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## Table of Contents

<b>Acknowledgment</b>	<b>6</b>
<b>Chapter 1: Introduction</b>	<b>7</b>
<i>Motivation (Abstract)</i>	7
<i>Background</i>	7
<i>Problem definition</i>	8
<i>Our Solution</i>	9
<i>Machine Learning Model</i>	10
Data	10
Data Preparation	10
Sampling	12
Insights	12
<i>ML Techniques</i>	12
<i>Gantt Chart</i>	13
<i>Project Development Methodology</i>	14
Waterfall	14
<i>The Used Tools</i>	15
Frontend	15
Backend	15
Machine Learning	15
<i>Report Organization</i>	16
Chapter 2	16
Chapter 3	16
Chapter 4	16
Chapter 5	16
<b>Chapter 2: Related Work</b>	<b>17</b>
<i>Existing Similar targeted apps</i>	17
Discord	17
Team balancing systems built in games	17
<i>Difference in our platform</i>	17
<b>Chapter 3: System Analysis</b>	<b>18</b>
<i>Project Specification</i>	18
System Architecture	18
Stakeholders	18
Functional Requirements	19
Non-functional Requirements	19
<i>Use Case Diagrams</i>	20

<b>Chapter 4: System Design</b>	<b>25</b>
<i>System Components Diagram</i>	25
<i>System Class Diagrams</i>	26
<i>Sequence Diagrams</i>	29
Sign Up	29
Sign In	29
Add Game	30
Personality Test	30
Edit Profile	31
Other Player Profile	31
Add Peer	32
Show Peer Requests	32
My Peers	33
Respond to Peer Request	34
Unpeer	35
Peer Review	35
Find Peers	36
<i>Project ERD</i>	37
<i>System GUI Design</i>	38
Sign Up Page	38
Personality Test Page	38
Login	39
Home Page	39
Player Profile	40
Player Profile Settings	40
Add Game	41
Find Peers	41
Send Peer Request	42
Other Player Profile	43
Notifications showing Peer Requests	43
View Profile of a Player Requesting Peering	44
User After Becoming Peers	44
Peer Review	45
Peer After Review	45
My Peers	46
<b>Chapter 5: Implementation and Testing</b>	<b>47</b>
<i>Implementation</i>	47
Frontend	47
Backend	47
Machine Learning	47
<i>Testing</i>	48
Applying the Test Cases	50
<b>Conclusion</b>	<b>66</b>

## Table of Tables

<b>Table 1: Questions List</b>	<b>10</b>
<b>Table 2: Review Questions List</b>	<b>11</b>
<b>Table 3: Gaming Data Set</b>	<b>11</b>
<b>Table 4: Use Case 1 --&gt; Sign Up</b>	<b>21</b>
<b>Table 5: Use Case 2 --&gt; Game Selection</b>	<b>21</b>
<b>Table 6: Use Case 3 --&gt; Personality Test</b>	<b>22</b>
<b>Table 7: Use Case 4 --&gt; Login</b>	<b>22</b>
<b>Table 8: Use Case 5 --&gt; Find Peers</b>	<b>23</b>
<b>Table 9: Use Case 6 --&gt; Accept/Decline Party Up Request</b>	<b>23</b>
<b>Table 10: Use Case 7 --&gt; Edit Profile</b>	<b>24</b>
<b>Table 11: Use Case 8 --&gt; Review Peer</b>	<b>24</b>
<b>Table 12: Test Cases</b>	<b>49</b>
<b>Table 13: Test Cases Execution</b>	<b>65</b>

## Table of Figures

<b>Figure 1: Gantt Chart</b>	<b>13</b>
<b>Figure 2: System Architecture</b>	<b>18</b>
<b>Figure 3: Use Case Diagram</b>	<b>20</b>
<b>Figure 4: System Components Diagram</b>	<b>25</b>
<b>Figure 5: System Class Diagram 1</b>	<b>26</b>
<b>Figure 6: System Class Diagram 2</b>	<b>27</b>
<b>Figure 7: System Class Diagram 3</b>	<b>27</b>
<b>Figure 8: System Class Diagram 4</b>	<b>28</b>
<b>Figure 9: System Class Diagram 5</b>	<b>28</b>
<b>Figure 10: Sign Up Sequence Diagram</b>	<b>29</b>
<b>Figure 11: Sign In Sequence Diagram</b>	<b>29</b>
<b>Figure 12: Add Game Sequence Diagram</b>	<b>30</b>
<b>Figure 13: Personality Test Sequence Diagram</b>	<b>30</b>
<b>Figure 14: Edit Profile Sequence Diagram</b>	<b>31</b>
<b>Figure 15: Other Player Profile Sequence Diagram</b>	<b>31</b>
<b>Figure 16: Add Peer Sequence Diagram</b>	<b>32</b>
<b>Figure 17: Show Peer Requests Sequence Diagram</b>	<b>32</b>
<b>Figure 18: My Peers Sequence Diagram</b>	<b>33</b>
<b>Figure 19: Respond to Peer Request Sequence Diagram</b>	<b>34</b>
<b>Figure 20: UnPeer Sequence Diagram</b>	<b>35</b>
<b>Figure 21: Peer Review Sequence Diagram</b>	<b>35</b>
<b>Figure 22: Find Peers Sequence Diagram</b>	<b>36</b>
<b>Figure 23: GUI --&gt; Sign Up</b>	<b>38</b>
<b>Figure 24: GUI --&gt; Personality Test</b>	<b>38</b>
<b>Figure 25: GUI --&gt; Login</b>	<b>39</b>
<b>Figure 26: GUI --&gt; Homepage</b>	<b>39</b>

Figure 27: GUI --> Player Profile	40
Figure 28: GUI --> Player Profile Settings	40
Figure 29: GUI --> Add Game	41
Figure 30: GUI --> Find Peers 1	41
Figure 31: GUI --> Find Peers 2	42
Figure 32: GUI --> Send Peer Request	42
Figure 33: GUI --> Other Player Profile	43
Figure 34: GUI --> Notifications Showing Peer Requests	43
Figure 35: GUI --> View Profile of a player Requesting Peering	44
Figure 36: GUI --> Accepting Peer Request	44
Figure 37: GUI --> Peer Review	45
Figure 38: GUI --> After Peer Review	45
Figure 39: GUI --> My Peers	46
Figure 40: Test Case 1 --> Empty Data Signup	50
Figure 41: Test Case 2 --> Wrong E-mail Format	50
Figure 42: Test Case 3.1 --> Username is Already Taken	51
Figure 43: Test Case 3.2 --> Discord Tag is Already Taken	51
Figure 44: Test Case 4 --> Data Filled Successfully	52
Figure 45: Test Case 5 --> Test Not Completed	52
Figure 46: Test Case 6.1 --> Completed Answering Personality test	53
Figure 47: Test Case 6.2 --> Completed Answering Personality test	53
Figure 48: Test Case 7 --> Empty Data Login	54
Figure 49: Test Case 8&9 --> Wrong Username or Password	54
Figure 50: Test Case 10.1 --> Correct Username and Password	55
Figure 51: Test Case 10.2 --> Correct Username and Password	55
Figure 52: Test Case 11.1 --> Entering profile settings to add game	56
Figure 53: Test Case 11.2 --> add Game page before adding any game with its handle	56
Figure 54: Test Case 11.3 --> add Game page after adding any game with its handle	57
Figure 55: Test Case 11.4 --> Find peers page before choosing the game	57
Figure 56: Test Case 11.5 --> Find Peers after choosing the game and presses Confirm	58
Figure 57: Test Case 12 --> View Peer Profile	58
Figure 58: Test Case 13 --> View Profile of Not a Peer	59
Figure 59: Test Case 14.1 --> Send Peer Request	59
Figure 60: Test Case 14.2 --> View Peer Requests	60
Figure 61: Test Case 14.3 --> View Peer Request	60
Figure 62: Test Case 15.1 --> Accept Peer Request	61
Figure 63: Test Case 15.2 --> Players added to each other's Peers	61
Figure 64: Test Case 16 --> After Rejecting the Friend Request	62
Figure 65: Test Case 18 --> Uncompleted Survey	62
Figure 66: Test Case 18 --> Peer Profile After Review	63
Figure 67: Test Case 19 --> Taken Username in Edit Profile	63
Figure 68: Test Case 20 --> Taken Discord Tag in Edit Profile	64
Figure 69: Test Case 21 --> Wrong E-Mail Format in Edit Profile	64
Figure 70: Test Case 22 --> Uncompleted Fields in Edit Profile	65
Figure 71: Test Case 23 --> Successfully Editing Profile	65

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# Chapter 1: Introduction

## Motivation (Abstract)

As gaming community is growing bigger and bigger every day, the need for matching the players together in online Lobbies is evolving as well. From that a big problem arise which is that players with different Mental models get matched up together, which results in a bad gaming experience for all of them.

Many players do not have the luxury of wasting their limited playing time with bad teammates because of the responsibilities of life, so we are aiming to help those and others in having the ultimate gaming experience through an efficient Player Recommendation system that would improve the quality of teams.

We are aiming to achieve that through matching the Players based on their Personalities and the games they usually play along with other deterministic factors that will allow us to solve this problem by using a Machine Learning Model in Analyzing the players' data and personalities and position each player in their appropriate cluster of players.

## Background

Until the end of the last century, games were only offline. We had multiple games like claw, Rollcage, GTA vice city and so much more. It was very basic and straight forward. You had some missions to complete until you meet the final boss.

Then games evolved with the advancement of technology to online-type-of-games, where you can play against, not only the computer, but also another player from any place in the world. With online games, we were introduced to team-based online games.

## Problem definition

Many problems arose with online type of games, like when you get matched with a toxic player, or maybe when you get matched with players with different personalities. This made the team chemistry from low to non-existent which leads to the loss of the match/game. It is also very annoying when you get matched with players who don't care about the game and keep harassing you in chat or voice chat. This leads to a very unpleasant gaming experience, and for some players, it ruins their day.

We decided to gather players' data to get a better understanding of their perspectives of online games experiences, we chose a Survey as a data gathering technique. We came up with a conclusion that there are nearly 83% players who hate when they get matched with random players, with 45% of the players consider the poor matching with randoms is the biggest problem with gaming.

We chose to address this problem because the effect it has on gamers which is a big part of our community, from the survey we made we concluded that 84.3% of people are gamers, and to help this big community we wanted to solve a problem that its solution can be provided by us, unlike other gaming problems that the gamers face like poor Latency and Packet Loss which is out of our control.

Our addressed problem has many side effects on players as it reduces the quality of gaming experience as all, so it leads to decrease in players win rate. Some people as we mentioned before do not have the luxury of trying different teams, so when they waste their limited time that they use in adjusting their moods to face the difficulties of life then their morality will decrease and that will have a negative impact on their lives.

## Our Solution

To solve this problem and offer a better gaming experience for all the players despite their mental model we decided to make a platform that contains all the Players and Match them with the most suitable players for them.

The Player when signing up must take a personality test that will help us define his mental model, personality, and what behavior we can expect from him during a game.

Using a Machine Learning Model (Clustering Technique) We Divide the players into Clusters that contains the players who are close to them and will have a good gaming experience with them.

When a player wants to search for peers, we use KNN Algorithm and match the player with his most suitable players with the closest personality to try to have the best possible gaming experience.

## Machine Learning Model

### Data

The data we'll be working on in this project contains two datasets:

#### *Personality Test Dataset*

Contains about 1 million records of users' answers to the Big 5 personality test, which gives scores for a person's personality traits like extraversion and agreeableness using 50 questions with answers from 1 to 5.

#### *Steam Games Users Dataset*

Contains 200K records of Steam (an online gaming platform) users, each record contains a player ID and Game name.

### Data Preparation

We've adjusted the datasets we'll work on to meet our project's needs according to the following:

#### *Feature Selection*

We've selected only the features (questions) that can be relevant to our purpose in the project in the personality test dataset, and we further adjusted them to match our needs in the gaming platform, and this is the list of features we'll be working with in the personality dataset:

Feature	Description	Feature	Description
Q1	I am energetic during the game.	Q15	I sympathize with others' feelings.
Q2	I don't talk a lot while gaming.	Q16	I prefer making friends over winning.
Q3	I feel comfortable playing with others.	Q17	I help newbies.
Q4	I start conversations.	Q18	I am always prepared.
Q5	I like to talk to new people in games.	Q19	I pay attention to details.
Q6	I don't like to draw attention to myself.	Q20	I don't stick to a gaming style.
Q7	I don't mind being the center of attention.	Q21	I like order.
Q8	I get stressed out easily.	Q22	I exit the game when I feel I am losing.
Q9	I am relaxed most of the time.	Q23	I follow a plan in game.
Q10	I get upset easily.	Q24	I have difficulty understanding others' plans.
Q11	I change my mood a lot.	Q25	I have a vivid imagination.
Q12	I prefer playing on my own.	Q26	I have excellent ideas.
Q13	I am interested in knowing new people.	Q27	I am quick to understand things.
Q14	I get nervous when I lose.		

Table 1: Questions List

And we also adjusted the questions to allow players to review each others in order to have a more realistic view of the players personalities:

Feature	Description	Feature	Description
Q1	Player is energetic during the game	Q15	Player respects other players in team
Q2	Player doesn't talk a lot while gaming	Q16	Player seems to prefer making friends over winning
Q3	Player plays well in a team	Q17	Player helps newbie teammates
Q4	Player starts conversations	Q18	Player seems confident and prepared
Q5	Player seemed to like talking to new people	Q19	Player pays attention to details
Q6	Player doesn't draw a lot of attention to himself	Q20	Player does not stick to a gaming style
Q7	Player likes to be the center of attention	Q21	Player likes order
Q8	Player gets stressed out easily	Q22	Player exits the game when they feel like losing
Q9	Player is relaxed most of the time	Q23	Player follows a plan in game
Q10	Player gets upset easily	Q24	Player has difficulty understanding plans
Q11	Player changes mood a lot during the game	Q25	Player has a vivid imagination
Q12	Player likes playing on his own even in a team game	Q26	Player has excellent ideas
Q13	Player seemed interested to know new people	Q27	Player is quick to understand things
Q14	Player gets nervous when they lose		

Table 2: Review Questions List

And in the Gaming dataset:

Feature	Description
User ID	The ID of a user (matches a row number in the personality test)
Game	Name of a game

Table 3: Gaming Data Set

### Handling Missing Values

1783 rows in the personality test dataset had missing values, which is a small number compared to the size of the dataset, and in these records, the whole rows had missing values not just one cell, so we simply removed these records.

### *Handling Invalid Values*

The personality test dataset should contain values only between 1 and 5 inclusive, while some of the values (exactly 203108) had a value of 0 which should not be valid, so we mapped these values to 1 instead, as they correspond to the least value.

### Sampling

We used random sampling to sample the dataset to preserve the distribution structure of features, we first worked with a small sample (about 10,000 records) to match the number of users in the steam dataset.

### Insights

You can find some insights of the data along with the process of data preparation in this drive link:

[https://drive.google.com/drive/folders/1cCMjeAQ8k4UWzDyUv\\_G4Q88LKXoWStOC?usp=sharing](https://drive.google.com/drive/folders/1cCMjeAQ8k4UWzDyUv_G4Q88LKXoWStOC?usp=sharing)

### ML Techniques

We have tried multiple ML unsupervised learning techniques in order to know which one will serve us best throughout the project, such as Agglomerative clustering, K-Means clustering and K-Nearest-Neighbors, and we decided to:

Use a combination of both K-Means clustering and K-Nearest-Neighbors.

We first applied K-Means clustering using the personality dataset on the whole dataset of users in the system, and this step needs to be done periodically (every day for example), and when a user chooses to play a certain game, KNN is applied to the user's cluster in order to sort them in ascending order of distance, and then we match the player with the closest players in his cluster that also play the same game.

## Gantt Chart

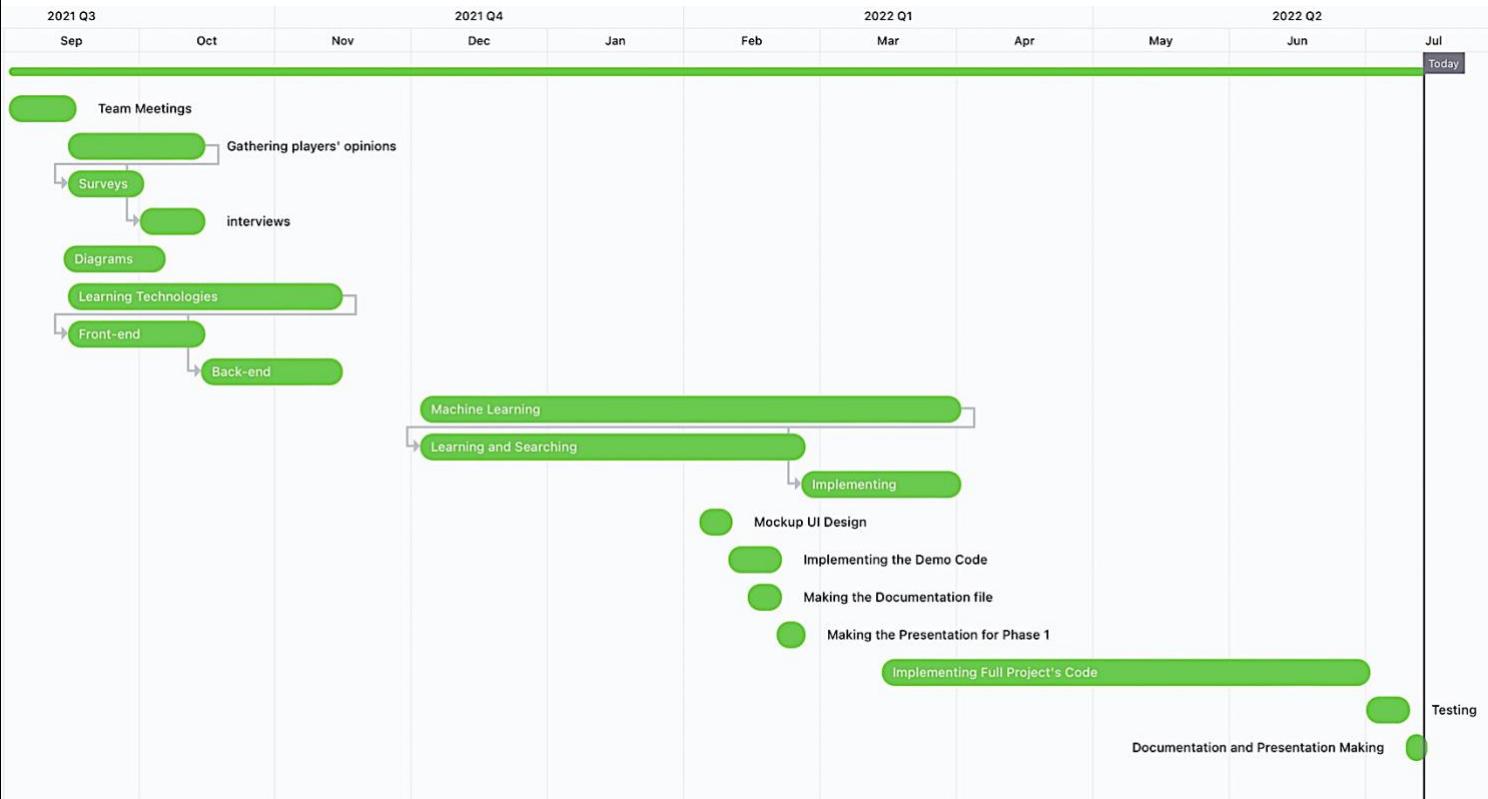


Figure 1: Gantt Chart

## Project Development Methodology

### Waterfall

Waterfall model divides software development process into separate phases. The outcome of each phase is the input for the next phase. Development moves from analysis, through design, implementation, testing, installation and ends up at deployment and maintenance. Each phase of development proceeds in strict order.

#### *Requirements*

The first phase involves understanding what user needs and what needs to design and what is its function, purpose, etc. Here, the specifications of the input and output or the final product are studied.

#### *Design*

The bridge that takes us from requirements to solutions (implementation), its objectives is to define and organize the components of the final solution as it serve as the blueprint (structure) for the next stage (implementation stage). In this stage, the design of application, databases, and user interface are identified.

#### *Implementation*

The design that is identified in the previous stage is implemented through transforming each use case into a working functionality.

#### *Testing*

Once the system has been developed, it will be tested to ensure that it is working as expected without any defects. A test plan will be followed. Different test cases will be executed according to three types: unit testing, integration testing, usability testing.

#### *Deployment*

Once the functional and non-functional testing is done, the product is deployed in the customer environment or released into the market.

## The Used Tools

### Frontend

#### *Angular + TypeScript*

Our main technology for the front-end of our website was Angular, we chose Angular because it offers the following benefits:

- Improved Speed and Performance
- Easy and effective communication with a RESTful server
- High quality of Angular applications
- Easy to transition to cross-platform development using ionic

### Backend

#### *Java + Spring Boot*

Our main technology for the back-end of our website was Spring Boot, we chose Spring because it offers the following benefits:

- Helps greatly in building loosely coupled applications
- Easy separation of different layers and packages
- Minimum boilerplate code for configuration
- Can be easily integrated with other applications and servers

### Machine Learning

#### *Python*

Python was the language of choice for the Machine Learning model because almost all ML frameworks and libraries are supported in Python.

#### *SKLearn*

Sci-Kit Learn offers a wide range of ready for use ML algorithms and models that need little effort in configuration and tuning, so it was the library we chose for Clustering and applying KNN algorithm in our ML model.

#### *Pandas*

Pandas was used to read data in the form of Data Frames in order to easily apply SKLearn techniques on our data.

#### *Flask*

Flask was used to build a REST API that is used by the back-end application to find suggested peers based on personality.

## Report Organization

The Next Chapters Will Discuss ***Party Up*** in More Details

### Chapter 2

Some Similar Solutions to the Same Problem and the Difference from our Project

### Chapter 3

Details of the Requirements in the System and Use Cases

### Chapter 4

More About the Design of Party Up in Details:

- System Component Design
- System Classes UML
- Sequence Diagrams
- System ERD
- System GUI

### Chapter 5

Implementation and Testing of the Application

## Chapter 2: Related Work

### Existing Similar targeted apps

#### Discord

Discord in a nutshell is a platform which allow players to communicate with each other via VOIP service which increases the chemistry, but it has nothing to do with finding the best members to be in the same team as it only provides a space to meet other players to improve the gaming experience.

#### Team balancing systems built in games

These team balancing systems are based on players skills and their performance on previous matches, but they don't put the personalities of users into account which does not necessarily achieve the most possible chemistry between the players.

### Difference in our platform

Our system does not concentrate only on providing space to meet like discord nor matching the players based on their skills and performance, but it tries to provide a better gaming experience by focusing on players personalities and their behaviors while matching them to achieve the maximum possible chemistry between team players, and also allows for players to review each other in order to make the system more efficient in finding appropriate matches.

# Chapter 3: System Analysis

## Project Specification

### System Architecture

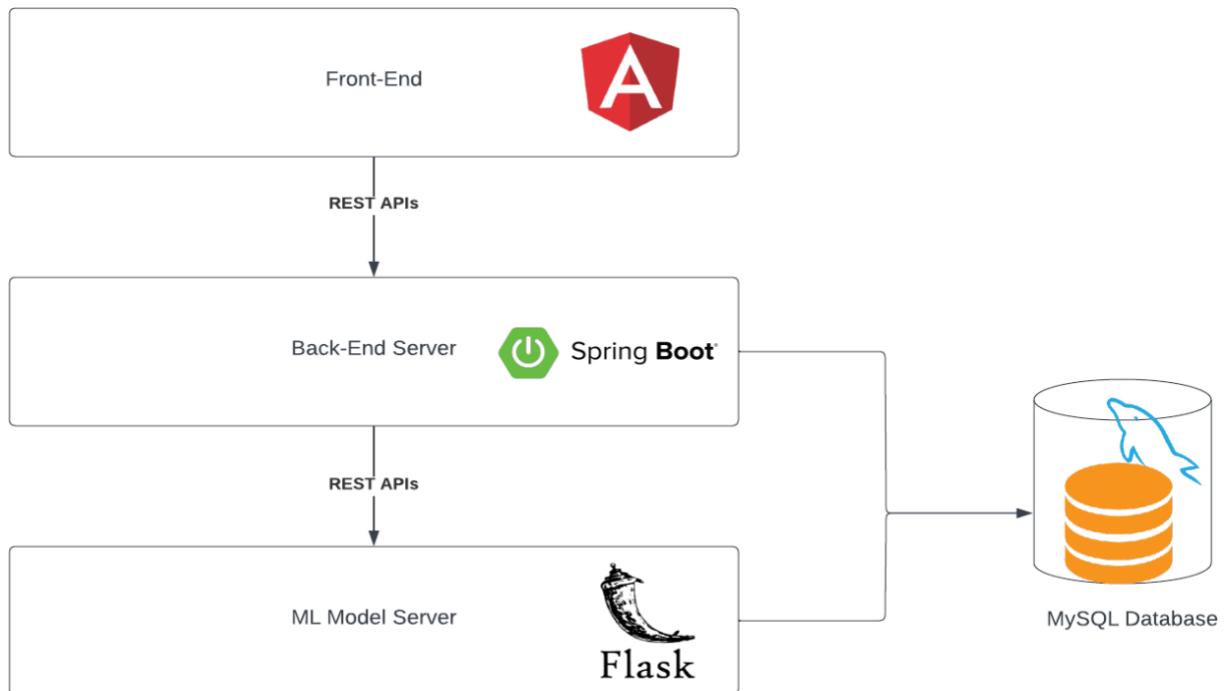


Figure 2: System Architecture

### Stakeholders

- Anyone who is interested in gaming. E.g., gamers
- Many different sponsors. E.g., Intel or Nvidia
- Gaming event's organizers. E.g., Insomnia
- Investors like gaming companies

## Functional Requirements

- ❖ The user should be able to sign up to the system
- ❖ The user should be able to sign into the system
- ❖ The sign-up information should be validated
- ❖ The user should be able to take a personality quiz to determine his/her personality features
- ❖ The user should be able to select the games he currently plays
- ❖ The user should be able to view recommended peers
- ❖ The user should be able to make a party up request
- ❖ The user should be able to accept/decline a party up request
- ❖ The user should be able to review a peer
- ❖ The user be able to edit his profile info
- ❖ The user should be able to un-peer a peer
- ❖ The user should be able to block a player
- ❖ The user should be able to see his peer's discord tag
- ❖ The user should be able to edit the games he currently plays
- ❖ The user should be able to search for other players' profiles

## Non-functional Requirements

- ❖ The interface will be attractive and built with attractive animations and high performance
- ❖ The interface will help the user to understand the system software easily without misleading information
- ❖ The interface will allow the user to reach any function in the minimum number of clicks
- ❖ The interface must be easy to navigate
- ❖ Users should be able to easily determine what a feature is and what it can do
- ❖ The interface should be highly memorable and easy to learn
- ❖ The system will be able to find peers in the least amount of time possible
- ❖ The system should be able to produce accurate recommendations that match the user's personality and the games he plays
- ❖ The system will provide the user with high security, authentication, authorization, and access control
- ❖ Model generates recommendations to the user with low response time and high accuracy

## Use Case Diagrams

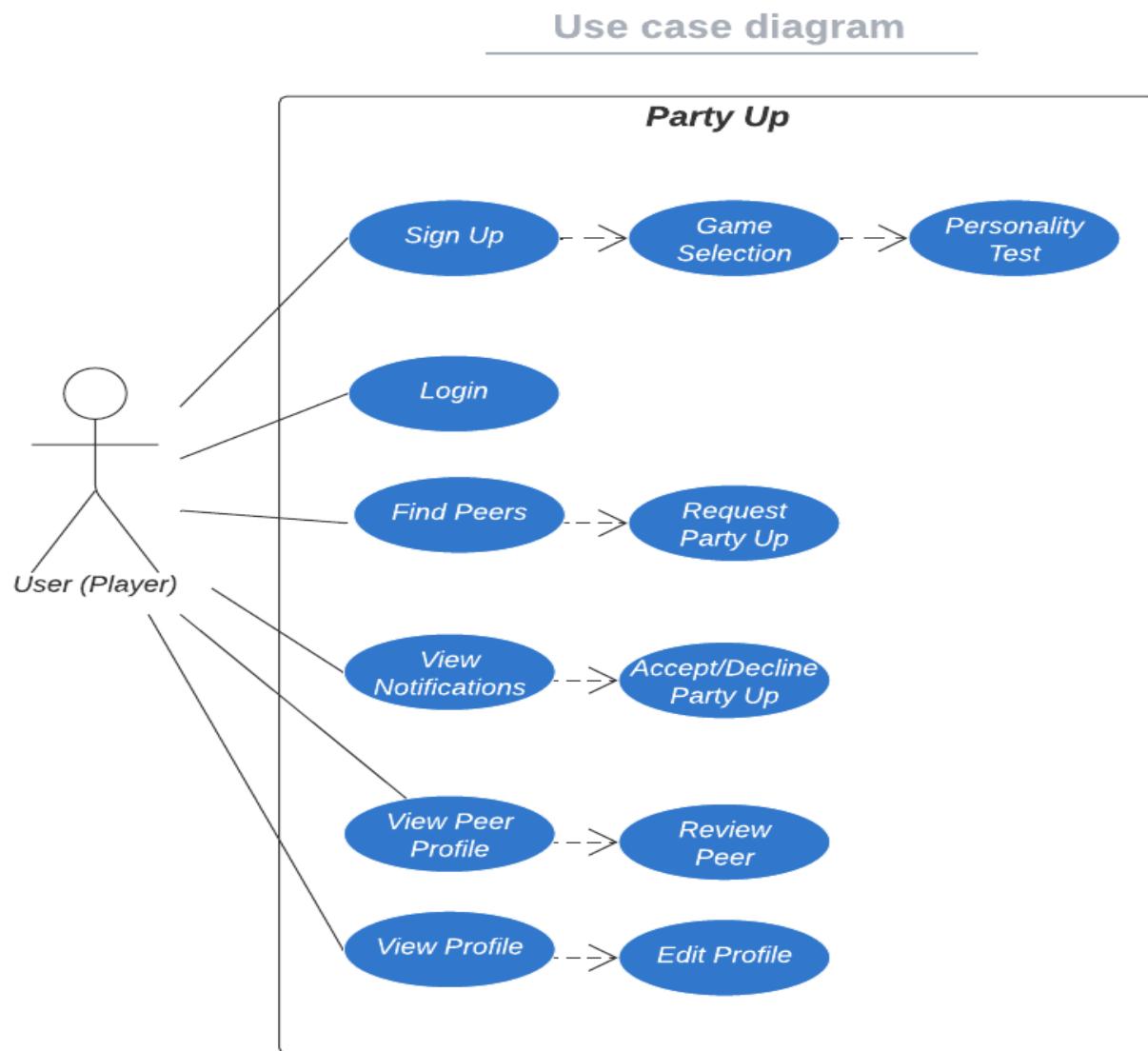


Figure 3: Use Case Diagram

<b>Use Case ID:</b>	1
<b>Use Case Name:</b>	Sign up
<b>Actors:</b>	User (Player)
<b>Pre-conditions:</b>	User is not registered in the website
<b>Post-conditions:</b>	User is redirected to games selection
<b>Flow of events:</b>	<b>Action</b>
	1- User enters his First name, last name, email address, password, date of birth, country/region.
	2- User enters his Discord username tag.
	3- System checks the validation of inputs.
	4- User is redirected to game selection page.

Table 4: Use Case 1 --> Sign Up

<b>Use Case ID:</b>	2
<b>Use Case Name:</b>	Game Selection
<b>Actors:</b>	User (Player)
<b>Pre-conditions:</b>	User is registered into the website but hasn't yet selected games.
<b>Post-conditions:</b>	User is redirected to the personality test
<b>Flow of events:</b>	<b>Action</b>
	1- User searches for the name of a game.
	2- A list of games matching this name appears.
	3- User selects the game/s he wants.
	4- User clicks Confirm button.
	5- User is redirected to the personality test.

Table 5: Use Case 2 --> Game Selection

<b>Use Case ID:</b>	3
<b>Use Case Name:</b>	Personality test
<b>Actors:</b>	User (Player)
<b>Pre-conditions:</b>	User is registered into the website but hasn't yet done the personality test.
<b>Post-conditions:</b>	User is registered successfully into the system.
<b>Flow of events:</b>	<b>Action</b>
	1- User is shown a list of questions that each has a scale from 1 to 5. 2- User answers all the questions in the test. 3- User confirms his choices. 4- User is redirected to the home page.

Table 6: Use Case 3 --> Personality Test

<b>Use Case ID:</b>	4
<b>Use Case Name:</b>	Login
<b>Actors:</b>	User (Player)
<b>Pre-conditions:</b>	User is Signed Up
<b>Flow of events:</b>	<b>Action</b>
	1- User Types his E-Mail or Username. 2- User Types his Password 3- User clicks the "Login" button. 4- If the Credentials is wrong user is told so 5- If the Credentials Correct the user will be redirected to his home Page

Table 7: Use Case 4 --> Login

<b>Use Case ID:</b>	5
<b>Use Case Name:</b>	Find Peers
<b>Actors:</b>	User (Player)
<b>Pre-conditions:</b>	User is logged in to the website.
<b>Flow of events:</b>	<p style="text-align: center;"><b>Action</b></p> <p>1- User clicks the “Find Peers” button.      2- User is shown a list of recommended peers based on the games he plays and the personality features.      3- User can view any of these profiles and make a party up request.      4- If the request is accepted, user is shown the Discord tag of the peer.</p>

Table 8: Use Case 5 --> Find Peers

<b>Use Case ID:</b>	6
<b>Use Case Name:</b>	Accept/Decline party up request
<b>Actors:</b>	User (Player)
<b>Pre-conditions:</b>	User is logged in to the website.
<b>Flow of events:</b>	<p style="text-align: center;"><b>Action</b></p> <p>1- User goes to the notifications panel.      2- User view profiles requesting to party up.      3- User clicks “Accept” or “Decline” to accept or decline the party up request.      4- User is shown the Discord tag of the peer.</p>

Table 9: Use Case 6 --> Accept/Decline Party Up Request

<b>Use Case ID:</b>	7
<b>Use Case Name:</b>	Edit Profile
<b>Actors:</b>	User (Player)
<b>Pre-conditions:</b>	User is logged in to the website.
<b>Flow of events:</b>	<b>Action</b>
	1- User goes to his profile. 2- User clicks on “Edit Profile” button. 3- User can change/edit any information in his website including the games he currently plays. 4- User confirms the changes.

Table 10: Use Case 7 --> Edit Profile

<b>Use Case ID:</b>	8
<b>Use Case Name:</b>	Review Peer
<b>Actors:</b>	User (Player)
<b>Pre-conditions:</b>	User is logged in to the website.
<b>Flow of events:</b>	<b>Action</b>
	1- User goes to the profile of the peer he wants to review. 2- User clicks “Review Peer” button. 3- User answers the review questions. 4- User confirms his answers.

Table 11: Use Case 8 --> Review Peer

## Chapter 4: System Design

### System Components Diagram

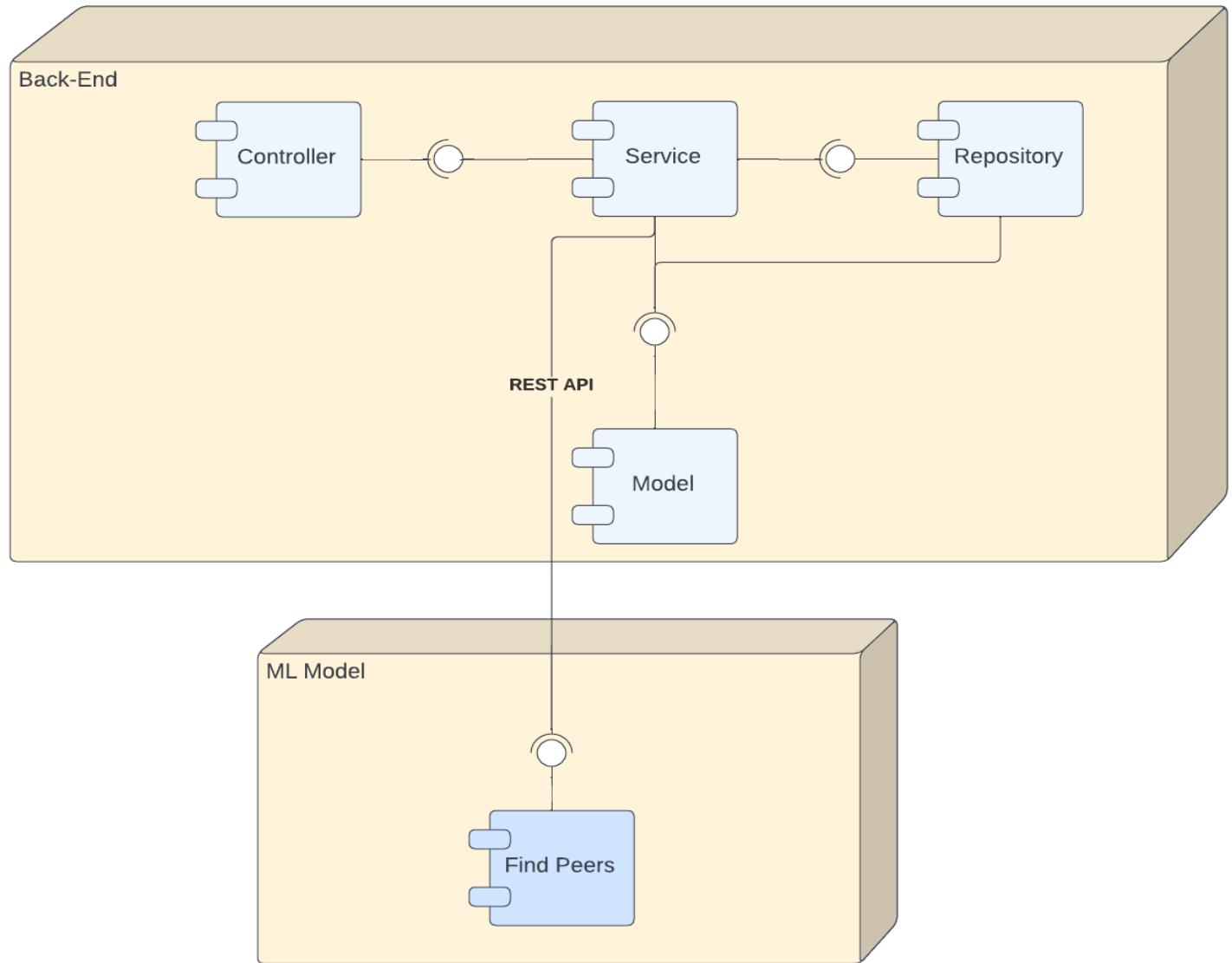


Figure 4: System Components Diagram

## System Class Diagrams

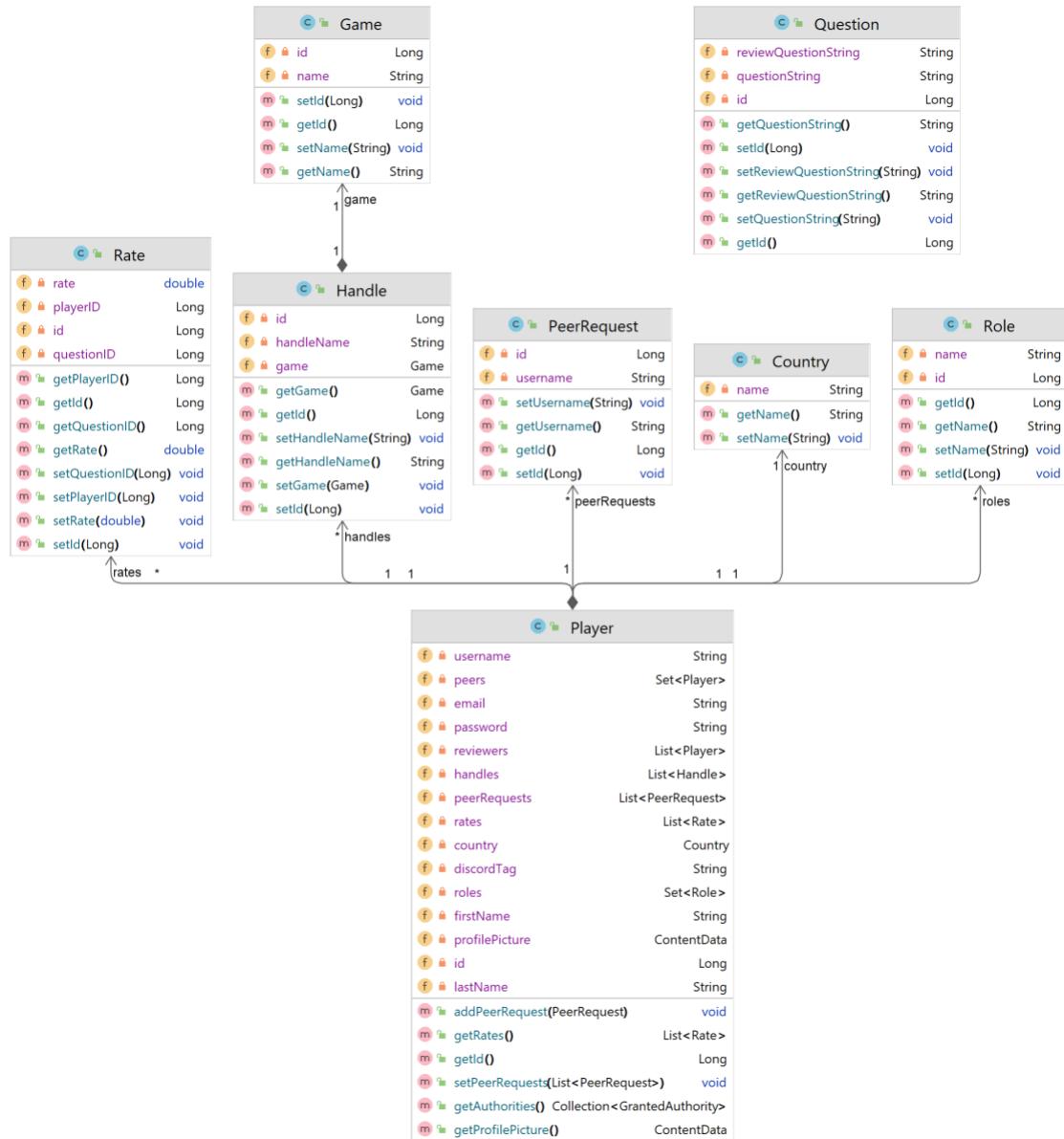


Figure 5: System Class Diagram 1

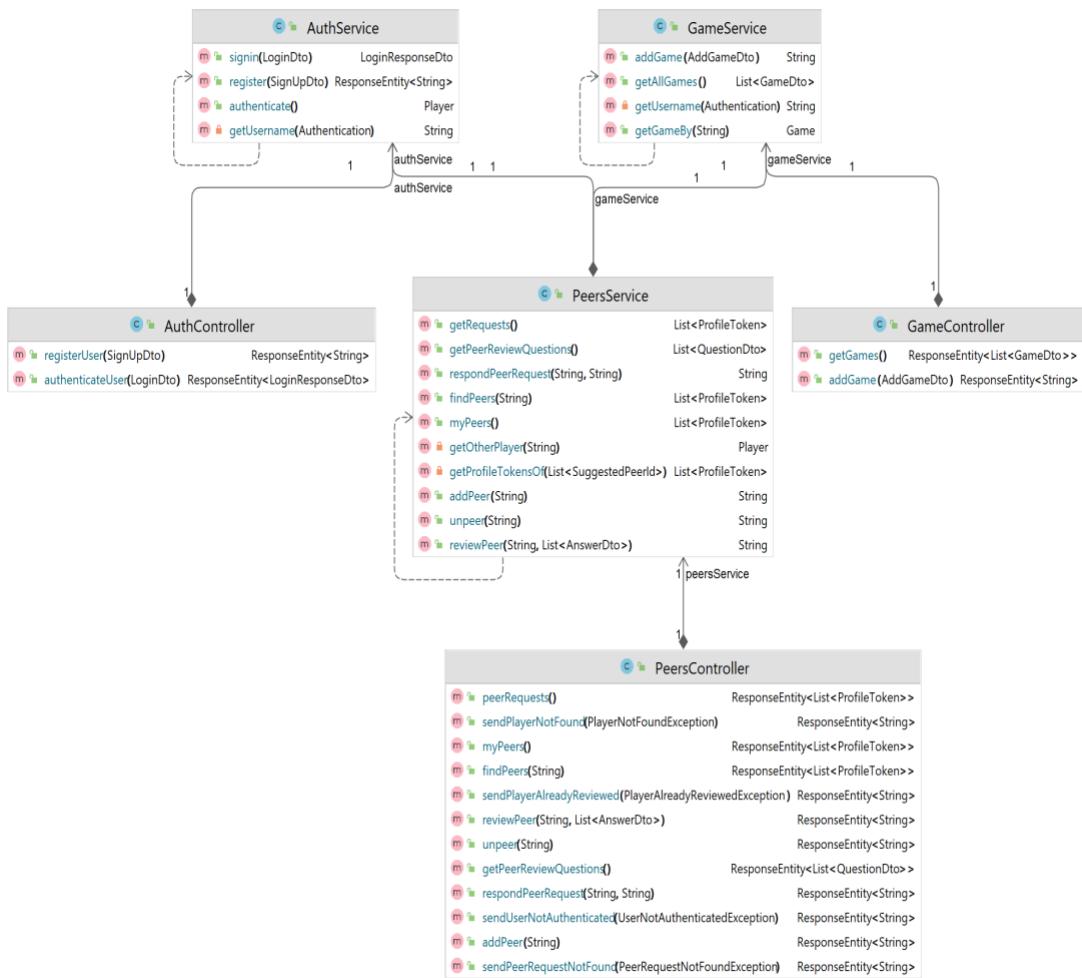


Figure 6: System Class Diagram 2



Figure 7: System Class Diagram 3

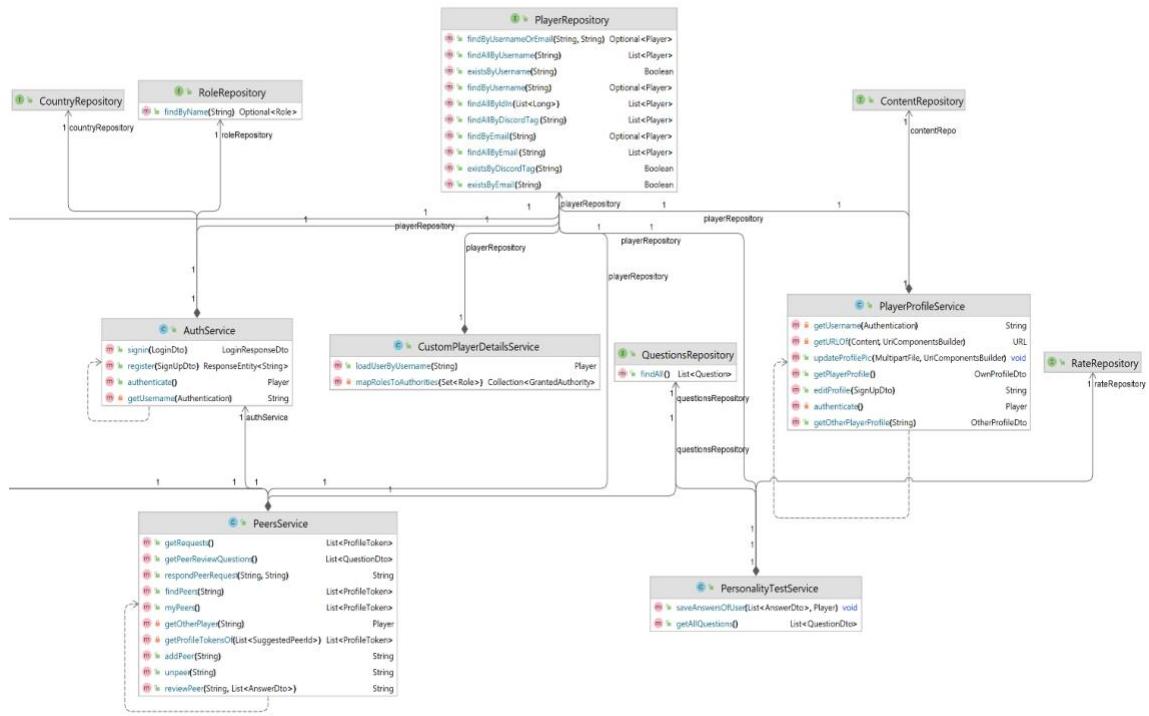


Figure 8: System Class Diagram 4

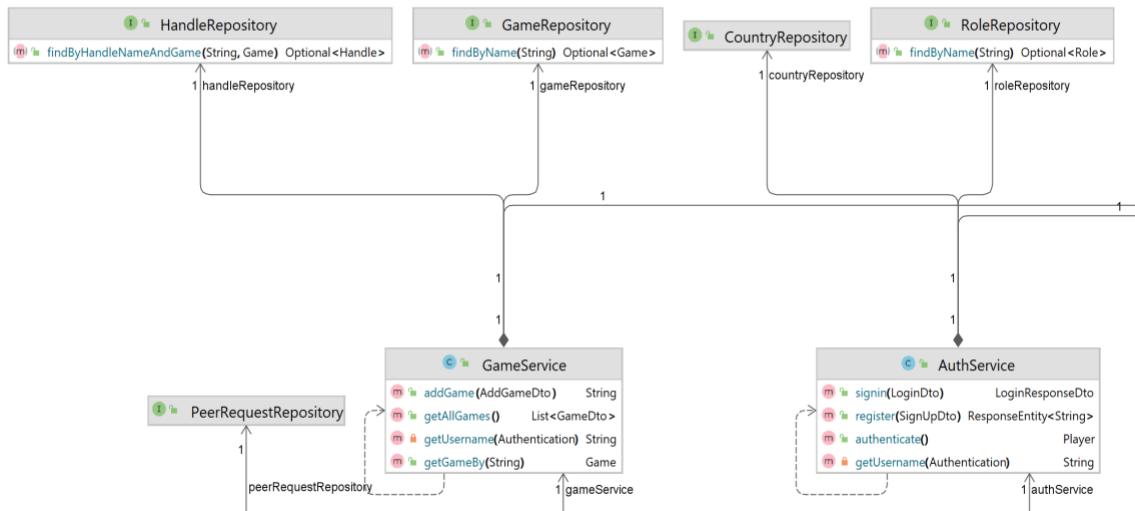


Figure 9: System Class Diagram 5

## Sequence Diagrams

### Sign Up

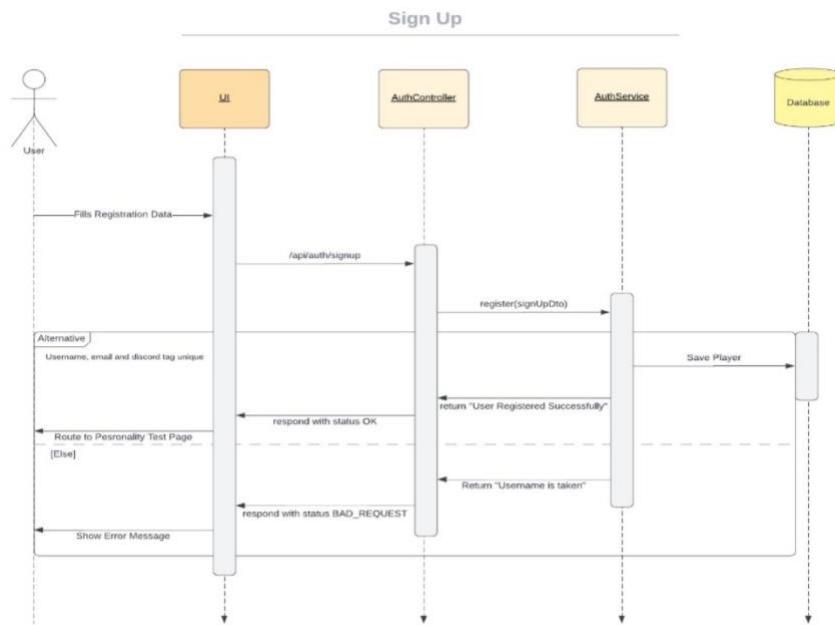


Figure 10: Sign Up Sequence Diagram

### Sign In

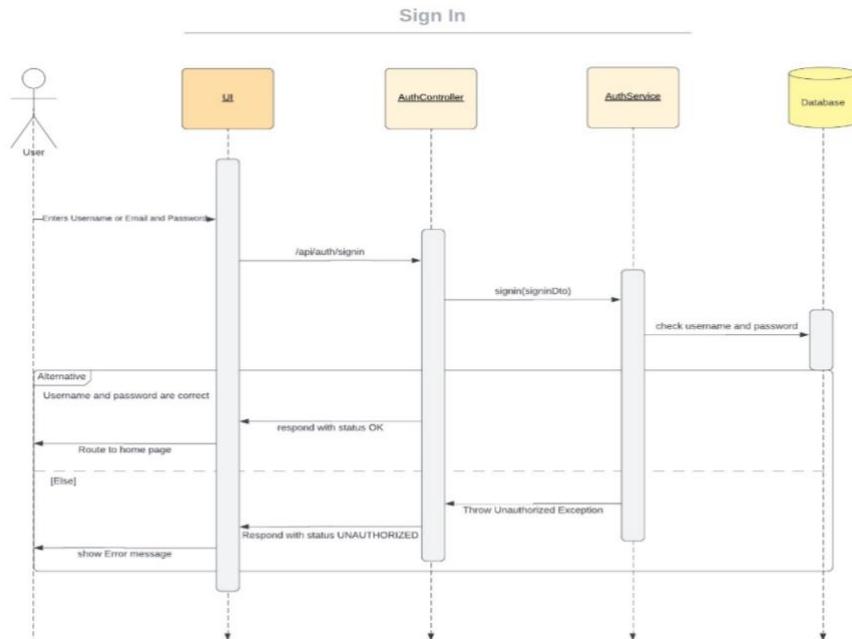


Figure 11: Sign In Sequence Diagram

## Add Game

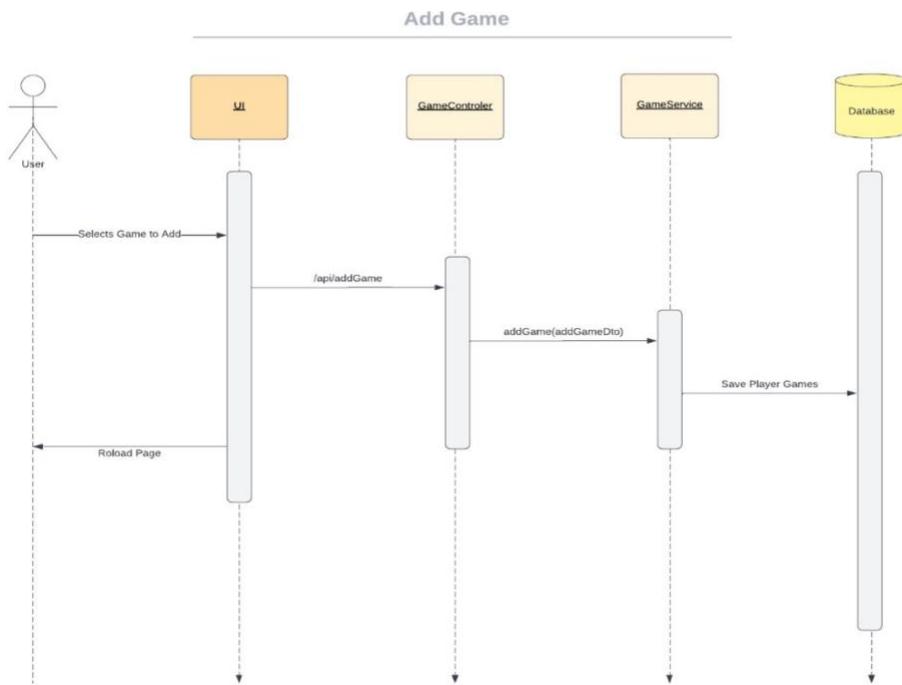


Figure 12: Add Game Sequence Diagram

## Personality Test

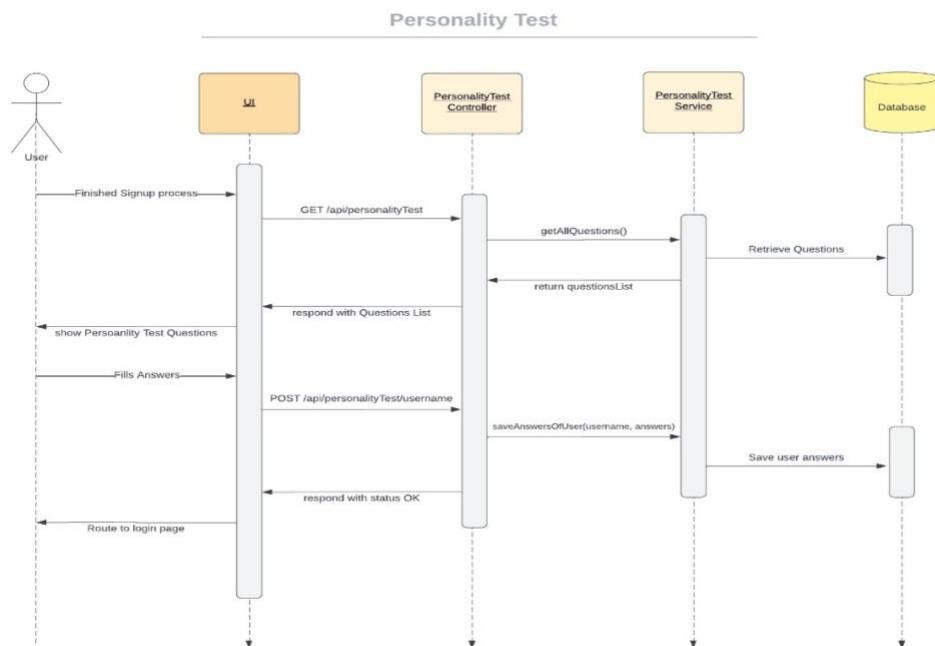


Figure 13: Personality Test Sequence Diagram

## Edit Profile

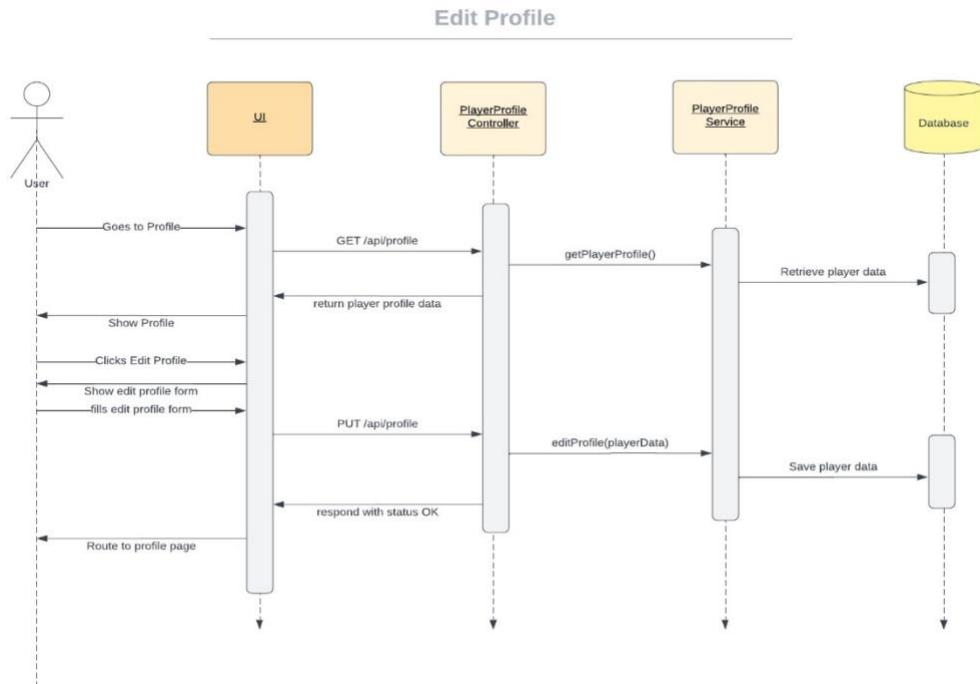


Figure 14: Edit Profile Sequence Diagram

## Other Player Profile

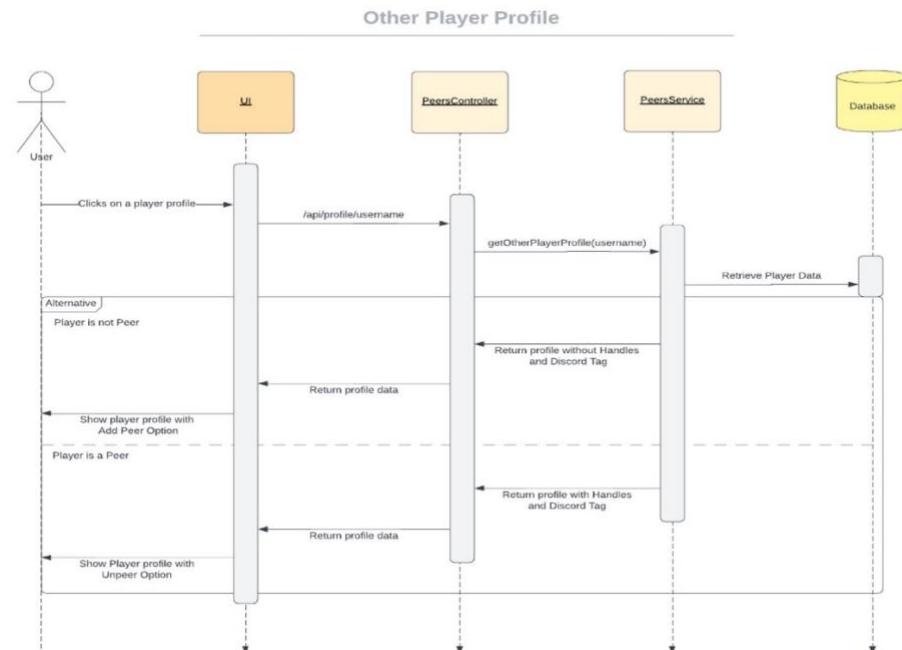


Figure 15: Other Player Profile Sequence Diagram

## Add Peer

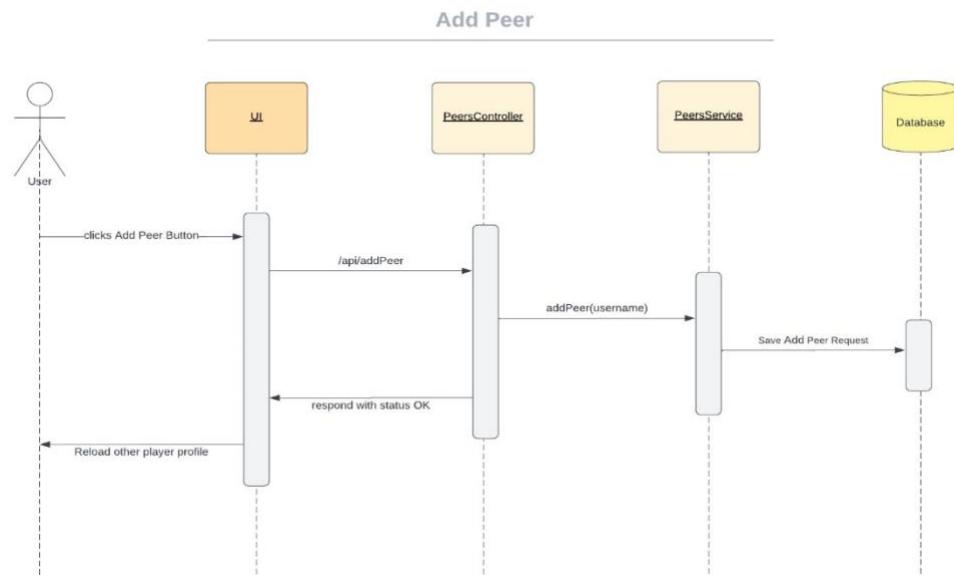


Figure 16: Add Peer Sequence Diagram

## Show Peer Requests

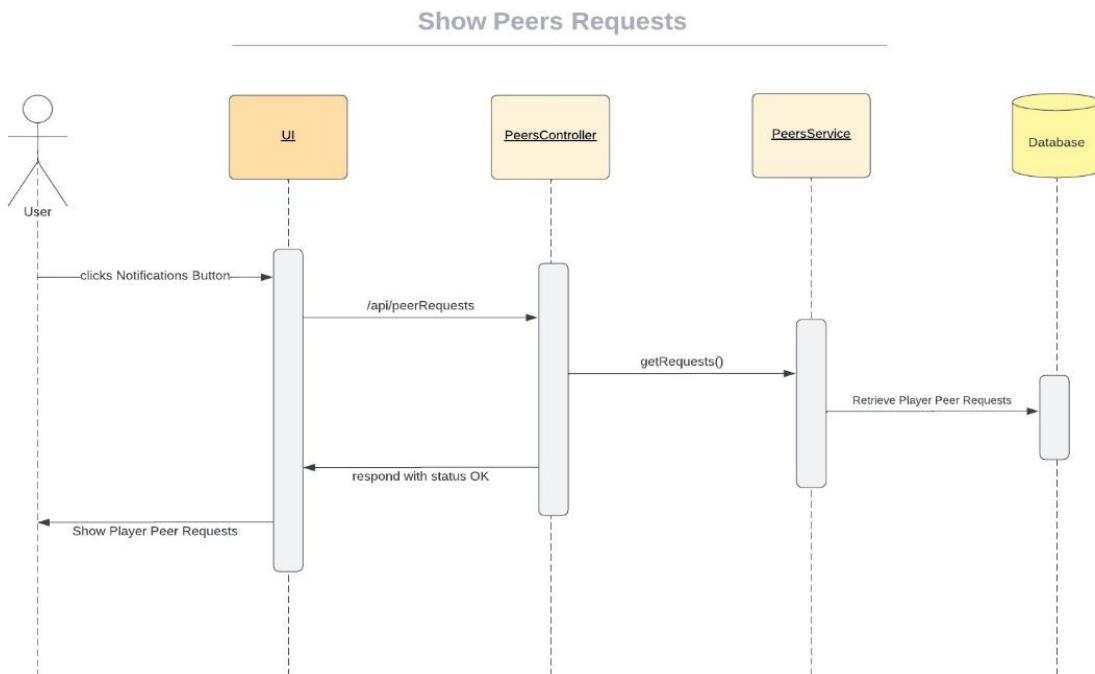


Figure 17: Show Peer Requests Sequence Diagram

## My Peers

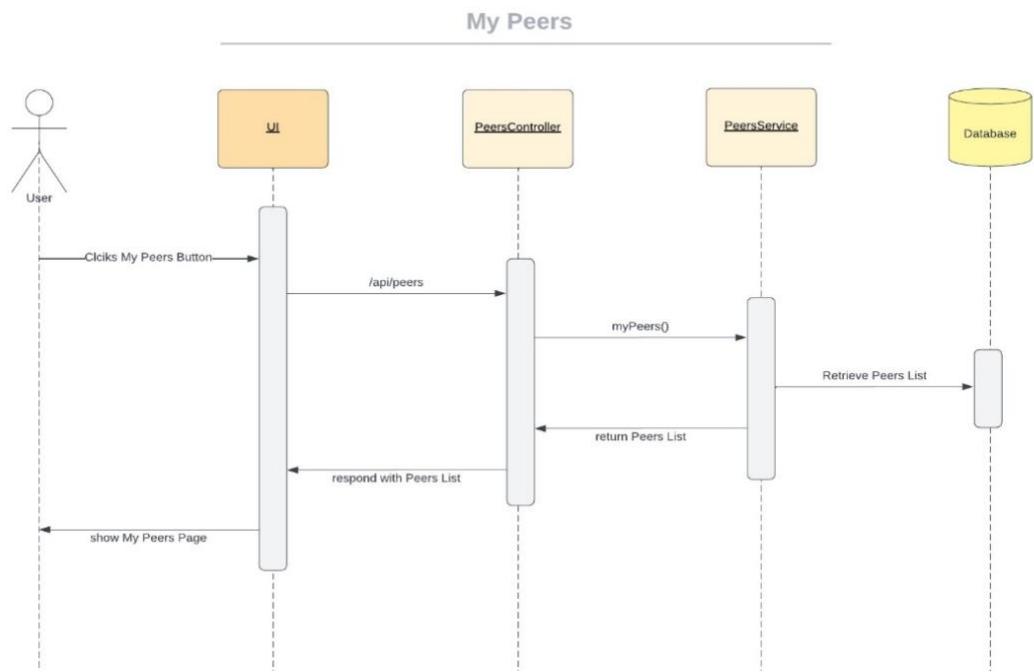


Figure 18: My Peers Sequence Diagram

## Respond to Peer Request

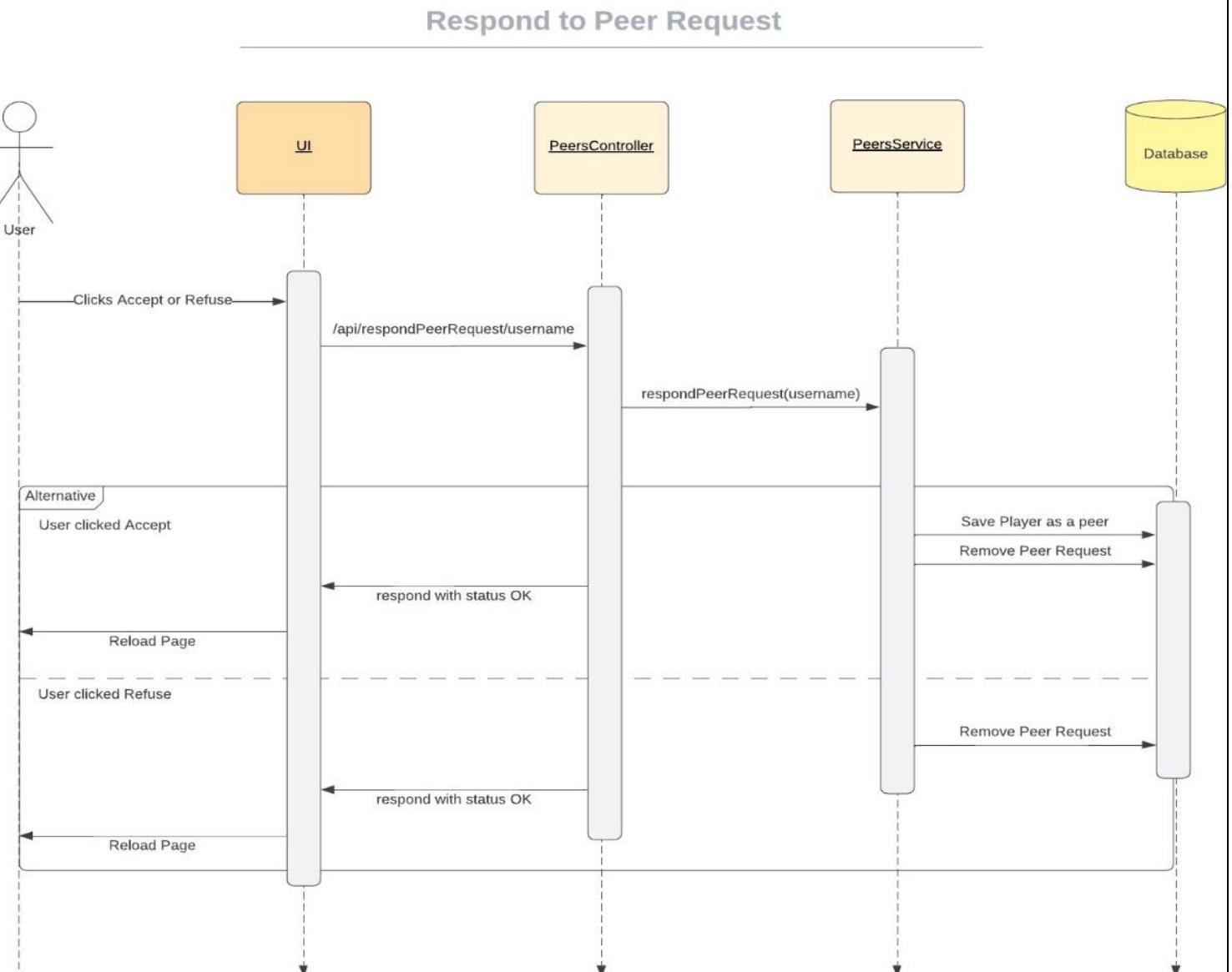


Figure 19: Respond to Peer Request Sequence Diagram

## Unpeer

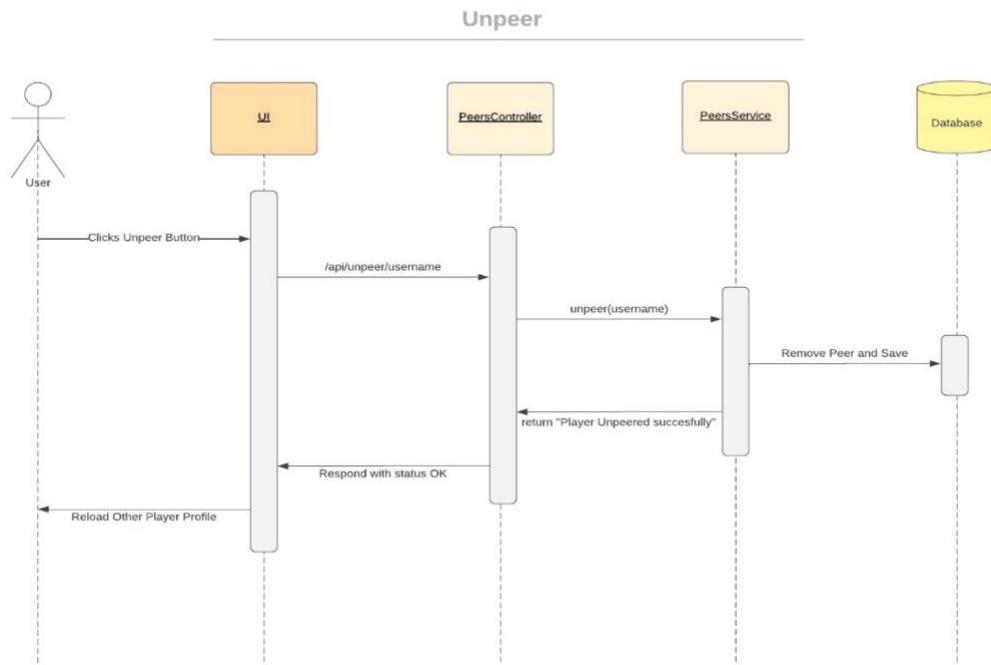


Figure 20: UnPeer Sequence Diagram

## Peer Review

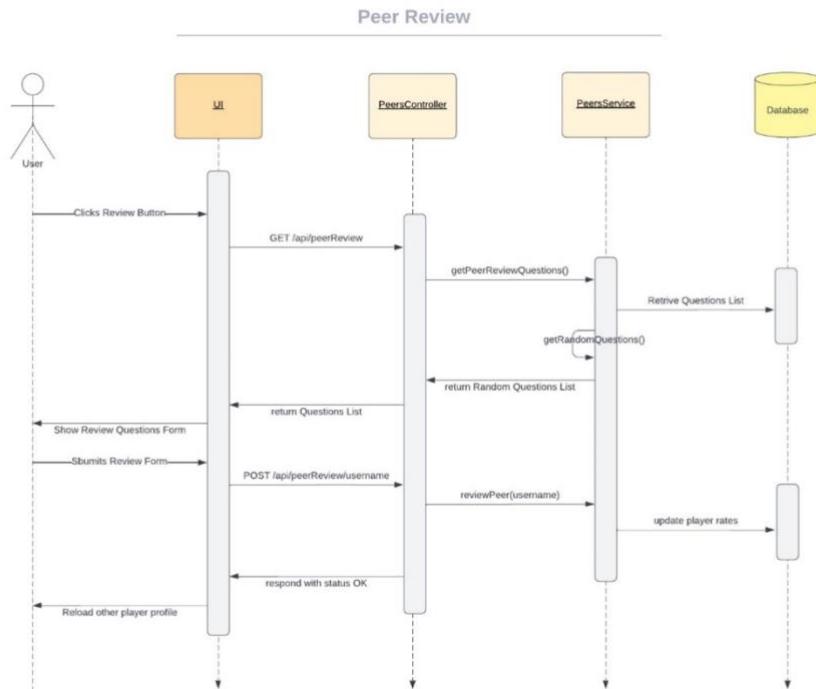


Figure 21: Peer Review Sequence Diagram

## Find Peers

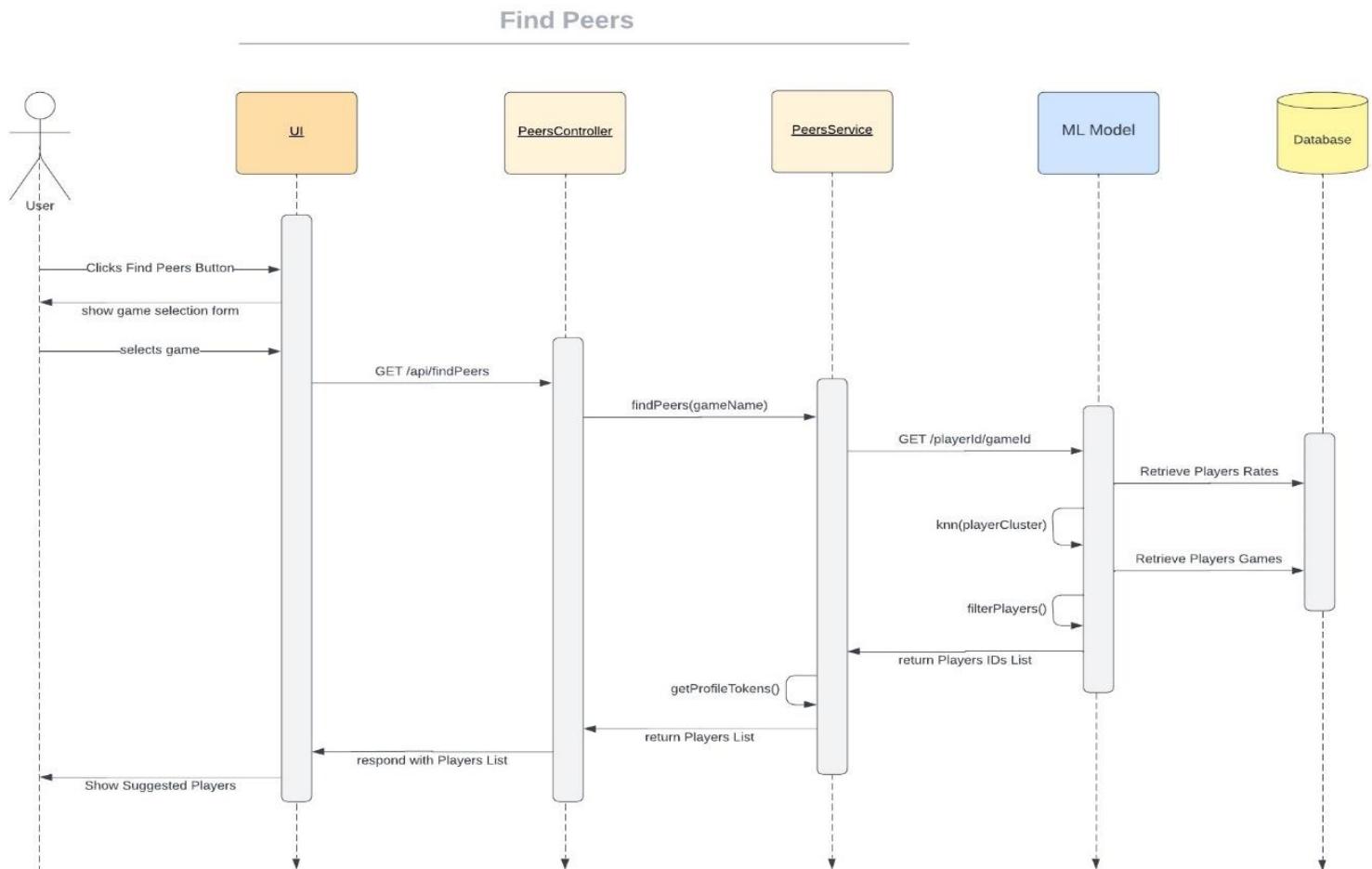
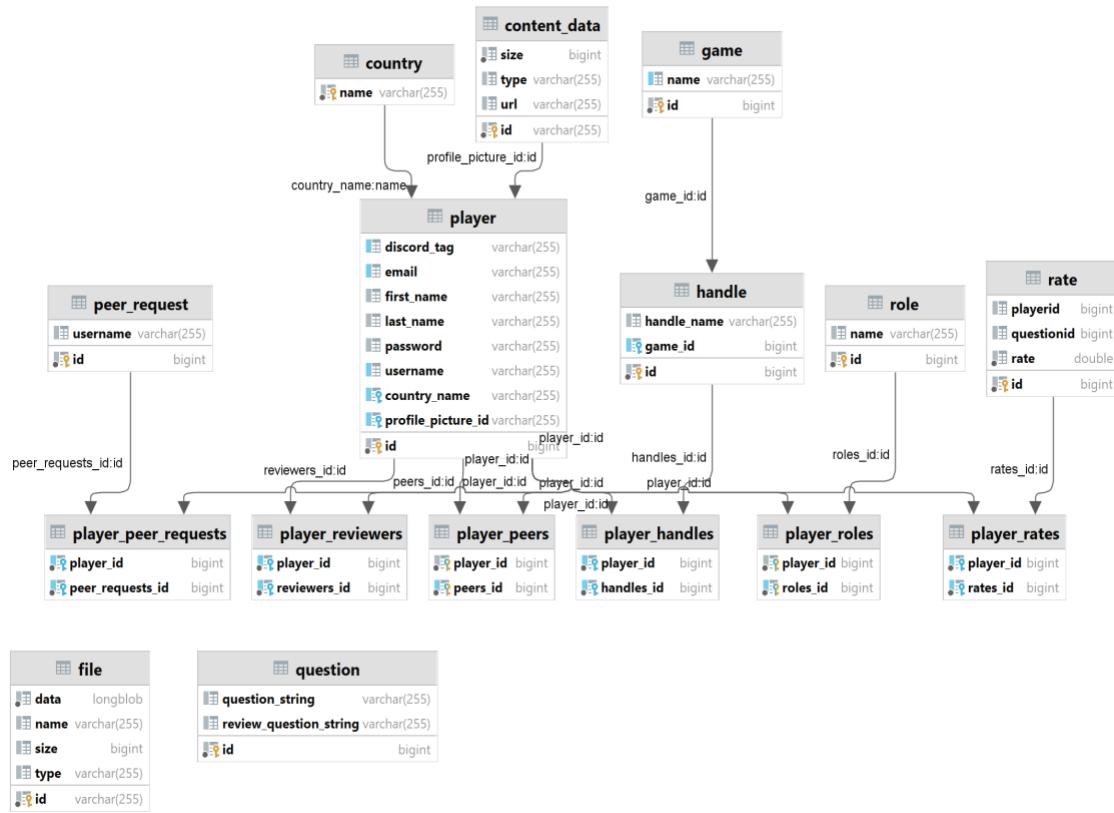


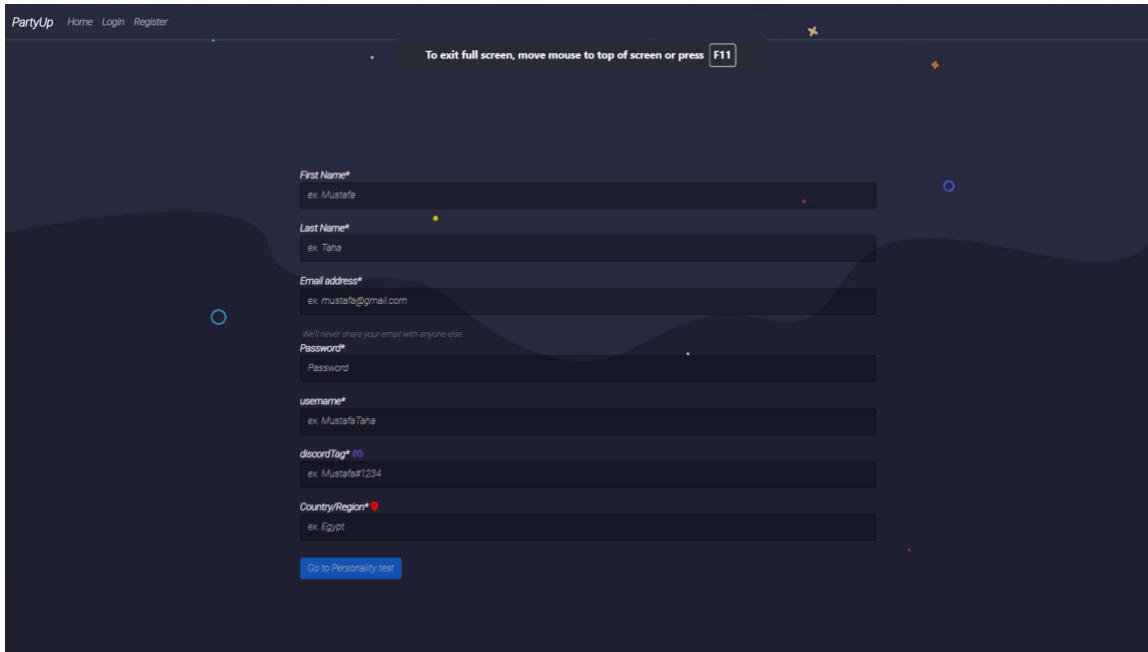
Figure 22: Find Peers Sequence Diagram

## Project ERD



## System GUI Design

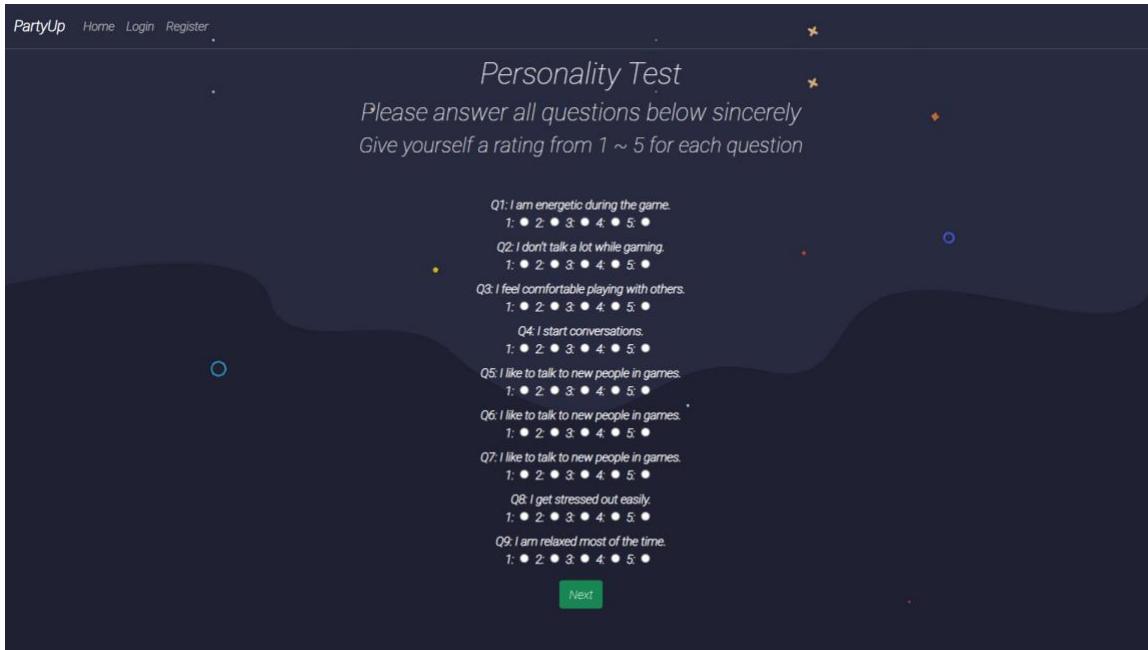
### Sign Up Page



The Sign Up page features a dark blue header with the PartyUp logo and navigation links for Home, Login, and Register. A message at the top right instructs users to move the mouse to the top of the screen or press F11 to exit full screen. The main form area contains fields for First Name, Last Name, Email address, Password, username, discordTag, and Country/Region, each with an example value. A "Go to Personality test" button is located at the bottom left of the form.

Figure 23: GUI --> Sign Up

### Personality Test Page



The Personality Test page has a dark blue header with the PartyUp logo and navigation links for Home, Login, and Register. The title "Personality Test" is centered above instructions: "Please answer all questions below sincerely" and "Give yourself a rating from 1 ~ 5 for each question". Below these, nine questions are listed with five rating options (1 to 5) for each. At the bottom right is a green "Next" button.

Q1: I am energetic during the game.  
 1: ● 2: ● 3: ● 4: ● 5: ●

Q2: I don't talk a lot while gaming.  
 1: ● 2: ● 3: ● 4: ● 5: ●

Q3: I feel comfortable playing with others.  
 1: ● 2: ● 3: ● 4: ● 5: ●

Q4: I start conversations.  
 1: ● 2: ● 3: ● 4: ● 5: ●

Q5: I like to talk to new people in games.  
 1: ● 2: ● 3: ● 4: ● 5: ●

Q6: I like to talk to new people in games.  
 1: ● 2: ● 3: ● 4: ● 5: ●

Q7: I like to talk to new people in games.  
 1: ● 2: ● 3: ● 4: ● 5: ●

Q8: I get stressed out easily.  
 1: ● 2: ● 3: ● 4: ● 5: ●

Q9: I am relaxed most of the time.  
 1: ● 2: ● 3: ● 4: ● 5: ●

Figure 24: GUI --> Personality Test

## Login

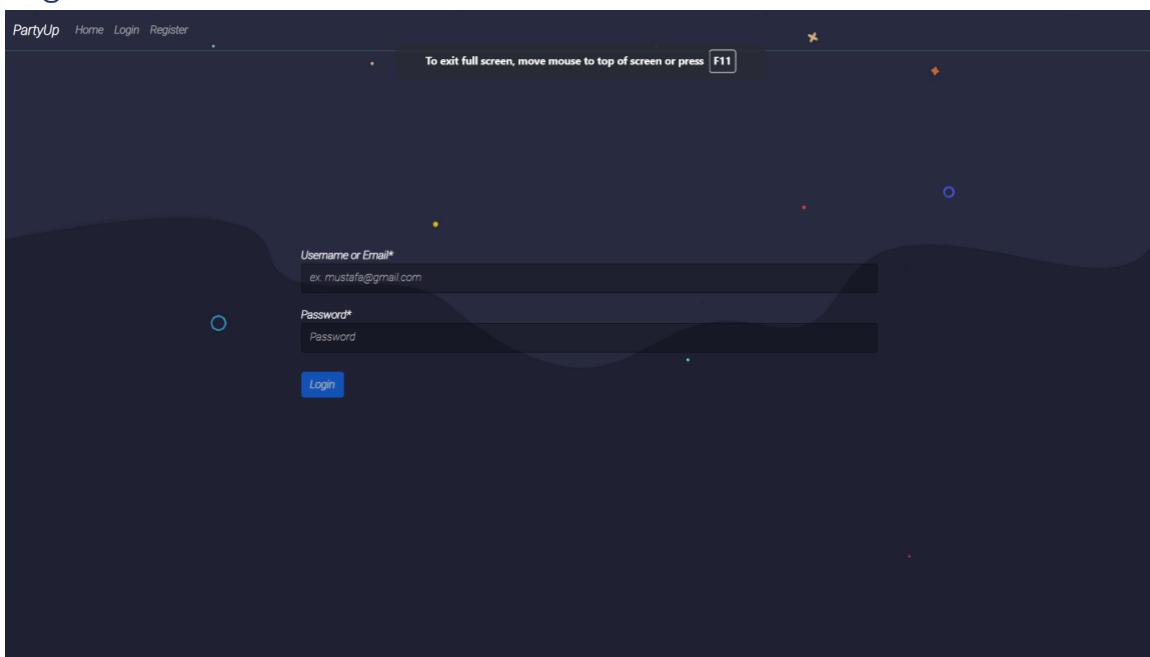


Figure 25: GUI --> Login

## Home Page

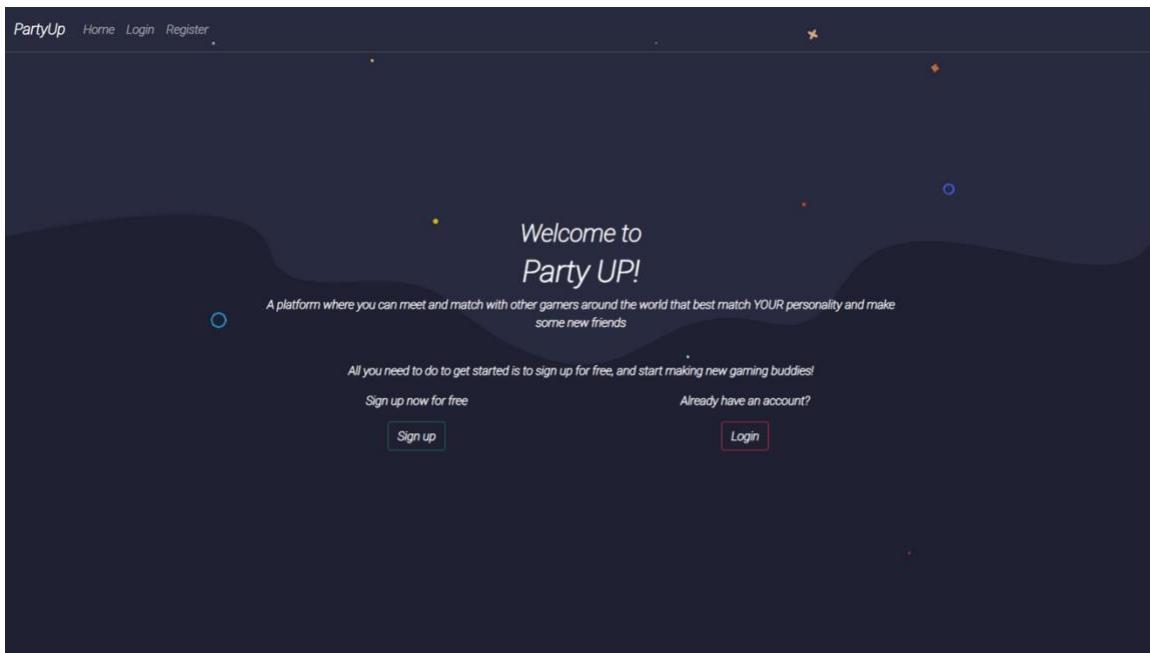


Figure 26: GUI --> Homepage

## Player Profile

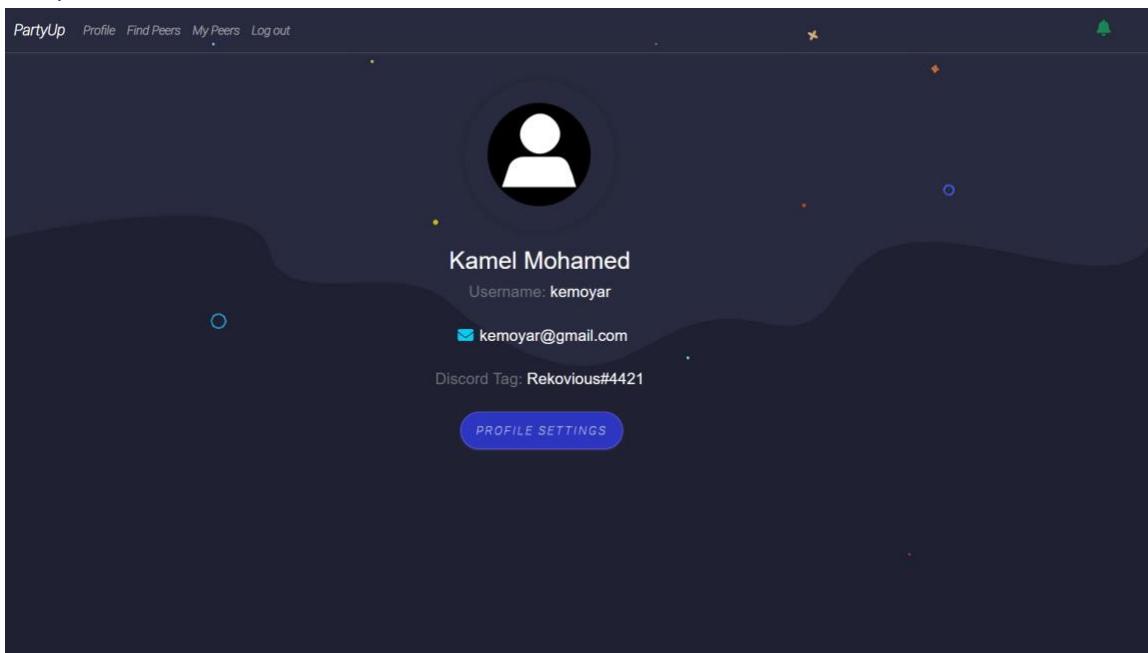


Figure 27: GUI --> Player Profile

## Player Profile Settings

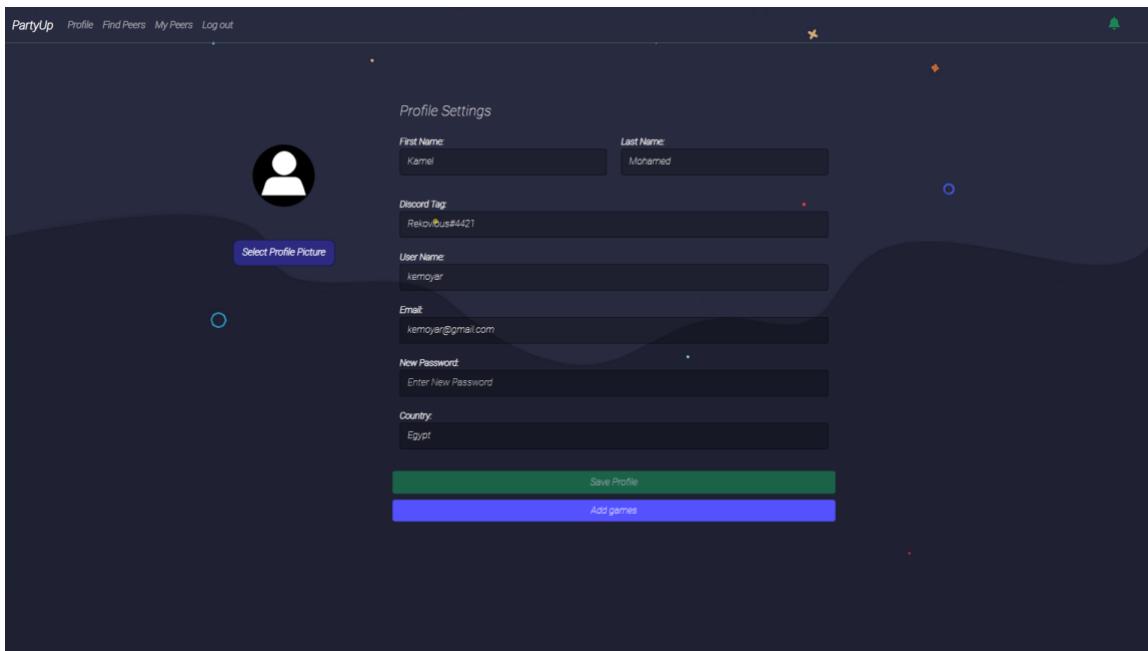


Figure 28: GUI --> Player Profile Settings

## Add Game

PartyUp Profile Find Peers My Peers Log out

Kamel Mohamed's list of games and Handles as shown in the table below

Game	Handle
League Of Legends	Rekovious

A form to add new games and handles to your account!

League Of Legends

Rekovious

Confirm View Profile

Figure 29: GUI --> Add Game

## Find Peers

PartyUp Profile Find Peers My Peers Log out

Please Specify your Game to Find the Most Suitable Peers

League Of Legends

Confirm

Figure 30: GUI --> Find Peers 1

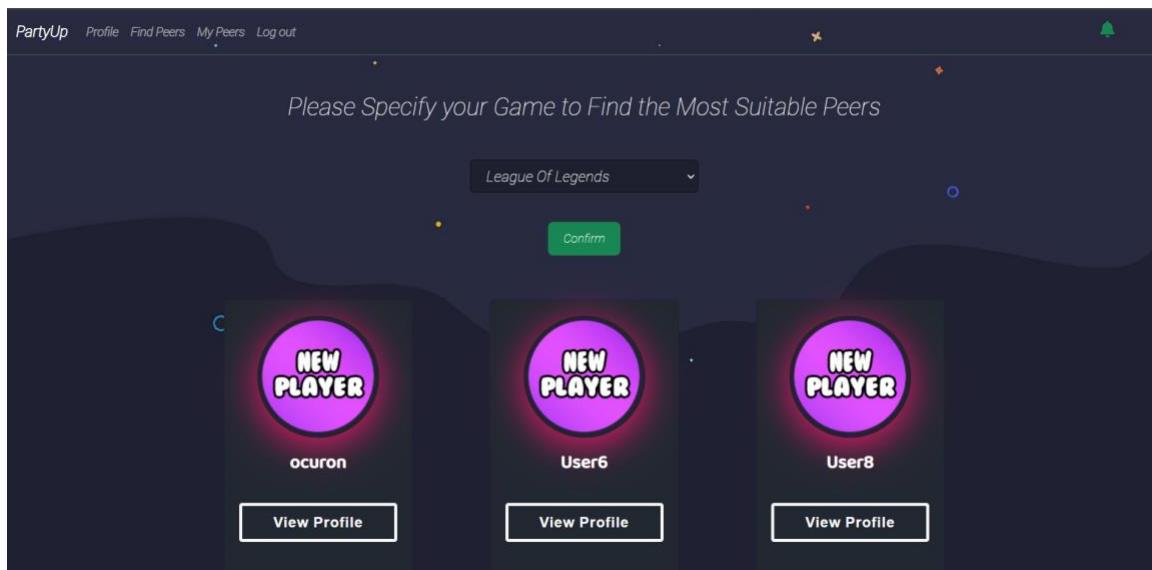


Figure 31: GUI --> Find Peers 2

## Send Peer Request

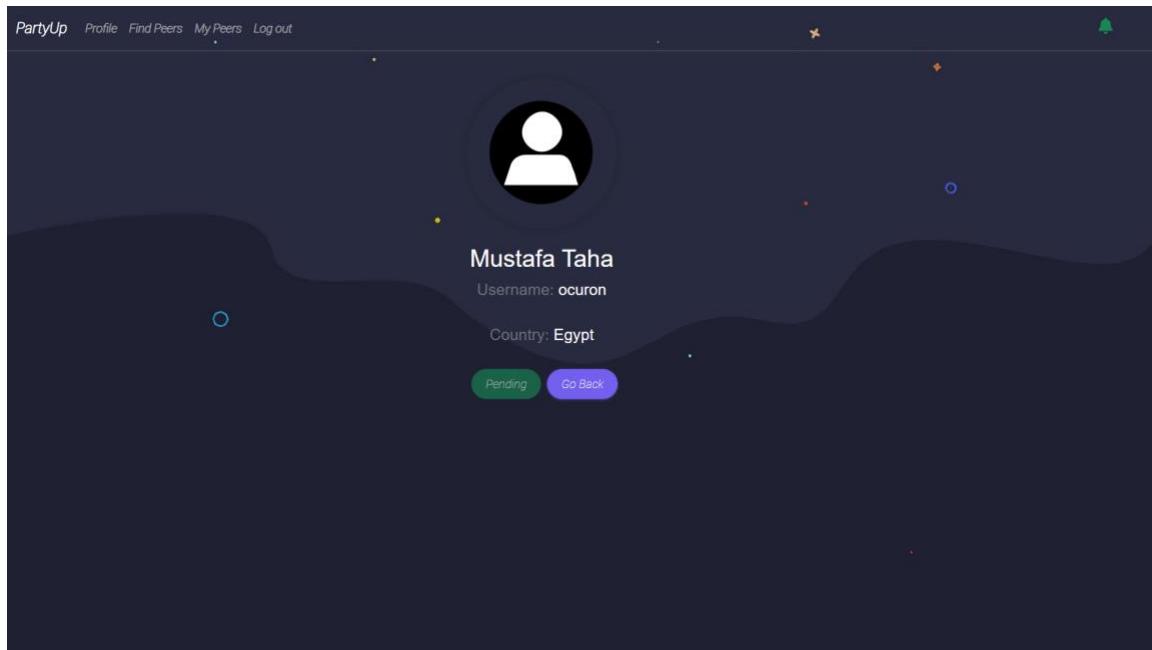


Figure 32: GUI --> Send Peer Request

## Other Player Profile

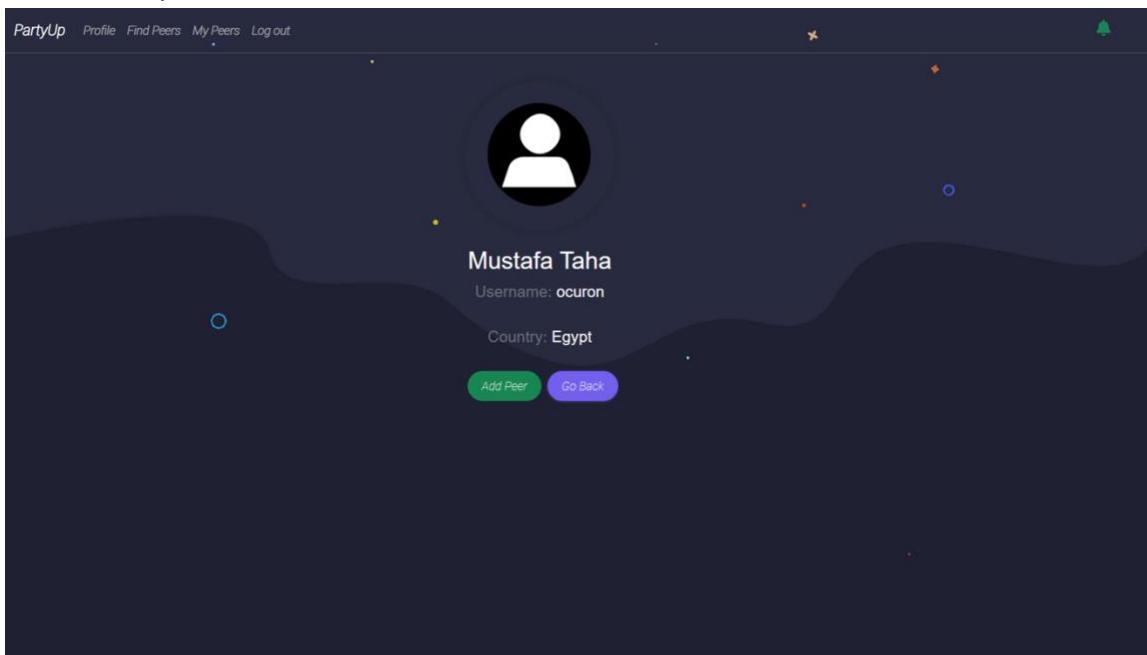


Figure 33: GUI --&gt; Other Player Profile

## Notifications showing Peer Requests

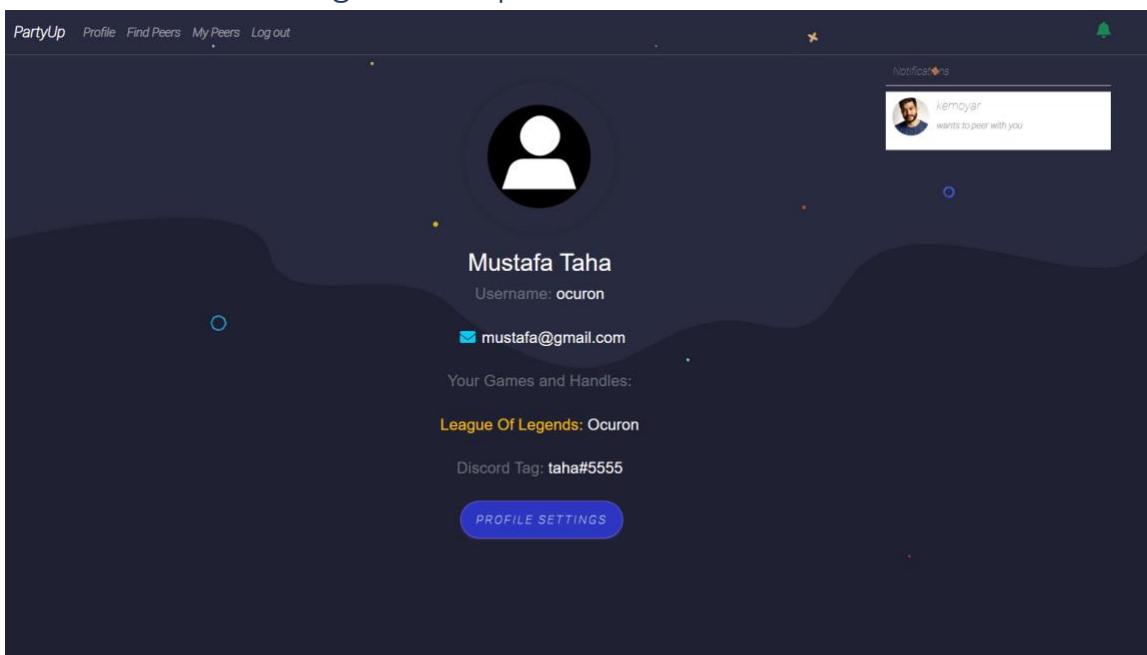


Figure 34: GUI --&gt; Notifications Showing Peer Requests

## View Profile of a Player Requesting Peering

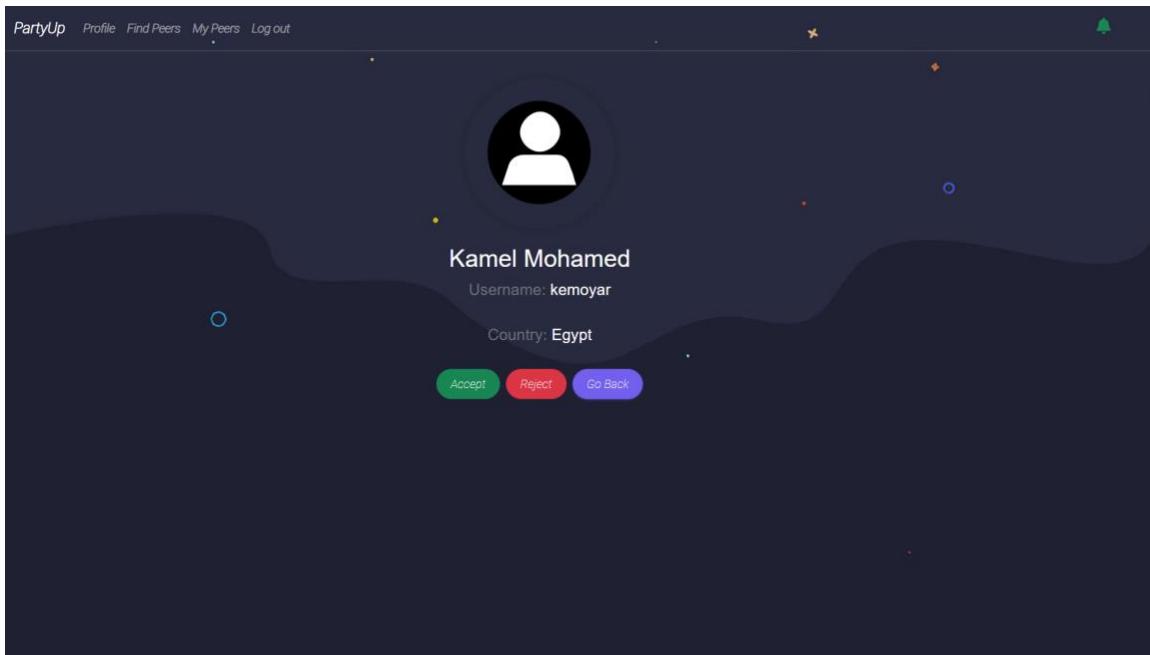


Figure 35: GUI --> View Profile of a player Requesting Peering

## User After Becoming Peers

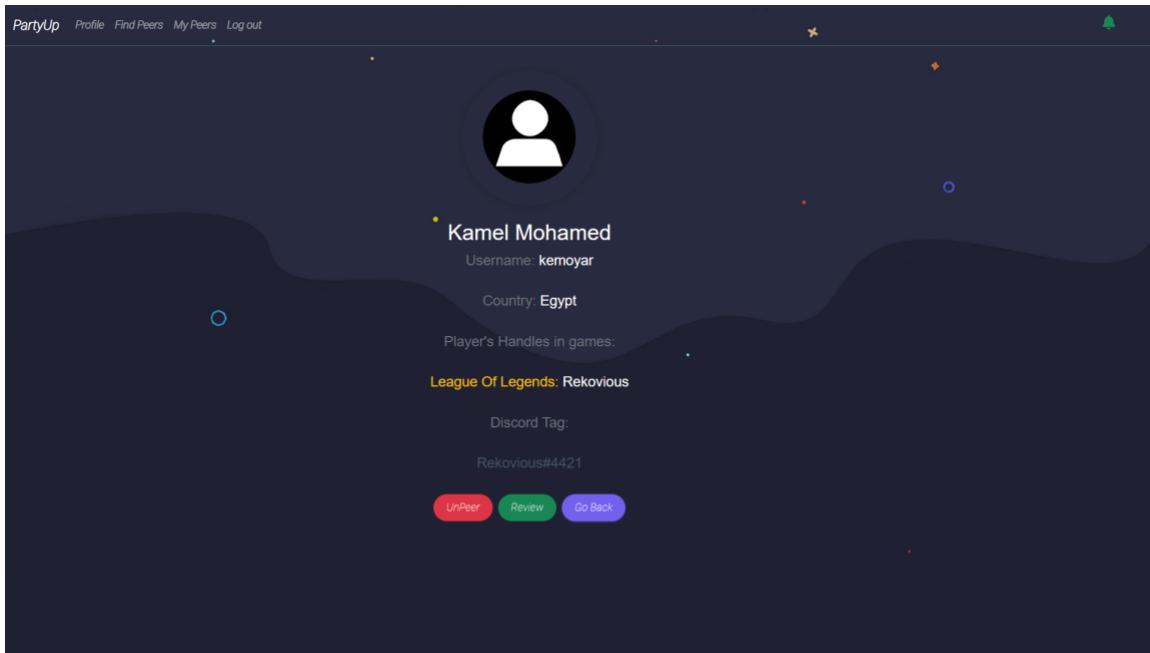
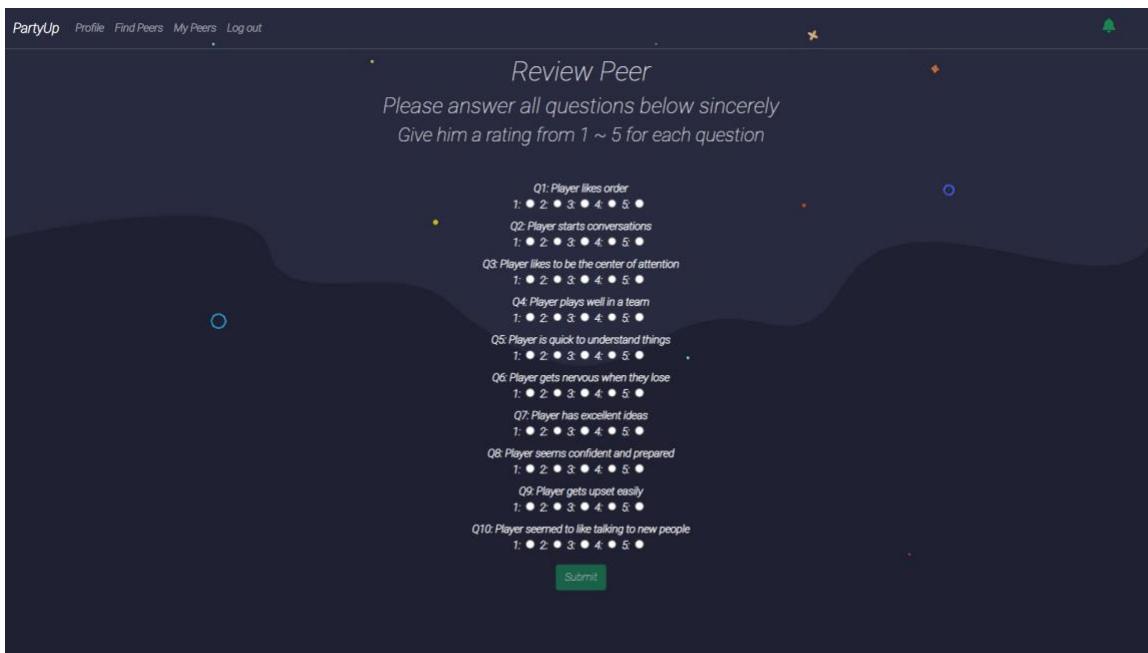


Figure 36: GUI --> Accepting Peer Request

## Peer Review



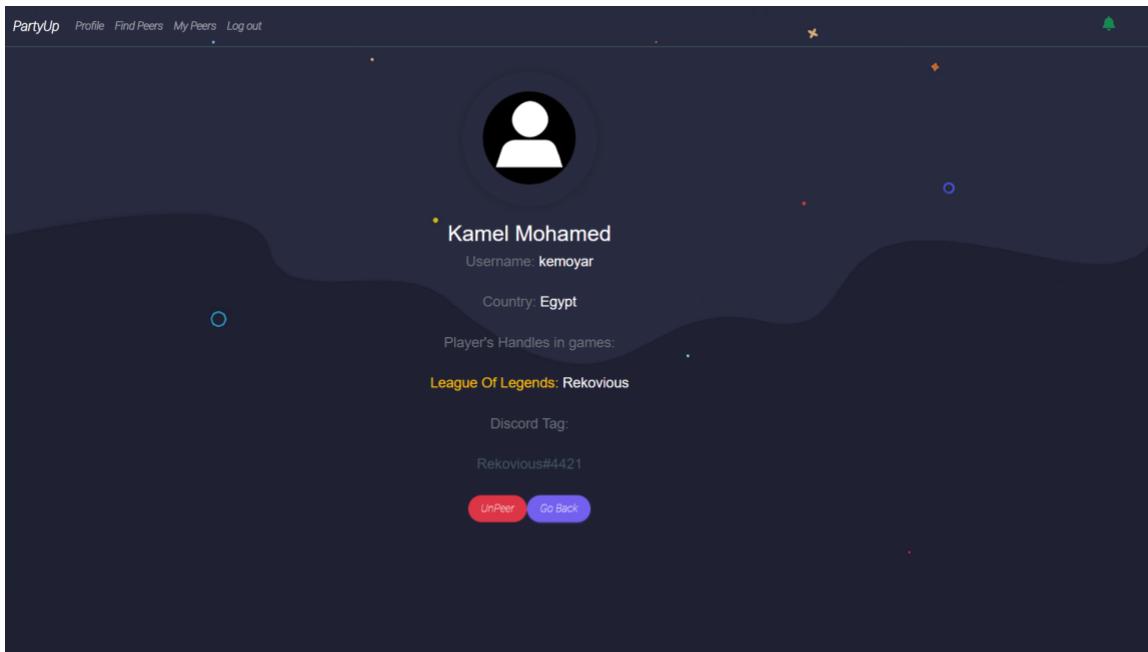
The screenshot shows the 'Review Peer' section of the PartyUp application. At the top, there's a navigation bar with links for 'Profile', 'Find Peers', 'My Peers', and 'Log out'. A bell icon with a notification count of 1 is also present. The main area is titled 'Review Peer' and contains instructions: 'Please answer all questions below sincerely' and 'Give him a rating from 1 ~ 5 for each question'. Below these are ten questions, each with five rating options (1 to 5) represented by radio buttons. The questions are:

- Q1: Player likes order  
1: ● 2: ● 3: ● 4: ● 5: ●
- Q2: Player starts conversations  
1: ● 2: ● 3: ● 4: ● 5: ●
- Q3: Player likes to be the center of attention  
1: ● 2: ● 3: ● 4: ● 5: ●
- Q4: Player plays well in a team  
1: ● 2: ● 3: ● 4: ● 5: ●
- Q5: Player is quick to understand things  
1: ● 2: ● 3: ● 4: ● 5: ●
- Q6: Player gets nervous when they lose  
1: ● 2: ● 3: ● 4: ● 5: ●
- Q7: Player has excellent ideas  
1: ● 2: ● 3: ● 4: ● 5: ●
- Q8: Player seems confident and prepared  
1: ● 2: ● 3: ● 4: ● 5: ●
- Q9: Player gets upset easily  
1: ● 2: ● 3: ● 4: ● 5: ●
- Q10: Player seemed to like talking to new people  
1: ● 2: ● 3: ● 4: ● 5: ●

A green 'Submit' button is located at the bottom right of the form.

Figure 37: GUI --> Peer Review

## Peer After Review



The screenshot shows the 'After Peer Review' section of the PartyUp application. At the top, there's a navigation bar with links for 'Profile', 'Find Peers', 'My Peers', and 'Log out'. A bell icon with a notification count of 1 is also present. The main area displays a peer profile for 'Kamel Mohamed'. It includes a placeholder profile picture, the name 'Kamel Mohamed', the username 'kemoyer', the country 'Egypt', and the text 'Player's Handles in games:'. Below this, it lists 'League Of Legends: Rekovious' and 'Discord Tag: Rekovious#4421'. At the bottom, there are two buttons: a red 'UnPeer' button and a blue 'Go Back' button.

Figure 38: GUI --> After Peer Review

## My Peers

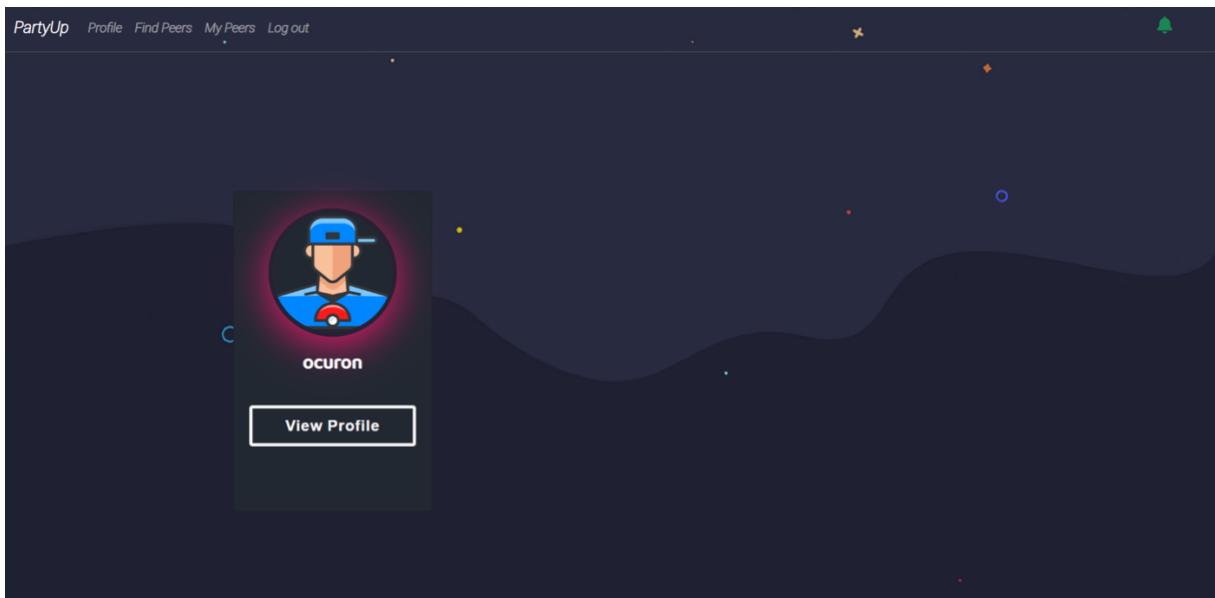


Figure 39: GUI --&gt; My Peers

# Chapter 5: Implementation and Testing

## Implementation

### Frontend

#### *Angular + TypeScript*

Our main technology for the front-end of our website was Angular, we chose Angular because it offers the following benefits:

- Improved Speed and Performance
- Easy and effective communication with a RESTful server
- High quality of Angular applications
- Easy to transition to cross-platform development using ionic

### Backend

#### *Java + Spring Boot*

Our main technology for the back-end of our website was Spring Boot, we chose Spring because it offers the following benefits:

- Helps greatly in building loosely coupled applications
- Easy separation of different layers and packages
- Minimum boilerplate code for configuration
- Can be easily integrated with other applications and servers

### Machine Learning

#### *Python*

Python was the language of choice for the Machine Learning model because almost all ML frameworks and libraries are supported in Python.

#### *SKLearn*

Sci-Kit Learn offers a wide range of ready for use ML algorithms and models that need little effort in configuration and tuning, so it was the library we chose for Clustering and applying KNN algorithm in our ML model.

#### *Pandas*

Pandas was used to read data in the form of Data Frames in order to easily apply SKLearn techniques on our data.

#### *Flask*

Flask was used to build a REST API that is used by the back-end application to find suggested peers based on personality.

## Testing

#	<i>Functionality</i>	<i>Test Case</i>	<i>Input</i>	<i>Expected Output</i>
<b>1</b>	<b>Sign Up</b>	<b>1</b>	Empty	“Go to personality test” button is disabled until the form is filled completely.
		<b>2</b>	Full Credentials but wrong E-Mail Format “Username: ShikhTawel Password: ShikhTawel Mail: aaaa Discord Tag: “	Error (Must Be Correct Format)
		<b>3</b>	Username or Discord Tag that’s Already Registered to another User “Username: Kamel Password: ShikhTawel Mail: <a href="mailto:ahmedshikhtawel@gmail.com">ahmedshikhtawel@gmail.com</a> Discord Tag: Kamel#2134”	Error (Username and Discord Tag is already Taken)
		<b>4</b>	Full Correct Credentials “Username: ShikhTawel Password: ShikhTawel Mail: <a href="mailto:ahmedshikhtawel@gmail.com">ahmedshikhtawel@gmail.com</a> Discord Tag: ShikhTawel#6144”	Create The Account and Forward to Personality Test Page
<b>2</b>	<b>Personality Test</b>	<b>5</b>	Click Done Without Completing the Test	Error (Must Complete the Whole Test)
		<b>6</b>	Click Done with Completing the Test	Navigates to the Login Page
<b>3</b>	<b>Login</b>	<b>7</b>	Empty	Error (Must Enter Credentials)
		<b>8</b>	Wrong Username	Error (Wrong Username or Password)
		<b>9</b>	Wrong Password	Error (Wrong Username or Password)
		<b>10</b>	Correct Username and Password “Username: ShikhTawel Password: ShikhTawel”	Signed in Successfully and redirect to the homepage
<b>4</b>	<b>Find Peers</b>	<b>11</b>	Click on Find Peers	The Closest User’s To You
<b>5</b>	<b>View Profile</b>	<b>12</b>	Click on View Profile on a Peer	Show the Peer’s Information including the Discord Tag

		<b>13</b>	Click on View Profile on a Not Peer	Show only the public information Like name and Profile Picture
<b>6</b>	<b><i>Send Peer Request</i></b>	<b>14</b>	Send Peer Request to a User	The Request Appear as a Notification on the Other Player's Profile and show "Request has been sent successfully" to you
<b>7</b>	<b><i>Respond to Peer Request</i></b>	<b>15</b>	Accept Peer Request	The two users added to each other's Peers List and the Notification is Removed
		<b>16</b>	Reject Peer Request	The Notification holding the Request is Removed
<b>8</b>	<b><i>Review Peers</i></b>	<b>17</b>	Start on the Review Survey and Not Complete it	Submit is Disabled (Survey Must be Completed)
		<b>18</b>	Start and Complete the Review Survey	Review Completed Successfully
<b>9</b>	<b><i>Edit Profile</i></b>	<b>19</b>	Change Username to a Taken Username "Username: Kamel Password: ShikhTawel Mail: <a href="mailto:ahmedshikhtawel@gmail.com">ahmedshikhtawel@gmail.com</a> Discord Tag: ShikhTawel#6144"	Error (Username is already taken)
		<b>20</b>	Change Discord Tag to a Taken Tag "Username: ShikhTawel Password: ShikhTawel Mail: <a href="mailto:ahmedshikhtawel@gmail.com">ahmedshikhtawel@gmail.com</a> Discord Tag: Kamel#2134"	Error (Discord Tag is already taken)
		<b>21</b>	Change E-Mail Address to an incorrect formatted mail "Username: ShikhTawel Password: ShikhTawel Mail: aaaa Discord Tag: ShikhTawel#6144 "	Error (Must Be Correct Format)
		<b>22</b>	Empty	Error (Must Enter Credentials)
		<b>23</b>	Change the Information Correctly "Username: Alaa Password: ShikhTawel Mail: <a href="mailto:ahmedshikhtawel@gmail.com">ahmedshikhtawel@gmail.com</a> Discord Tag: ShikhTawel#6144"	Profile Updated Successfully

Table 12: Test Cases

## Applying the Test Cases

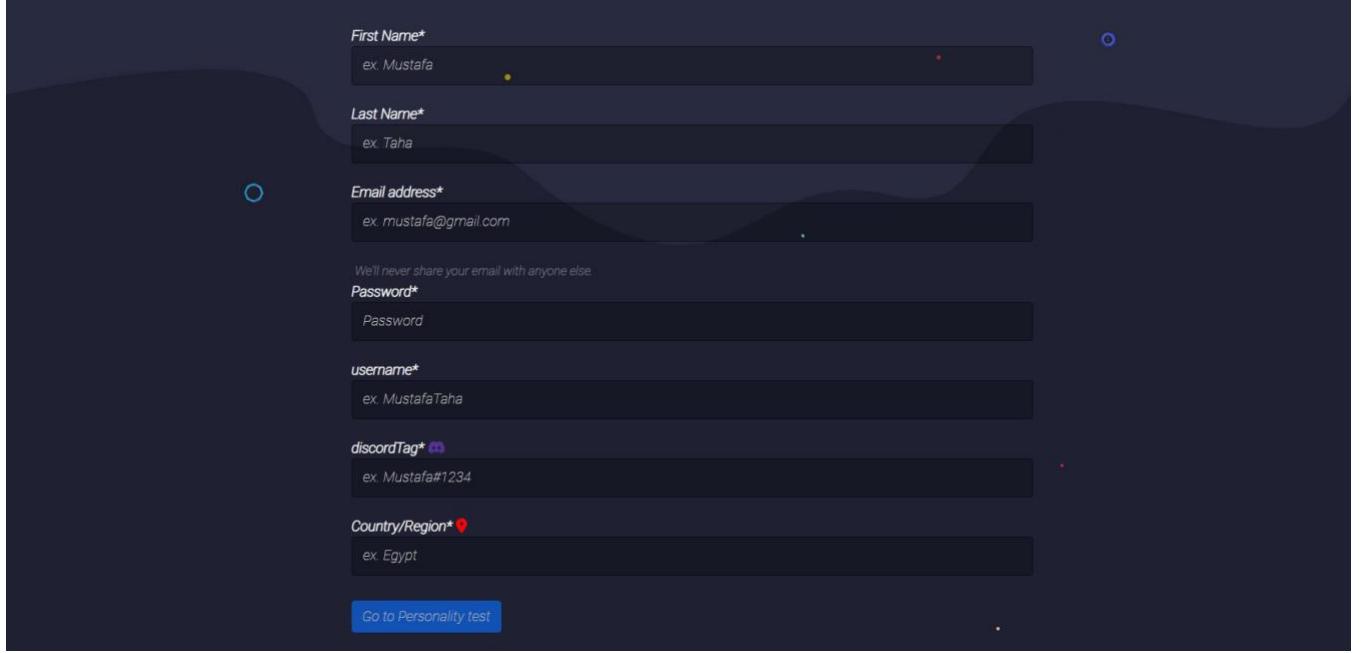
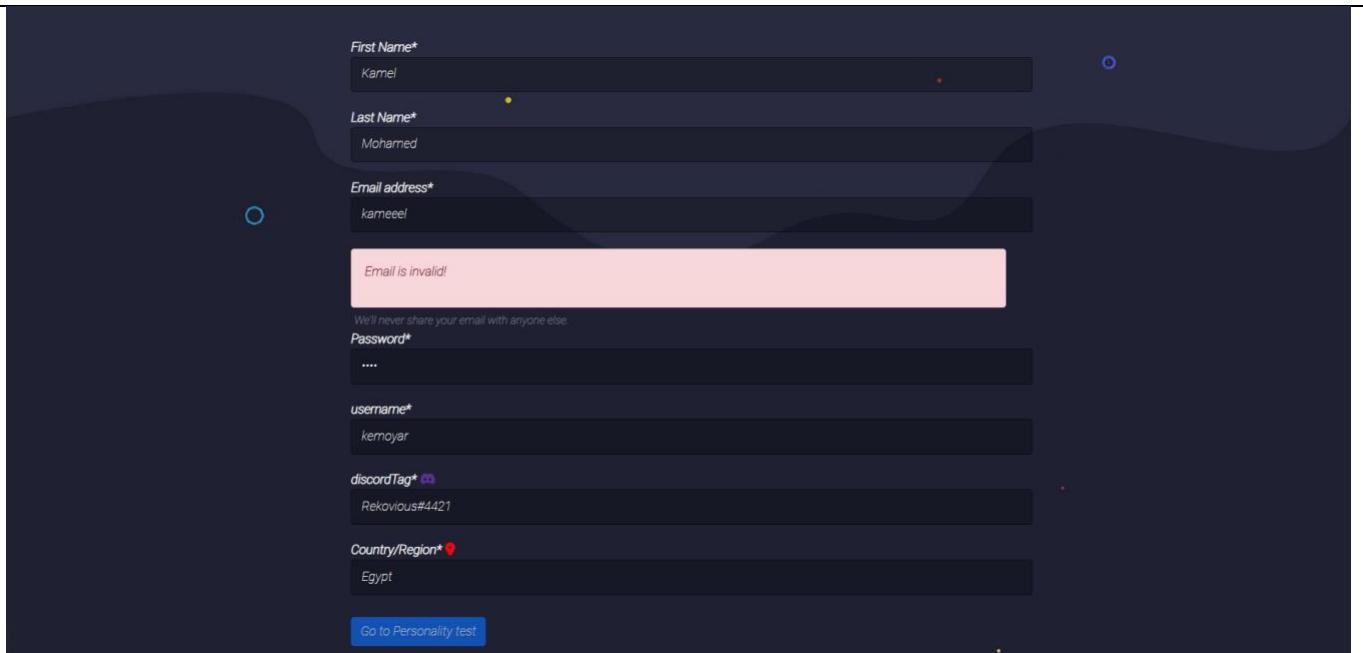
Test Case	Screenshot
1	 <p>The screenshot shows the Party Up sign-up form with all input fields empty. Placeholder text like "ex. Mustafa" and "ex. Taha" is visible in the fields.</p>
2	 <p>The screenshot shows the Party Up sign-up form with an invalid email address ("kameeel") entered. A red validation message "Email is invalid!" is displayed above the password field. All other fields are filled with placeholder text.</p>

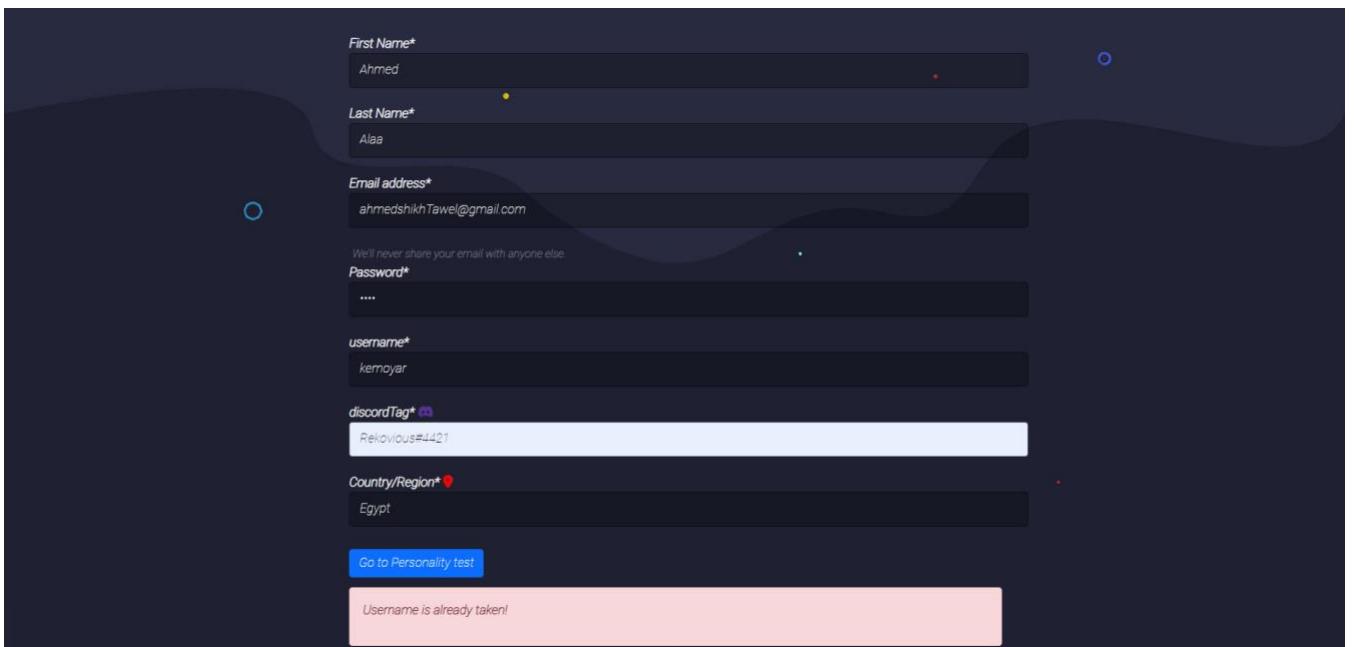
Figure 40: Test Case 1 --> Empty Data Signup

Note: these sentences in the text inputs are placeholders not actual data

Figure 41: Test Case 2 --> Wrong E-mail Format

Must enter a valid email format, so the “go to personality test” button is disabled until we fix this issue

3

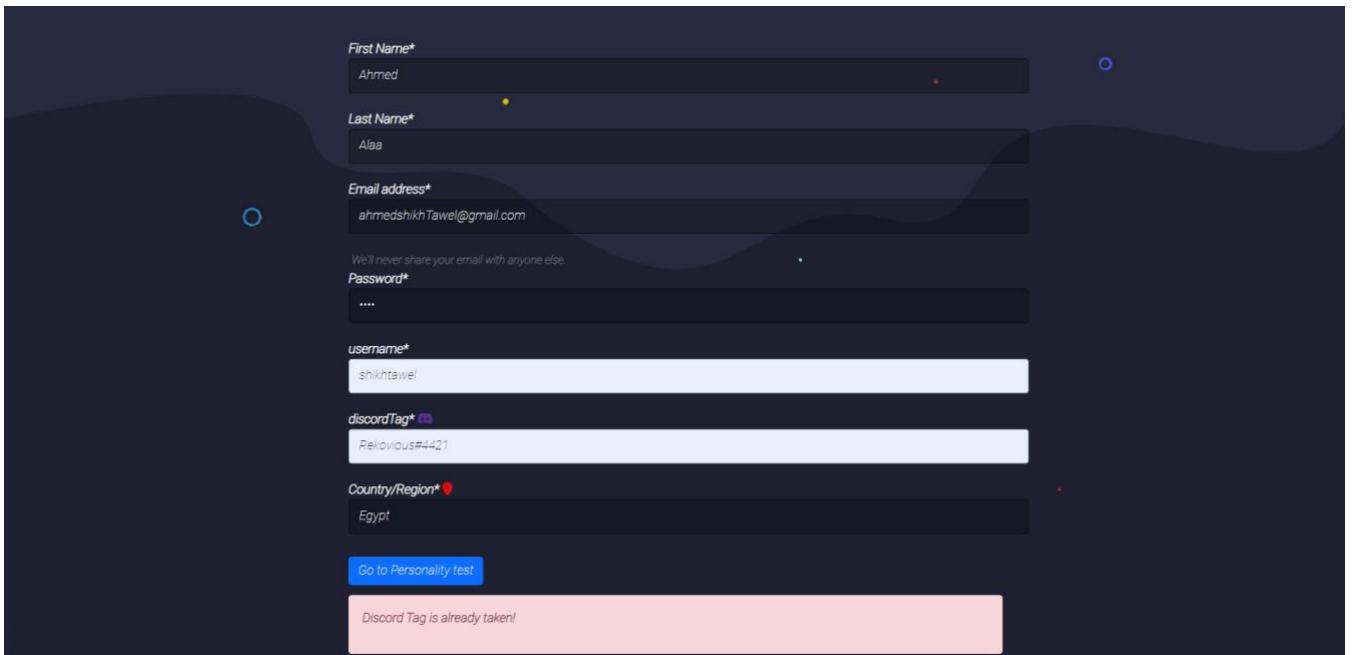


The screenshot shows a registration form with a dark background. The fields filled are:

- First Name\***: Ahmed
- Last Name\***: Alaa
- Email address\***: ahmedshikhTawel@gmail.com
- Password\***: (redacted)
- username\***: kernoyer
- discordTag\***: Reliovius#4421
- Country/Region\***: Egypt

Below the form is a blue button labeled "Go to Personality test". A pink error message box at the bottom states: "Username is already taken!".

Figure 42: Test Case 3.1 --> Username is Already Taken



The screenshot shows a registration form with a dark background. The fields filled are:

- First Name\***: Ahmed
- Last Name\***: Alaa
- Email address\***: ahmedshikhTawel@gmail.com
- Password\***: (redacted)
- username\***: shikhtawel
- discordTag\***: Reliovius#4421
- Country/Region\***: Egypt

Below the form is a blue button labeled "Go to Personality test". A pink error message box at the bottom states: "Discord Tag is already taken!".

Figure 43: Test Case 3.2 --> Discord Tag is Already Taken

When we try to register with an already existed email or a discord tag, this error message is shown when we press the “Go to personality test” button.

4

PartyUp Home Login Register

## Personality Test

Please answer all questions below sincerely  
Give yourself a rating from 1 ~ 5 for each question

*Q1: I am energetic during the game.*  
1: ● 2: ● 3: ● 4: ● 5: ●

*Q2: I don't talk a lot while gaming.*  
1: ● 2: ● 3: ● 4: ● 5: ●

*Q3: I feel comfortable playing with others.*  
1: ● 2: ● 3: ● 4: ● 5: ●

*Q4: I start conversations.*  
1: ● 2: ● 3: ● 4: ● 5: ●

*Q5: I like to talk to new people in games.*  
1: ● 2: ● 3: ● 4: ● 5: ●

*Q6: I like to talk to new people in games.*  
1: ● 2: ● 3: ● 4: ● 5: ●

*Q7: I like to talk to new people in games.*  
1: ● 2: ● 3: ● 4: ● 5: ●

*Q8: I get stressed out easily.*  
1: ● 2: ● 3: ● 4: ● 5: ●

*Q9: I am relaxed most of the time.*  
1: ● 2: ● 3: ● 4: ● 5: ●

[Next](#)

Figure 44: Test Case 4 --> Data Filled Successfully

When we press the “Go to Personality test” button, it navigates successfully to the personality test page

5

PartyUp Home Login Register

## Personality Test

Please answer all questions below sincerely  
Give yourself a rating from 1 ~ 5 for each question

*Q19: I pay attention to details.*  
1: ● 2: ● 3: ● 4: ● 5: ●

*Q20: I don't stick to a gaming style.*  
1: ● 2: ● 3: ● 4: ● 5: ●

*Q21: I like order.*  
1: ● 2: ● 3: ● 4: ● 5: ●

*Q22: I exit the game when I feel I am losing.*  
1: ● 2: ● 3: ● 4: ● 5: ●

*Q23: I follow a plan in game.*  
1: ● 2: ● 3: ● 4: ● 5: ●

*Q24: I have difficulty understanding others' plans.*  
1: ● 2: ● 3: ● 4: ● 5: ●

*Q25: I have a vivid imagination.*  
1: ● 2: ● 3: ● 4: ● 5: ●

*Q26: I have excellent ideas.*  
1: ● 2: ● 3: ● 4: ● 5: ●

*Q27: I am quick to understand things.*  
1: ● 2: ● 3: ● 4: ● 5: ●

Please, answer all the questions in order to proceed!

[Previous](#) [Submit](#)

Figure 45: Test Case 5 --> Test Not Completed

When we press the “Submit” button, it shows this red error message stating that we should answer all questions (questions from 24 to 27 are not answered).

**6**
[PartyUp](#) Home Login Register

## Personality Test

- Please answer all questions below sincerely
- Give yourself a rating from 1 ~ 5 for each question

*Q19: I pay attention to details.*

1:  2:  3:  4:  5:

*Q20: I don't stick to a gaming style.*

1:  2:  3:  4:  5:

*Q21: I like order.*

1:  2:  3:  4:  5:

*Q22: I exit the game when I feel I am losing.*

1:  2:  3:  4:  5:

*Q23: I follow a plan in game.*

1:  2:  3:  4:  5:

*Q24: I have difficulty understanding others' plans.*

1:  2:  3:  4:  5:

*Q25: I have a vivid imagination.*

1:  2:  3:  4:  5:

*Q26: I have excellent ideas.*

1:  2:  3:  4:  5:

*Q27: I am quick to understand things.*

1:  2:  3:  4:  5:

[Previous](#)

[Submit](#)

Figure 46: Test Case 6.1 --> Completed Answering Personality test

[PartyUp](#) Home Login Register

Username or Email\*  
ex. mustafa@gmail.com

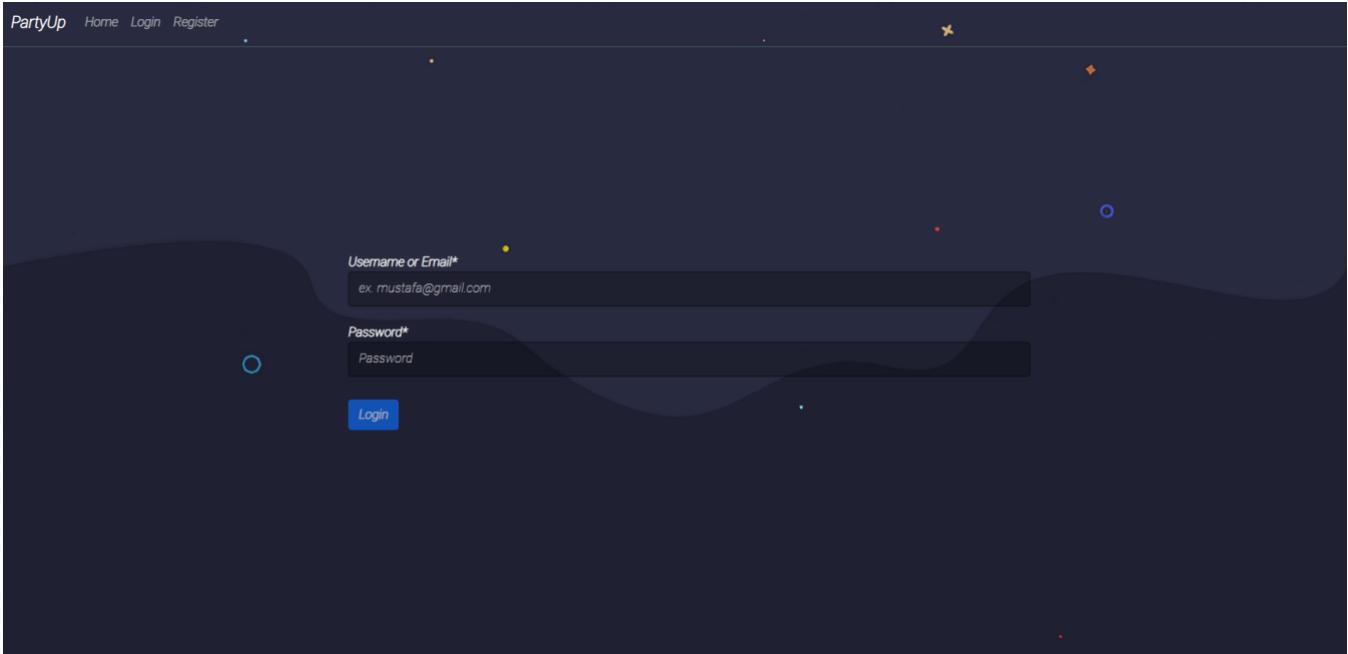
Password\*  
Password

[Login](#)

Figure 47: Test Case 6.2 --> Completed Answering Personality test

All questions have been answered, then when we press the “Submit” button, it navigates to the login page

7

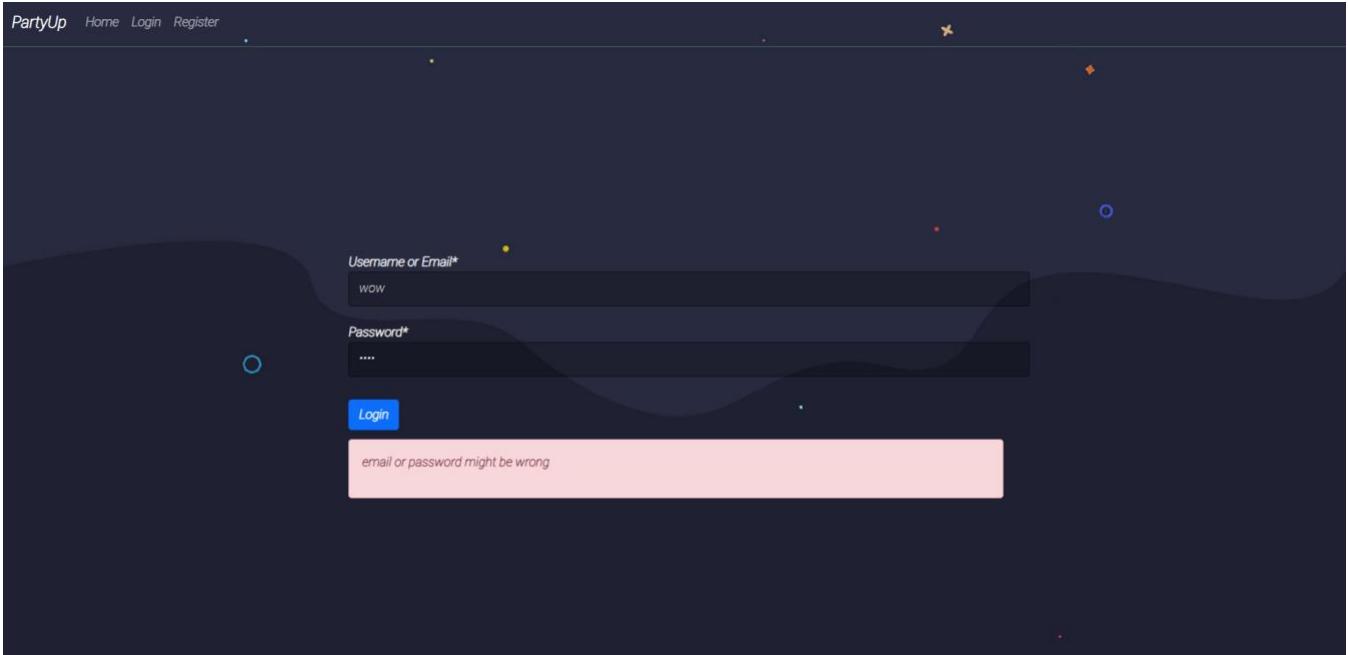


The screenshot shows the PartyUp login page with a dark blue background. At the top left is the 'PartyUp' logo and navigation links for 'Home', 'Login', and 'Register'. Below this is a large input field labeled 'Username or Email\*' with placeholder text 'ex. mustafa@gmail.com'. Underneath it is another input field labeled 'Password\*' with placeholder text 'Password'. A blue 'Login' button is positioned below the password field. The entire form is set against a dark, wavy background.

Figure 48: Test Case 7 --> Empty Data Login

The “Login” button is disabled until we fill completely the Login Form

8&amp;9

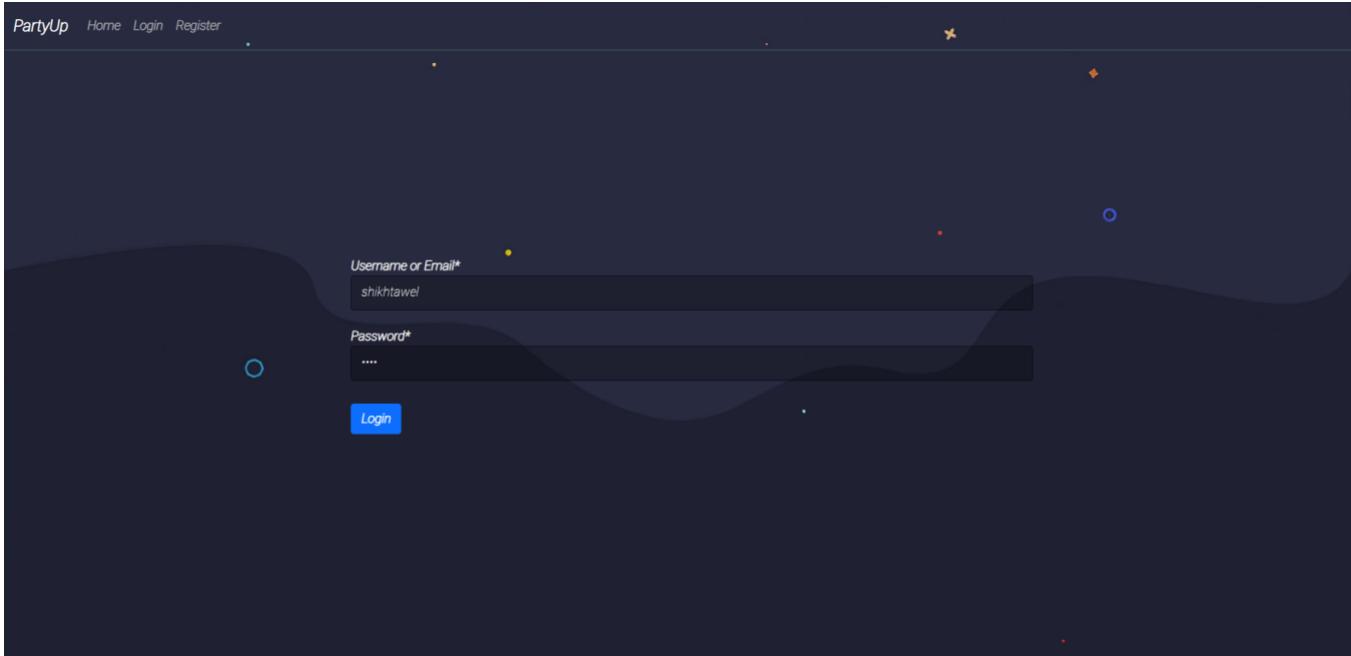


This screenshot shows the same login page as Figure 48, but with different input values. The 'Username or Email\*' field contains 'WOW' and the 'Password\*' field contains '...'. A pink rectangular callout box at the bottom displays the error message 'email or password might be wrong'. The rest of the interface is identical to Figure 48.

Figure 49: Test Case 8&9 --> Wrong Username or Password

This error arises stating that the username or the password might be wrong (we don't specify each one separately for security reasons).

10



The screenshot shows the PartyUp login interface. At the top, there is a navigation bar with links for 'Home', 'Login', and 'Register'. Below the navigation bar, there are two input fields: 'Username or Email\*' containing 'shikhtawel' and 'Password\*' containing three dots (...). A blue 'Login' button is positioned below the password field.

Figure 50: Test Case 10.1 --> Correct Username and Password

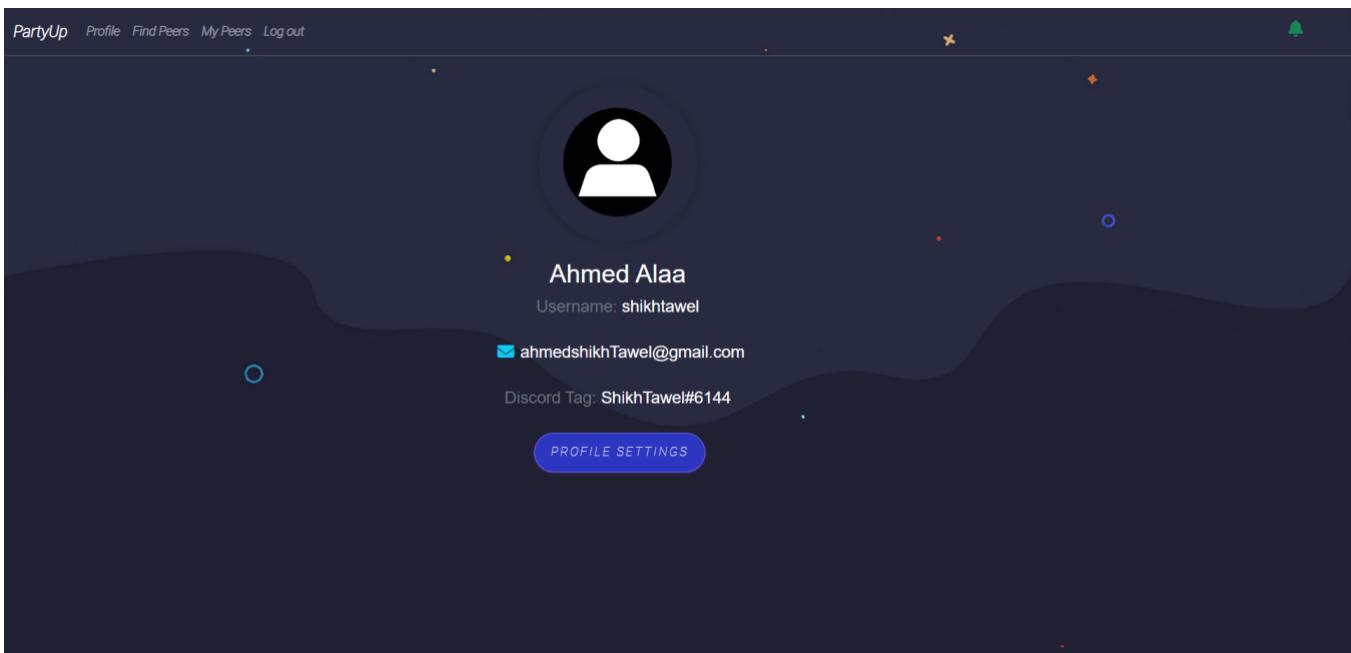
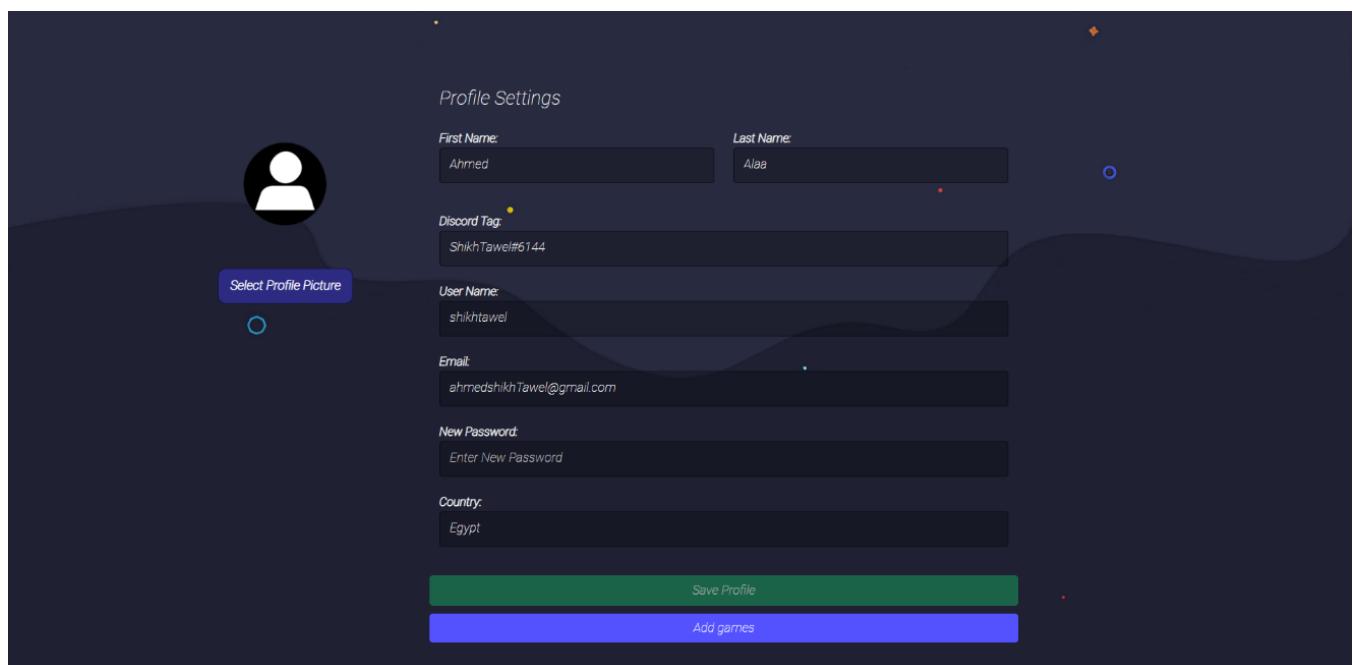


Figure 51: Test Case 10.2 --> Correct Username and Password

Navigates correctly to the profile page for the logged in user (the homepage).

11

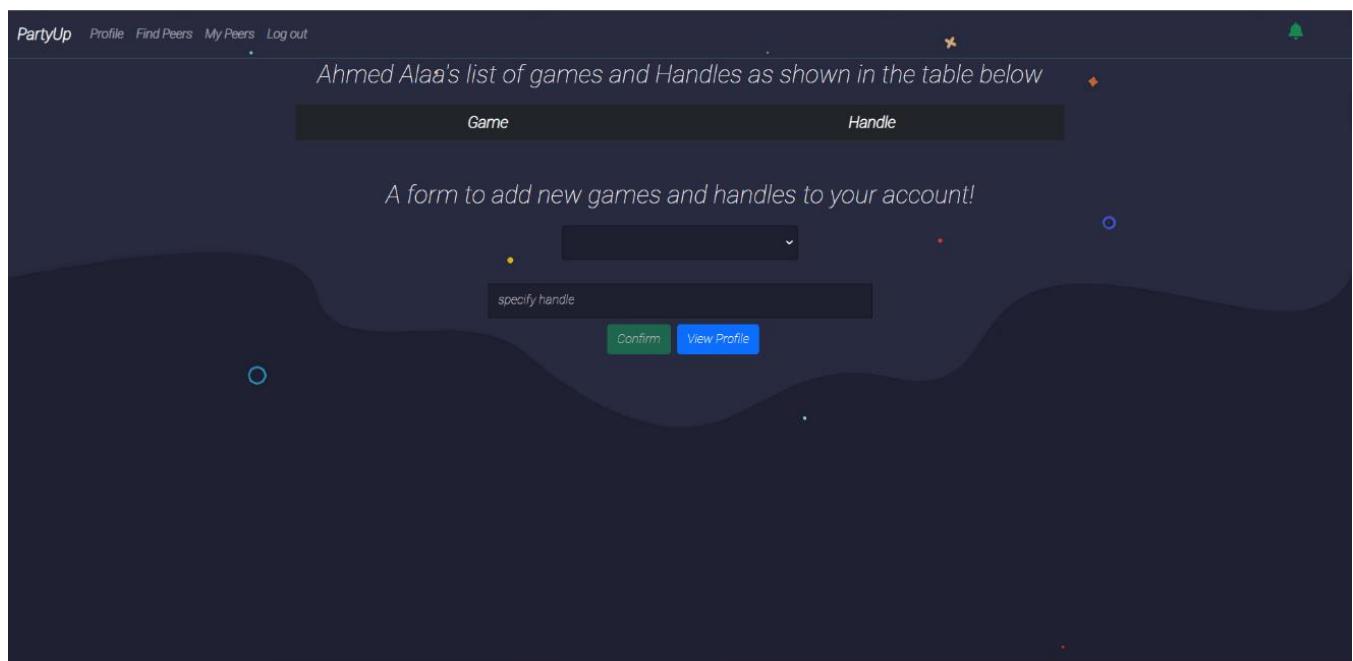


The screenshot shows the 'Profile Settings' page. At the top left is a user icon. Below it is a 'Select Profile Picture' button. The main area contains several input fields:

- First Name:** Ahmed
- Last Name:** Alaa
- Discord Tag:** Shikhtawel#6144
- User Name:** shikhtawel
- Email:** ahmedshikhtawel@gmail.com
- New Password:** Enter New Password
- Country:** Egypt

At the bottom are two buttons: a green 'Save Profile' button and a blue 'Add games' button.

Figure 52: Test Case 11.1 --> Entering profile settings to add game



The screenshot shows the 'Add Game' page. At the top left is the 'PartyUp' logo and navigation links: Profile, Find Peers, My Peers, Log out. A bell icon is at the top right. The main content area has a heading: 'Ahmed Alaa's list of games and Handles as shown in the table below'. Below this is a table with columns 'Game' and 'Handle'. A sub-section below the table says: 'A form to add new games and handles to your account!'. It features a dropdown menu, a text input field labeled 'specify handle', and two buttons: 'Confirm' and 'View Profile'.

Figure 53: Test Case 11.2 --> add Game page before adding any game with its handle

PartyUp Profile Find Peers My Peers Log out

Ahmed Alaa's list of games and Handles as shown in the table below

Game	Handle
League Of Legends	Alaa

A form to add new games and handles to your account!

Figure 54: Test Case 11.3 --> add Game page after adding any game with its handle

PartyUp Profile Find Peers My Peers Log out

Please Specify your Game to Find the Most Suitable Peers

Figure 55: Test Case 11.4 --> Find peers page before choosing the game

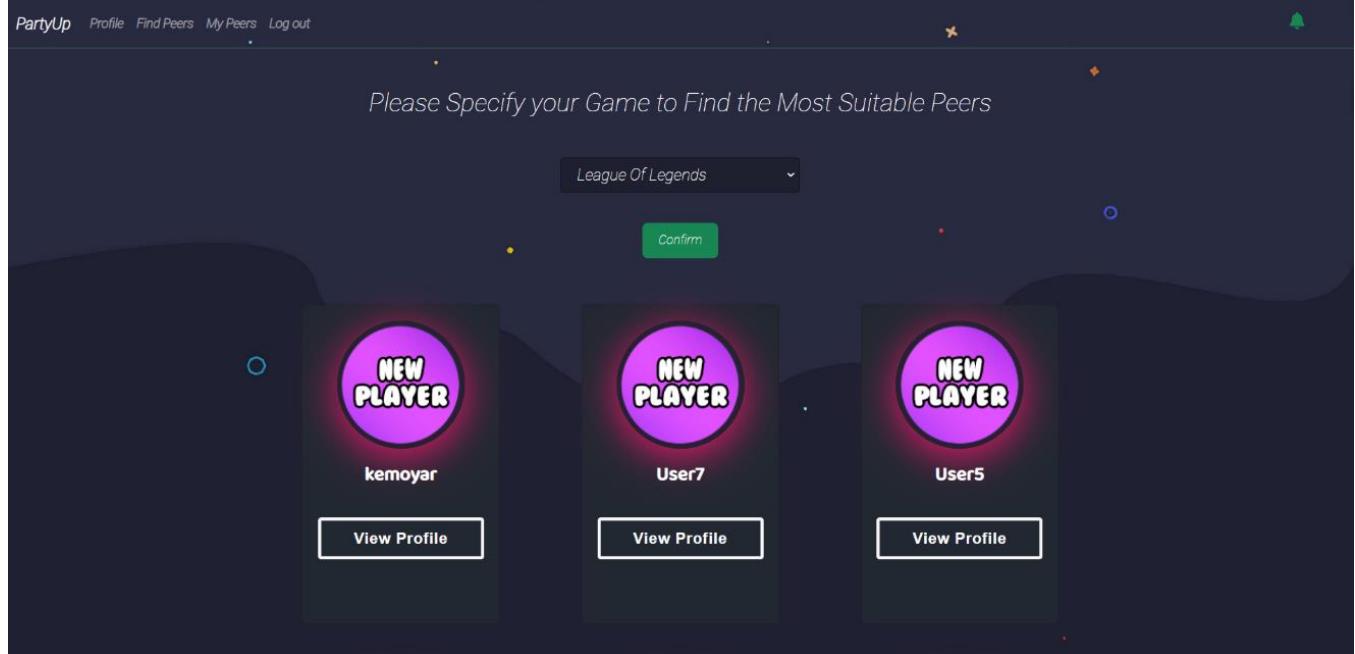


Figure 56: Test Case 11.5 --> Find Peers after choosing the game and presses Confirm

Find peers function to be correctly running, the user must first enter a game with its handle in the add game page, then he goes to find peers page and chooses the game and presses the “confirm” button, and if there are players playing the same game as him, they will be shown and sorted by the most suitable personality for you

**12**

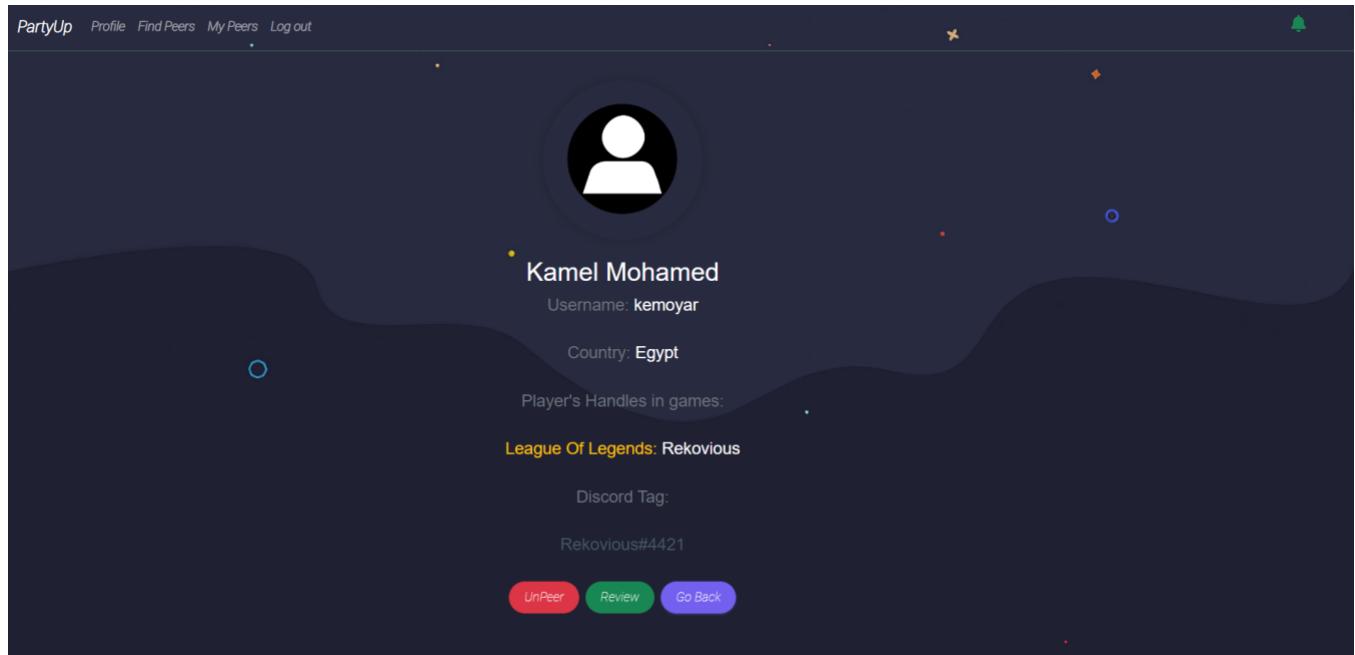


Figure 57: Test Case 12 --> View Peer Profile

13

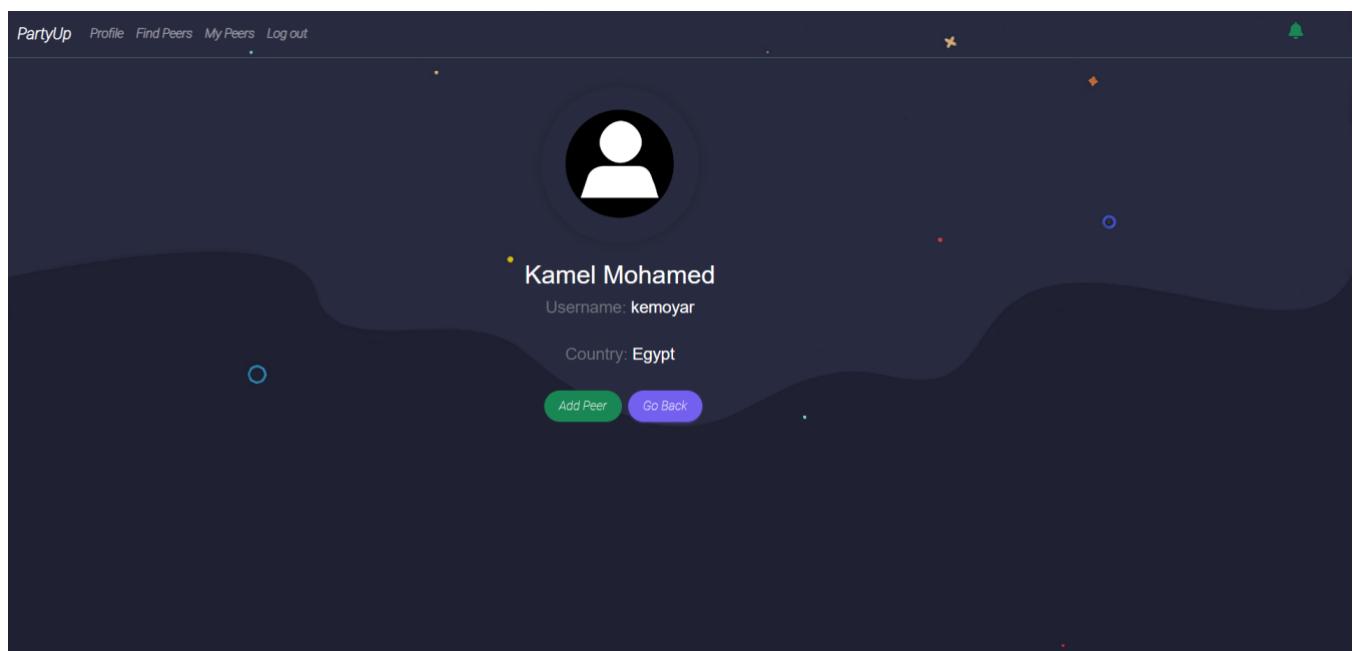


Figure 58: Test Case 13 --> View Profile of Not a Peer

14

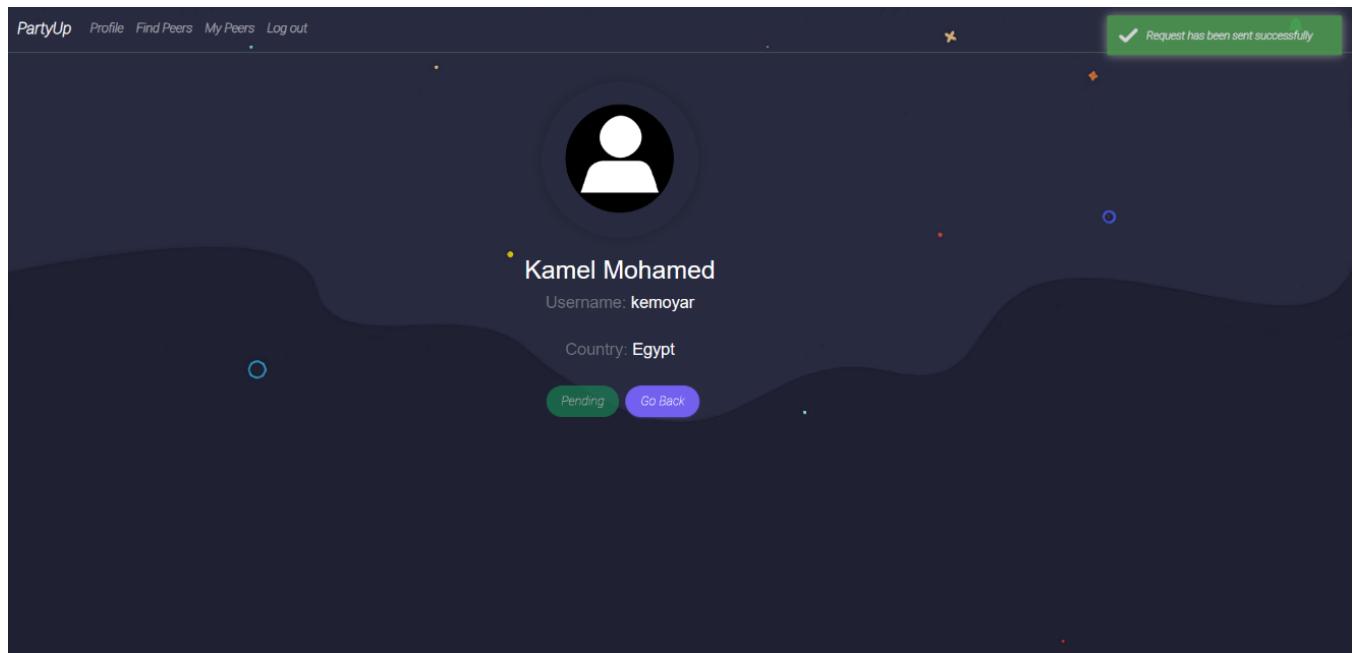


Figure 59: Test Case 14.1 --> Send Peer Request

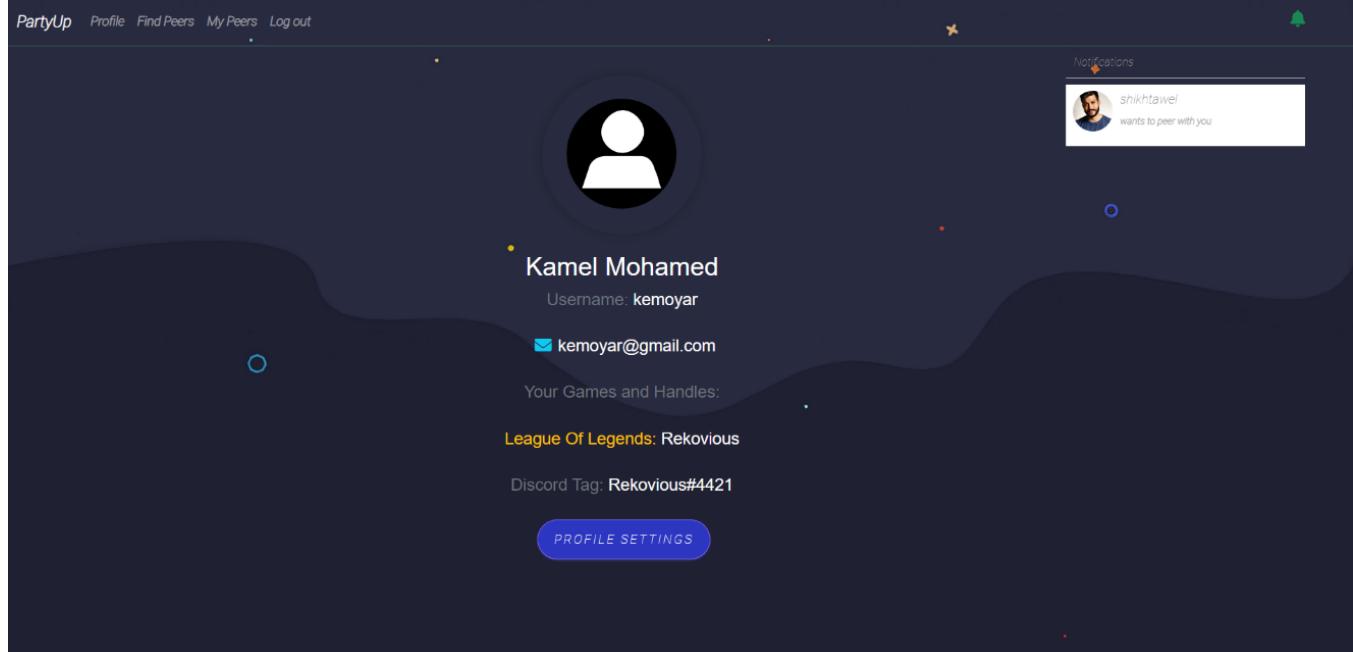


Figure 60: Test Case 14.2 --> View Peer Requests

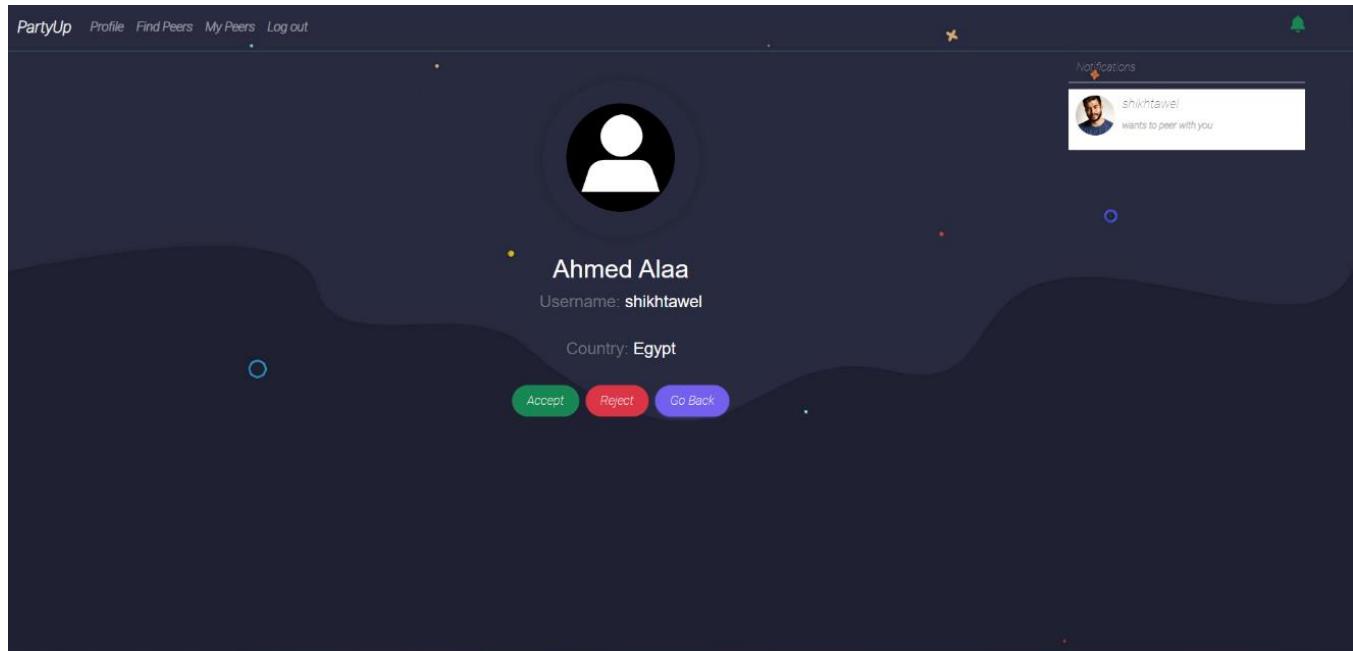


Figure 61: Test Case 14.3 --> View Peer Request

After we send the peer request it shows “pending”, and the notification arises for the other requested player when he logged in, and when he presses on the notification, it navigates him the requester profile page showing the public information and two buttons “Accept” and “reject”

15

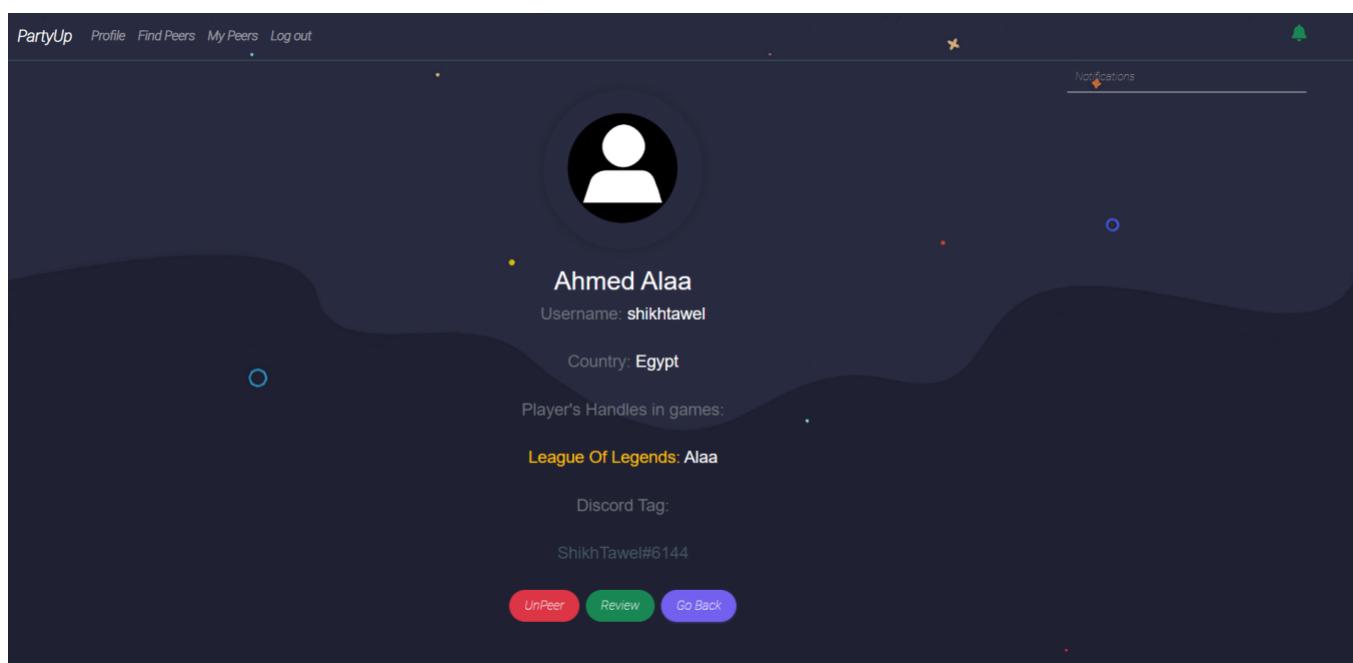


Figure 62: Test Case 15.1 --> Accept Peer Request

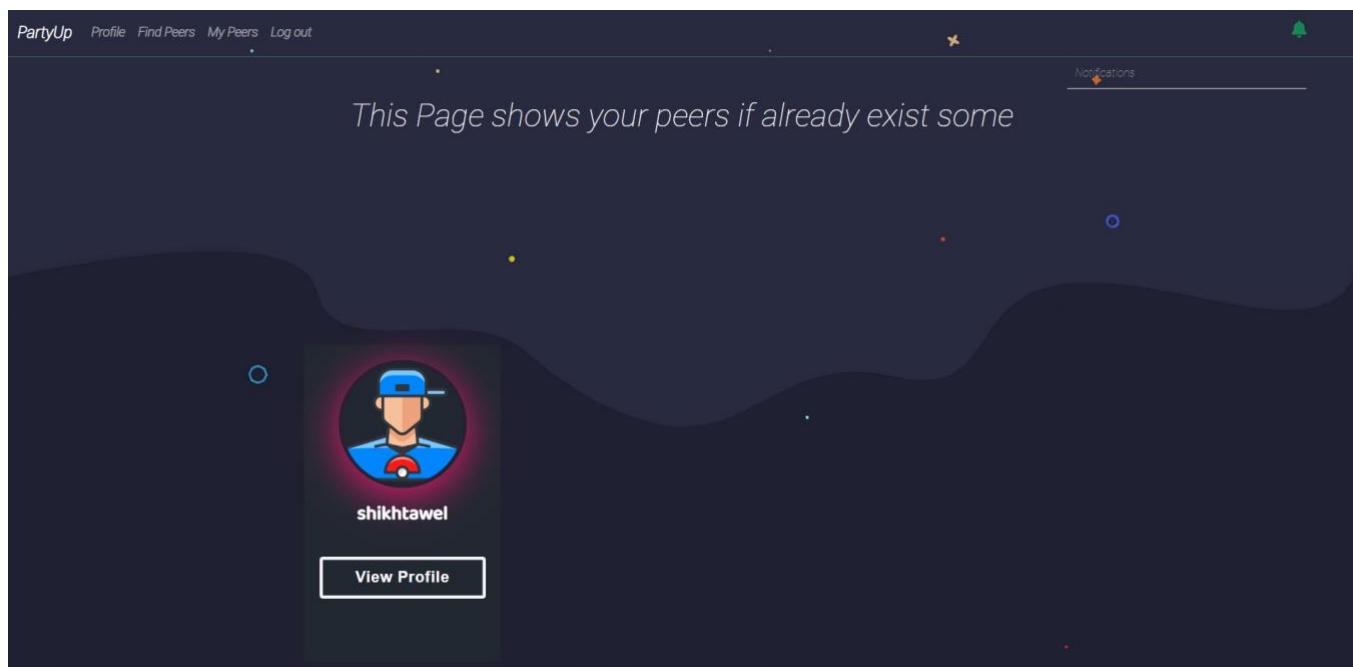


Figure 63: Test Case 15.2 --> Players added to each other's Peers

16

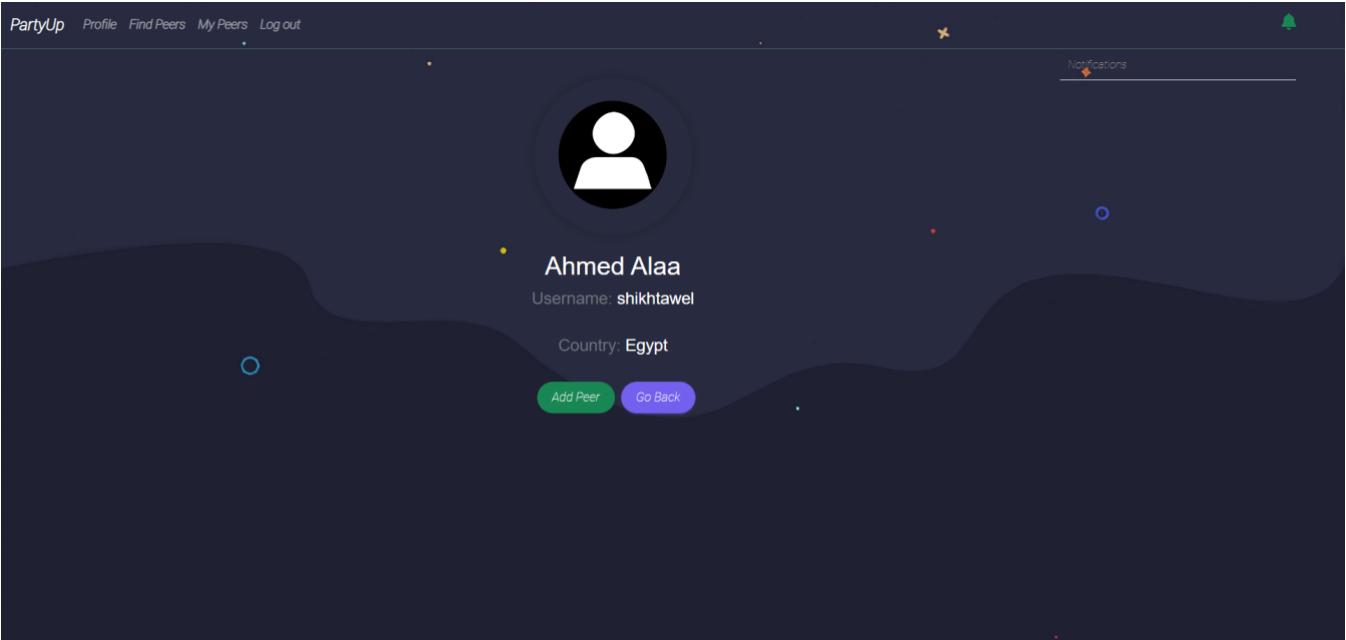


Figure 64: Test Case 16 --> After Rejecting the Friend Request

17

### Review Peer

Please answer all questions below sincerely  
Give him a rating from 1 ~ 5 for each question

Q1: Player is relaxed most of the time  
 1:  2:  3:  4:  5:   
 Q2: Player seemed interested to know new people  
 1:  2:  3:  4:  5:   
 Q3: Player exits the game when they feel like losing  
 1:  2:  3:  4:  5:   
 Q4: Player seemed to like talking to new people  
 1:  2:  3:  4:  5:   
 Q5: Player has a vivid imagination  
 1:  2:  3:  4:  5:   
 Q6: Player helps newbie teammates  
 1:  2:  3:  4:  5:   
 Q7: Player gets upset easily  
 1:  2:  3:  4:  5:   
 Q8: Player seems confident and prepared  
 1:  2:  3:  4:  5:   
 Q9: Player pays attention to details  
 1:  2:  3:  4:  5:   
 Q10: Player gets nervous when they lose  
 1:  2:  3:  4:  5:

Figure 65: Test Case 18 --> Uncompleted Survey

The Submit button is disabled until completing the Test

18

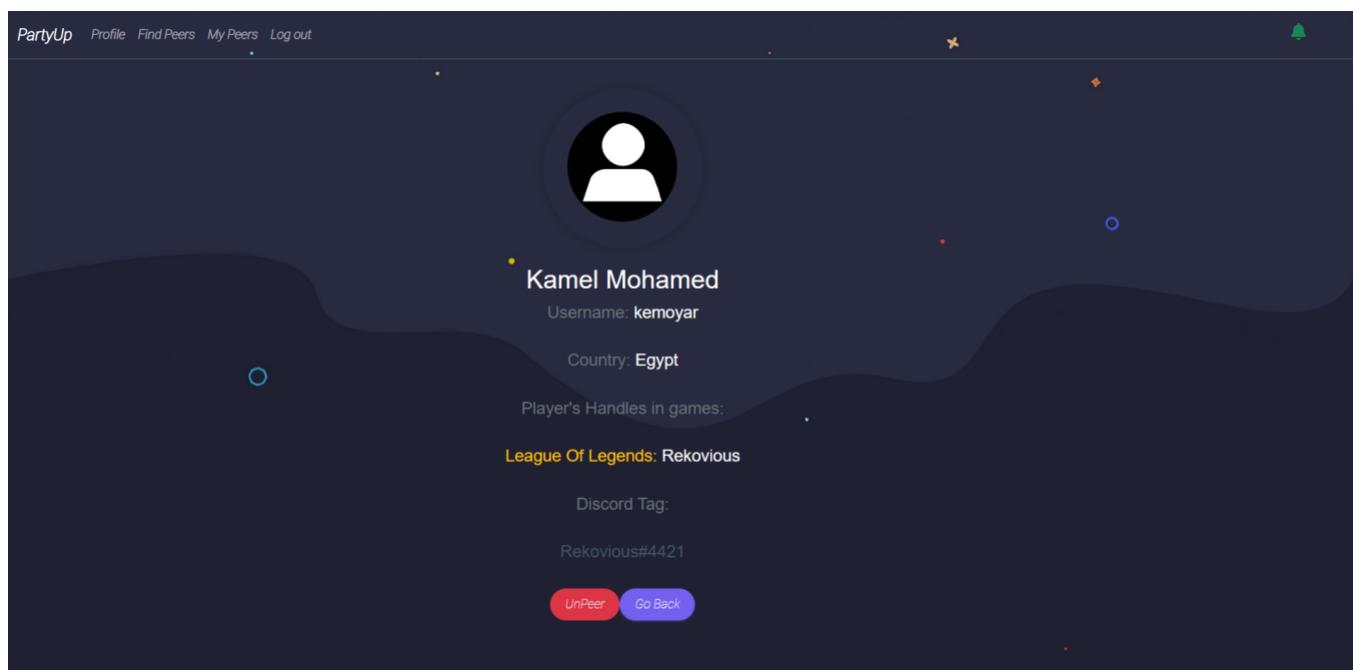


Figure 66: Test Case 18 --> Peer Profile After Review

The Review Button is Removed

19

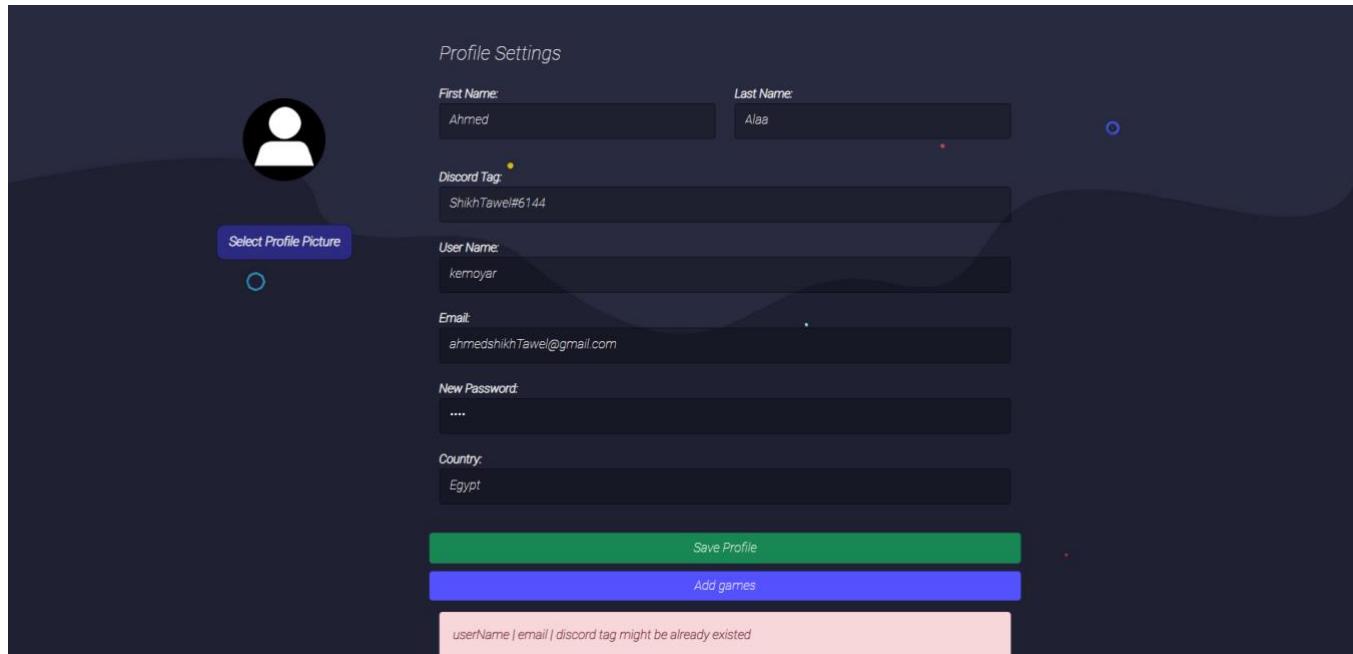


Figure 67: Test Case 19 --> Taken Username in Edit Profile

20

Profile Settings



**Select Profile Picture**

First Name: Ahmed      Last Name: Alaa

Discord Tag: \* Rekovious#4421

User Name: shikhtawel

Email: ahmedshikhTawel@gmail.com

New Password: ....

Country: Egypt

**Save Profile**

**Add games**

userNmae | email | discord tag might be already existed

Figure 68: Test Case 20 --> Taken Discord Tag in Edit Profile

21

Profile Settings



**Select Profile Picture**

First Name: Ahmed      Last Name: Alaa

Discord Tag: \* ShikhTawel#6144

User Name: shikhtawel

Email: ahmedshikhTawel

Email is invalid!

New Password: ....

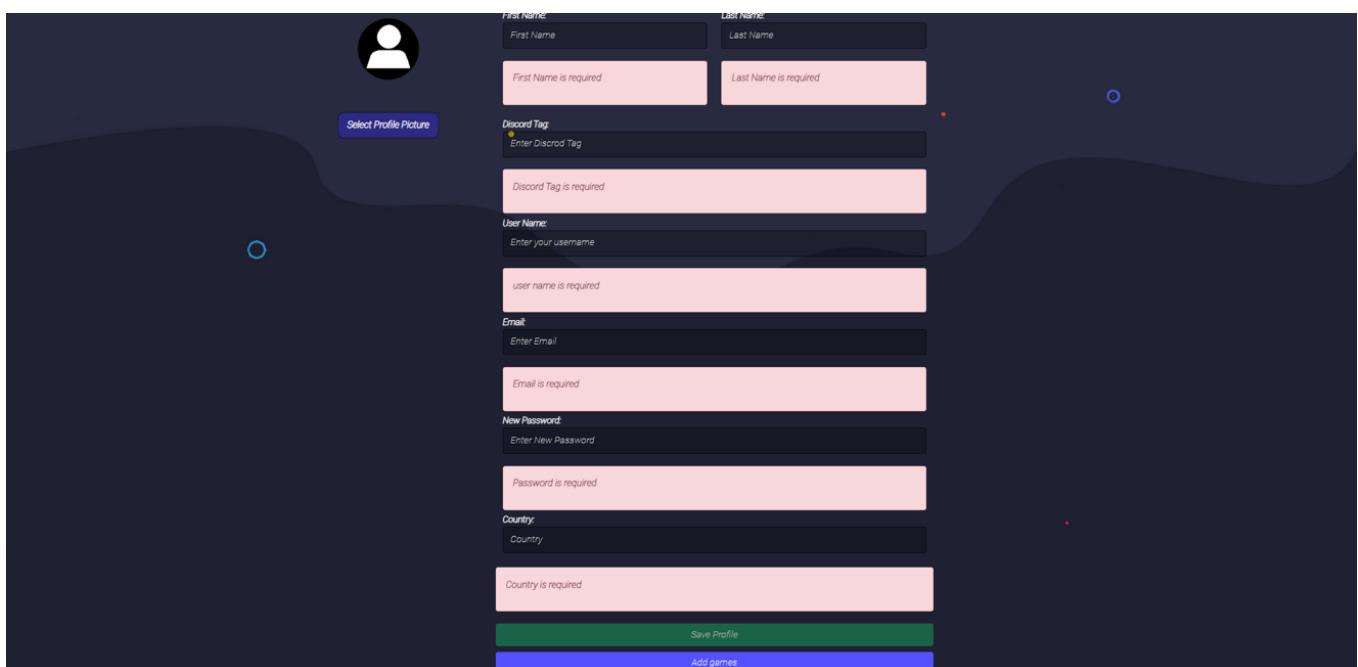
Country: Egypt

**Save Profile**

**Add games**

Figure 69: Test Case 21 --> Wrong E-Mail Format in Edit Profile

22



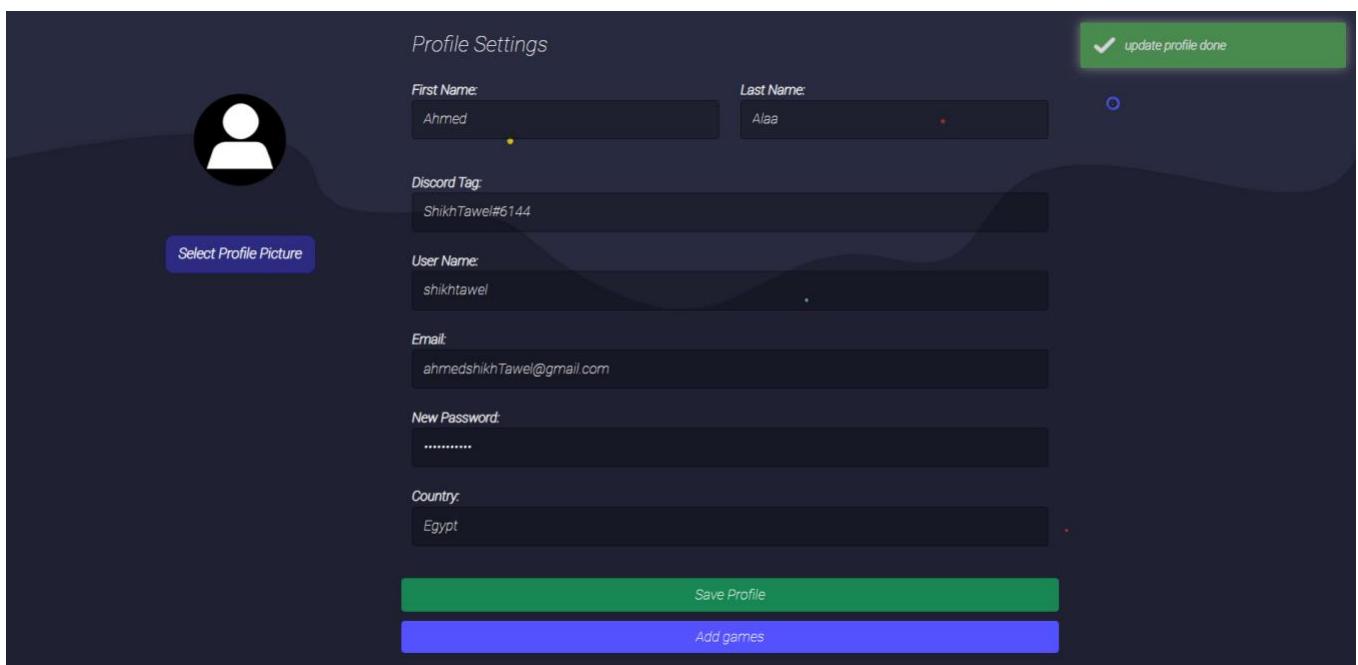
The screenshot shows the 'Edit Profile' screen of the Party Up app. At the top, there is a placeholder profile picture icon with a 'Select Profile Picture' button below it. Below the picture are several input fields with validation messages:

- First Name:** 'First Name' field with error message 'First Name is required'.
- Last Name:** 'Last Name' field with error message 'Last Name is required'.
- Discord Tag:** 'Enter Discord Tag' field with error message 'Discord Tag is required'.
- User Name:** 'Enter your username' field with error message 'user name is required'.
- Email:** 'Enter Email' field with error message 'Email is required'.
- New Password:** 'Enter New Password' field with error message 'Password is required'.
- Country:** 'Country' field with error message 'Country is required'.

At the bottom of the screen are two buttons: a green 'Save Profile' button and a blue 'Add games' button.

Figure 70: Test Case 22 --&gt; Uncompleted Fields in Edit Profile

23



This screenshot shows the same 'Edit Profile' screen as Figure 70, but with all fields filled correctly. The validation messages from Figure 70 are no longer present. The input values are:

- First Name:** 'Ahmed'
- Last Name:** 'Alaa'
- Discord Tag:** 'ShikhTawel#6144'
- User Name:** 'shikhtawel'
- Email:** 'ahmedshikhTawel@gmail.com'
- New Password:** '.....'
- Country:** 'Egypt'

At the bottom of the screen, a green button labeled 'Save Profile' contains a checkmark and the text 'update profile done'. A blue 'Add games' button is also visible.

Figure 71: Test Case 23 --&gt; Successfully Editing Profile

Table 13: Test Cases Execution

## Conclusion

As we discussed the Randoms Problem is the biggest problem that affects the gaming community and lead to lower the experience to most people that see their gaming time as a break from the hardness of the world.

To solve this Problem, we made a Platform to connect Gamers depending on their personality to make the gaming experience better because you will be playing with someone who sees the game from your Point of View

Our Platform is a website that the users take a personality Test as soon as he registers to the website, that Test is then forwarded to a Machine Learning Model that Classifies the Player into his appropriate Cluster. When the Player Need to play specific game, he searches for peers and our Platform find him the Best suitable peers for him to connect to ordered from best to worst using KNN Technique.

After the Players Match Together, they should communicate via Discord and Play. Then they Review Each Other to validate the info each user registered in the first place.

This solution solves the Randoms problem in a significant way hoping to provide an excellent gaming experience for all gamers.