

Capstone Final Report (FIYU)

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Introduction

The US education system is growing year by year, and as we see a diverse background of students from various countries joining university programs every year, there is a need for students to go to the right university and pursue programs and degrees that are the best fit for them. To solve this problem, we have developed the FiYU (find your university) web application, which provides students with recommendations for what universities they could get based on their academic grades and competitive exam scores. The application also provides an easy way to research desired universities inside the portal. The application also allows users to add and read university reviews and ratings so that prospective students can better understand the university and alumni can provide feedback and reviews of their time there. There is also a chatbot in the application, which makes the website more accessible by allowing the features of the app inside the chatbot application.

Product functionalities

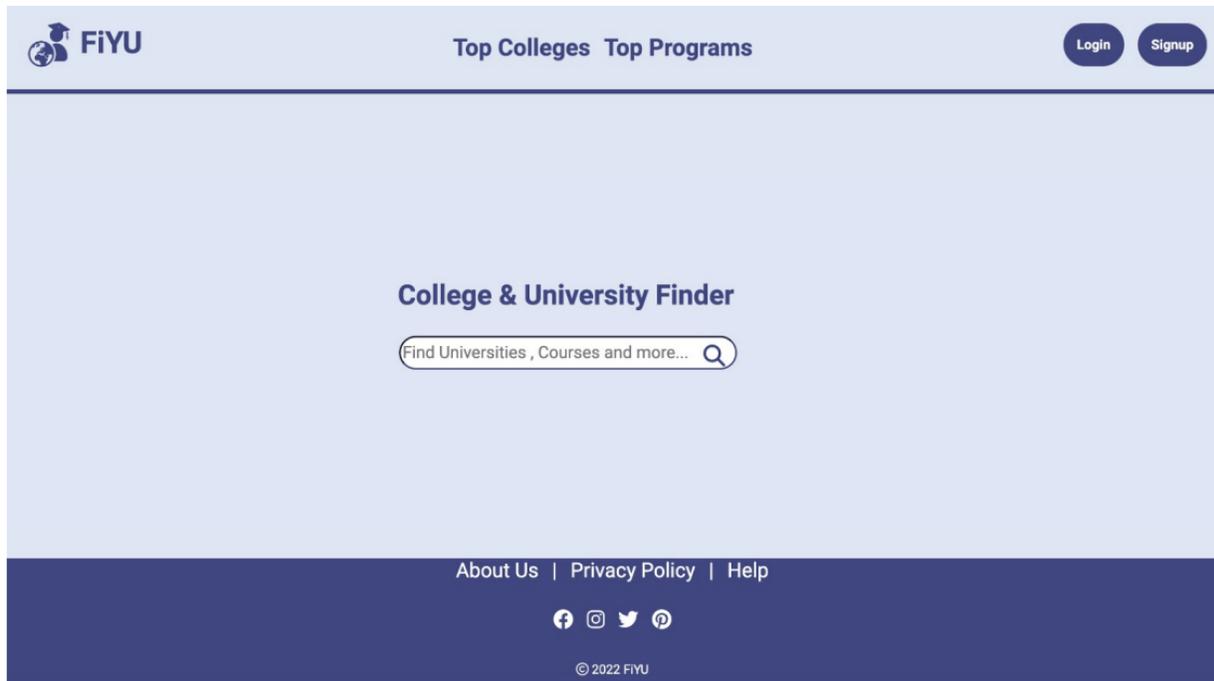
User Story: Here are the fields on the sign-up page for students: first name, last name, email address, and password and we also take some additional information such as expected graduation date, joining date etc.

The screenshot shows the 'Student Signup' form on the FiYU website. The header includes the FiYU logo, 'Top Colleges', 'Top Programs', and 'Login'/'Signup' buttons. The form itself is titled 'Student Signup' and prompts the user to 'Enter your details to Signup'. It contains four input fields: 'First Name', 'Last Name', 'Email Address', and 'Password' (with a toggle for visibility). A 'Sign Up' button is positioned below the fields. The footer contains navigation links for 'About Us', 'Privacy Policy', and 'Help', social media icons, and a copyright notice for 2022 FiYU.

This student login page is used to verify the identity of newly registered users. It has username and password fields, and when the proper information is entered, the user is able to access the application.

The screenshot shows the 'Student Login' form on the FiYU website. The header is identical to the signup page. The form is titled 'Student Login' and prompts the user to 'Enter your details to login'. It features two input fields: 'Username' and 'Password' (with a toggle for visibility). A 'Login' button is centered below the fields. At the bottom of the form, there are links for 'Signup' and 'Forgot Password?'. The footer is also identical to the signup page, including navigation links, social media icons, and a copyright notice for 2022 FiYU.

This is a university search page that will take you to a university page with all the details about the universities, including reviews, ratings, and other information. Anyone can access this page and the search results can be accessed without logging in.



When we search for a university, we are taken to a page with information about that university. The reviews and ratings for that university are added in the following sprint.

Virginia Polytechnic Institute and State University



- Established 1896
- Acceptance Rate 66%
- Average tuition cost \$21,000
- Main Campus : Blacksburg, VA

Virginia Tech is a public land-grant research university with its main campus in Blacksburg, Virginia. It also has educational facilities in six regions statewide, a research center in Punta Cana, Dominican Republic, and a study-abroad site in Riva San Vitale, Switzerland

Reviews : NA
Average Rating: NA
Courses and Program Details : NA

This is a student profile page which has general information such as enrolled date,gender,college,graduation date along with email and location.

FiYU Top Colleges Top Programs J. Sean



Jay Sean

Email: jsean@gmail.com
Location: Blacksburg
Role: College Student

General Information

Enrolled Date	: 2020
Gender	: Male
College	: Virginia Tech
Graduation Date	: 2022

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This is a recommendation page ,where students enter information which is used to recommend some college for bachelors or masters . The input for recommendation form is college gpa, SAT/GRE score , Toefl score and research proficiency on a scale of 0 to 1.

FiYU Top Colleges Top Programs Recommendations Hi shashank logout

Student Information

Hey, Enter your details to get recommendations

Select your preference:

Bachelor's Masters

Recommend Me!!!

About Us | Privacy Policy | Help

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After entering the data, we use a machine learning algorithm to analyze the input and make some college recommendations .

Hello shashank, Your recommendations are here.



Duke University

Durham

Duke University is a private research university in Durham, North Carolina. Founded by Methodists and Quakers in the present-day city of Trinity in 1838, the school moved to Durham in 1892.



Georgia Institute of Technology

Atlanta

The Georgia Institute of Technology, commonly referred to as Georgia Tech or, in the state of Georgia, as Tech, is a public research university and institute of technology in Atlanta, Georgia.



The University of California, Los Angeles

Los Angeles

The University of California, Los Angeles is a public land-grant research university in Los Angeles, California. UCLA's academic roots were established in 1881 as a teachers college then known as the

School.

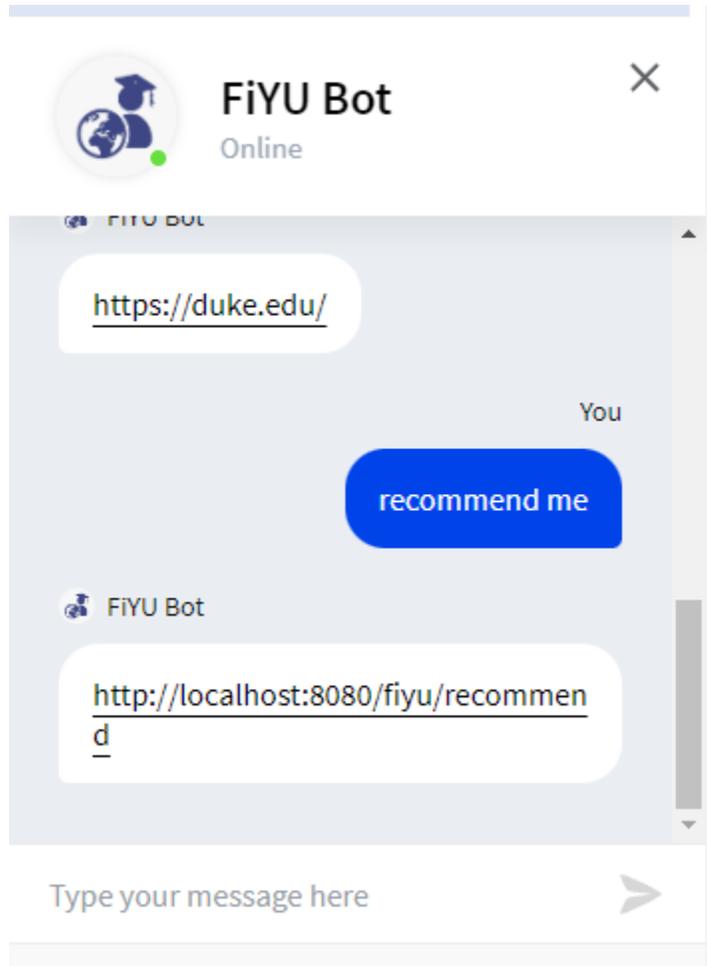


Brown University

Providence

Brown University is a private Ivy League research university in Providence, Rhode Island. Brown is the seventh-oldest institution of higher education in the United States, founded in 1764 as the College in the English Colony of Rhode Island and Providence Plantations.

The chatbot for our application, which is available on every page of the website, assists in providing information about finding webpages. As we can see from the image, the chatbot can direct us to different pages, including the recommendations page when we say things like "recommend me."



Design

Domain Diagram:

A domain model is a conceptual representation of the domain used in software engineering that includes both behavior and data. A domain model is a formal representation of a knowledge domain complete with concepts, roles, data types, people, and rules, usually based on a description logic.

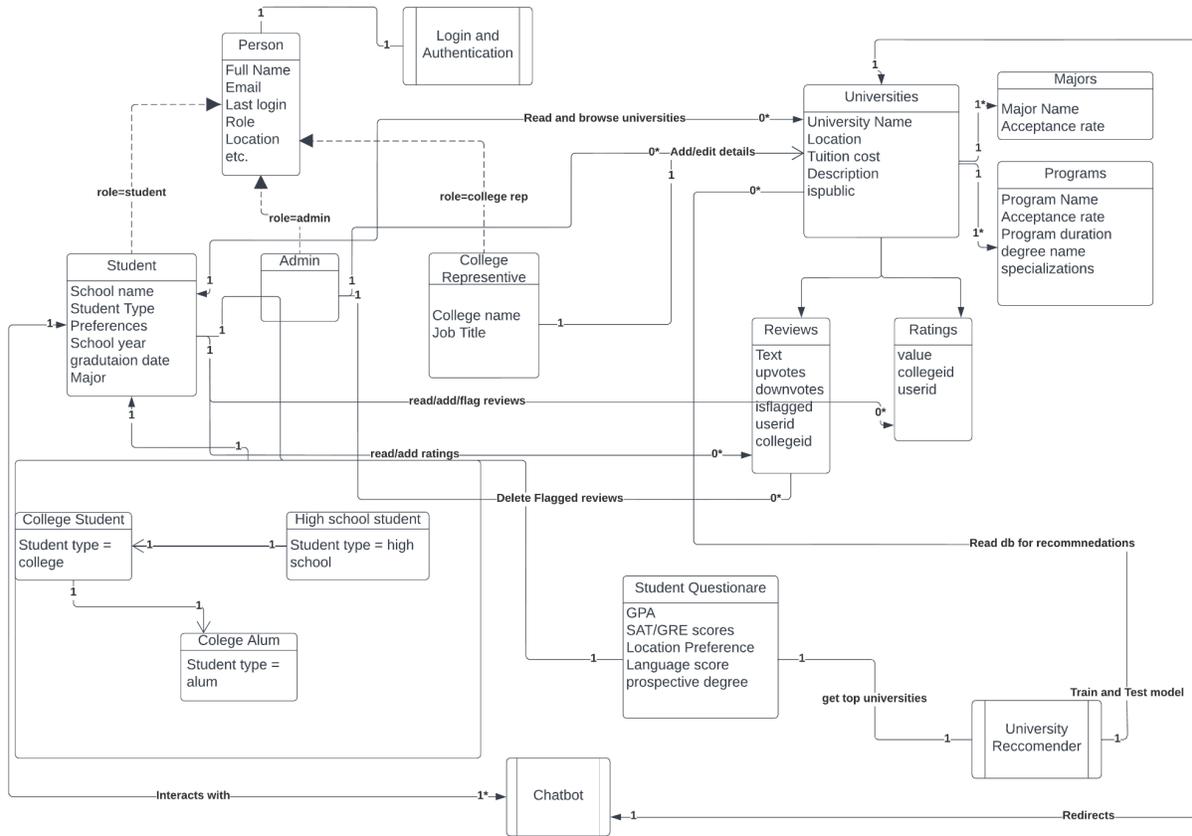


Fig. Domain Diagram of FiYU

The domain diagram for the project FiYU is shown above. This includes every domain that is a part of the project. The primary concepts in this project are people and universities, which are further divided into subcategories like people (student and college representative) and student (high school student, college student). As a result, a high-level domain is divided into lower-level concepts, which helps a developer more easily comprehend the software design. Additionally, we have a module for universities that is further divided into sections for reviews, ratings, majors, and programs. The diagram also includes project-related elements like Chatbot and University Recommender, which are algorithmic parts of the project. We also have included multiplicity accordingly with all the domains based on how one domain reacts with another domain.

Interaction Diagram:

Sequence diagrams and collaboration diagrams are two forms of interactive diagrams.

Sequence Diagram:

Sequence diagram depicts the flow of the software design and implementation based on the flow of steps. In the field of software engineering, a sequence diagram, also known as a system sequence diagram, displays process interactions arranged in time sequence. It illustrates the procedures used and the order in which messages were exchanged among the procedures to carry out the functionality.

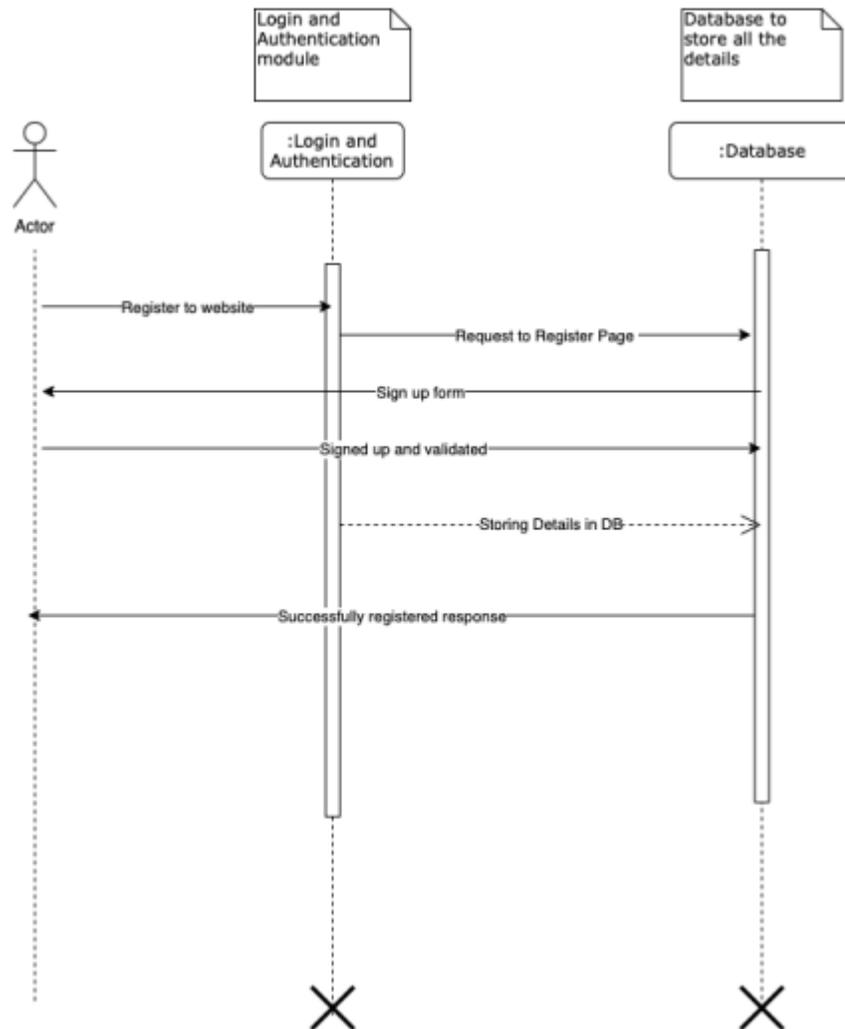
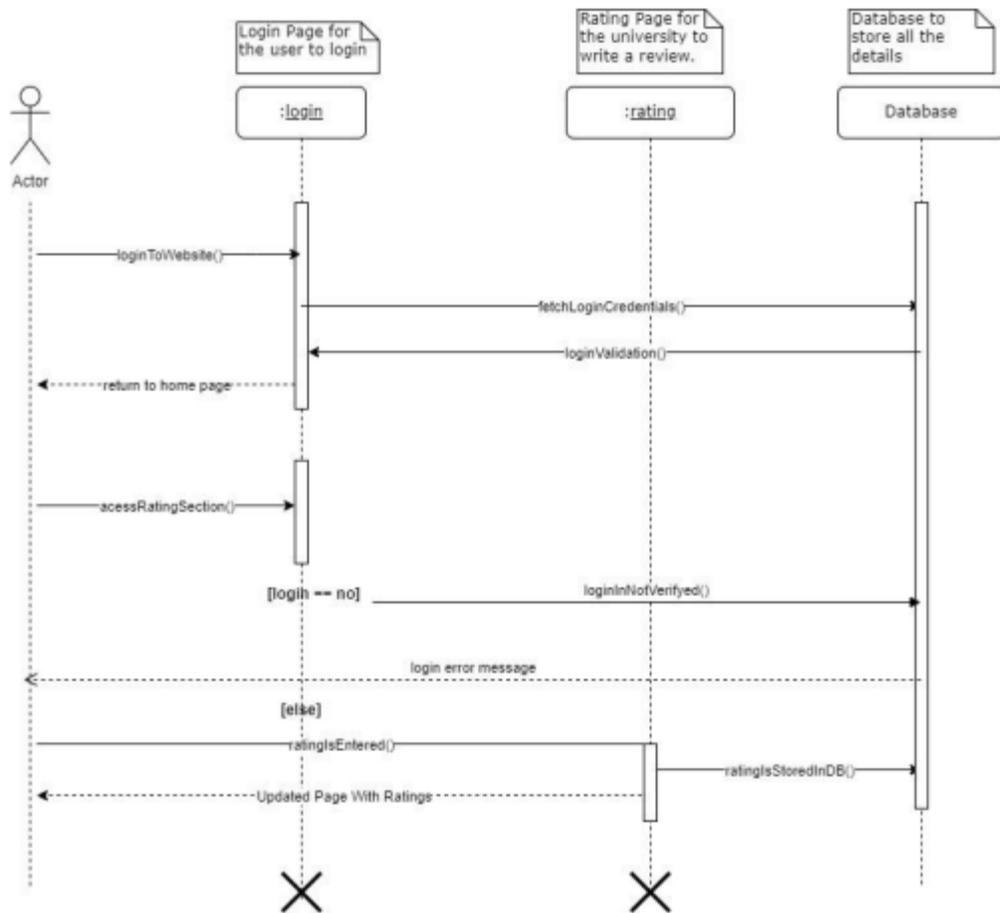
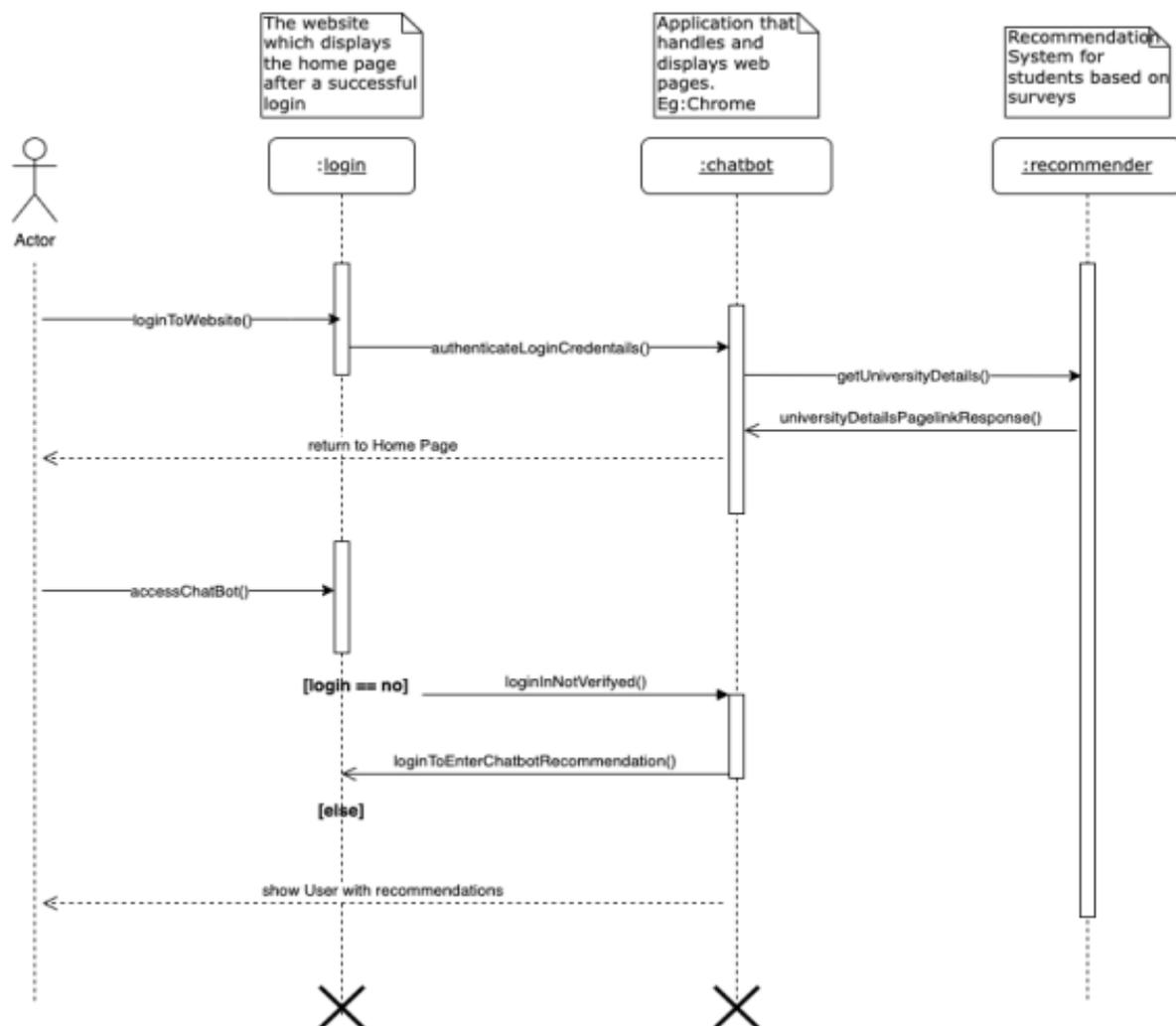


Fig. Sequence Diagram for Login and Authentication

The sign-up and login flow of the application is shown in the diagram above. This illustrates the steps taken by a user to interact with the system. First, the user registers for the application, and then the login process is carried out by validating the credentials saved in the database. The database contains these credentials, which are checked at each stage of authentication.



The figure above depicts how a user interacts with the system and logs into the application, after which the user is redirected to the ratings page upon clicking the ratings page. After the user enters the ratings, they are saved in the database and reflected in the page after logging back into the application.



The diagram above depicts the sequence flow of logging in and then interacting with the chatbot. Once the credentials are verified, the user is redirected to the chatbot page, and then to the university home pages based on their interactions with the chatbot. Additionally, the chatbot includes university recommendations.

Collaboration Diagram:

Communication diagrams are another name for collaborative diagrams. As a result, in this diagram, numerous objects are connected, and their communication mechanisms are illustrated until the student logs in and is routed to the home page.

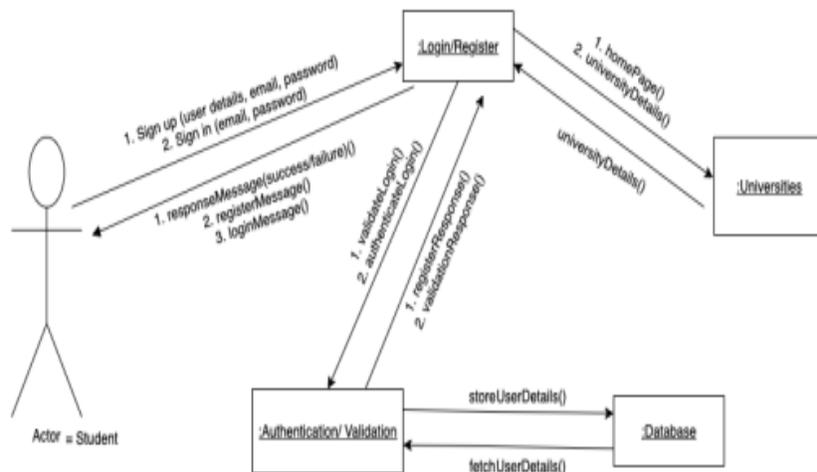


Fig. Collaboration Diagram of Login and Authentication

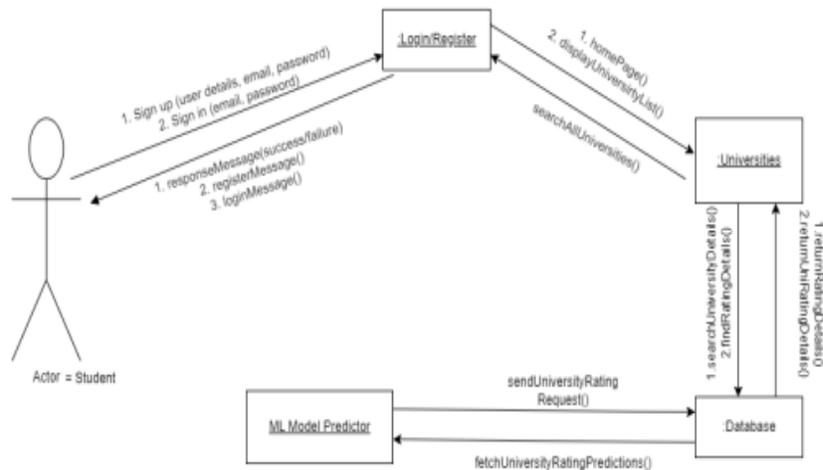


Fig. Collaboration of University Search Diagram

The above two collaborative diagrams depict the collaboration of login functionality with system objects, as well as how the database is involved in and the process. The above diagram also explains how the university search is collaborated with the user after logging in.

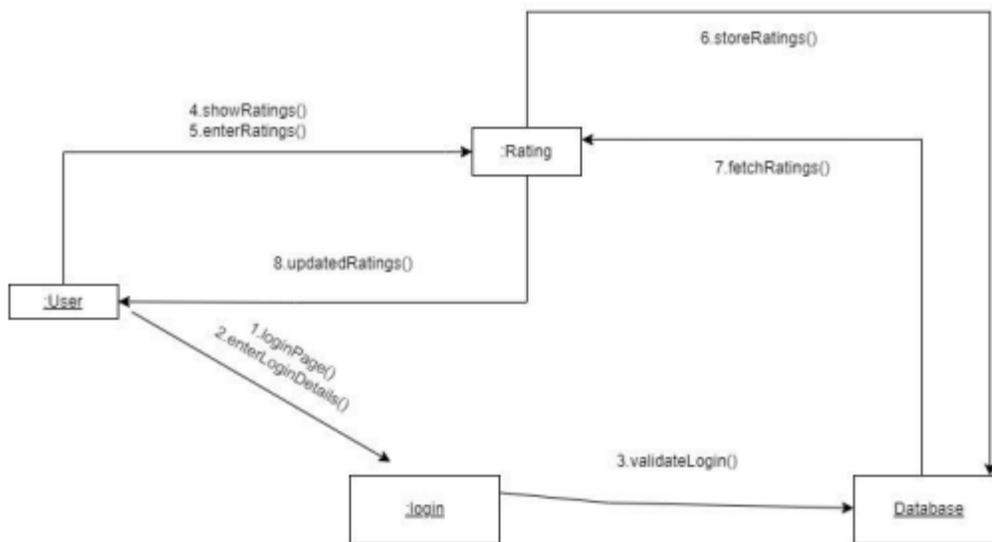


Fig. Collaboration diagram of University Ratings

The diagram above depicts university collaboration and how ratings are managed between universities. It also demonstrates how reviews/ratings are saved in the database and then reviewed when the webpage is accessed.

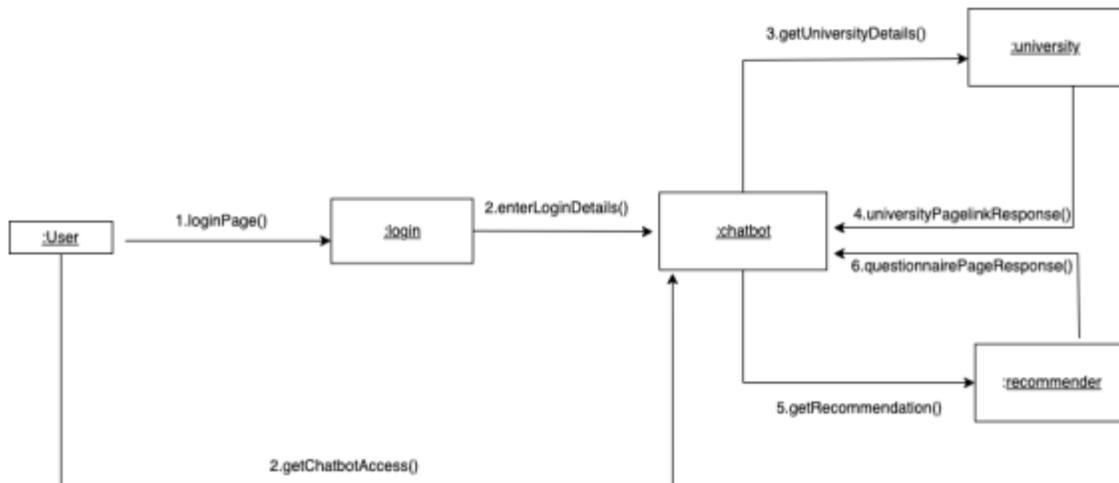
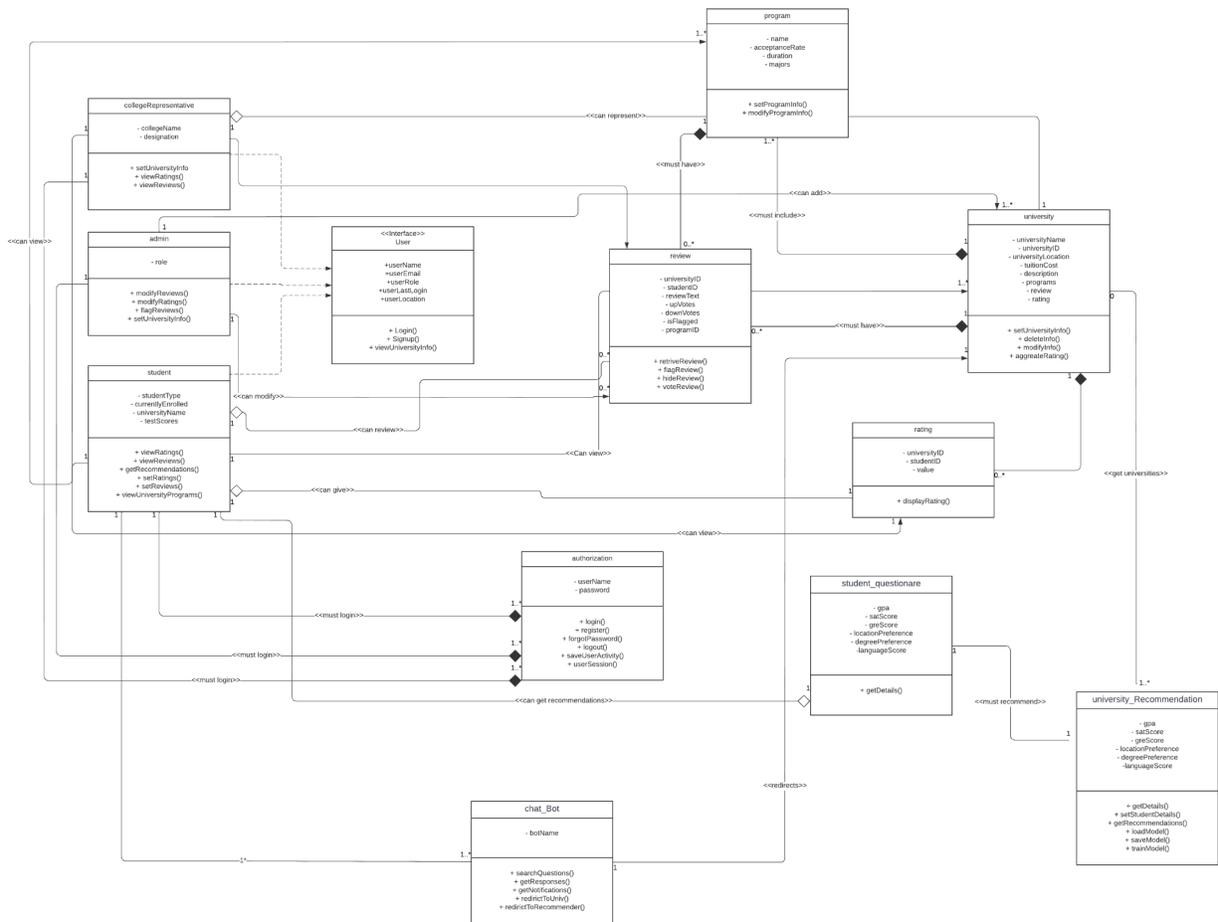


Fig. Collaboration diagram of Chatbot University Recommendation

The collaboration diagram above depicts the collaboration of the chatbot input function and how it is redirected to the university recommendation page, which contains a questionnaire about the user profile and then displays universities based on the profile and the ML recommender model.

Class Diagram:

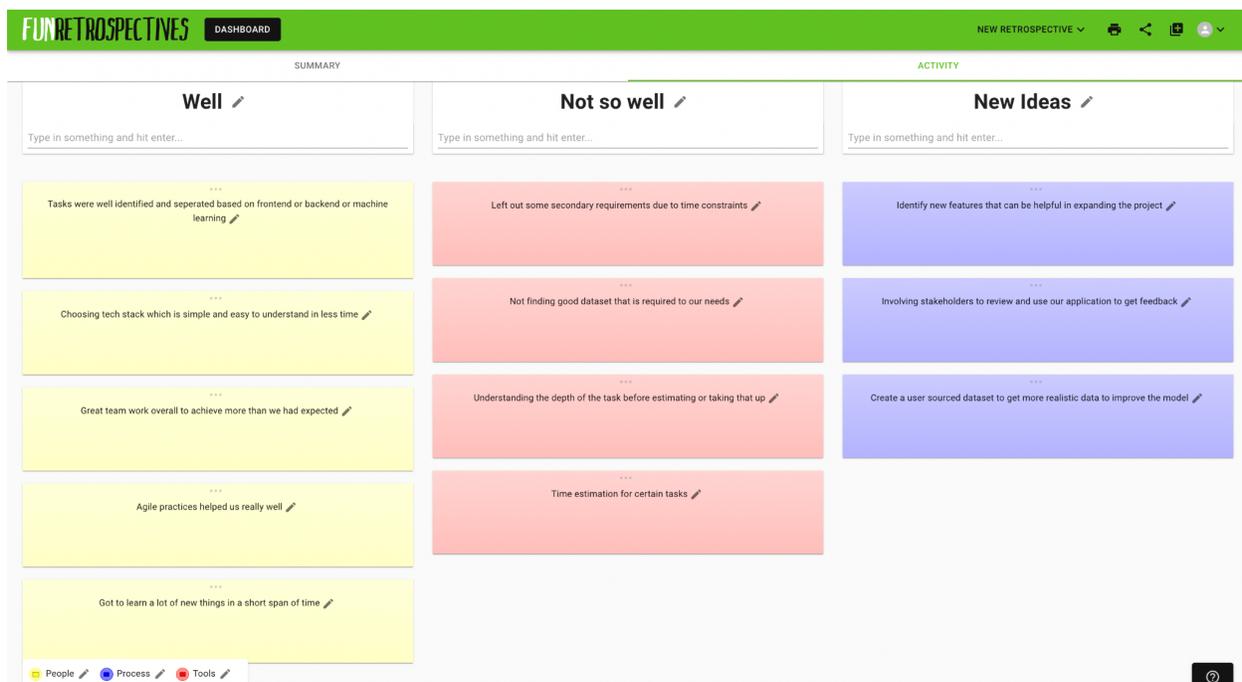
A class diagram in the Unified Modeling Language is a type of static structure diagram in software engineering that depicts the structure of a system by displaying the system's classes, their attributes, operations, and the relationships between objects.



We included all of the class objects involved in the application in the above class diagram [link](#). We have included class objects such as students and universities in the diagram, which include many functions/methods of each object. Every object in this class diagram is again linked with other objects based on the multiplicity of their interaction. This diagram made it easier to develop and maintain the system, and helped prevent bugs that could have affected the functionality of the system. The class diagram is used to generate code for the classes in a system, which was easier to develop and consistent with the overall design of the system.

Retrospection

This project has been a great learning curve for all the members involved. It has been challenging and at the same time fun to work in a team of six people. There were a lot of positives and many learnings which can be taken from this capstone project. Following agile methodologies streamlined our development and also aided in collaboration and helped in understanding and tracking the roadblocks of any task. Every team member participated in all the agile discussions like sprint planning, story point estimations, and weekly checkpoints as well as a retrospective at the end of the sprint. We have used a tool called fun retrospectives which allows teammates to express their opinion about what went well, what can be improved and also some of the new ideas to improve for the next sprints. We have done this for every sprint of the project and finally, we did a similar retrospective to summarize all the key things which we can take away from this project.



To summarize some of the key things which we did well in our project are

- We did a good job in identifying user stories and further dividing them into smaller subtasks based on whether these subtasks belong to the backend, frontend or machine learning tasks.

- The tech stack of our project is chosen by keeping in mind the expertise of all the teammates. Though the tech stack was selected based on the strengths of the people there was enough exposure for everyone to learn and experience the unknown tech stack that they are using for the first time.
- We followed pair programming as this allowed a collaborative environment among the team and also faster resolution of any errors while coding.
- We followed all the agile practices expected in this course which give us a good understanding and also made our project easy to navigate at any point.
- Finally, everyone got something new to learn and also contribute to the project in a short span of time.

These are only a few of the important things that we as a team could achieve. There are numerous experiences while the development of the project that is invaluable and increased our knowledge of the subject matter.

There were quite a few learning which can be noted from this project and can be improved on in our professional experiences in the future such as

- Story point estimation is a key area where we could improve as there were numerous occasions where we underestimated the amount of work needed to complete the task.
- We could have got a deeper understanding of the task before estimating and also starting to develop it.
- Not understanding how challenging a task to find the correct dataset for our use case is. This led to some delay in the feature and also changing our features according to the dataset we have based on the time constraints.
- As a result of all the points above, we had to let go of a few non-essential secondary requirements from our backlog to make time for all the important tasks.

Despite all the positives and negatives of our project, we had an opportunity to learn a lot of new skills from this project. All the team members were not skilled in at least a few technologies we used in the project. This was a perfect opportunity for us to learn new skills. Though the first sprint took some time and caused a few stories to spill over due to challenges faced around technical skills, everyone was able to learn quickly and adapt to the tech stack and that improvement showed in our second sprint where we could easily complete all the tasks. Working with six people and also multiple people working on different tasks, we learned how to manage git and how to commit changes without affecting others' work which is an essential skill while working in a large team in any company.

Finally, we are satisfied how our vision of the product has tured out after 3 sprints. To improve it further we have a few pointers which would make our product better.

- One of the key challenge for our machine learning model was not having a data set that has matched our needs. We would like to gather data from across colleges to get accurate and also the information which we need to make our model better.

- We could involve stakeholders from across different universities to view our MVP and get a feedback as to what their needs are and how they could be incorporated into our project in the future.
- Further we would like to expand on the current features and implement new features helpful to the users like online career counsellor support, feature to hold webinars for universities to help students become aware of different programs offered by them.
- Make the application mobile responsive so that it could be accessible from anywhere.

There can be a lot of improvements that can be considered to make the application more useful to the enduser which can be further improved.