

# 1. General Shared Pages (Admin & Player)

## Registration and Login Page

### Registration Process:

1. Navigate to the **Register Page**.
2. Enter your details (e.g., email, name, etc.).
3. A verification code will be sent to your email.
4. Enter the verification code on the register page to complete the registration process.

### Login Process:

1. Navigate to the **Login Page**.
2. Enter your credentials to log in.

## Profile Page

- Upon logging in, both admins and players can:
    - View and modify their profile information (*except their role*).
    - View their scores earned from each tournament.
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# 2. Player Specific Pages

## Available Tournament Page

Players can:

- View all upcoming tournaments.
- Sign up for their desired tournament using the available information.

## AI ChatBot

- Players can query the **AI chatbot** for questions contextually relevant to this web app, or any questions at all.

## Sign-Up Process for Tournaments

1. Navigate to the **Available Tournaments** page.
2. Click on the tournament you want to join.
3. Sign up for the tournament.

On competition day:

- Admins will match players with opponents based on:
    - **Random Matching**, or
    - **Skill-Based Matching** (*using Trueskill*).
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# 3. Admin Specific Pages

## Tournament Page

Admins can perform the following actions:

- **Create tournaments.**
- **Edit tournament details.**
- **Delete tournaments** they have created.

Admins can select the matching algorithm for a tournament:

- **Skill-Based Matching:** Matches players based on their **Trueskill rating**.
- **Random Matching:** Pairs players randomly.

## Generating Matches

On the competition day:

1. The admin clicks the **“Match Participants”** button to pair users.
2. If the **“isRandom”** checkbox is unchecked:
  - Players will be matched according to their **Trueskill rating**.
3. If the **“isRandom”** checkbox is checked:
  - Players will be randomly paired.

## Scoreboard Update Page

During matches, the admin can:

- Update the scoreboard.
  - Players' ratings are updated using the **Trueskill Rating system**.
  - Move the winner to the next round of matches.
  - Display the winner for the tournament at the end of the game.
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# 4. Trueskill Rating System

## How Skill-Based Matchmaking is Done

- **TrueSkill Rating:**

Our system uses Microsoft's **TrueSkill algorithm** to rank players. TrueSkill uses:

- **Mu ( $\mu$ ):** Represents a player's **skill estimate**.
- **Sigma ( $\sigma$ ):** Represents **uncertainty** in that estimate.

When a player competes and wins:

- **$\mu$  increases** and  **$\sigma$  decreases**, reflecting a higher and more certain skill level.
- Ratings are updated after each duel.
- **High  $\sigma$  values** indicate more uncertainty.
- **Low  $\sigma$  values** indicate greater confidence in the skill estimate.

## Key Concepts in TrueSkill

- **Mu ( $\mu$ ) - Skill Estimate:**

Players start with a default  $\mu$  value representing their initial skill. This value adjusts as players win or lose, reflecting changes in their skill.

- **Sigma ( $\sigma$ ) - Uncertainty:**

Players also start with a default  $\sigma$  value representing initial uncertainty.

- **Winning against stronger opponents:** Decreases  $\sigma$  (*more confidence*).
- **Losing against weaker opponents:** Increases  $\sigma$  (*greater uncertainty*).

## TrueSkill Calculation

- **Match Updates:**

During each match, ratings for both players are updated based on the outcome.

- **Outcome Effects:**

- If Player A wins against Player B:
  - Player A's  $\mu$  **increases** and Player B's  $\mu$  **decreases**.
  - Player A's  $\sigma$  **decreases** (*higher confidence*), while Player B's  $\sigma$  **might increase**.
- This dynamic process ensures that ratings reflect both recent performance and the confidence in a player's skill level.