

# Requested Changes

Below are the changes requested by the teams who reviewed our documents during Iteration 2 of the project.

## Feature Proposal Document 1

### Feature 1: Matchmaking System with ELO

The reviewing team suggests an ELO-based ranking system be implemented to pair players based on skill level. This is meant to ensure balanced gameplay. The expectations for the change are as follows:

- The matchmaking system will pair players based on their ELO rating to ensure balanced competition and a more complex system
- Players would be able to find and join matches with opponents with similar skill levels
- The system should adjust ranking based on game outcomes and reward wins and adjust scores when a player loses
- The matchmaking system will implement a “confidence” variable that would become more accurate with the number of matches played, and would mean that the system is more confident in the assigned rank as the number of matches played increases
- There should be a lobby system that allow users to queue for matches and view the ranking progression
- The interface should be interactive and seamless

### Feature 2: Friend Request Enhancement

The reviewing team requests that a change be made to the Friend Request feature be enhanced by adding a "Friend Request Queue" to allow users to send, receive, and manage friend requests more effectively. The expectations for the change are as follows:

- The feature should provide a Pending Requests tab under the user’s profile, where users can view sent and received friend requests.
- Users should be able to accept or reject requests directly from their profile or notifications.
- A search function should be added to help users find other players and send friend requests easily.
- Privacy controls should be implemented to allow users to block friend requests from unknown players.

## **Feature Proposal Document 2**

### **Feature 1: Forfeit Option for Tic-Tac-Toe and Connect 4**

The reviewing team requests that we add a Forfeit option for Tic-Tac-Toe and Connect 4, if a player no longer wishes to keep playing. The opponent should also be notified when this occurs. The suggested features and implementation is as follows:

- Add a "Forfeit" button in the game interface, allowing players to voluntarily surrender the match.
- Upon forfeiting, display a confirmation prompt to prevent accidental forfeits.
- When a player forfeits, the opponent is automatically declared the winner, and the match result is recorded accordingly.
- Notify both players when a forfeit occurs, displaying a message such as "Player X has forfeited the game. Player Y wins!"
- In rankings, ensure forfeits are properly accounted for in win/loss records.

### **Feature 2: Multi-Factor Authentication (MFA) for Enhanced**

The reviewing team requests the introduction of an optional Multi-Factor Authentication feature to improve account security. This means that users need to verify their identity using either a one time code sent via phone or email. The suggested features and implementation is as follows:

- Users can enable or disable MFA from their profile settings.
- If enabled, after entering their password, users must enter an OTP sent via email or SMS.
- Add a "Remember this device" option for users who don't want to authenticate every time.
- Implement a backup method in case users lose access to their email/phone.

# Accommodating the Proposed Features

## Feature Proposal Document 1

### Feature 1: Matchmaking System with ELO

Our system already planned to include an ELO ranking system, and we believe our implementation meets the expectations listed adequately. Our system matches players based on their ELO rankings to ensure matches remain fair, and our matchmaking system allows players to queue for a match until an opponent of a similar ELO ranking is found. These rankings are then recalculated at the end of each match based on the results for each player. One expectation our team did not implement was the suggested "confidence" variable. We investigated the addition of such a factor and found that although relatively straightforward to implement the factor would be of limited benefit for the user since they would only be added information, rather than an improvement to ELO accuracy. For details about our ELO calculation and ELO based matchmaking please see the below files.

*ELOCalculator.java*

*MatchMaker.java*

*leaderboardREADME.md*

### Feature 2: Friend Request Enhancement

We planned to have an "Add friend" feature already for our system which would have met the requirements outlined by the requested team. This would have meant that users would have the ability to check their notifications for friend requests and accept or decline the requests as they see fit. They would be able to add a friend via the friends playerID and allow for privacy controls in the form of a Blocked list which allowed users to block specific players if the desire. Unfortunately, due to time constraints, we were unable to implement the "Add Friends" system completely. The basic code is present, but functionality is limited. For details about the "Add Friends" system please see the below files.

*ProfileDatabaseManager.java*

*Profile.java*

*profileREADME.md*

## Feature Proposal Document 2

### Feature 1: Forfeit Option for Tic-Tac-Toe and Connect 4

Forfeit match was a feature we had planned to include for chess during our Iteration 1 process. It makes logical sense to have a forfeit function for players who might need to leave a match

abruptly. We have added the ability to forfeit matches at any time, resulting in a loss for the player forfeiting and a win for their opponent. For further details, please see the below files.

*src/game*

## **Feature 2: Multi-Factor Authentication (MFA) for Enhanced**

Our team has added the MFA ability to provide extra security if desired for a users account, as suggested by the reviewing team. Users have the option to be sent an email containing a One-Time-Code which they enter in order to authenticate and gain access to their account/profile. Certain features such as "Remember this Device" and a backup method were not implemented due to time constraints, but the core functionality of the feature is present.

*EmailManager.java*

*UserAuthentication.java*