Final Project: Spades

# Introduction

Project: Implement a two-player version of Spades

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# Design/Architecture

# Installation Instructions

## External Dependencies

The following dependencies are required in order to install and play the spades game. This paper assumes the user knows how to install, configure, and run these dependencies.

* PostgreSQL 11
* Any Java IDE that supports Maven 3.5.2 (We used IntelliJ) with the 10.0.2 JDK
* JDK 10.0.2
* Java 1.8
* Two Separate Internet Browsers (We tested against Firefox and Google Chrome) or two separate computers.

## Initial Setup

In order to run the Spades game, the user must set up the initial database. This involves creating the necessary tables for both Spring Security as well as tables used to run and store information about Spades games.

Inside the Java project there is a folder called “sql\_scripts” and a file called “create\_database.sql”. To create the necessary tables, run the file “create\_database.sql” inside the Postgres’s pgAdmin tool using the Query tool.

# Operating Instructions

The first step in order to play this game requires that two user accounts are created.

# Game Rules

## Objective

Be the first player to reach 500 points. If both players reach 500 points in the same round the player with the higher number of points between the two wins.

## Setup

Each “Round” a 52 Card Deck is shuffled. Two players are each dealt thirteen cards from the deck randomly. This leaves 26 cards that are remaining in the deck, which will not be used in the current round. (13 cards per player \* 2 players + 26 cards left over = 52 Total Cards in Deck)

## Card Rank

Card Values are Ace (A), King (K), Queen (Q), Jack (J), 10, 9, 8, 7, 6, 5, 4, 3, and 2. Suits are Spades (S), Hearts (H), Clubs (C), and Diamonds (D). Spades beats every other suited card. E.g. 2S (2 of Spades) beats AH (Ace of Hearts). In the case of same card suits, the higher valued card will win, so 9H (9 of Hearts) beats 7H (7 of Hearts). If a Spades suit is not played but the played cards have different suits, then the leading player (the player that went first in the current trick) will win regardless of card value.

## Bidding

Each player will decide how many “Tricks” they think they can win in a round. They can also choose “nil” if they want to try to lose every trick that hand to try to get 100 points for that round (See Scoring) A “Trick” is simply a winning hand. Bidding occurs each round.

## Scoring

Each winning trick is worth 10 times the bid amount and every trick that is won that goes over the bid amount is referred to as a “Sandbag” or “bag” and is worth 1 point. **Example:** Player 1 bids 6 tricks and wins 8. They are awarded 62 points, 60 for their bid and 2 for their bag.

If a player fails to meet the number of tricks they bid the player is deducted the entire bid times 10 points for each bid. **Example:** Player 2 bids 8 tricks but only gets 6 tricks in the round, they are deducted 80 points.

Sandbags are kept track of for each player and once a player hits 10 bags or more they are deducted 100 points, and their bags are subtracted by 10.

A player can bid 0 (known as a NIL bid) if they believe they can lose every trick in order to get 100 points for the round. If they fail to do this and get even 1 trick they are deducted 100 points.

## Gameplay

Player 1 starts the game and plays a card, player 2 then follows. Spades are not allowed to be played unless they have already been “broken”. In order to “Break Spades” a player may play a spade if they do not have any cards of the suit that the opening player plays, or if the opening player only has cards of the Spades suit remaining. Once Spades is broken it can be opened with in any following round.

Example: Player 1 has 5S, 4C, 2D and 3D, player 2 has QH, 10D, 3S, and 4S. Player 1 plays 2D, player 2 must play a Diamond, in the next hand Player 1 Plays 3D because Player 2 no longer has any Diamonds they can play their 3 of Spades to win the trick, Spades are now broken and Player 1 can play their 5S in the next hand.

The winner of the trick starts the next hand. Each hand is played until the players are out of their initial 13 cards. The round is then scored and a new round is started. This process goes on until one of the players wins the game.

# Why This Application is Secure

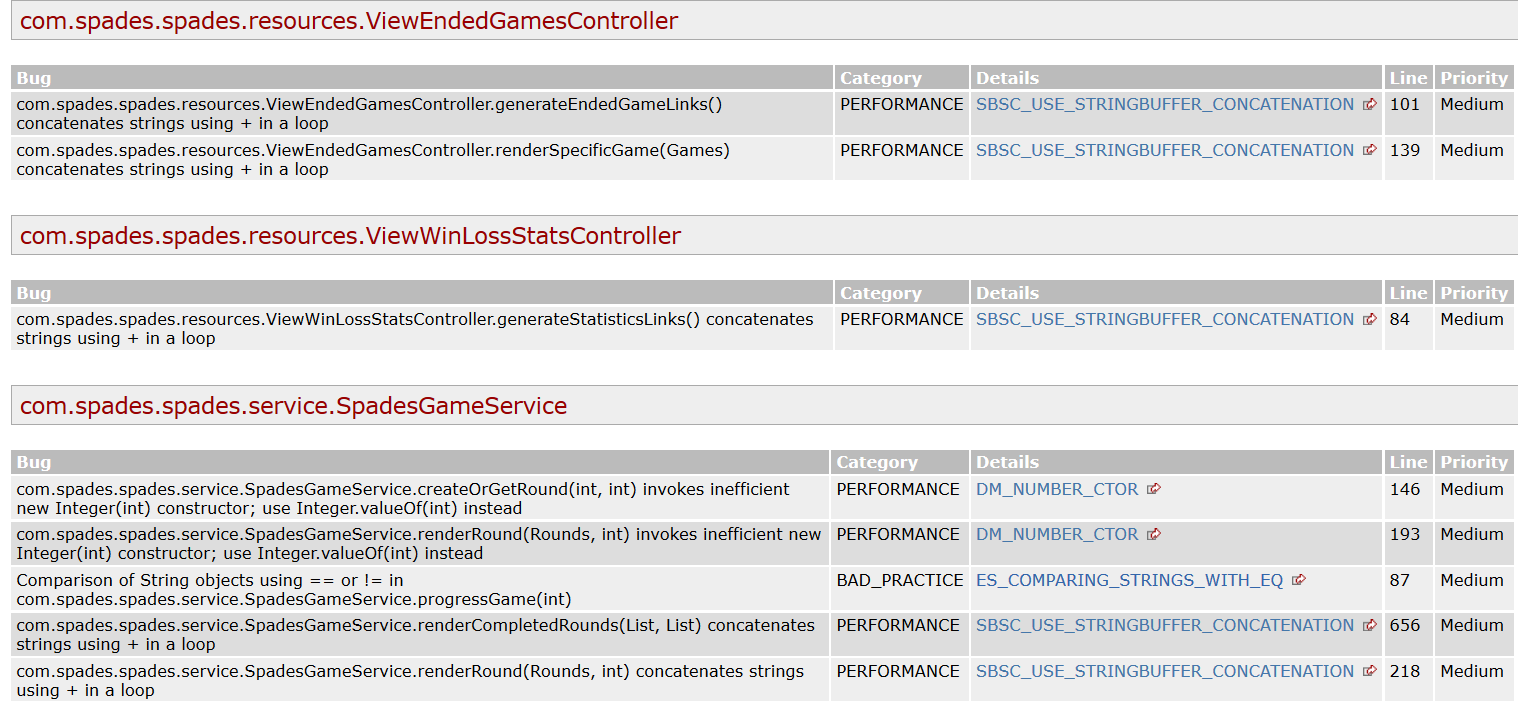
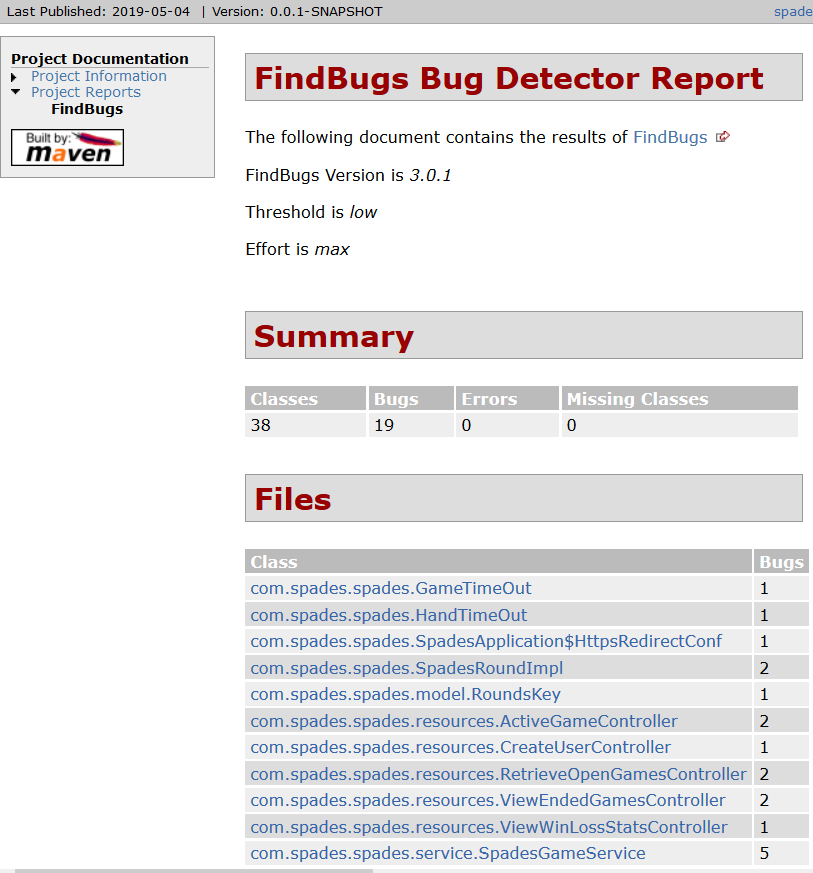
## Information protection

The entire application uses HTTPS to encrypt information that is exchanged. This reduces the risk that a third-party could retrieve sensitive data from web traffic that could be used to inflict damage.

Additionally, apart from the initial home page and the create user page, all other points in the application requires user authentication in order to access it. This is done by extending Spring Security’s default configuration and requiring that all requests to a certain path (containing the functionality of the application) requires user authentication, and will otherwise prompt the user with a login page.

## Using Analysis Tools

The static analysis tool FindBugs was used to scan for any potential issues. An initial use of the tool revealed 19 different issues. However, most of these initial issues were related to performance or bad practice, and didn’t reveal any severe problems. After using this tool, the issues were inspected and addressed. Below is the generated summary and a sample excerpt of the issues report.



After these initial issues were resolved, another use of the FindBugs report indicated the following: