



Bilkent University

Department of Computer Engineering

SENIOR DESIGN PROJECT

Project Name: UniStud

High Level Design Report

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1. Introduction

In the recent years, with the wide popularization of the web, the number of people who actively use different online platforms and applications has increased to an incredible rate, reaching 3.58 billion in 2017 [1]. Among these users' statistics show that the majority of them belong to a group age between 17-28 years old, making these people a very ideal target group for application developers. Students seem to use these platforms excessively but even though here are different applications that help them with several individual needs, there is a lack in the market for application that allow students to access several services in the same time, saving their time, money and energy.

If you are a student enrolled in a university or even an aspiring student, you have to navigate between several applications in order to access services related to the search of the opportunities, tutorials and online courses, finding books or even exploring nearby events. What we aim is to introduce an alternative that allows them to access these services in a single application in a simpler and more effective way.

UniStud will be offered as a web service and as an Android application, in this way reaching a higher number of users and operating better according to the demand of the users. What makes UniStud innovative, is the fact that a student is fed with relevant information without passing from link to another. UniStud will keep users updated with everything that is happening around them. The users can not miss the new opportunities and will easily engage into their educational path. In this report, detailed information about current platforms, proposed system and how it will be implemented will be provided.

1.1 Purpose of the system

UniStud will be focused on the students, the target users of our project all over the world and will offer them a platform where they can access different services simultaneously. Accordingly, the users will be able to access information in four main areas.

The first category will be regarding the search for different academic opportunities such as finding universities, scholarships and internships. The students can search based on their preferences on universities and they will be provided with the university information that fits their needs and in addition with the opportunity to connect with students that are currently studying in these universities. The main reason for this is to feed the users with real data and get a more realistic perspective on the requirements, challenges and procedures to be part of that university. In this category users will also be able to find different internships opportunities from different companies depending on their departments.

In the second category, the platform will provide an online tutorial service where the students can create and share these tutorials with others that are interested in studying a new course or improving an old one. The tutorials will be both online which will be live streamed and then stored once they are finished and private which will be based on user agreement.

The third category will be related to study materials where the users will have the opportunity to buy/sell/exchange/loan any important study materials such as books, notes, devices etc.

Finally, the last category will be regarding student events where the user will be able to keep track of all the events happening around.

1.2 Design Goals

In this section, all design goals of UniStud system are described and important user experience aspects are discussed.

1.2.1 Usability

- The design of the application should be “user-centered design”, in order to be easy and friendly to be used from the students.
- The application should provide necessary information how to open a tutorial, watch and comment on it.
- The content of the system should follow the same standards everywhere and maintain a visual hierarchy.

1.2.2 Reliability

- The system should be able to withstand a high number of users at the same time.
- Our team purpose is to have 100% trustworthy content that is sourced from the users as well as trustable university or companies.
- The application should filter the content via filtering algorithms and platforms to remove inappropriate content, such as: photos.
- A system crash should not result in data loss.

1.2.3 Efficiency

- The response time of the system should be fast. Since there will be many interactions with the system, it is crucial to make the data retrieval and server-client interaction processes as efficient as possible.
- The application should not take a lot of time while switching to livestream mode.

1.2.4 Security

- The application will not distribute personal data to third parties.
- Data will not be corrupted, and it will be stored safely in our servers.
- Users will be responsible for personal security by editing the sharing properties.

1.2.5 Portability

- The system should be able to be used in different softwares and hardware, in our case on both Web and Android.

1.2.6 Maintainability

- In order to increase maintainability, UniStud will be using relational database to keep track of students, universities, events, time and personal data information.
- Every user will be provided with information that is related to their needs. This will increase maintainability since each user will be given information specific to their needs rather than all the information that UniStud can provide.

1.2.7 Extensibility

- Design and implementation of the system should allow it to be able to cater future changes.
- The system should be open to future additions.

1.2.8 Supportability

- The application will be open to future updates.

1.3 Definitions, Keywords, Acronyms and Abbreviations

Career Opportunities: Browse section for different universities and internships.

UniTrade: The section where students will be able to sell/buy/loan study materials.

UniStream: The section where students will be able to watch or create tutorials.

UI: User Interface

API: Application Programming Interface

HTTP: Hypertext Transfer Protocol

TCP: Transmission Control Protocol

Client: The part of the system that user interact with.

Server: The part of the system that responds to client's requests. It is responsible for data management, API interactions and logical operations.

2. Current System

The purpose of this section is to give an outline of the information regarding the existing application and platforms that resemble the proposed system. Towards the end of the section the features that make the difference between proposed system and existing platforms will be explained.

2.1 University Search Engine apps and platforms

2.1.1 Study in Europe

Study in Europe is a popular University Search Engine that will find you university or college based on the information you provide.

- The platform is focused only on universities located in Europe.
- Study in Europe is offered only as a web platform.
- The information the portal provides on Free Package is not sufficient for student to get a full background on the university that they are searching. Other packages are extremely expensive and they just redirect students to official website of the university that they are searching.
- Users can search for Universities by providing a keyword such as program, country, language etc.
- User can further filter the result by only one keyword.
- User can get information about the Schengen Visa and residence permit according to each country.
- User can get information about The European education system.
- User can get information about The European Grading system and compare the scores between different countries.
- Premium Users can get information about important application deadlines on the country that they are interested.
- User can get different facts about different countries, such as: academic year, categorization of study programs.
- User can compare tuition fees between different countries in Europe, which are categorized as EU students, NON-EU students.

2.1.2 Top Universities

Top Universities help students find their perfect university, course or study destination using university rankings, country and course guides, events and international student forums [2].

- Top Universities is offered only as a web service.
- The platform provides information for worldwide university rankings, courses, guides and events.
- User can find the perfect university program by completing a short survey.
- User can search for universities by providing study level, subject of interest or study destination.
- User can find overviews according each university which is composed of about, facilities, student life, admissions and career.
- User can see the location of the university and other related content such as: latest tweets, news, videos, images.
- User can compare universities with each other.
- User visit the official website of the university.

2.1.3 Big Future - College Board

Big Future is the part of the College Board platform and facilitate student to quickly perform a university or college search by major, location, type of university, financial aid, test and scores. It contains direct connect the students with pre-registered institutions to send several official scores such as SAT, ACT etc. [3].

- Big Future is offered only as a web service.
- User can filter universities by providing type of campus & housing, sports and activities, diversity, addition support programs.
- User can create a list of preferred universities or colleges.
- User can find overviews according each university which is composed of about, facilities, student life, admissions and career.
- User can calculate the net price for a particular university or college.
- User can search for grants and scholarships.
- User can compare universities or colleges with each other.
- User can view suggestions what other people view in order to have multiple options.
- User visit the official website of the university.

2.2 Career Search Engine apps and platforms

2.2.1 LinkedIn

Founded on December, 2002, and launched on May 5, 2003, it is mainly used for professional networking, including employers posting jobs and job seekers posting their CVs. [4].

- LinkedIn operates via websites and mobile applications.
- User can get contact with recruiters for particular jobs or internships.
- While applying for a new job/internship user have the opportunity to view if anyone of his network has previously worked at that position.
- User can comment on different posts.
- User can search jobs by providing keywords.
- User can save jobs opportunities for consuming them later.
- User can search job posted based on the experience level (Internships, Entry Level, Associate, Director, Executive).

2.2.2 Glassdoor

Founded in 2007 and based in Sausalito, CA, Glassdoor gets its internship listings from several sources, including company websites, partnerships with job boards and directly from employers [4].

- Glassdoor is offered both as mobile application and as a web platform.
- Glassdoor collects jobs from over 10000 companies and utilizes a ranking algorithm to show the users only the relevant news.
- Glassdoor offers an instant way to search for salaries, company reviews and descriptions of job interviews.
- User can view jobs/internships nearby from the “Local Tab”. User can also change the location to get other jobs from different parts of the world.
- User can save jobs opportunities for consuming them later.
- User can search jobs by providing keywords.

2.2.3 Internships.com

Founded in 2010, Internships.com is now owned by textbook rental and online tutoring company Chegg in Santa Clara, CA. It offers 100,000 listings from 60,000 employers [4].

- Internships.com is offered only as a web service.
- User can browse different jobs and internships by categories, locations and companies.
- User can use survey in order to evaluate personal preferences and find out which is the right internship or job.
- User can learn the basics of writing a cover letter and interviewing tips.
- User can search jobs by providing keywords.
- User can save jobs opportunities for consuming them later.

2.3 Virtual Learning Environments apps and platforms

2.3.1 Udacity

Founded in June 2011 and launched in February 2012, Udacity is a for-profit educational organization founded by Sebastian Thrun, David Stavens, and Mike Sokolsky offering massive open online courses. Main features are:

- Udacity is offered both as mobile application and as a web platform.
- The platform helps student to be proficient in a particular course.
- User can search tutorials by providing keywords or by navigating through different available categories.
- The basic courses are free while other courses need to be bought.
- User can join Nanodegree program and Learn in-demand skills, build incredible projects, and gain an industry-valued credential.
- Based on the dream job of the user the platform suggests a path the user should follow in order to achieve it.
- User can get a detailed resume review from an industry professional to ensure that resume effectively conveys user abilities and gets attention from employers.
- Users can get a customized review of LinkedIn profile from an industry professional.

2.3.2 Udemy

Udemy.com is an online learning platform. It is aimed at professional adults. Unlike academic MOOC programs which are driven by traditional collegiate coursework, Udemy uses content from online content creators to sell for profit. Main features are:

- Udemy courses can be accessed from several different devices and platforms, including a desktop / laptop, Android app, iOS app, and Apple TV app.
- Udemy features an extensive, multi-language library, which includes over 80,000 courses taught by expert instructors.
- User can take courses across a wide range of categories.
- Each Udemy course is created, owned and managed by the instructor(s).
- The foundation of each Udemy course are its lectures, which can include videos, slides, text and additional resources the instructor has uploaded.
- Instructors can add quizzes, practice tests, assignments and coding exercises, as a way to enhance the learning experience of students.
- If user is not sure if a course is right for him/her, the user can start a free preview and watch a handful of lectures the instructor has selected.
- If user is not happy with a course, user can even request a full refund within 30 days of purchasing a course.

2.3.3 Coursera

Coursera was founded in 2012 by Stanford University computer science professors Andrew Ng and Daphne Koller. Ng and Koller were inspired by their experiences offering their Stanford courses online in fall 2011, and soon after left Stanford to launch Coursera.

- Course courses can be accessed from several different devices and platforms, including a desktop / laptop, Android app, iOS app.
- Currently, Coursera boasts an active catalog of 2,700 online courses created by partner institutions.
- Coursera courses consists of pre-recorded video lectures. The lectures have student discussion forums, homework/assignments, and online quizzes or exams.
- Coursera courses are free to audit (i.e. watch videos) but if user wants to access graded assignments or earn a course Certificate, user will need to pay.

2.4 Broadcasting apps and platforms

2.4.1 Facebook Live

Facebook Live was launched to some high-profile users beginning in August 2015. By April 2016, everyone had the ability to go Live. Some of its features are:

- Facebook Live is accessible from Facebook mobile application and web service.
- User can open live video streaming to engage with followers and grow audience.
- User can choose the group of people which will be able to watch the stream.
- User can enhance the stream by applying camera AR Filters.
- User can comment, react, share a live stream.
- Maximum time for a stream is four hours.
- User can get notified when a person they follow starts streaming.
- Facebook Live Map allow user to find live streams from all over the world.
- User is able to find live streams by providing keywords.

2.4.2 Instagram Live

Instagram started insta-stories in August 2016, with Live Stories later added in November 2016.

- Instagram Live is accessible only from mobile devices and tablets.
- User can comment, react, share a live stream.
- User can see who is viewing the live stream and user is able to turn off commenting.
- Users can get notified when a person they follow starts streaming, granted they have set their notification settings accordingly.
- User has the option to save the video as an Instagram story for 24 hours.
- User can enhance the stream by applying camera AR Filters.
- You can spice up your Instagram Live broadcast with Face filters. This feature lets you add accessories, hats, stars, rainbow light and many other special effects at the top of your face. This is thanks to the advancements in facial recognition and AI.
- With a current functionality, rolled out in October 2017, two users can broadcast using the same stream.

2.4.3 YouTube Live Streaming

Launched in November 2008 YouTube Live was only available to selected partner organizations and later YouTube has quietly rolled the feature out to all accounts [5].

- YouTube Live is accessible from YouTube mobile application and web service.
- YouTube allows you to add a highlights reel/promotional video to your live stream, for display when the stream is offline.
- For event organizers who want to strip out all of the distractions of a standard YouTube page, the live event player can be embedded in any webpage.
- Each YouTube live streaming event is limited to 8 hours.
- User can comment, react, share a live stream.

2.5 UniStud

UniStud will be offering a collection of the best services mentioned above. The main difference of UniStud with other platforms is that it is not based only in the information taken from the different databases but also real-time contacts, such as students studying in different universities. In contrast with other platforms that are pre-recorded, UniStud will create a more enhanced way to learn by following different live streaming tutorials, so the users can actively participate. Our platform will facilitate the internship opportunities for students' eager to work by proving an easy communication between parties.

3. Subsystem Decomposition

3.1 Overview

UniStud's system decomposition aims to present the structures of its systems and subsystems in details. Firstly, the decomposition of the system into sub systems is discussed and illustrated by diagrams. Next, hardware and software mapping is explained in details, showing the allocation of resources and how particular parts of the system operate in different hardware components. In Persistent Data Management, the report introduces the essential data of the system where system databases and objects are described. In Access Control and Security section, the access boundaries of the user and security of the system is depicted. Global Software Control section clarifies how the general flow behaves in the system. Lastly, in boundary conditions the report specifies the initialization, termination and failure conditions of the system.

3.2 Subsystem Decomposition

UniStud distributed application structure will be client-server. Our system aims to serve a minimum of 5000 clients simultaneously and efficiently. Client-server architecture perfectly satisfies the system needs.

UniStud's server should contain all the necessary information and then distribute it to the clients performing background operations. For example, if the user is asking for universities located in Turkey, the system will analyze this request, and request information from the server. The application itself will do few computations in order to fetch data required by the user and present the data to the user accordingly. UniStud aims to offer a fast and reliable user experience, thus reducing operations done by the application will be main point. The server manages the network of the user, control and aggregate data produced by the users. This architecture guarantees that the scope of the project is preserved.

In this system UniStud is going to implement 4-layer concept, where the system is divided into the following layers: Presentation, Control, Logic and Data. As it can be seen from the figure, the lowest layer, data, will mainly deal with the data that are going to be saved in the system. The saved data are then used by Logic Layer, where a lot of operations are performed and handled. Some of the operations performed in this layer are filtering and aggregating the data. Then using control layer to communicate with the server the data are passed to presentation

layer and showed to the user. To process the information, enter by the user the system undergoes the backward path.

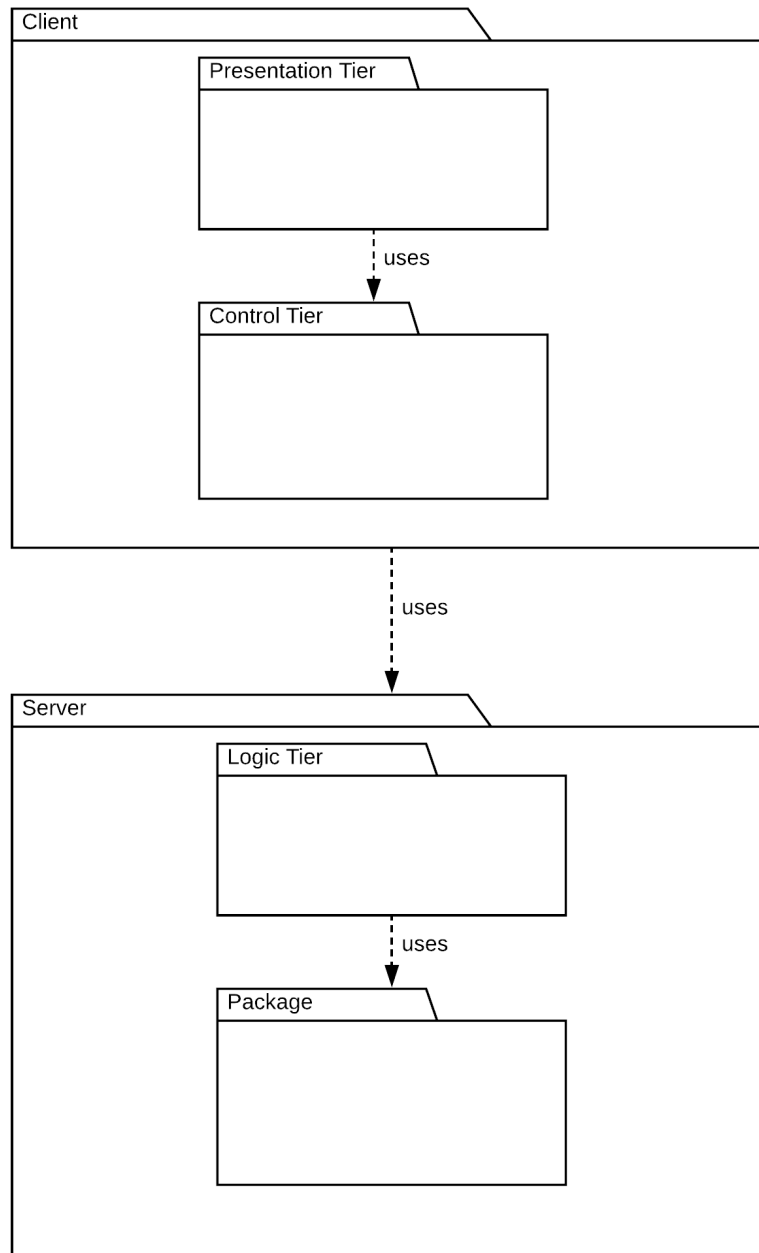


Figure 1 - Subsystem Decomposition

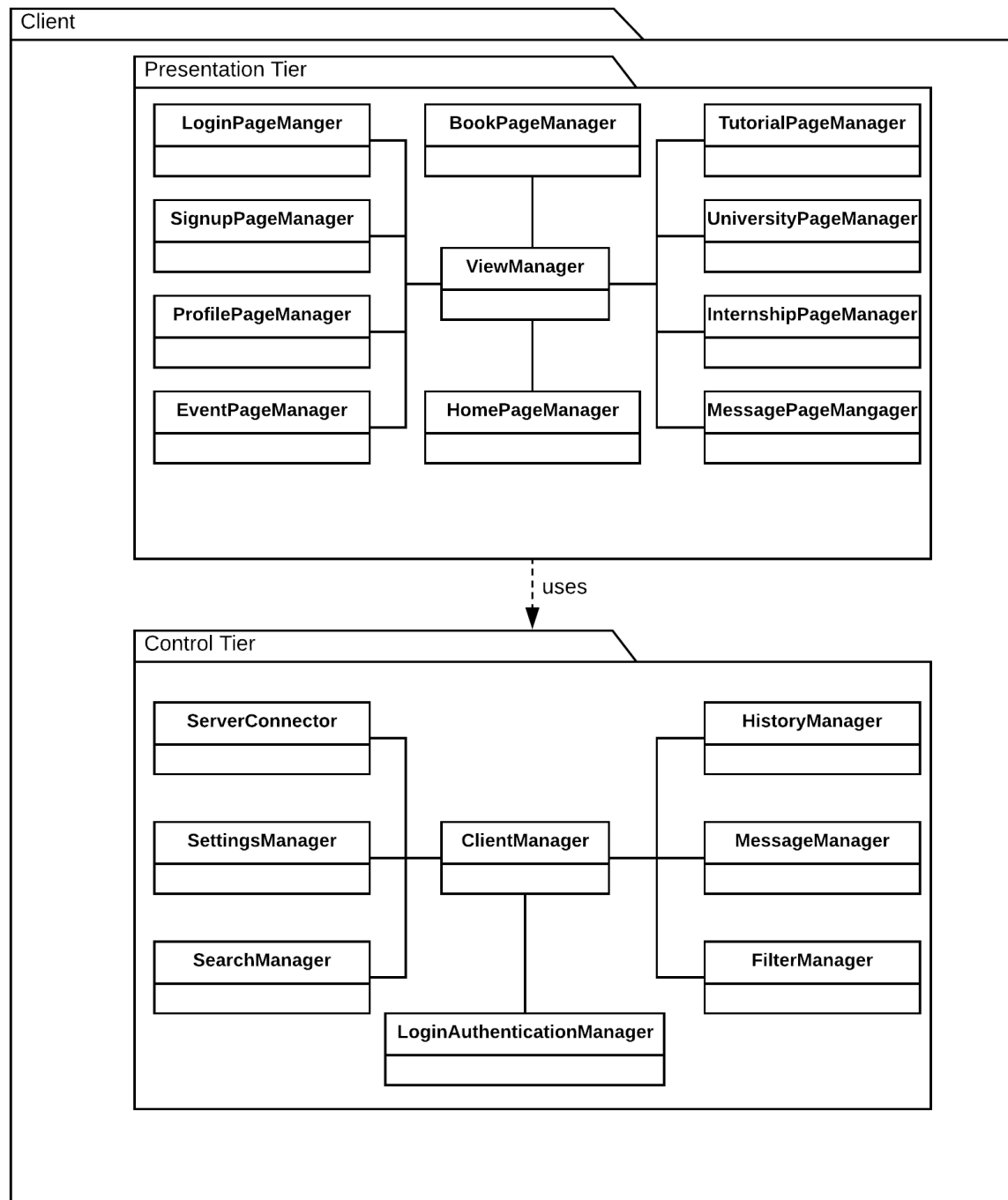


Figure 2 - Detailed View of Subsystem Decomposition: Client

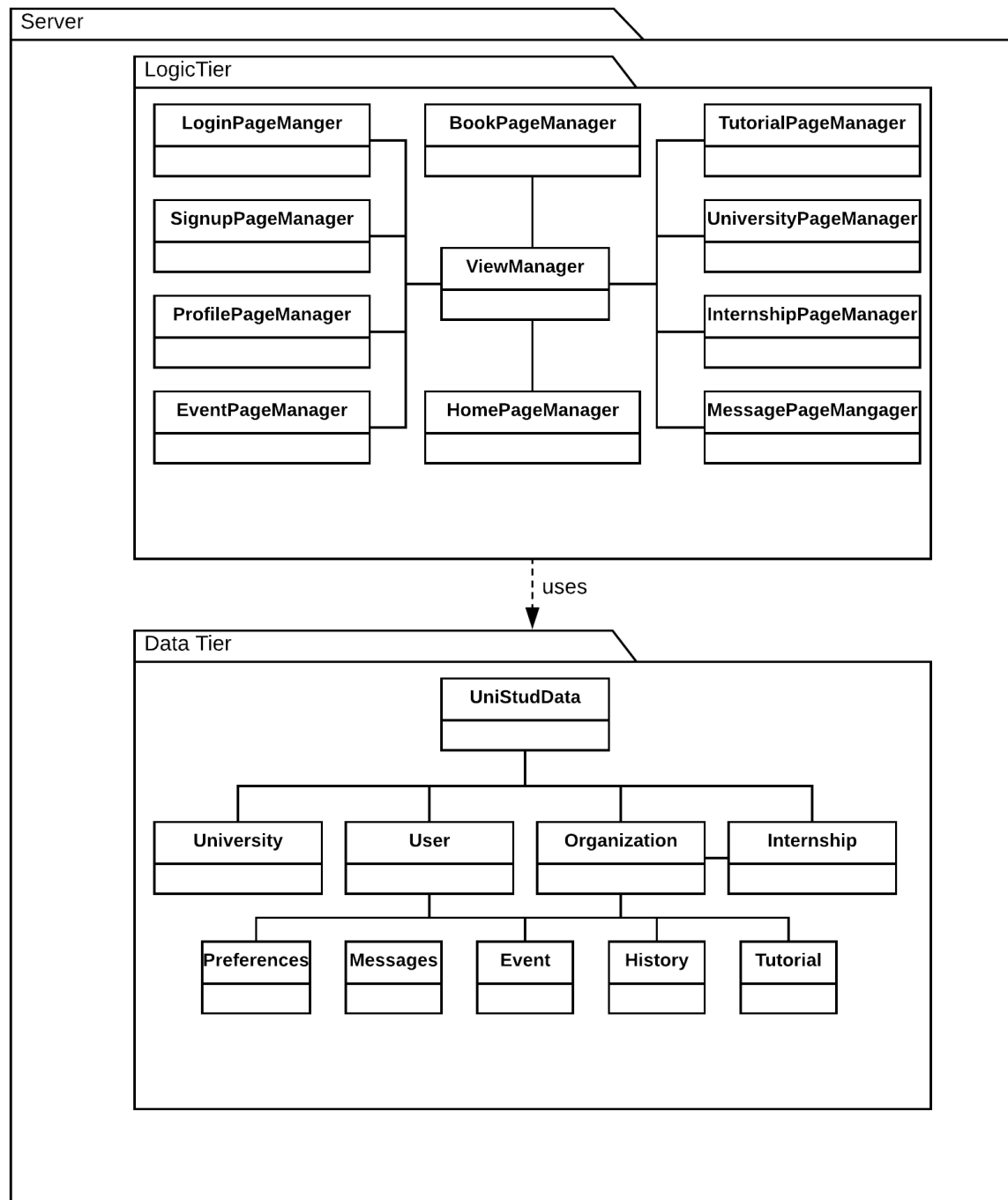


Figure 3 - Detailed View of Subsystem Decomposition: Server

3.3 Hardware & Software Mapping

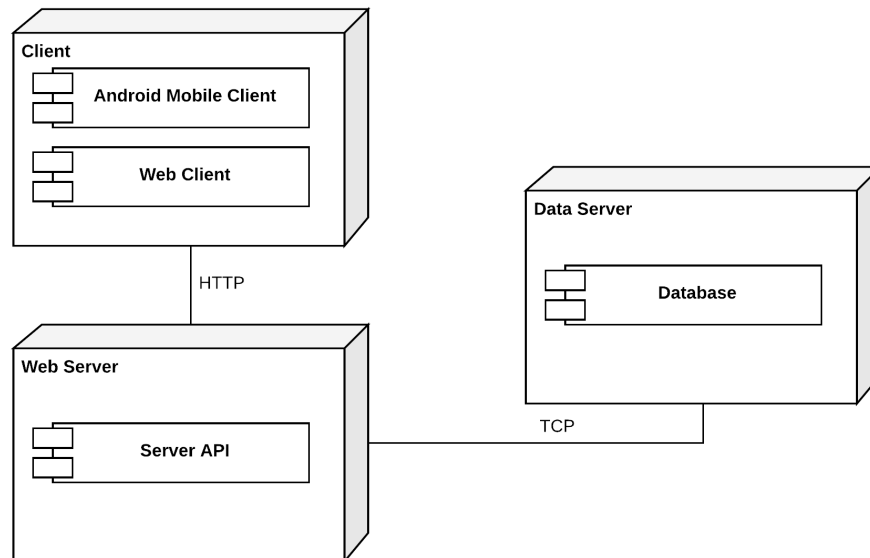


Figure 4 – Hardware & Software Mapping

The system will have two important client types: Android mobile clients and Web clients. Depending on the type of the client the system will be using the respective location services. As shown in the *Figure 3.4* all the data will be kept in the Data Server. Since the application will make use of several API's it requires a Web Server. HTTP request/responses will be used to communicate with the server. Web Server will be responsible for filtering the data and sending/receiving the data from the Data Server. Since the data will be fetched from the Data Server, the mobile devices do not have to allocate much memory for the application.

3.4 Persistent Data Management

In the system, stable database is an important component. Since the system will hold an enormous amount of data, the data must be persistent. All essential user information such as: name, username, password(encrypted), email, phone number, etc., will be stored in our database. Furthermore, each user will have specific information that vary from all of the other users such as: books bought, tutorials viewed, books sold, events interested etc. Some other information that are crucial for the system are: universities, internship opportunities, events. Our team will manage everything very careful and we will be backing up the database frequently to make sure that the system data does not get lost in case of system failures.

3.5 Access Control and Security

Every user will be able to control his/her own personal data edit according to the preferences. Sensitive information of users' such as password will be saved in the database after it is encrypted. Some personal information will be accessible only by the user who own them. Seeing other users' credentials will be strictly forbidden in UniStud.

UniStud requires users to provide a valid email, username and password to register in the platform. For security reasons, an email can only be used for a single user. This is intended to limit the number of accounts a person can create. In the case that the user forgets his/her password, an email will be sent to their respective emails.

User is also able to sign in to the system using either Google or Facebook account. Without signing in, users will not be allowed to the system. In order for our application to use the data of the user from Facebook and/or Google, their permission will be asked.

3.6 Global Software Control

The main controller of the software will be the server. The server will work based on the request of the user. According to the request the user is making, the respective APIs will be used to set up the environment and provide appropriate data to user. When user uploads photos, Google Vision API will be used to check the photo for inappropriate contents. Google Maps API will be used in order to develop Maps related tasks, Google Firebase API might be used for two-step verification etc. Background algorithms, combined together with the information on the server will lead to appropriate response to users' requests.

3.7 Boundary Conditions

The main boundary conditions that exist in UniStud system are: Starting the application, terminating the application and failure of the application. These boundary conditions are described more in details below.

3.7.1 Initializations

The main recourse to initialize the application is to have a browser such as: Safari, Google Chrome, Mozilla, Opera etc. Further to open the mobile version of the system the application should have been downloaded in an Android smartphone. Only users who have registered and logged in the system will be able to interact with the application. A failure in the login process

will lead to the login screen being displayed again. Additionally, the application retrieves real-time data to perform its functionalities thus it requires an internet connection.

3.7.2 Termination

Logout Button will be used to logout the user of the system. Without logging out the user will be able to open the application directly since the state of the system will be saved. If the user wishes to utilize the application again, respective data will be loaded. Another option to terminate the application will be to clear the cache of the application.

3.7.3 Failure

The application will fail to work the user if there is no internet connection. When the application cannot connect to the internet it will go into offline state. In this mode, only cached data will be presented.

4. Subsystem Services

4.1 Client

The client service corresponds to both mobile and web applications, because all functionalities will be implemented in both platforms. The client is the presentation layer of our system. Most of the requests that will be made will be sent to the server and data will be returned and displayed to the user accordingly. Client is responsible for managing users' operations on the system, presenting the data from the server to the user and also notifying the user when it is necessary. Client subsystem includes Presentation Tier and Control Tier. Presentation Tier is responsible for all of the user interface interactions and it uses Control Tier in order to communicate with the server.

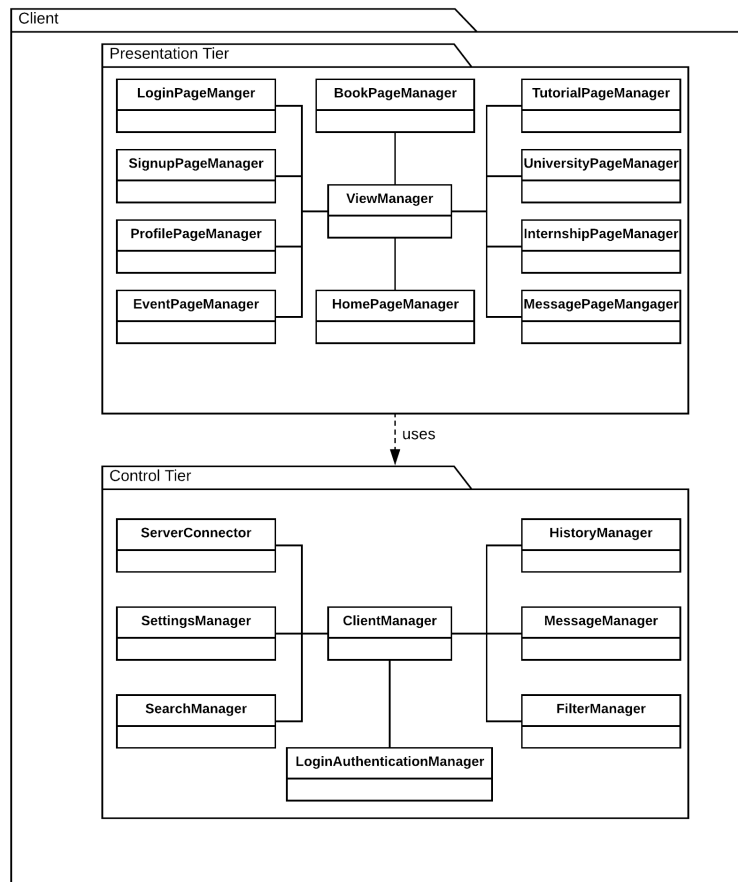


Figure 5 - Detailed View of Subsystem Decomposition: Client

4.1.1 Presentation Subsystem

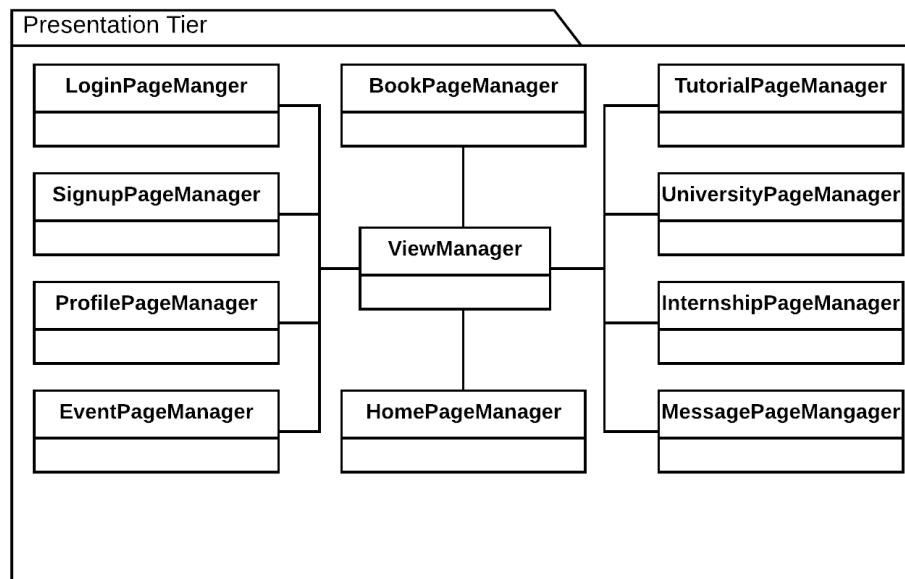


Figure 6 - Presentation Subsystem in Client

Presentation subsystem includes operations related to the user interface(UI).

- **LoginPageManger:** This class handles the first page operations and UI that the user will see upon opening the system.
- **SignupPageManager:** This class handles the Sign-Up operations and UI for users that are not yet registered to our system.
- **ProfilePageManager:** This class handles all operations related to UI for a user's account and settings and the UI.
- **MessagePageManger:** This class handles all operation related to UI for a user's sent and received messages.
- **EventPageManager:** This class handles all event related operations and the UI.
- **HomePageManager:** This class handles all Home Page related operations and the UI.
- **BookPageManager:** This class handles all Study Material related operations and the UI.
- **InternshipPageManger:** This class handles all Internship related operations and the UI.
- **UniversityPageManager:** This class handles all Universities related operations and the UI.
- **TutorialPageManager:** This class handles all Tutorial related operations and the UI.

4.1.2 Controller Subsystem

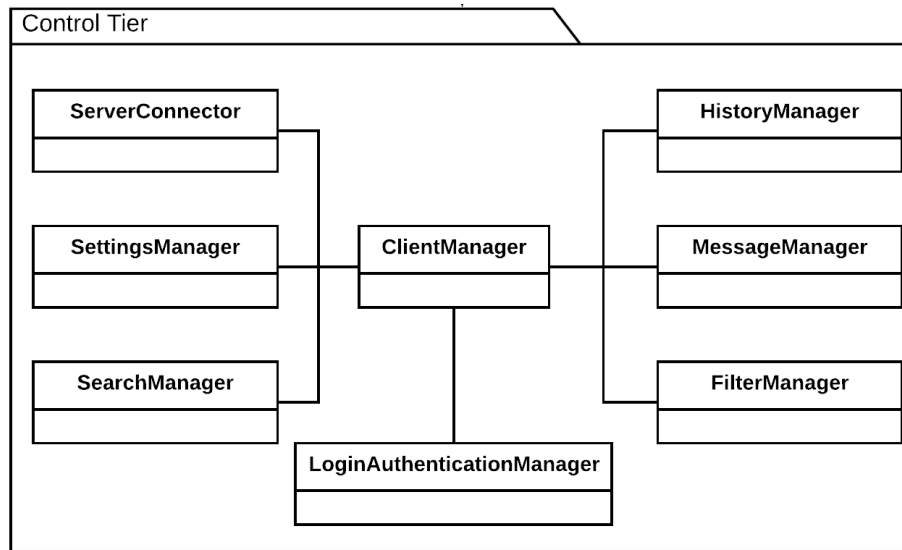


Figure 7 - Controller Subsystem in Client

- **ServerConnector:** This class handles the communication between the client and the servers.
- **SettingsManger:** This class updates the settings of the user according to their changes and preferences.
- **SearchManager:** Class that stores the previous searches in order to help the user and also directs the search to the server to get the results.
- **LoginAuthenticationManager:** Class that handles login operations.
- **FilterManager:** Class that handles filters for all types of searches and applies the search according to them.
- **MessageManager:** Class that handles message sending and receiving operations.
- **HistoryManager:** Class that saves and updates the history according to user operations and interaction with the system.

4.2 Server

Server is a crucial part of our system that will be responsible for all the interactions that the user will have with the system. The tutorials that will be offered will be recorded on the client side and delivered to the server. The server will receive this data and will make it accessible for the other users in the platform. It will also handle the information that will be entered regarding the other categories such as opportunities, trading and events and will make the necessary adjustments of this information accordingly.

All the controllers are located on the server. It will accommodate the logic and data layers making possible that entities presented within this layer to be allocated on the server. In addition, it controls the persistency of the data and performs operation on top of it. Logic tier is the backend application part responsible for handling requests and the data layer is the database responsible for permanent storage of entities in the application.

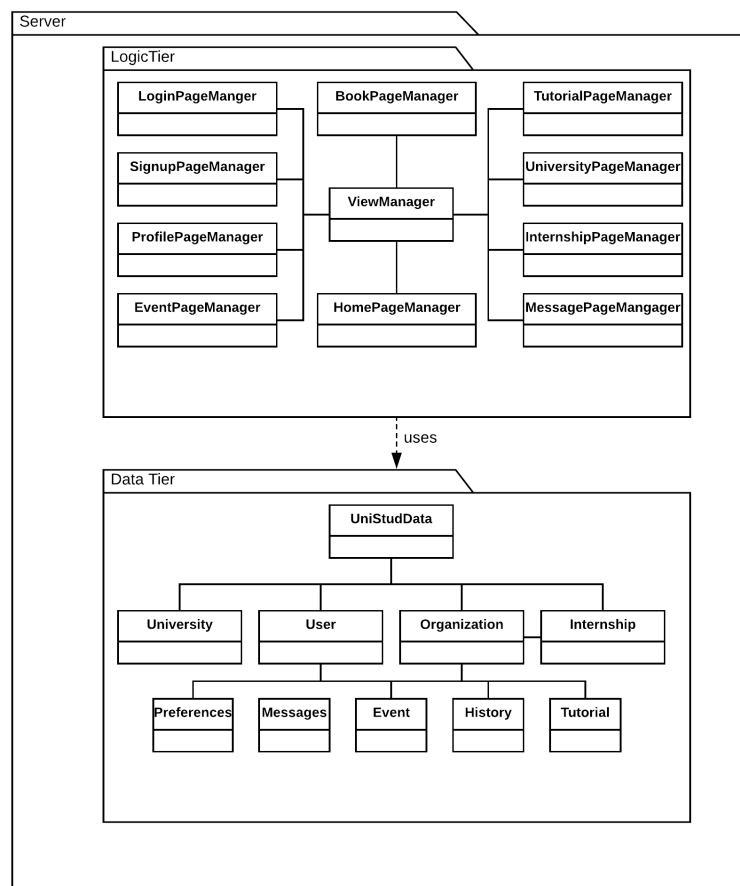


Figure 8 - Detailed View of Subsystem Decomposition: Server

4.1.1 Logic Tier

The Logic tier is the application layer responsible for the control of the flow of information between presentation layer and data layer. It accommodates all the heavy operations the application needs to handle.

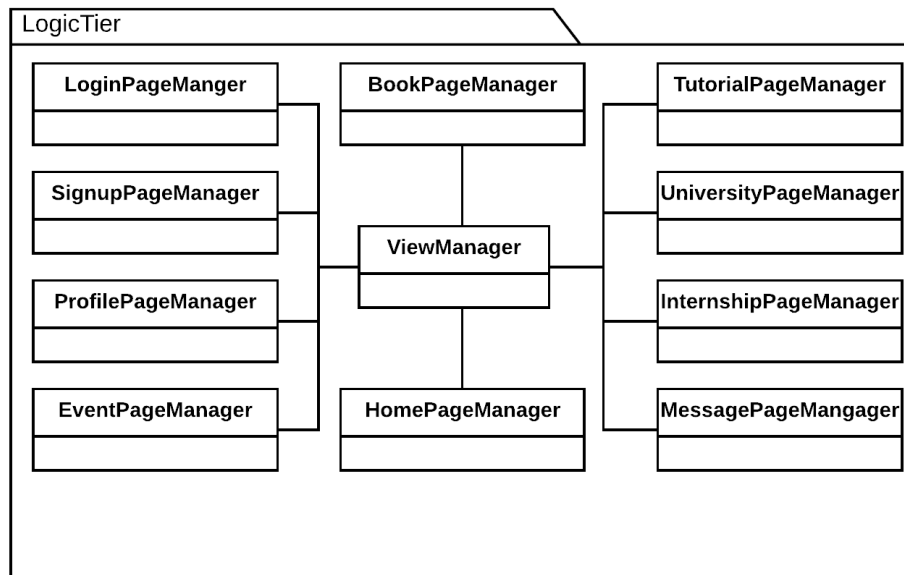


Figure 9 - Logic Subsystem in Server

- **ViewManager:** Fundamental class that will be responsible for accessing the services provided by the application. It will gather all the information and deal with the interactions of the user leading to each of these individual services.
- **HomePageManager:** Class that will be responsible for storing information and directing the user to specific services.
- **TutorialPageManager:** This class is responsible for the tutorials and will have all the necessary information regarding them. It will be responsible for the interaction of the user with the tutorials both in offering and accessing.
- **InternshipPageManager:** This class is responsible for the internships and will have all the necessary information regarding them. It will be responsible for the interaction of the user with the internships.
- **UniversityPageManager:** This class is responsible for the university related search and will have all the necessary information regarding them.
- **EventPageManager:** This class is responsible for the events related and will have all the necessary information regarding them. It will deal with the interactions on both offering and accessing an event.

- **MessagePageManager:** This class will handle the interactions between the users via sending and receiving messages.
- **BookPageManager:** This class that is responsible for the displaying and trading of all of the academic materials and will be responsible for the interaction of the user with these materials.
- **LoginPageManager:** This class is responsible for handling the Login process of the user and dealing with the provided data.
- **SignUpPageManager:** This class is responsible for handling the SignUp process of the user, dealing with the provided data and managing the interactions to make the user part of the platform.
- **ProfilePageManager:** This class is responsible for the user information and will store all the necessary data.

4.1.2 Data Tier

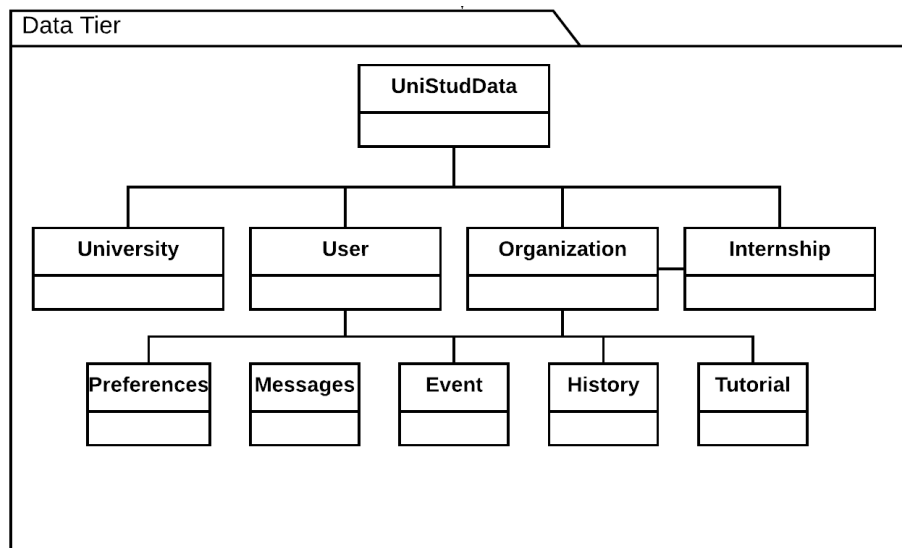


Figure 10 – Data Subsystem in Server

- **User:** Data class representing users.
- **University:** Data class representing all the universities in UniStud.
- **Internship:** This class contains the information about the internships offered by the companies in the platform.
- **Organization:** This data class concerns with the information connecting the other data classes such as preferences, messages, event, history and tutorial.

- **Preferences:** This class handles all the user's preferences by the filters provided in the platform.
- **Messages:** This class represents the data concerning the messages between the users of the platform.
- **Event:** This data class represents all the events provided and advertised in the platform.
- **History:** The data class which handles the information of the user's history.
- **Tutorial:** This data class represents all the available tutorials in the platform.

5. References

- [1] INTERNET USAGE STATISTICS The Internet Big Picture. (n.d.). 2018
<https://www.internetworldstats.com/stats.htm>. Accessed: 2018-10-14.
- [2] "Top Universities." *Top Universities*, www.topuniversities.com/. Accessed: 2018-11-04.
- [3] "BigFuture - Get Ready for College - College Planning, Financial Aid, Educator Resources." *Pay for College - Where to Find College Scholarships*, bigfuture.collegeboard.org/. Accessed: 2018-11-04.
- [4] Adams, Susan. "The 10 Best Websites For Finding An Internship." *Forbes*, Forbes Magazine, 18 Feb. 2015, www.forbes.com/sites/susanadams/2015/01/30/the-10-best-websites-for-finding-an-internship/#61ef59b11b44. Accessed: 2018-11-04.
- [5] "YouTube Live Streaming: Myths, Perks and Perils." *Event Amplifier*, 6 Nov. 2017, eventamplifier.com/2015/02/11/youtube-live-streaming-myths-perks-and-perils/. Accessed: 2018-11-04.
- [6] *Guideline: Communication Diagram*, www.michael-richardson.com/processes/rup_for_sqa/core.base_rup/guidances/guidelines/use-case_model_CC121CF4.html. Accessed: 2018-11-04.