CS 491: Senior Design Project

Project Specification Report

BilMate

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1.0 Introduction

Nowadays, especially in Turkey, one of the leading and most crucial problems university students face is finding a proper place to live while studying for a degree. Although there are existing student dormitories for students, there are times when they are full, in bad condition, expensive, or very far away from the university of students. Including the motivation to live in an individual room rather than a shared room with 2, 3, 5, or even 8 people, there are many reasons for students to share a house with other students, preferably with the students of their university. Yet this can be tiring and challenging as there is no easy way of finding a place at a good location, shared with trusted students, for a preferred rent, etc. Some university confession pages, such as “Bilkent Itiraf” currently act as a meeting point for people looking for a housemate and those wanting to become a housemate. Yet, as those platforms are not specialized for such issues, they are very inefficient in achieving suitable matches that satisfy both sides.

At this point arises the need for a platform where students looking for housemates and students who want to become one can meet and browse through the options based on their price range, house location, number of housemates, ownership of pets, habits like smoking, etc. This platform will be the mobile application intended to be created through the specifications on this report, where users will register, enter their preferences and details and look for their best matches to share a house with.

1.1 Description

The solution to solve the problem mentioned above will be provided through a social platform as a mobile application for the students to use. The app will provide two options to newcomers, who can either be students looking for a housemate to share the rent and other costs with or those already looking for a house that other students are sharing.

At this point, both sides will start this process of finding housemates with their criteria. These criteria will reflect their priorities, such as the location of the house in terms of security, the proximity to the university or transportation lines, rent and other expenses, etc., as well as their concerns or preferences, such as pet allowance, smoking or drinking rules, loudness and socialness within the house, cleanliness, etc. All of these criteria and more will need to be filled in by the users. There is supposed to be a large number of criteria. Although only the crucial ones will be asked in the registration step of the application, the other less important ones, such

as the preferred departments of housemates or the number of housemates, will be asked at intervals during the use of the application, for the convenience of the use of the application.

With the data retrieved through the questionnaire, the app will find matches between the housemate-seekers and house-seekers. It will be frequently pointed out in the application that with more data fields that the user fills, it will be more probable to find a good match between the two user types. Having found a good match that satisfies the users, they will be able to contact each other either through the messaging portal of the application or through their contact details, such as phone numbers or e-mail addresses, in case they want to share. It will also be possible with the app to browse through listings of houses or housemates rather than go for a matching process.

BilMate will bring sustained innovation into the market of house-sharing in Turkey in the form of a service that will transform the way students choose their roommates or find a proper place to live in. Rather than going through 10s or even 100s of people trying to find a suitable room and roommate combination, BilMate will optimize that process by allowing the user to decide for himself/herself what a suitable roommate should be.

For the initial implementation, we are planning on prioritizing the essential features that allow the user to list posting, create a posting, edit their profile, etc. During the later stages of development, we would start implementing and refining the matching algorithm to suit each user's needs. The most substantial risk that we might face during the development stage is the accuracy and reliability of the matching algorithm. If the algorithm does not prove to be sufficient on its own, we will add extra manual filtering and sorting to accompany it in order to offer a complete experience to the user. However, if the algorithm proved to be sufficient with respect to the criteria that were established, a manual filtering system may not be needed but may still be implemented for convenience purposes.

1.2 Constraints

1.2.1 Implementation Constraints

- The project is an Android mobile phone application.
- The application will only be available for people who have mobile phones running Android OS.
- The implementation consists of two divisions: Backend and Frontend.
- For the Backend, the FastAPI Framework will be utilized.
- For the Database, MongoDB will be utilized.
- For the Frontend, Kotlin will be utilized.
- To keep track of the application's version, Git and GitHub will be used.

- The Recommendation Algorithm of the application will be written in Python.
- For project management, Trello will be used

1.2.2 Economic Constraints

- Publishing an app into Google Play Store requires a one-time payment of a $25 registration fee [1].
- The application might include advertisements for the continuity of the service.

1.2.3 Sustainability Constraints

- User feedback will be collected at specific intervals. The application will be updated by the provided user responses.

1.2.4 Language Constraints

- Initially, the language of the project will be English. Additional languages, such as Turkish, might be added in later phases of the development.

1.2.5 Security Constraints

- Users' data is confidential and will not be shared with any untrusted party.
- The application will include reporting system. A reported user will be examined with authorities or admins, and required action will be taken accordingly, such as banning the reported user.

1.2.6 Social Constraints

- The initial user base of the application is students of Bilkent University.
- The user base scope of the app might be enhanced to other universities depending on the app's state in the future.

1.2.7 Timeline Constraints

- The application will be released on Google Play Store after CSFair 2023.
- Please find the required documents for the project below.
    - Analysis and Requirements Report: Nov 7, 2022, Monday, 5 pm.
    - Presentation and Prototype Demo: Towards the final weeks of the fall semester.
    - Detailed Design Report: 3rd week of the spring semester.
    - Final Report: 13th week of the spring semester.

1.3 Professional and Ethical Issues

- Since this application is designed to be used by students, login of non-students should not be allowed by verification of being a student. This verification will be done by allowing signup with only university emails.
- The data of the users should not be shared with third-party companies without the permission of the user.
- In the case of abuse and misuse of the program, such as acts of violence and posting irrelevant postings, the involved users are banned from the system, and they will not be allowed to use the application again.
- The data of the users should be considered sensitive data and be kept secure using appropriate encryption algorithms, and the application should use a “data protection by design and default” strategy.

2.0 Requirements

2.1 Non-Functional Requirements

2.1.1 Usability

It is essential to hide the complexity behind the UI layer in apps with complex algorithms. Regardless of what is going on in the domain layer, users should not be bothered with that part, and a seamless flow should be offered to them. In BilMate, there will be many questions for users in order to make the matching algorithm as accurate as possible. However, the app will be optimized to make that questioning flow as user-friendly as possible.

2.1.2 Security

All information shared by the users can be considered sensitive data. This means that on both the backend and frontend sides, BilMate must be developed with a “data protection by design and default” strategy. All the sensitive content will be encrypted with a well-chosen encryption algorithm, and any data that is not required to be stored will not be stored.

2.1.3 Scalability

The app must be scalable first of all for the increasing number of Bilkent students; then for the other universities and their students as well.

2.1.4 Maintainability

User traffic on the app will fluctuate based on the time of the year which means especially at the start of semesters, the app will face intense user traffic. At those times, there will be some problems on the backend side due to high user requests, and possibly some UI bugs will appear

on the frontend side. The architecture must allow developers to fix problems and maintain the app as fast as possible for those scenarios.

2.2 Functional Requirements

2.2.1 Users

2.2.1.1 General Requirements

- Users should be able to register an account using their verified email.
- Users should be able to log into their accounts.
- Users should be able to log out of their accounts.
- Users should be able to change their password.
- Users should be able to modify their profile.

2.2.1.2 House-Seeker Requirements

- House-seeker should be able to answer questions indicating the preferred traits of their roommate.
- House-seeker should be able to answer any number of questions to refine the matching algorithm.
- House-seeker should be able to stop answering questions at any time.
- House-seeker should be able to manually filter and sort through post listings.
- House-seeker should be able to add specific posts to a Favorites list.
- House-seeker should be able to remove posts from their Favorites list.

2.2.1.3 House-Sharer Requirements

- House-sharer should be able to create their own posts to indicate that they are looking for a roommate.
- House-sharer should be able to add contact information to their posting.
- House-sharer should be able to modify or remove their contact information from their posting.
- House-sharer should be able to delete their own posts.
- House-sharer should be able to indicate their preference on the post before it is published.
- House-sharer should be able to edit their posts once they are published.
- House-sharer should be able to report other users in case the other party breaks the TOS.

2.2.2 Admin

- Admins should be able to ban/unban users from the platform.
- Admins should be able to review report cases.
- Admins should be able to provide a verdict regarding reported users.

3.0 References

[1] J. Granados, “How to publish an app on Google Play Store and app store (apple),” *GoodBarber*, 31-Oct-2021. [Online]. Available: https://bit.ly/3rpea0Y. [Accessed: 02-Oct-2022].