
   Event stream:

   - The user logs in

- The user is redirected to the homepage
- The user selects the 'Profile' tab

Extension Points:

- The user comments on CVs
- The user creates a new CV and posts it on the Profile page

9. Usecase: View the jobs listed on the homepage for students
   Description: View the currently available jobs listed on the homepage for students
   Actor: Employer
   Event stream:
   - The user logs in
   - The user is redirected to the homepage
   - The user selects the 'Available jobs' tab

   Extension Points:
   - The user views job details
   - The user searches for jobs

10. Usecase: Review and approval of CV
    Description: Employers can review CVs submitted by students and contact selected students
    Actor: Employer
    Event stream:
    - The user logs in
    - The user is redirected to the homepage
    - The user selects the 'Received CVs' tab

5.4 System design

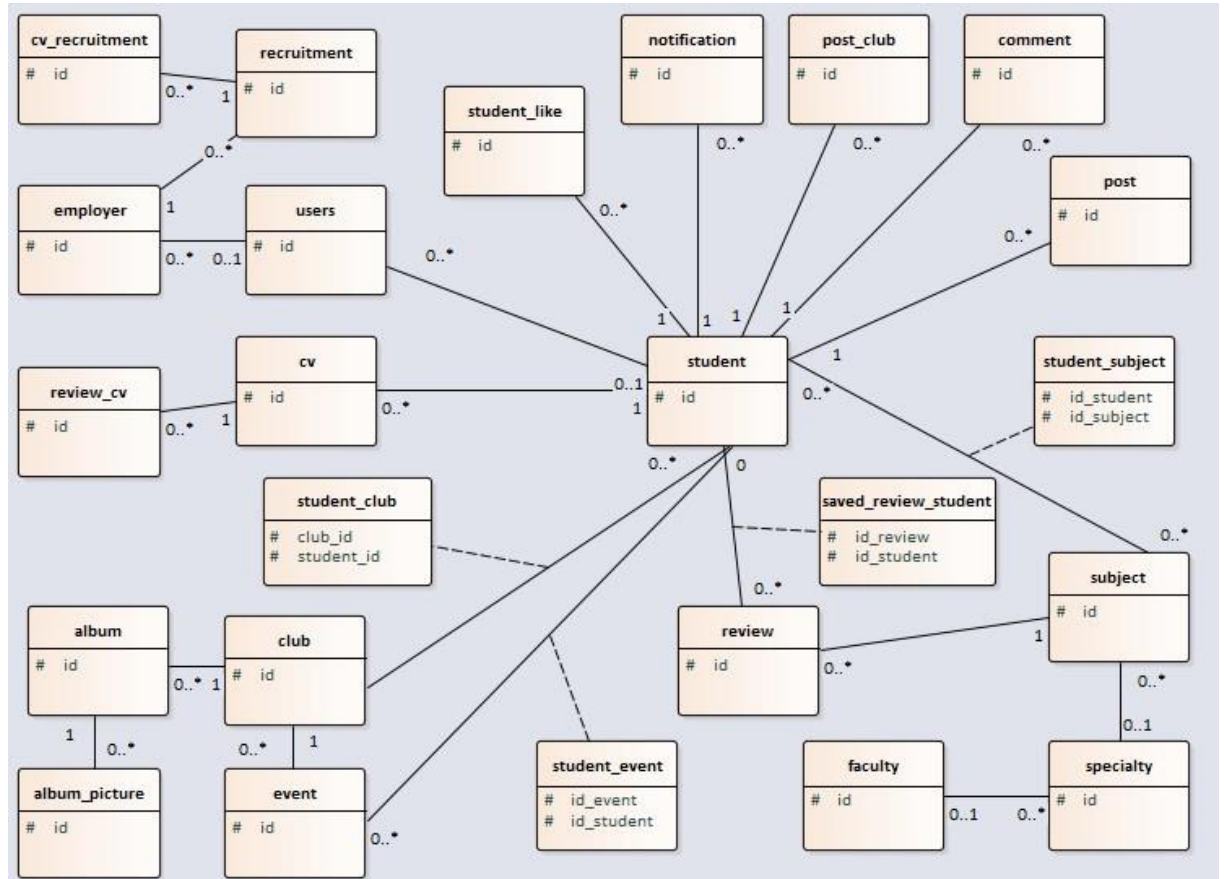In the system design, the main class is the student. Users, club, subject, and cv are submain classes.

Figure 5. Overall design level class diagram (containing Figures 1-19 and Tables 1-17 in Appendix).

Classes' relationships:
- Users class and Student class: each user account is assigned to only one student.
- Users class and Employer class: each user account is assigned to only one employer.
- Recruitment class and CV-recruitment class: Multiple CVs can be sent to one recruitment account, and one CV can be sent to multiple recruitment accounts.
- Recruitment class and Employer class: An employer may post nothing or post multiple recruitment articles, each recruitment article should be posted by only one employer class.
- Faculty class and Specialty class: a faculty may have multiple specialties, and each specialty belongs to only one faculty.
- Specialty class and Course class: a specialty may have multiple courses, each course belongs to only one specialty.

- Review class and Course class: a course may have multiple reviews, each review belongs to only one course.
- Comment class and Student class: a student may have multiple comments, each comment belongs to only one student.
- Review class and Saved-review-student class: a review can be saved by multiple students.
- Student class and Saved-review-students: a student may save multiple reviews.
- Student class and Post class: a student can post multiple discussions, a discussion belongs to only one student.
- Student class and Notification class: a student may receive multiple notifications, a notification belongs to only one student.
- Student class and CV class: a student may create multiple CVs, a CV belongs to only one student.
- CV class and Review-cv class: a CV may receive multiple reviews, a review belongs to only one CV.
- Student class and Student-like class: a student may like multiple posts, and one post may be liked by multiple students.
- Student class and Student-course class: a student may study multiple courses.
- Course class and Student-course class: a course can be studied by multiple students.

6 Results

This chapter demonstrates the outcome and user guide of our website. In the results chapter, Phu shows the course review, creating course review, creating a CV, CV review, and recruitment news features.

6.1 Review function

6.1.1 CRUD review

It is an important function of the project, supporting users to view, search, and look up desired reviews to support the registration of the project.
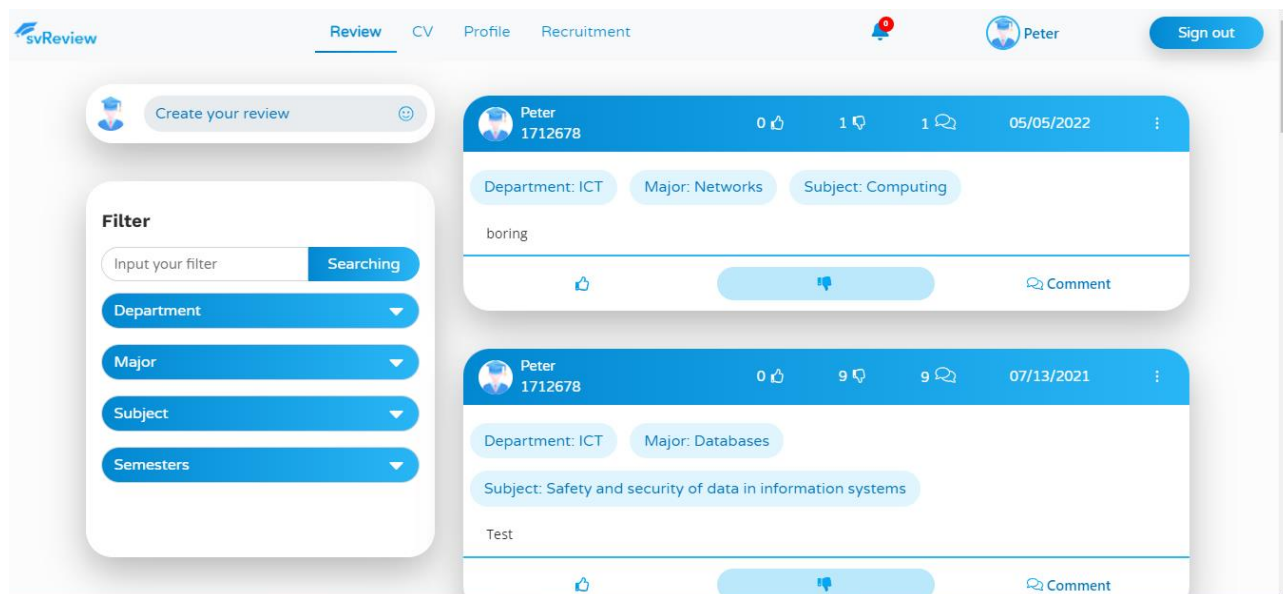

Figure 6. Review homepage screen.

The Review homepage screen includes (Figure 6):

- A display box for displaying all reviews with the following information: review writer, number of likes, number of dislikes, posting date, number of comments, and review content.

- A search box for searching reviews by entering text or available filters like faculty, specialty, course, and year.
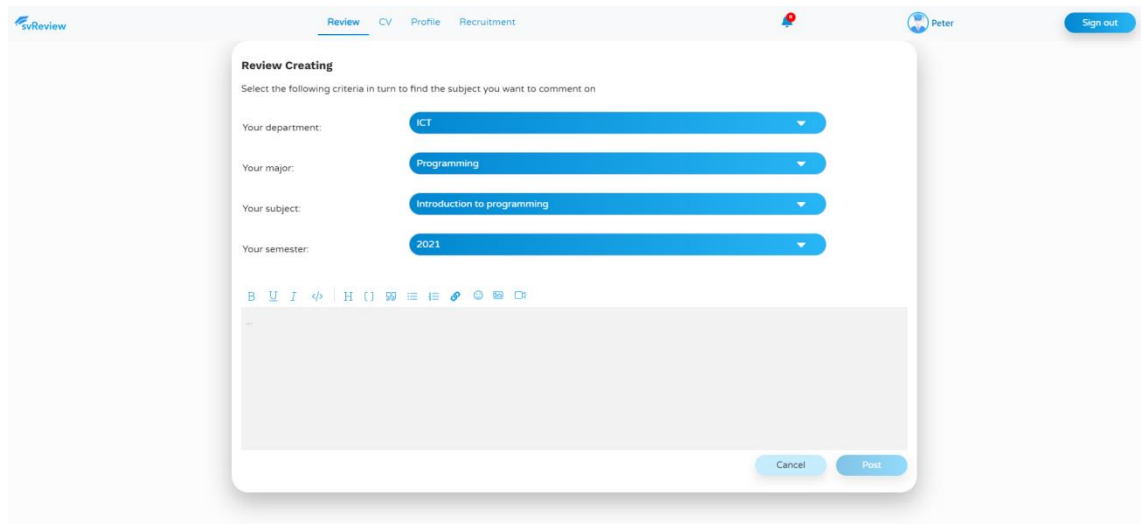- A review form for posting a new review.

Figure 7. Course review posting screen.

The course review posting screen includes (Figure 7):

- A list of review filters including faculty, specialty, course, and year.
- A window, text editing.

Usecase of the function of viewing reviews:

- Step 1: The user selects the Browse icon and enters the following link: https://snago.online/login
- Step 2: The user enters username: 1712684.
- Step 3: The user enters password: 12345678.
- Step 4: The user clicks the 'Login' button.
- Step 5: After the system confirms successful login, the user is directed to the review homepage.
- Step 6: The user views the displayed reviews.
- Step 7: The user enters keywords in the "Database" box on the search bar.
- Step 8: Reviews related to the keywords entered in the "Database" box will be displayed on the review homepage screen.

Usecase of the function of posting a review:

- Step 1: The user selects the Browse icon and enters the following link: https://snago.online/login
- Step 2: The user enters username: 1712684.
- Step 3: The user enters password: 12345678.
- Step 4: The user clicks the 'Login' button.
- Step 5: The user selects the course to write comments on.
- Step 6: The user selects the Faculty of Information Technology.
- Step 7: The user selects the specialty of software engineering.

- Step 8: The user selects the course of interface design.
- Step 9: The user selects the school year of 2021.
- Step 10: The user enters the comments on the course.
- Step 11: The user clicks the 'Post' button.

6.1.2 Interactive functions: liking/disliking, commenting

These are functions allowing users to interact directly with any review. When reading a review, users can express their personal opinions by selecting the like/dislike buttons and discussing the review through the comment function. Both functions are updated on a real-time basis to increase the interactivity among users.
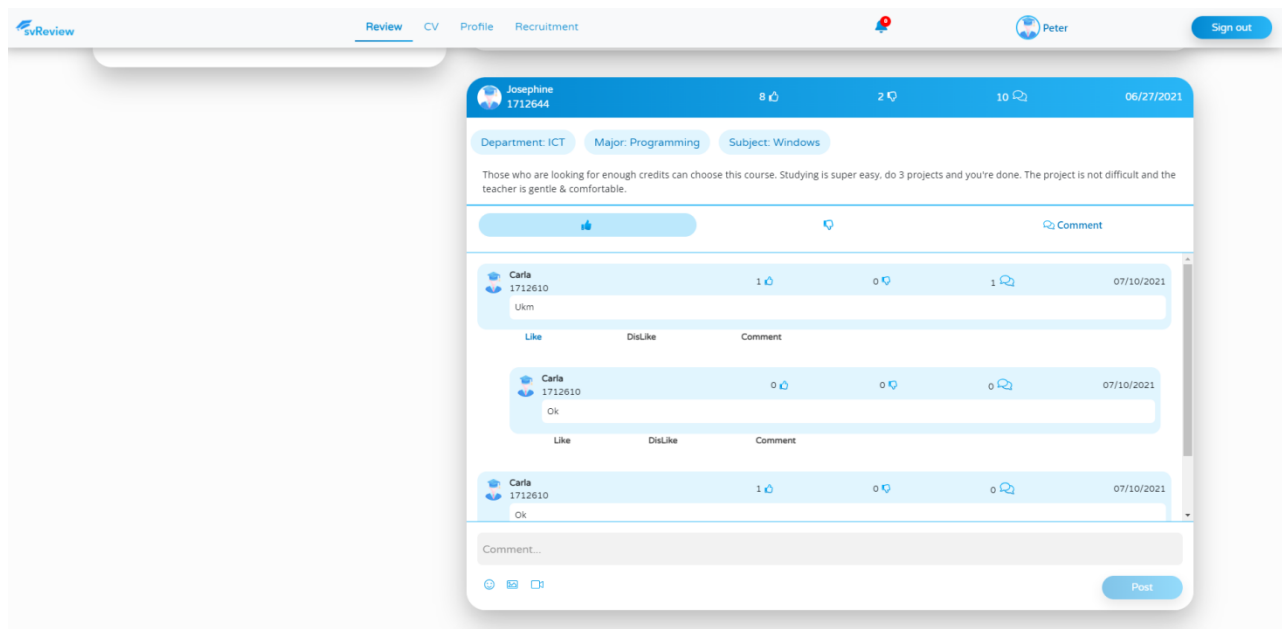

Figure 8. The screen for viewing details of a review.

The screen includes (Figure 8):

- Dislike and like buttons for users to interact with a review.
- List of comments below the review, each comment includes the comment writer's personal information, posting time, sub-comments, number of likes, number of dislikes, and number of sub-comments.

Usecase of the function of liking a review:

- Step 1: The user selects the Browse icon and enters the following link: https://snago.online/login
- Step 2: The user enters username: 1712684.
- Step 3: The user enters password: 12345678.

- Step 4: The user clicks the 'Login' button.
- Step 5: After the system confirms successful login, the user is directed to the review homepage.
- Step 6: The user views the displayed reviews.
- Step 7: The user clicks a review to see its details.
- Step 8: The user clicks the 'Like' button.

Usecase of the function of disliking a review:

- Step 1: The user selects the Browse icon and enters the following link: https://snago.online/login.
- Step 2: The user enters username: 1712684.
- Step 3: The user enters password: 12345678.
- Step 4: The user clicks the "Login" button.
- Step 5: After the system confirms successful login, the user is directed to the review homepage.
- Step 6: The user views the displayed reviews.
- Step 7: The user clicks a review to see its details.
- Step 8: The user clicks the "Dislike" button.

Usecase of the function of commenting on a review:

- Step 1: The user selects the Browse icon and enters the following link: https://snago.online/login.
- Step 2: The user enters username: 1712684.
- Step 3: The user enters password: 12345678.
- Step 4: The user clicks the 'Login' button.
- Step 5: After the system confirms successful login, the user is directed to the review homepage.
- Step 6: The user views the displayed reviews.
- Step 7: The user clicks a review to see its details.
- Step 8: After the user clicks to view comments, the system displays the comments on the review.
- Step 9: The user enters "Such a good comment" and sends it; after the comment is recognized to be successfully sent by the system, it will be displayed on the list of comments on the review.

6.1.3 Other functions: saving and reporting a review

These functions allow users to save and reports reviews, thereby helping them use the reviews displayed on the review home page. The function of saving reviews helps users store the best and most favorable reviews, and the function of reporting reviews helps users report incorrect reviews, which are more offensive to individuals and organizations other than reviewing a course.
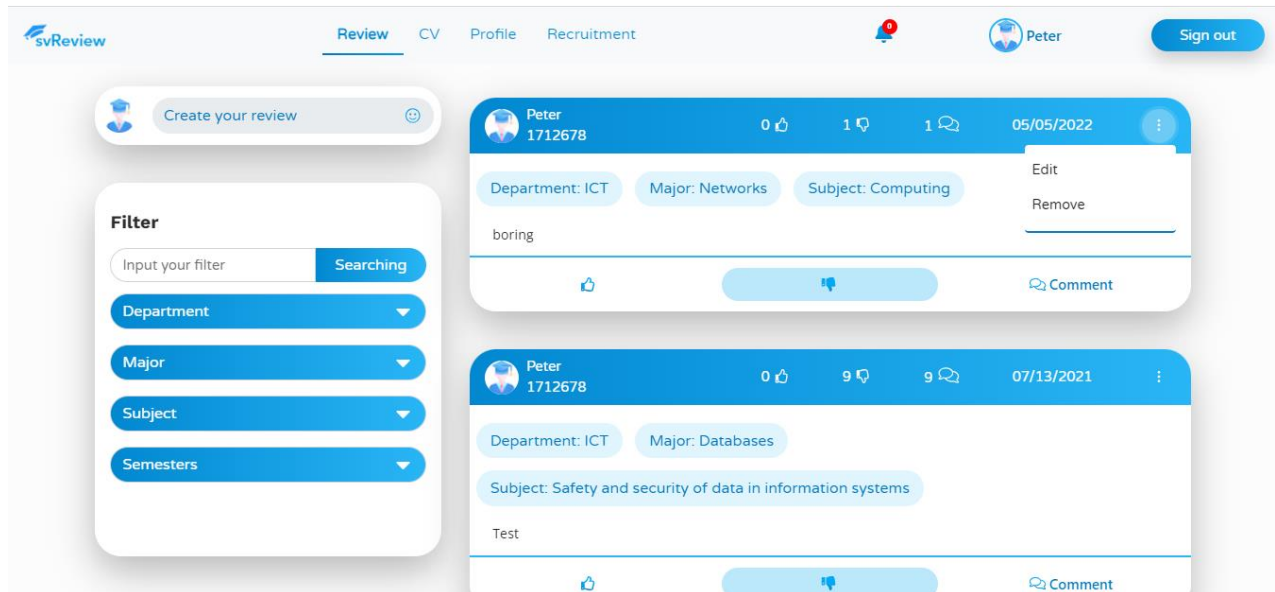
Figure 9. The screen for reporting a review on a course.

Figure 9 demonstrates that two buttons for "share" and "report" appear when a user clicks on the "..." symbol on a review.

Usecase of the function of saving a review:

- Step 1: The user selects the Browse icon and enters the following link: https://snago.online/login.
- Step 2: The user enters username: 1712684.
- Step 3: The user enters password: 12345678.
- Step 4: The user clicks the 'Login' button.
- Step 5: After the system confirms successful login, the user is directed to the review homepage.
- Step 6: The user views the displayed reviews; if the user finds a review good to be saved, the user selects the function of saving a review.
- Step 7: The user clicks 'save'.

Usecase of the function of reporting a review:

- Step 1: The user selects the Browse icon and enters the following link: https://snago.online/login.
- Step 2: The user enters username: 1712684.
- Step 3: The user enters password: 12345678.
- Step 4: The user clicks the 'Login' button.
- Step 5: After the system confirms successful login, the user is directed to the review homepage.
- Step 6: The user views the displayed reviews; if the user wants to report a review, the user selects the function of reporting a review.
- Step 7: The user clicks 'report'.

6.2 Functions of creating and managing CVs

6.2.1 Creating and saving CVs

These functions allow users to create a CV using an available template posted on the website by downloading directly a CV from the user's device.
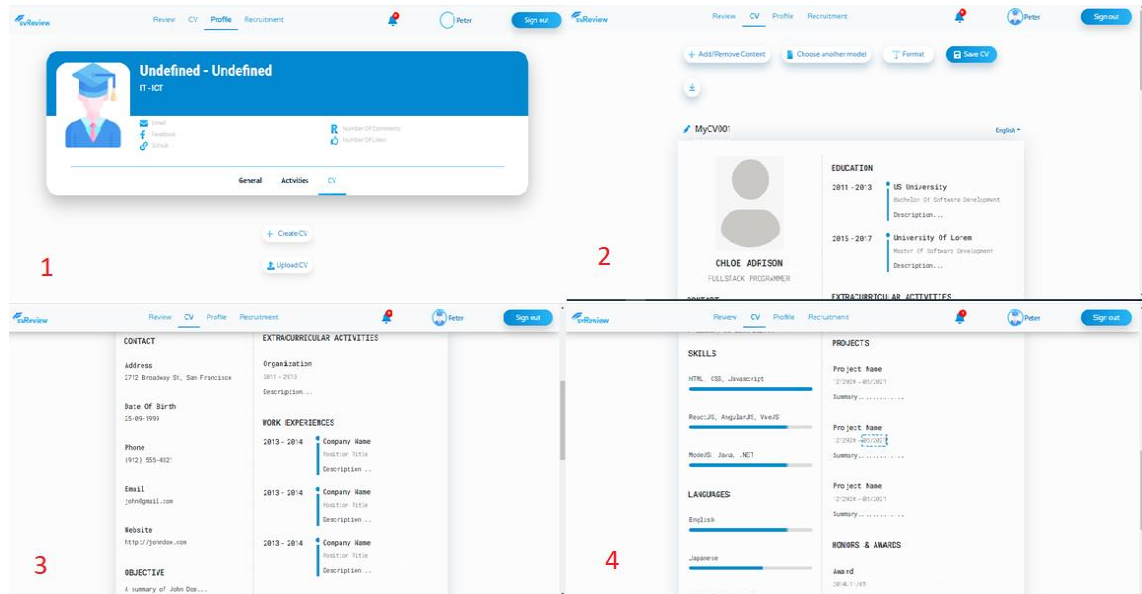

Figure 10. The screens for creating a CV.

The screen for creating a CV includes (Figure 10):

- Screen 1 has two buttons with two functions allowing the user to create a CV using an available template posted on the website or downloading directly a CV from the user's device.
- Screens 2, 3, and 4 are the forms for editing the CV and include the following required items: education, personal information, work experience, projects, awards, and references.

Usecase of the function of creating and saving a CV:

- Step 1: The user selects the Browse icon and enters the following link: https://snago.online/login.
- Step 2: The user enters username: 1712684.
- Step 3: The user enters password: 12345678.
- Step 4: The user clicks the 'Login' button.
- Step 5: The user clicks on the username "Peter"
- Step 6: After being directed to the profile page, the user clicks the 'Profile' tab.

- Step 7: The user enters complete information about education, personal information, activities, experiences, career goals, projects, skills, certificates, awards, and interests according to his/her personal information.
- Step 8: The user clicks the 'Save' button to save the CV.

6.2.2 The function of discussing and reviewing CVs

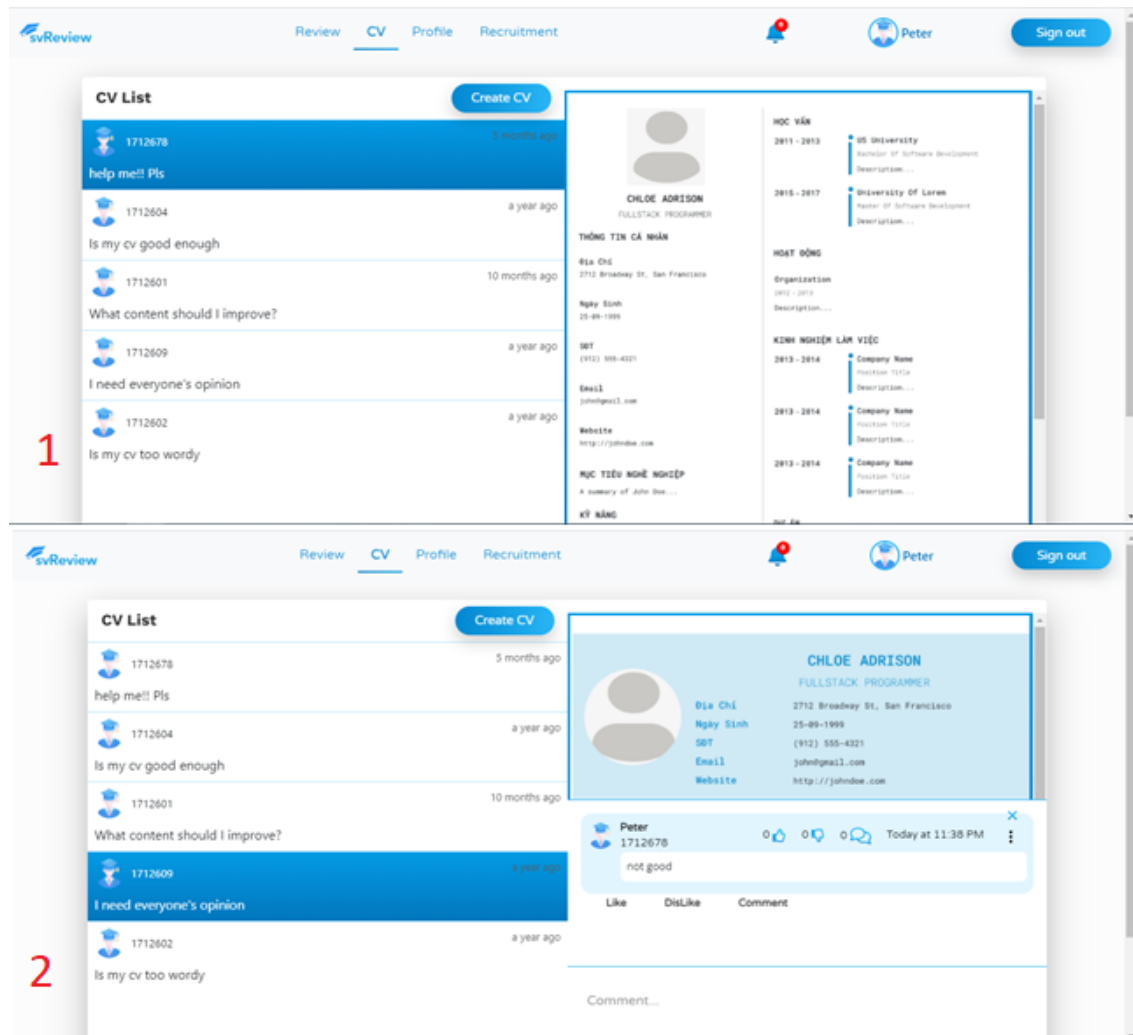The function allows users to discuss and advise on the CVs which need to be consulted on the forum.

Figure 11. The screen for discussing and reviewing a CV.

The screen includes (Figure 11):

- The first screen is a list of CVs that need to be discussed: The contents which need to be discussed are displayed on the left of the screen, and the corresponding CVs are displayed on the right.

- There is a button for users to view or contribute comments.
- The second screen displays a list of comments on a review, each comment includes comment writers' personal information, posting time, sub-comments, number of likes, number of dislikes, and number of sub-comments.

Usecase of the function of discussing and reviewing on a CV:

- Step 1: The user selects the Browse icon and enters the following link: https://snago.online/login.
- Step 2: The user enters username: 1712684.
- Step 3: The user enters the password: 12345678.
- Step 4: The user clicks the 'Login' button.
- Step 5: The user clicks the 'Profile' tab.
- Step 6: The CVs uploaded to the forum will be displayed.
- Step 7: The user selects CVs to view them.
- Step 8: The user clicks to comment on a CV.
- Step 9: The comments on that CV will be displayed.
- Step 10: The user joins the discussion about that CV by filling in the comment box.
- Step 11: The user clicks the button to send the comment.

6.3 Main functions for job seeking

This function helps employers find suitable jobs. Jobs posted by the employer on the recruitment management page which is different from this page. Students can search for jobs by location and category on the filter column.
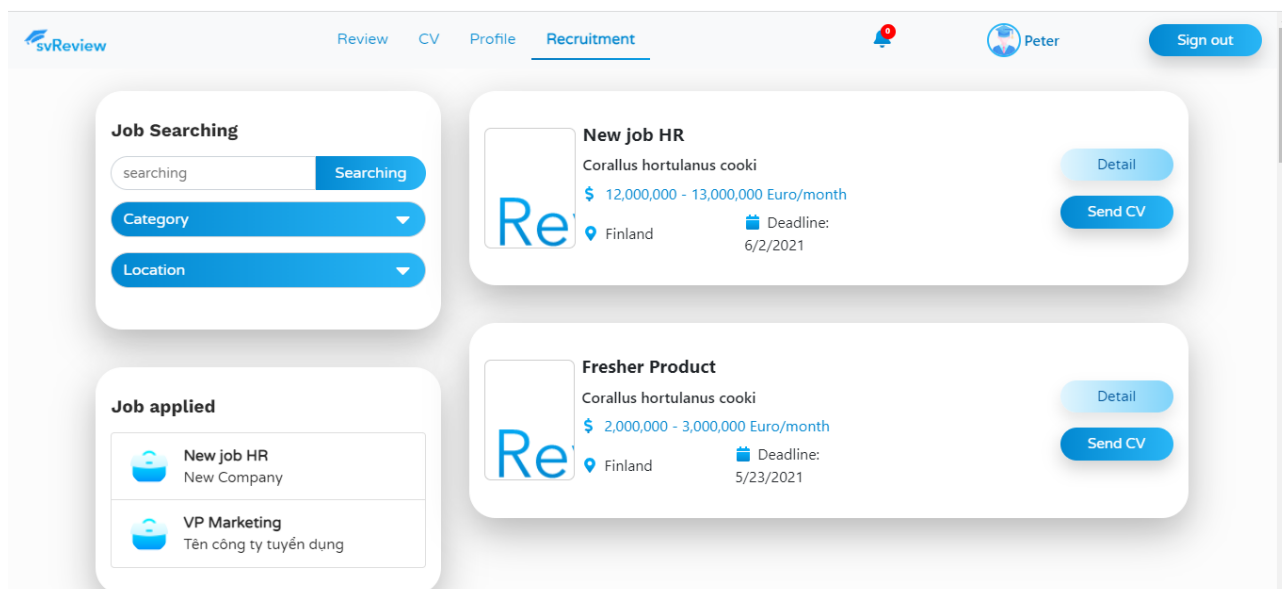

Figure 12. The screen of recruitment news.

The screen includes (Figure 12):

- Job searching on the top left. Students can search the name of the job by category and location they want.
- Job applied on the bottom left. With a job applied, students can see again the job that they already applied for.
- On the right of the screen, is the main page. Jobs posted by employers and students can get the name of the job, company, salary, location, and the deadline for applying. The "Send CV" button will send the student's CV to the employer.
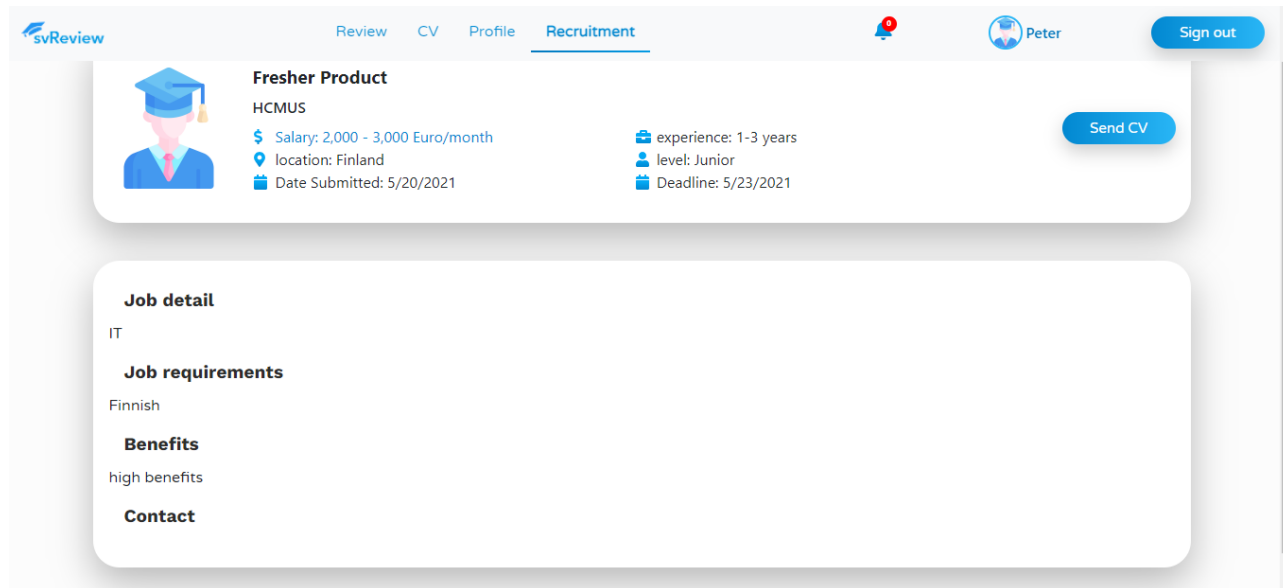

Figure 13. The screen of recruitment detail.

The screen includes (Figure 13):

- Job's position on the top left of the first window' following general information such as salary experience company location
- On the second window, there are job details such as language requirements benefits contact
- If you have all requirements you can submit your CV by the "send cv" button on the top right of the first window.

7 Conclusion

The thesis aimed to create a website that allows candid discussions about the quality of university/college courses and other relevant subjects from learners' points of view with the hope of providing a comprehensive guideline for (prospective) students to compare different educational institutions all around the world, which would maximize the chance of them finding the most suitable study program. Besides common knowledge such as course name, duration, teacher name, course content, etc. which is often provided by the institutions themselves, the website would bring forward unavailable (or at least hard to find) information such as teaching ability (e.g., language proficiency, how a lesson is conveyed, does the teacher provide adequate assistance/feedback, answer the students' questions and/or their emails in time, etc.), are the skills and knowledge taught in the course relevant for the current job market (worldwide and in the country/location that the institution is located), which (additional) tools could be used to better support learning, how best to internalize the knowledge/skills, etc. We are aware that, at least for Finnish higher education, there are various types of feedback surveys for students regarding their studies, however, the results are often shared internally within an institution, and students from outside those institutions, Finland or the EU might not know where to find these results. Moreover, most of these surveys are quite general and students usually do not take them.

The main functions (i.e., feedback discussion, CV creation, job market) of the application were satisfactory as the requirements were met. The student website has been built successfully, a place where students can gather information to support their decision in choosing a study program/institution or learn in advance and prepare for the upcoming school year. The website is not mainly about rating courses, but a community where students can voice questions regarding their studies and be guided in the right direction (e.g., many students might not know where to find the information they need even if it is already available at universities' websites or some other places, they can start with this website where other users can help lead them to the right sources). Moreover, students are also assisted with highly relevant features that would support them in their future careers such as CV creation and evaluation, as well as job seeking. This thesis can be used as a reference to build a worldwide education forum that is not only for the student but can also bring benefits to teachers and learning institutions (e.g., to learn about other universities' courses and students' experiences, to interact directly with students all over the world) as well as companies and employers (e.g., to voice their own needs in term of skills and knowledge that students should have for different occupations, which would help bridge the gap between what are taught in universities and what employers are looking for).

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System Analyst

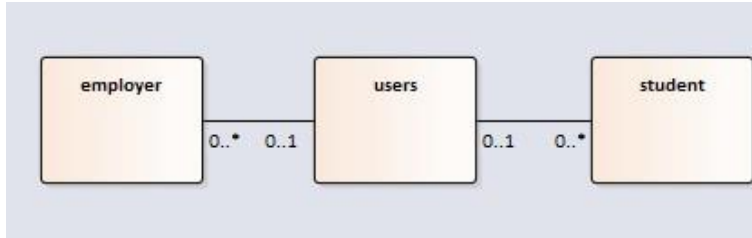- Functions of Login and Forgot Password:

Figure 1. Class diagram of the functions of login and forgot password.

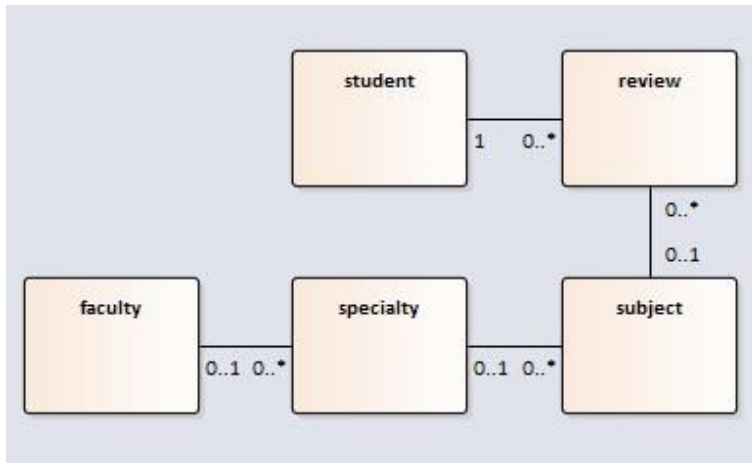- CRUD function for comments:

Figure 2. Class diagram analyzing CRUD function for comments.

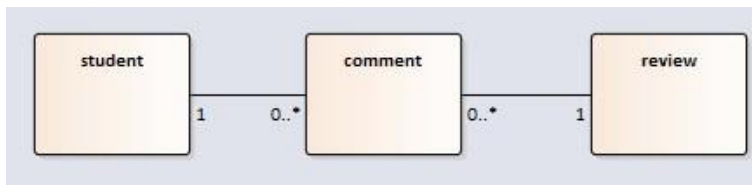- Function of commenting on reviews:

Figure 3. Class diagram analyzing the function of commenting on reviews.
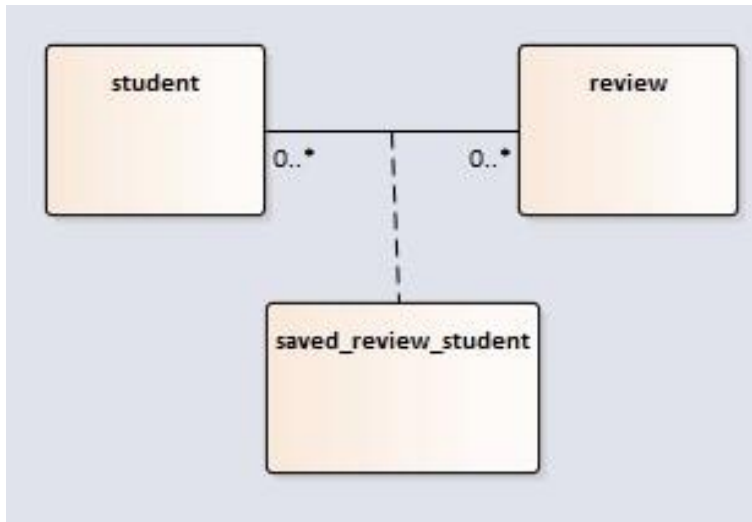
- Function of saving comments:

Figure 4. Class diagram analyzing the function of saving comments.
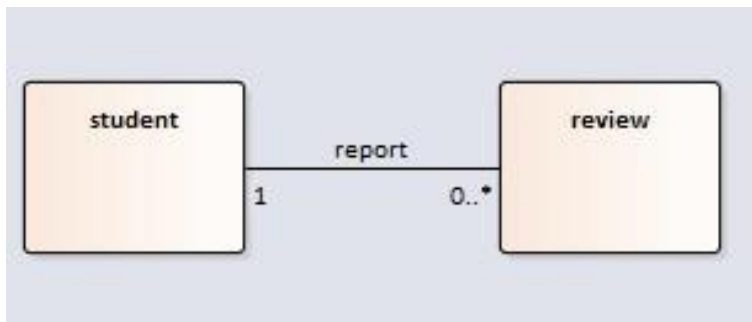
- Function of reporting comments:

Figure 5. Class diagram analyzing the function of reporting comments.

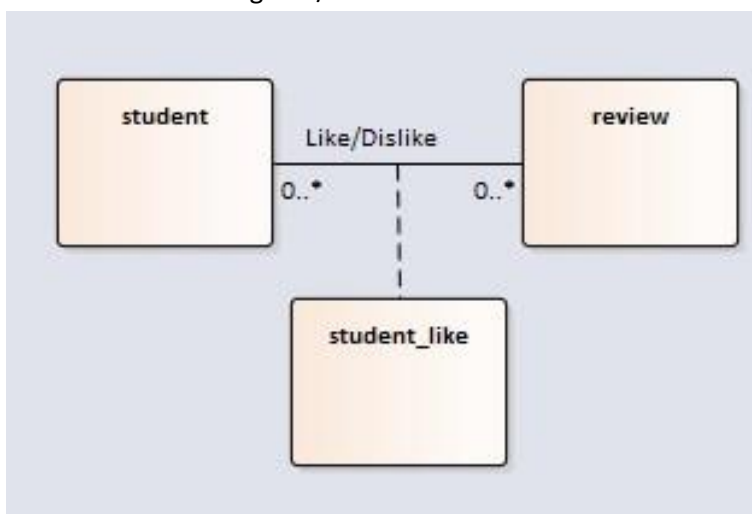- Function of showing Like/Dislike on comments:

Figure 6. Class diagram analyzing the function of showing Like/Dislike on comments.

- CRUD function for posts:

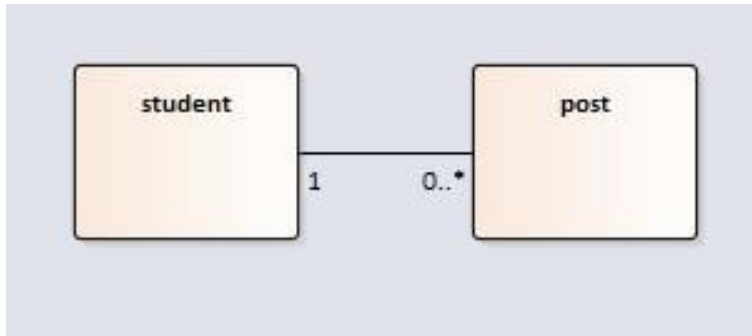Figure 7. Class diagram analyzing CRUD function for posts.

- Function of commenting on posts:
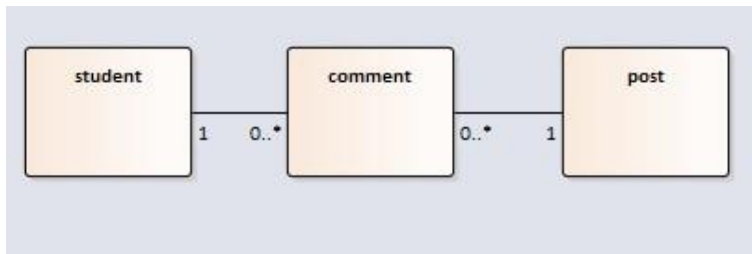
Figure 8. Class diagram analyzing the function of commenting on posts.

- Function of reporting posts:
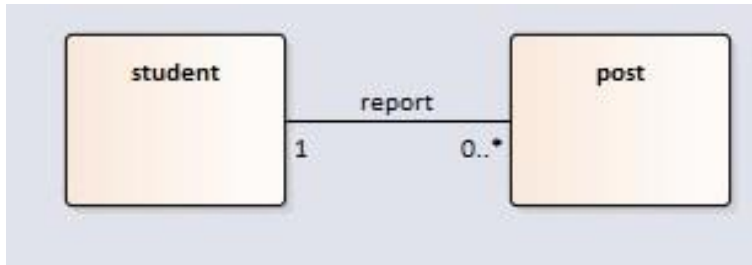
Figure 9. Class diagram analyzing the function of reporting posts.

- Function of submitting a CV for job application:
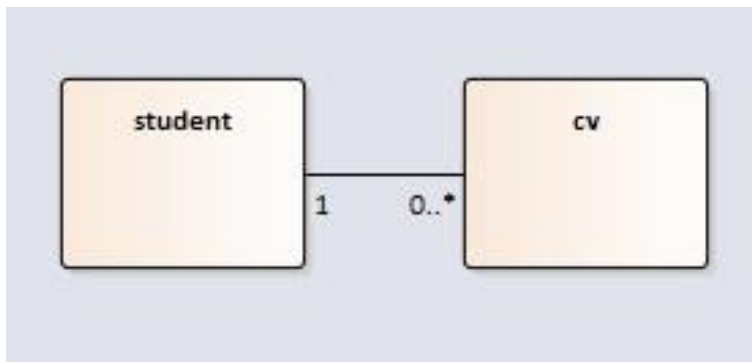
Figure 10. Class diagram analyzing the function of submitting a CV for a job application.

- Function of viewing and commenting on published CVs:
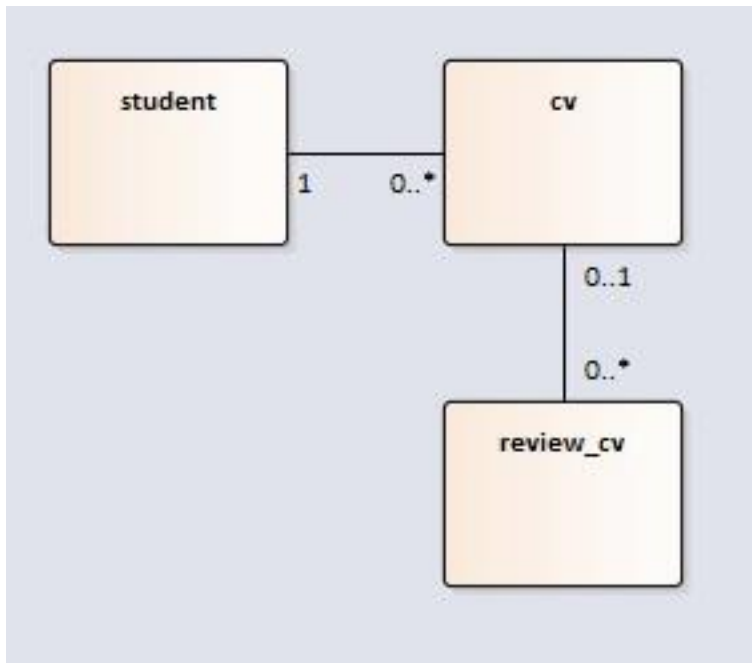
Figure 14. Class diagram analyzing the functions of login and forgot password.

- Function of managing personal information:
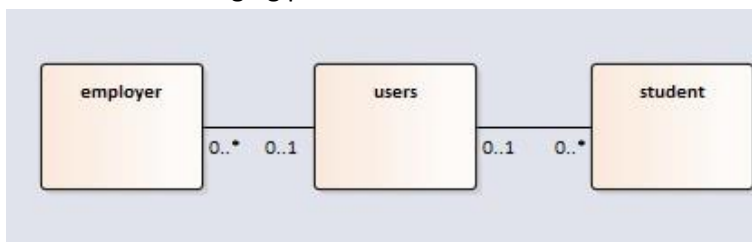
Figure 15. Class diagram analyzing the function of managing user information.

- Function of managing personal comments:
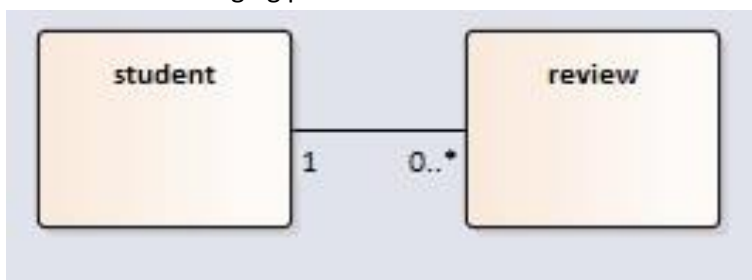
Figure 16. Class diagram analyzing the function of managing personal comments.

- Function of viewing notifications:
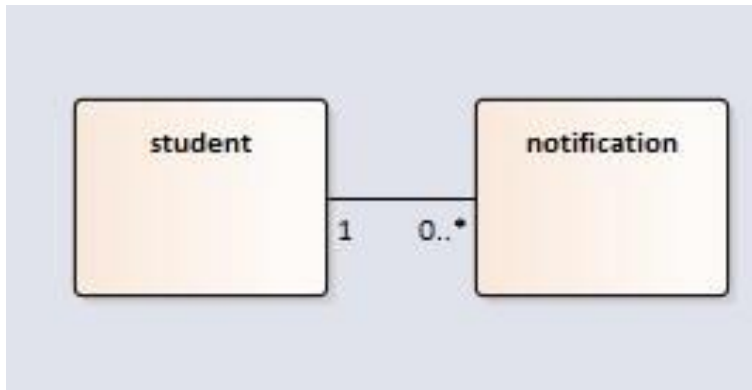
Figure 17. Class diagram analyzing the function of viewing notifications.

- Function of uploading and creating a CV:
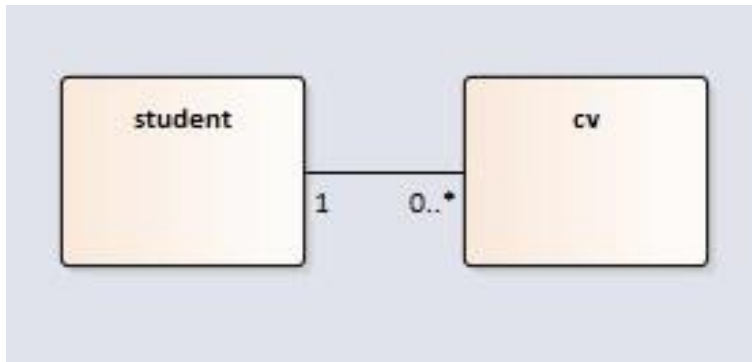
Figure 18. Class diagram analyzing the function of uploading and creating a CV.

- Function of managing jobs by employer s:
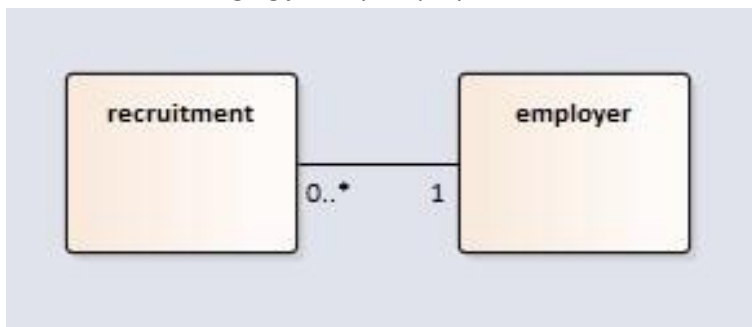
Figure 19. Class diagram analyzing the function of managing jobs by recruiters.

Table 1. A Users class stores data related to user accounts.

Class users

Method	Meaning
id	Main course
username	username
password	password
created-date	created-date
role	Type of users
status	status
phone-number	phone-number
verified-code	verified-code
Method	Meaning
Login()	Logs in
Logout()	Logs out
Block()	Block user

Table 2. A Student class stores students' information.

Class Student	
Attribute	Meaning
id	Main course
student-id	Student number
name	name
date-of-birth	date-of-birth
address	address
gender	gender
number	phone-number

git	Link git
face	Link face
train	experience
user-id	user-id
avatar	Profile picture
faculty-id	faculty-id
Method	Meaning
Update()	Edit info

Table 3. An Employer class stores information about job applicants collected by employers.

Class employer	
Attribute	Meaning
id	Main course
name	Employer's name
introduction	description
address	address
link	Link contact
email	Email contact
user-id	user-id
Method	Meaning
Update()	Edit info

Table 4. A Faculty class stores information about the faculties of the university.

Class faculty	
Attribute	Meaning
id	Main course
name	Faculty's name
founded-date	founded-date
Method	Meaning
Update()	Edit info

Table 5. A Specialty class stores information about the specialties of each faculty.

Class specialty	
Attribute	Meaning
id	Main course
name	Faculty's name
faculty-id	faculty-id
Method	Meaning
Update()	Edit info

Table 6. A Course class stores information about the courses.

Class course	
Attribute	Meaning
id	Main course

name	Faculty's name
specialty-id	specialty-id
category	category
Method	Meaning
Update()	Edit info

Table 7. A Review class stores information about course reviews.

Class review	
Attribute	Meaning
id	Main course
topic	Topic
content	content
created-date	created-date
student-id	student-id
course-id	course-id
updated-date	updated-date
image	image
status	status
Method	Meaning
Update()	Edit info
Create()	Create review
Delete()	Remove review
Like()	Like or dislike review

Comment()	Comment on review
Save()	Save review
Report()	Report review
Find()	Find review

Table 8. A Saved-review-student class stores information about the reviews saved by users.

Class saved-review-student	
Attribute	Meaning
id	Main course
student-id	student-id
review-id	review-id
created-at	created-at

Table 9. A Student-like class stores information about users' favorite reviews.

Class student-like	
Attribute	Meaning
student-id	Student-id, Main course
target-id	Target-id review, Main course
category	category, Main course
is-like	Like/Dislike
target	target

Table 10. A Student-course class stores the courses the student has studied.

Class student-course	
Attribute	Meaning
id	Main course
student-id	Student-id
course-id	course-id
mark	mark
course	course
Method	Meaning
Add()	Add course

Table 11. A Post class saves discussions as posted on the forum.

Class post	
Attribute	Meaning
id	Main course
topic	Topic
content	Content
created-date	Created-date
student-id	student-id
image	image
Method	Meaning
Update()	Edit info
Create()	Create post

Delete()	Remove post
Like()	Like or dislike post
Comment()	Comment on post
Save()	Save post
Report()	Report post
Find()	Search for post
Vote()	downvote or upvote post

Table 12. A Notification class stores notifications sent to users.

Class notification	
Attribute	Meaning
student-id	Student-id
created-by-id	created-by-id
type	type
target-id	target-id
content	Content
status	Status
Link	Link
created-date	Created-date
updated-at	updated-at
Main course	student-id,created-by-id,type,targetid

Method	Meaning
GetNotification()	GetNotification

CreateNotification()	CreateNotification

Table 13. A CV class stores information about the CVs created and uploaded by users.

Class cv	
Attribute	Meaning
id	Main course
student-id	Student-id của cv
metadata	content cv
created-date	Created-date
status	Status
Link	Link cv
Method	Meaning
UploadCV()	Upload CV
CreateCV()	Create CV

Table 14. A Review-CV class saves reviews on the CVs.

Class review-cv	
Attribute	Meaning
id	Main course
student-id	Student-id of cv
cv-id	id cv
describe	Comment,rate

created-at	Created-date
Method	Meaning
AddReview()	Add review
Create()	Create review

Table 15. A Recruitment class stores posts on available jobs.

Class recruitment	
Attribute	Meaning
id	Main course
employer-id	employer-id
job-title	position
category	category
location	Working address
salary	salary
start-date	start-date
end-date	end-date
min-salary	min-salary
max-salary	max-salary
description	Job description
requirement	requirement
benefits	benefits
status	Status
logo	Logo company
company-name	company-name

Method	Meaning
Update()	Edit info
Create()	Create job
Find()	Find job

Table 16. A CV-recruitment class saves the CVs submitted for job applications.

Class cv-recruitment	
Attribute	Meaning
student-id	Student-id
recruitment-id	recruitment-id
cv-id	cv-id
created-date	created-date
status	Status
Main course	student-id,recruitment-id,cv-id
Method	Meaning
AddCV()	Submit CV

Table 17. A Comment class saves comments on reviews and discussions.

Class comment	
Attribute	Meaning
id	Main course
student-id	Student-id
target-id	target-id

created-date	Created-date
category	category
content	Content
Method	Meaning
Update()	Edit comment
Add()	Add comment
Delete()	Remove comment
Rep()	Reply comment
Like()	Like or dislike comment