# PROJECT Design Documentation

## Team Information

- Team name: Team D
- Team members
  - Brandon Chen
  - Giovanni Melchionne
  - Kris Schnupp
  - Johnny Puskar
  - Kyle Collins

## Executive Summary

Web Checkers is an online, multiplayer web app that allows users to play checkers with one another. Users can sign in with a desired username and play against friends or strangers.

### Purpose

Provide a way for users to play checkers with their friends. The target user base would be all checkers lovers.

### Glossary and Acronyms

| Term | Definition |
|---|---|
| MVP | Minimum Viable Product |

## Requirements

Allow users to Sign In with a username, without Sign Out functionality.
Allow users to start a game with other online players who are not in a game.
Allow users to play a game with their opponent.
Allow users to record and watch replays of any game.
Allow users to ask for help when they are stuck.

### Definition of MVP

The MVP of the project is to have a basic checkers game with sign in and sign out functionality.

### MVP Features

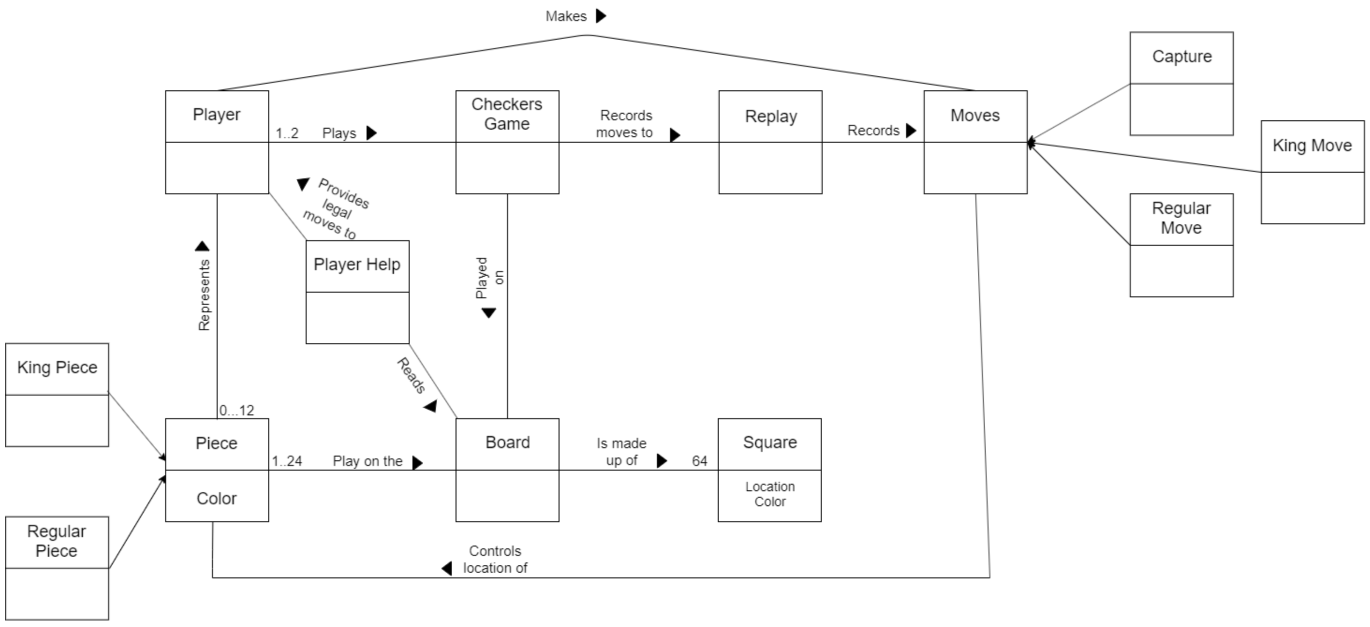
The features of the MVP will be sign in with a username and sign out.
Start a game with a player who is not in a game.
Resign a game.
Validate the moves.
Submit and pass your turn.

### Roadmap of Enhancements

Allow users to ask for help about available moves.
Allow users to record the moves in the game and replay them.

## Application Domain

This section describes the application domain.



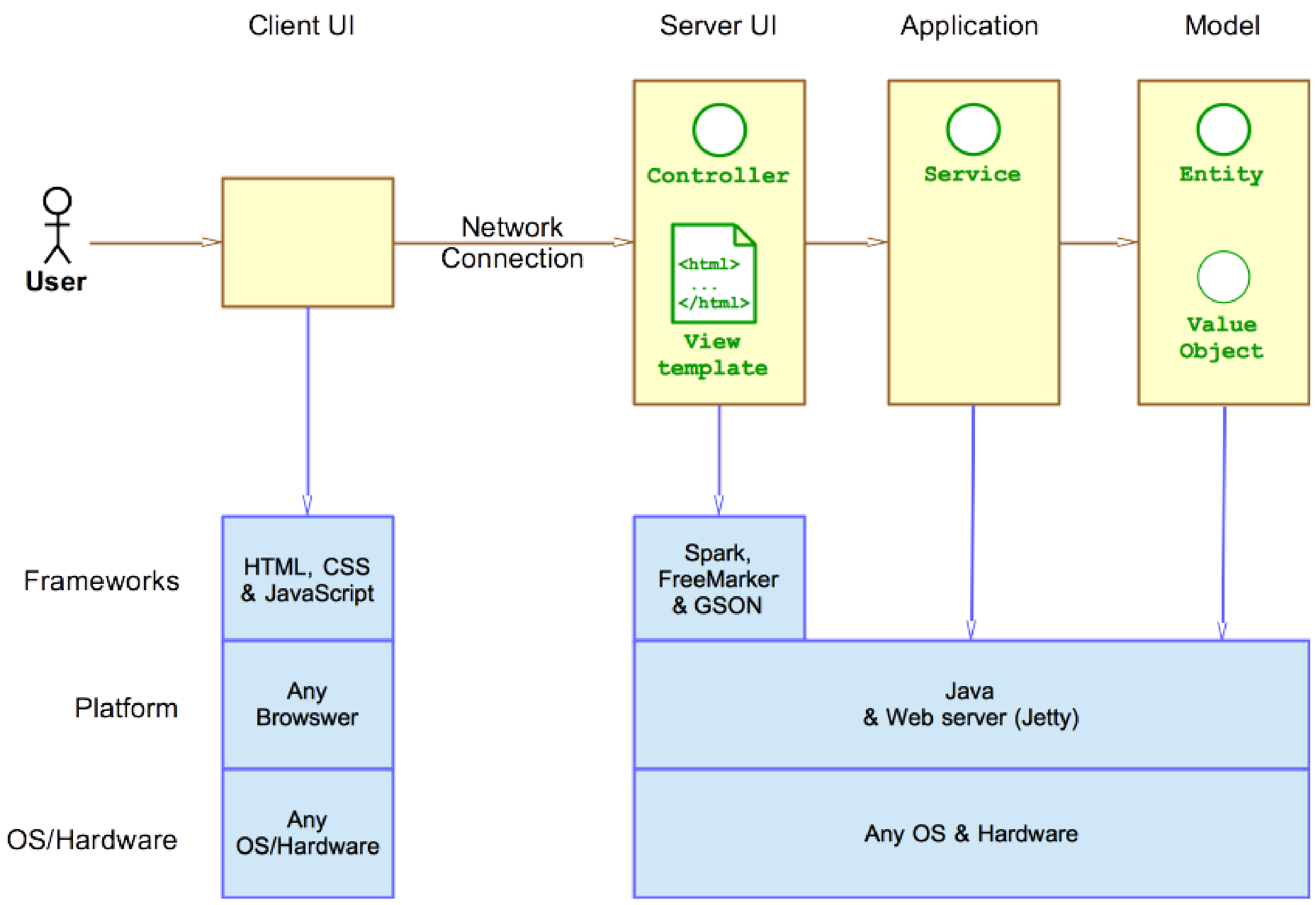
The main entities are the board, player, piece, moves, and square.
Pieces belong on the board, and the board is made of squares.
A Player is represented by a piece and makes moves.
A Piece can either be a regular piece or king piece.
The different types of moves are capture, regular move, and king move.

## Architecture and Design

This section describes the application architecture.

### Summary

The following Tiers/Layers model shows a high-level view of the webapp's architecture.



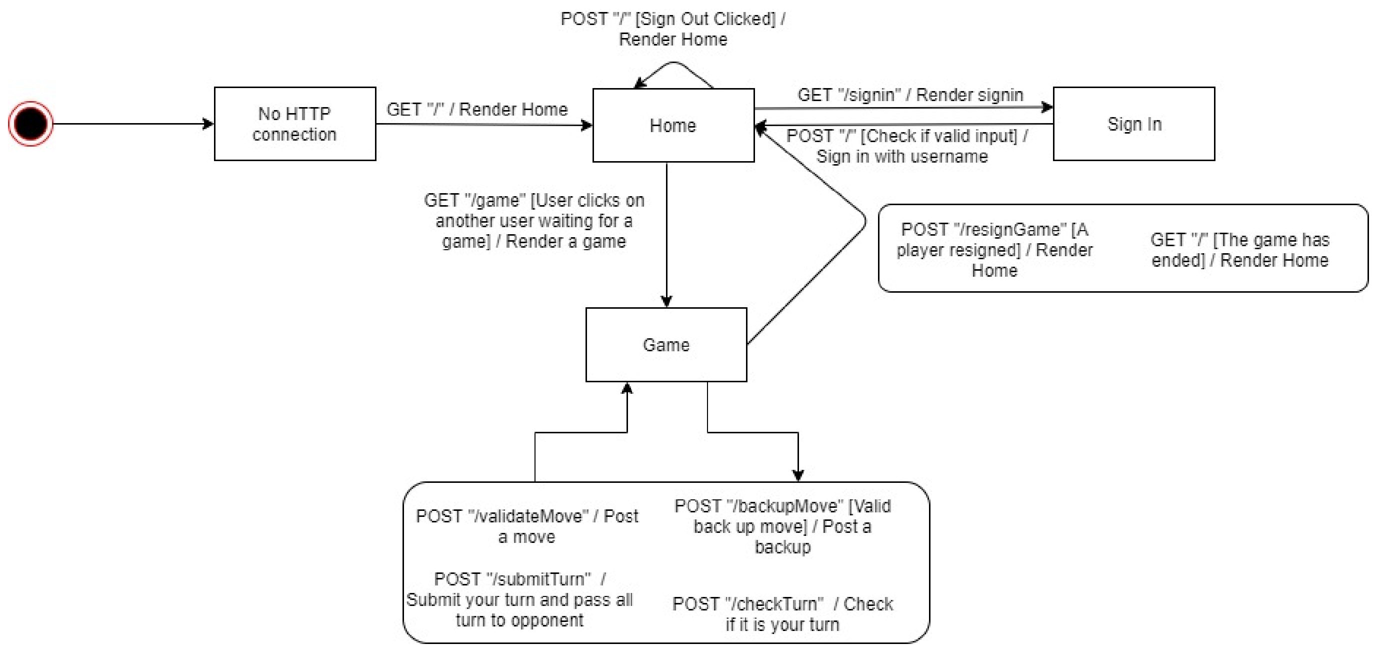
As a web application, the user interacts with the system using a browser. The client-side of the UI is composed of HTML pages with some minimal CSS for styling the page. There is also some JavaScript that has been provided to the team by the architect.

The server-side tiers include the UI Tier that is composed of UI Controllers and Views. Controllers are built using the Spark framework and View are built using the FreeMarker framework. The Application and Model tiers are built using plain-old Java objects (POJOs).

Details of the components within these tiers are supplied below.

### Overview of User Interface

This section describes the web interface flow; this is how the user views and interacts with the WebCheckers application.


POST "/" [Sign Out Clicked] / Render Home
No HTTP connection
GET "/" / Render Home
Home
GET "/signin" / Render signin
Sign In
POST "/" [Check if valid input] / Sign in with username
GET "/game" [User clicks on another user waiting for a game] / Render a game
POST "/resignGame" [A player resigned] / Render Home
GET "/" [The game has ended] / Render Home
Game
POST "/validateMove" / Post a move
POST "/backupMove" [Valid back up move] / Post a backup
POST "/submitTurn" / Submit your turn and pass all turn to opponent
POST "/checkTurn" / Check if it is your turn

After the user connects, the user sees the home page with route "/". After, if he chooses to sign in, he gets sent to the "/signin", seeing the signin.ftl page. After he signs in, he is redirected to the homepage if he inputs a valid name, and if not, he stays on the "/signin" route. If he is signed in, he can choose to start a game which would load the "/game". In a game, the user

## UI Tier

> *Provide a summary of the Server-side UI tier of your architecture. Describe the types of components in the tier and describe their responsibilities. This should be a narrative description, i.e. it has a flow or "story line" that the reader can follow.*

> *At appropriate places as part of this narrative provide one or more static models (UML class structure or object diagrams) with some details such as critical attributes and methods.*

> *You must also provide any dynamic models, such as statechart and sequence diagrams, as is relevant to a particular aspect of the design that you are describing. For example, in WebCheckers you might create a sequence diagram of the `POST /validateMove` HTTP request processing or you might show a statechart diagram if the Game component uses a state machine to manage the game.*

> *If a dynamic model, such as a statechart describes a feature that is not mostly in this tier and cuts across multiple tiers, you can consider placing the narrative description of that feature in a separate section for describing significant features. Place this after you describe the design of the three tiers.*

## Application Tier

> *Provide a summary of the Application tier of your architecture. This section will follow the same instructions that are given for the UI Tier above.*

## Model Tier

> *Provide a summary of the Application tier of your architecture. This section will follow the same instructions that are given for the UI Tier above.*

## Design Improvements

> *Discuss design improvements that you would make if the project were to continue. These improvement should be based on your direct analysis of where there are problems in the code base which could be addressed with design changes, and describe those suggested design improvements. After completion of the Code metrics exercise, you will also discuss the resutling metric measurements. Indicate the hot spots the metrics identified in your code base, and your suggested design improvements to address those hot spots.*

## Testing

The tests that we performed involved unit testing to see if our code would return the expected outcome given any input. Also, acceptance testing was done manually to see if the logic of the game was correct and to catch any bugs that could occur.

### Acceptance Testing

Acceptance testing was done manually by someone who did not write the code to test the logic of the program. All of our user stories have passed the suite of acceptance criteria tests. We have nto yet tested any of the enhancement user stories. Some of the issues we found included random bugs in the game logic such as moving backwards when the piece was not a king and being able to end your turn even with an available capture.

### Unit Testing and Code Coverage

Our overall code... Some of our unit tests were purposely not tested as they required tedious checks. For exmaple, we did not check the case where the game would end if a user no longer had any places to move with his pieces. We thought that this was an extreme condition that was hard to test with a unit test, but instead tested it manually for the expected outcome.