

CS4530 Final Project: ArrayIndexOutOfBounds

Group 108 - Prof. Bhutta - Fall 2025

<https://fall25-project-108.onrender.com>

<https://github.com/neu-cs4530/fall25-project-108>

Project Overview

We developed three major features to enhance a Stack Overflow-inspired platform: **Auth0 SSO Integration with Private Profiles**, **Elo Ranking System with Real-time Leaderboard**, and **Analytics Dashboard**. Our platform gamifies user participation through dynamic ratings, provides comprehensive privacy controls for user profiles, and offers detailed analytics to track individual progress and community engagement.

🔒 Auth0 & Privacy

Third-party authentication via Auth0 with granular privacy controls. Users can hide their entire profile or specific elements (bio, picture, etc.) with real-time updates via WebSockets.

🏆 Elo & Leaderboard

Dynamic reputation system using Stack Overflow-style point adjustments. Real-time leaderboard with WebSocket updates, caching layer, and tied ranking support.

📊 Analytics Dashboard

Comprehensive user statistics including activity trends, login streaks, achievement badges, and community comparisons with visualized metrics.

Technology Stack & Design

MongoDB

Auth0

React

Node.js

Express

Socket.io

Jest

Playwright

Cypress

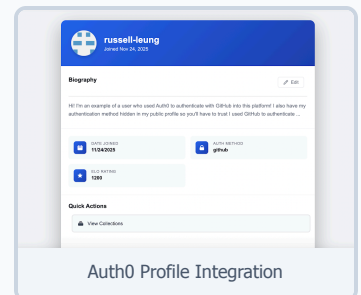
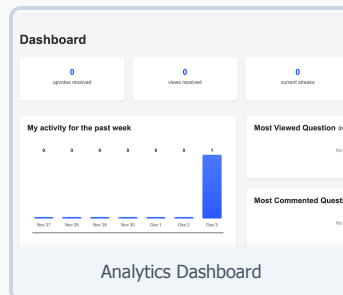
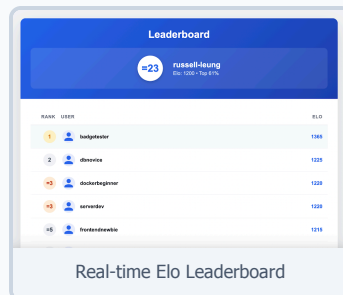
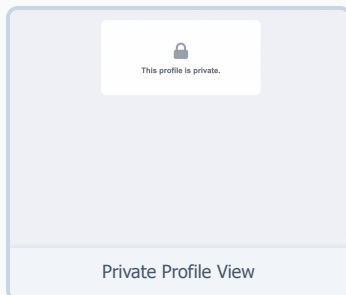
Key Design Decisions:

- **Auth0 Integration:** Built on top of existing local authentication to maintain backward compatibility while enabling SSO
- **User Schema Extension:** Added elo, eloHistory, badges, and privacy flags to existing User model to support all features
- **Real-time Updates:** Leveraged Socket.io for instant privacy changes and Elo updates across all connected clients
- **Performance Optimization:** Implemented 30-second caching for leaderboard queries and optimized statistics queries

Future Work

- **Enhanced Elo System:** Consider implementing traditional chess-style Elo with K-factors and expected win probabilities for more nuanced rating adjustments
- **Advanced Privacy:** Add time-based privacy settings (e.g., profile visible only to friends after 30 days) and access logs
- **Leaderboard Categories:** Create separate leaderboards for different time periods (weekly, monthly, all-time) and categories (best answers, question askers)
- **Team/Organization Support:** Allow users to form teams with aggregate Elo and shared analytics dashboards
- **Notification System:** Real-time notifications for badge achievements, rank changes, and milestone celebrations
- **API Abstraction:** Refactor to create standardized interfaces for different ranking algorithms and privacy models

Feature Screenshots



Key Achievement: Successfully completed all Essential and Desirable conditions of satisfaction across all three features, achieving over 90% test coverage with Jest, Playwright, and Cypress. Implemented real-time synchronization via WebSockets for instant updates across privacy settings and Elo rankings.