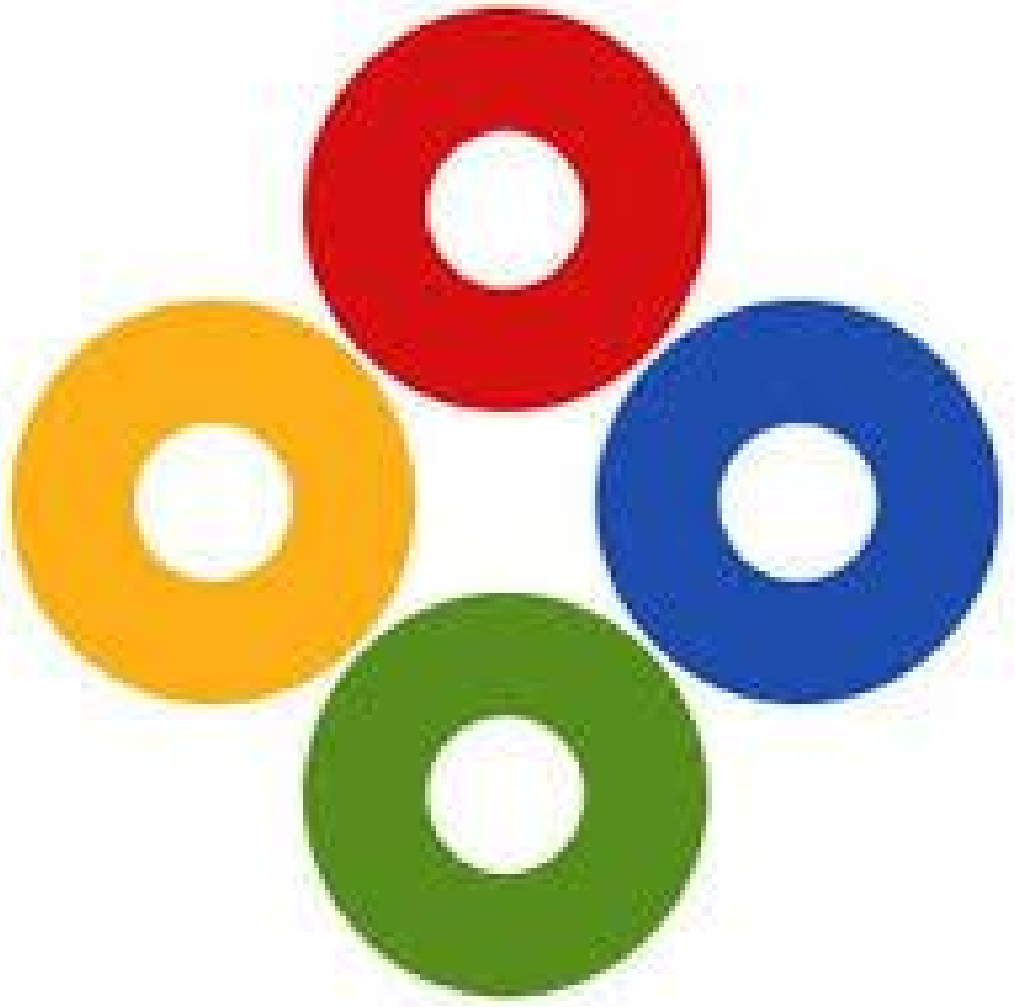
EWA Technical Documentation

Ludo web application (Human Annoy Yourself Not)



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Introduction

This guide is meant to help deployment engineers, software engineers, and architects who are working on extending or migrating our Ludo web application to another IT technology. It provides a clear understanding of our product vision, key features, target users, market positioning, growth plans, and the challenges we faced during development, along with alternative solutions we considered.

By going through this guide, you'll gain insights into the design principles, architecture, and security considerations that shaped our Ludo web application. You'll also understand the alternative solution options we explored and why we chose the ones we did. Additionally, you'll find a roadmap for future growth and expansion.

Whether you're deploying the application, adding new features, or moving it to a different IT technology (say another cloud service), this guide will provide you with the information and guidance you need for a successful implementation. It will help you understand our product vision, keep the design consistent, and make informed choices to meet our users' changing needs.

This guide will give you the necessary context and guidance for a correct implementation, as well as our design choices, difficulties and other solutions we looked at.

Product vision

Our online Ludo web application aims to provide a seamless and engaging platform for users to enjoy the classic board game Ludo online, while also offering a vision for the future as an expansive online platform hosting multiple old-school board games.

Description and Key Features:

Our Ludo web application offers a digital adaptation of the beloved Ludo game, allowing players to enjoy the traditional gameplay experience online. With an intuitive and visually appealing user interface, players can create and join multiplayer games and compete against opponents from around the world.

Key features of our Ludo web application include:

1. Multiplayer Gameplay: Users can join existing game rooms or create their own to play against other players in real-time multiplayer matches. This brings people together and adds a friendly competitive vibe to the game.
2. Customizable Game Settings: Users have the flexibility to customize game settings such as the number of players, game duration, and rule variations to cater to their preferences.

Target User Communities and Interests:

Our Ludo web application targets a diverse range of user communities with a shared interest in classic board games and online gaming. These communities include casual gamers, board game enthusiasts, families, and friends seeking to engage in a fun and nostalgic gaming experience.

Positioning in the Market:

In the market for online board game platforms, our Ludo web application distinguishes itself by focusing on providing a user-friendly and immersive experience specifically for Ludo enthusiasts. While there are alternative platforms available, we differentiate ourselves through our intuitive user interface, customizable game settings, and emphasis on multiplayer engagement.

Future Growth and Expansion:

Looking ahead, we envision our Ludo web application evolving into a comprehensive online platform hosting multiple old-school board games. By expanding our game offerings beyond Ludo, we aim to attract a broader user base and cater to diverse gaming preferences. This expansion will provide users with a variety of classic board games to choose from, further strengthening our position as a leading online platform for nostalgic gaming experiences.

We believe that this direction of growth will not only enhance user engagement but also open doors to partnerships with game developers and opportunities for collaboration within the board game community. Our vision is to become the go-to online destination for individuals seeking a digital platform that combines the nostalgia of traditional board games with the convenience and accessibility of online gaming.

Summary

List of most important Epic/User stories:

1. User Registration and Identification:
    - Users can choose a player name and password.
    - Users can register their geographical location.
    - Users can register their email address.
    - Users can add a profile photo.
    - Users can reset their password.
2. Starting New Game Instances:
    - Initiators of a game can determine relevant parameters such as the maximum number of players, time period for registration, maximum waiting time for players' turns, variant of game rules, and other specific factors or options.
    - Users have an overview of all open invitations, displaying the initiator's name, the number of players who have already registered, the maximum number of participants, and other relevant parameters.
3. Playing the Game with Consistent Rules:
    - An online help system explains the rules of the game.
    - The platform blocks user actions that violate the rules and provides understandable error messages.
    - The platform updates the game state and informs all players of the consequences of a player's action.
    - The platform determines the outcome of the game, including potential wins, losses, or the end of the game.
4. Intuitive and Dynamic User Interface for Turns:
    - The user interface includes stylish graphical elements resembling the original board game.
    - Users can interact with the interface in a dynamic and intuitive manner, resembling physical actions with the game's pieces/cards.
    - The responsiveness of the user interface is smooth and real-time.
5. Deployment on an Online Cloud Service:
    - The platform can be deployed on an online cloud service, specifically with Azuzre..
    - The service is robust and can host multiple game instances simultaneously without requiring frequent restarts.
    - Deployment and configuration of the application on the hosting service are fully automated.
    - The deployment procedure supports updating the software while preserving user account data and the status of active and previously played games.

Acceptance criteria per user story

User Story: As a player I would like to be able to sign up for the online Ludo board game.

- Have a form with input fields where the player can put his personal data. (Fields: Username, Password, E-mail, Country code and a profile image)
- Submit button to submit the player's registration.

User Story: As a player I would like to be able to reset my password.

- A separate menu item in the navigation bar on the profile of the player which redirects to a page where the player can change the password.
- A page with an input field to insert the new password.
- A submit button to change the password

User Story: As a player I want to be able to create/host a match.

- There should be a page with customizable settings. (Amount of players, lobby name, optional password and the turn timer)
- A create button so the lobby becomes visible for other players.

User Story: As a player i would like to be able to see an overview of all the open matches that are starting

- A page where all the joinable lobbies become visible.
- A button to join the lobbies if the player wants to.

User Story: As a player I would like to see an overview of the matches I created or joined.

- A page where all the joined and created matches are visible.

User Story: As a player I want to be able to see the rules of the game

- There should be a separate item in the menu bar of the application.
- By clicking on this item a new page should show up and show the rules of the game Ludo.

User Story: As a player I want to play the game itself

- By joining a match you created or joined the match will start if the lobby is full.
- When the match starts the player is redirected to a new page where the board is visible with all the players.
- From here the game starts and every player can roll the dice and move their marbles.

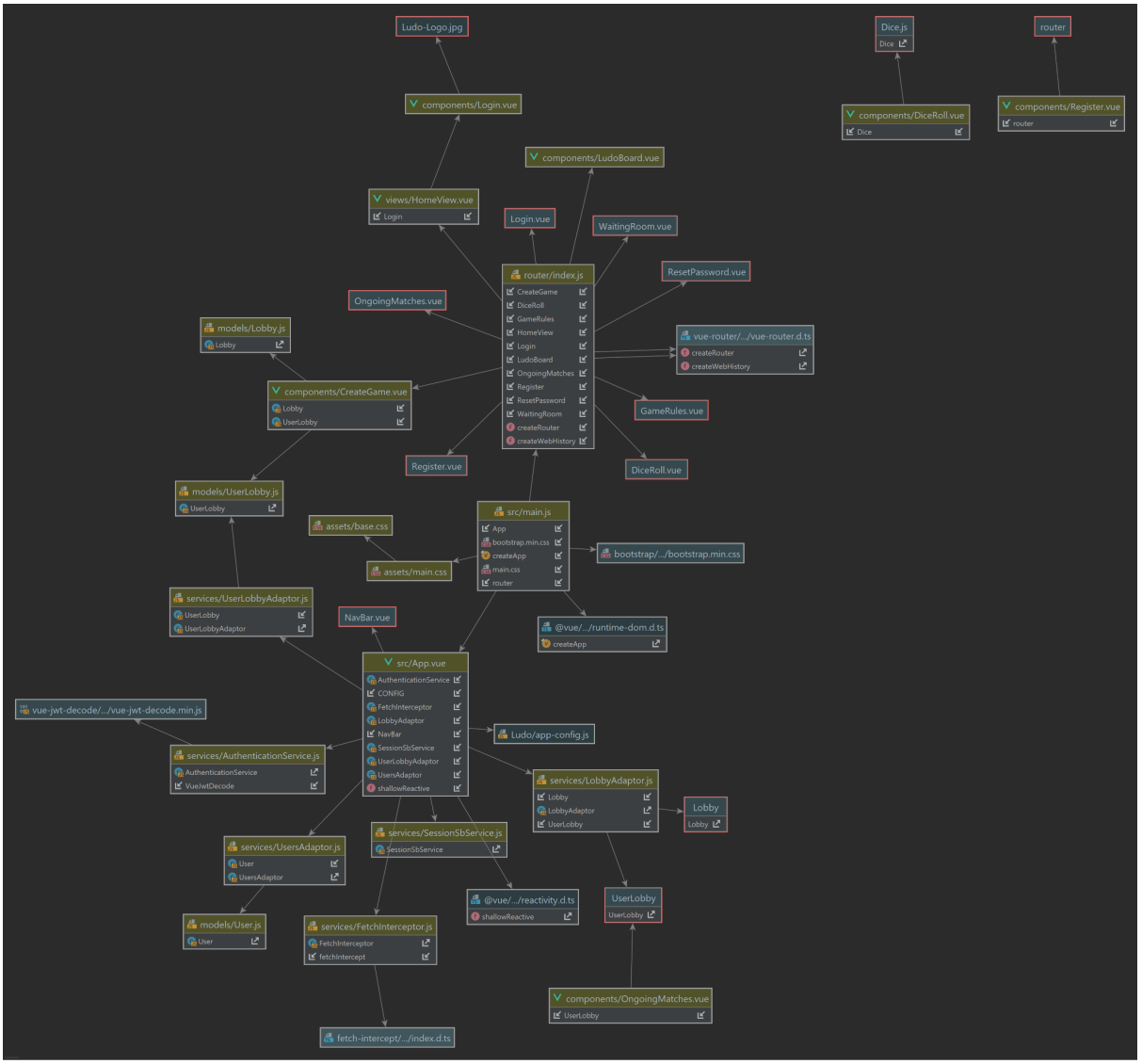
Future Growth:

In the future we want to expand our application by adding features that make our websit easier to use. For example, we could use messages to make sure the user knows a certain action was successful. We’d also like to work on the AI to make our application easier to use.

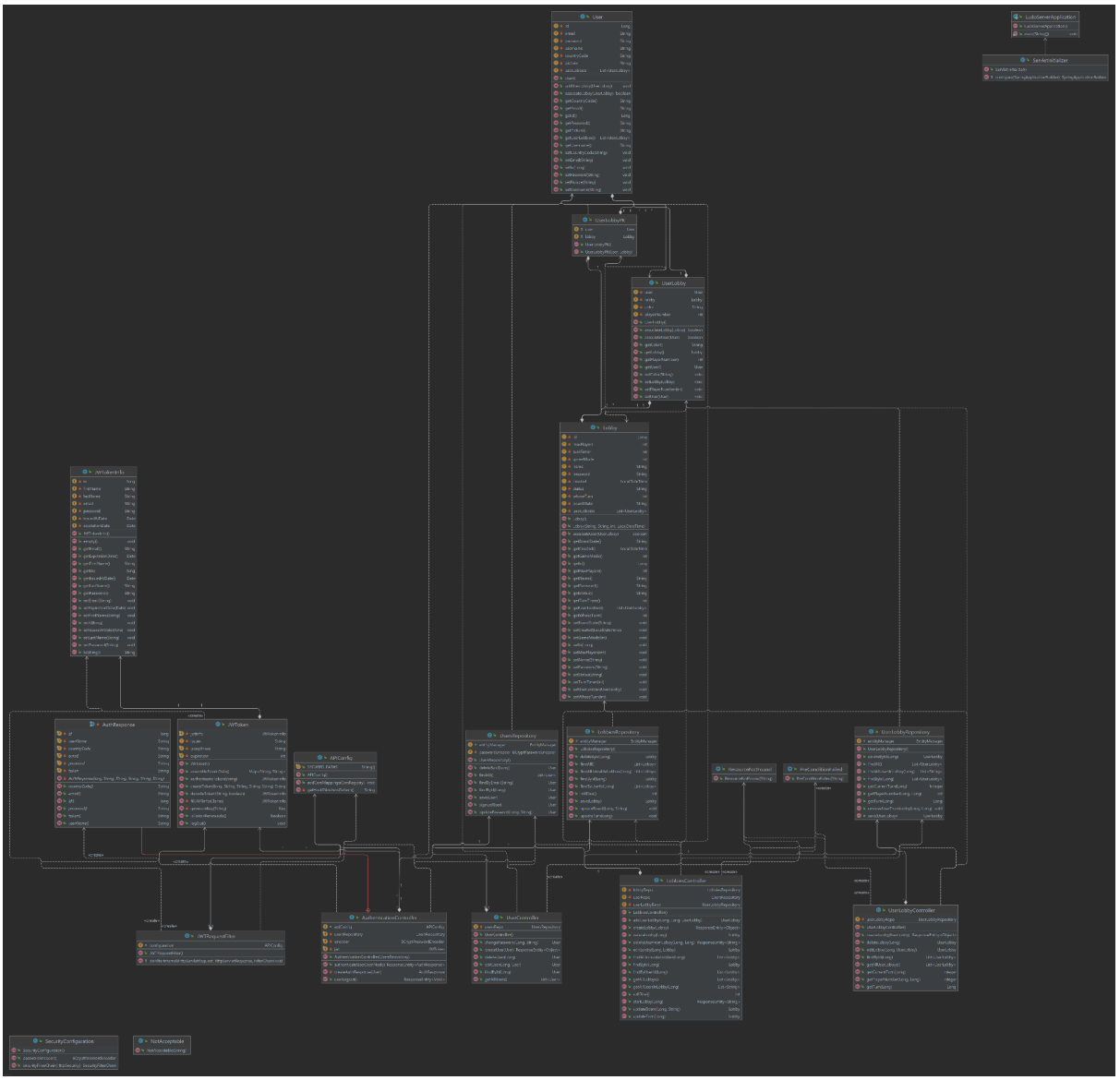
Class diagram

Below the back end UML image is a link to a google driver folder, so you can view the images more easily.

Front end UML



Back end UML



Link to the individual images:
https://drive.google.com/drive/folders/1ByC-ptzzxvsfGn_vZyR31_Bid301L0MF

Elaboration on the challenges and alternative solution options

Challenges:

When designing our Ludo web application, security was a top priority due to the nature of user registration, personal information, and gameplay involved. We faced the following challenges in ensuring a secure design:

1. User Authentication: We needed a strong authentication mechanism to protect user identities and prevent unauthorized access.
2. Data Encryption: Sensitive information like passwords and personal details had to be encrypted to prevent data breaches.
3. Secure Communications: Ensuring secure communication between the client and server was vital to protect against attacks.

Solution and Justification:

To address these challenges, we implemented the following solutions:

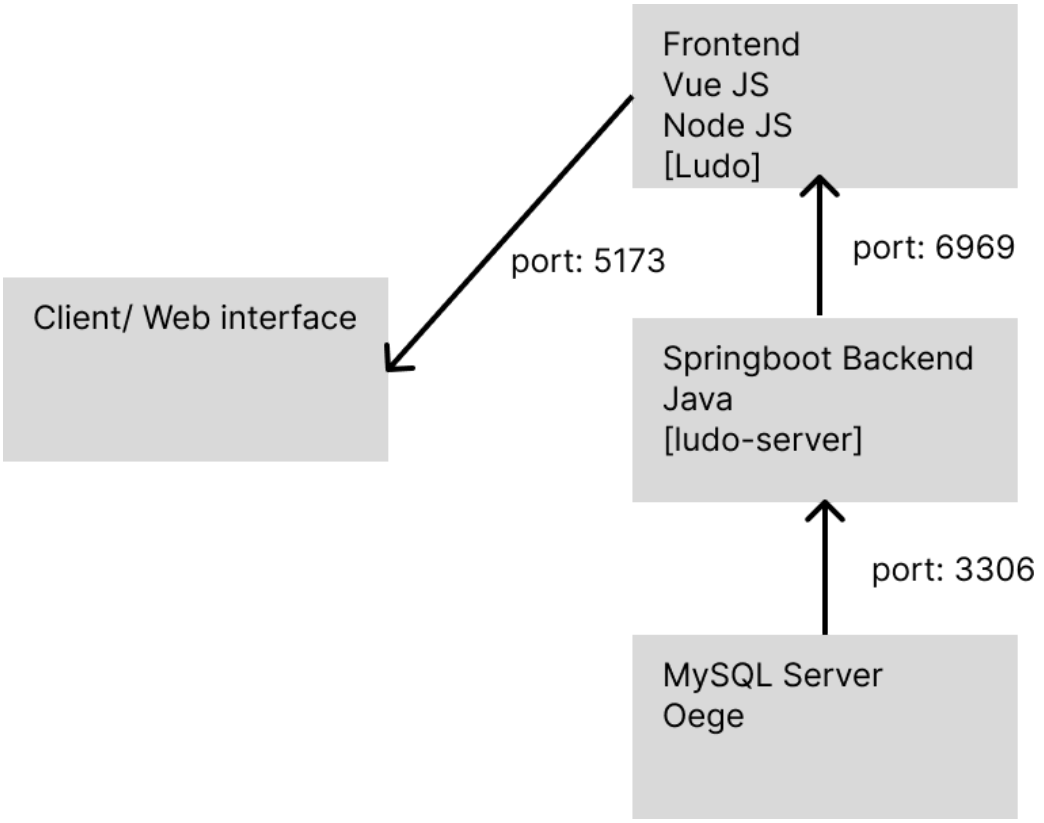
1. User Authentication: We used industry-standard protocols like OAuth or JSON Web Tokens (JWT) to authenticate users securely. Strong password policies and secure hashing algorithms were also implemented to protect user credentials.
2. Data Encryption: Encryption techniques such as SSL/TLS were employed for secure data transmission. User passwords were securely stored and validated using hashing algorithms like bcrypt.

Alternative Solutions Considered:

1. Single Sign-On (SSO): We decided against SSO to maintain an independent user registration process and a separate user base.
2. Two-Factor Authentication (2FA): While 2FA adds an extra layer of security, we deferred its implementation for future enhancements based on user feedback and security trends.

In conclusion, our chosen solutions for securing the Ludo web application involved robust authentication, data encryption, secure communications, and input validation.

Deployment diagram



The front end is built with the framework Vue.Js. The front end communicates with a Spring Boot back end which is accessible through port 6969. The back end uses a MySQL server which is hosted in the oege server and is accessible through port 3306. The user interacts with the website using a browser, which connects to the front end using port 5173.

Cloud deployment

In case of deployment. There are two separate instances needed for deployment in a production environment. Namely a front end and back end instance. We've opted for the cloudhosting Azure by Microsoft, we've discovered the speed Azure delivers on both the front and back-end were necessary for our application to run correctly, so users can expect great performance. Both need to be deployed on a compatible stack using the system requirements explained above.

Reflection

Our design for the Ludo web application aims to provide a seamless and engaging online gaming experience, with a focus on security, scalability, and future growth. While our design covers important aspects like user registration, game creation, gameplay, and deployment, there are areas where we can further improve the application's functionality and user experience to ensure its success.

Improvements can be made in the following areas:

1. User Experience (UX): We need to prioritize user experience to ensure high engagement and satisfaction. Enhancements can include improving the visual appeal of the user interface, providing clear instructions and tooltips, and incorporating user feedback to address any issues and optimize the overall user journey.
2. Cross-Platform Compatibility: Currently, our web application is designed for desktop browsers. To reach a wider audience, we should make it compatible with mobile devices. This involves creating a mobile-friendly layout, optimizing touch interactions, and addressing performance considerations for mobile users.
3. Social Integration and Community Features: To build a strong community and make the experience more fun, we should add social features like user profiles, friend lists, and chat. This way, users can connect with friends, keep track of their gaming stats, and chat with other players. It will make the whole experience more enjoyable and engaging.
4. Enhanced Game Customization: While our design allows for basic game customization, we can expand the options and rule variations to provide a more personalized experience. This can include implementing different game modes, allowing players to create custom rule sets, and incorporating additional variations of the Ludo game.

In conclusion, our design for the Ludo web application sets a solid foundation for a fun and engaging online gaming experience. We prioritize security, scalability, and a user-friendly interface to stand out in the market and appeal to a wide range of players. However, there's still room for improvement to make the application even better.