Design Document

Individual Project

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# **Introduction**

The Design document focuses on the technical structure of the individual project. It will give insights into what methodology will be followed, what frameworks will be used and how the quality will be assured.

# **Project Methodology**

This project will follow the Agile methodology. This is due to the Agile method's emphasis on using practical and efficient approaches to generate high-quality products.

# **Frameworks**

Frameworks that will be used on this project:

* **Java Spring Boot** for the back end of the application
* **React** for the front end of the application
* **MySQL** database
* **Spring Data JPA** for working with the database
* **JWT** technology for the authentication and authorization

## Why do I use these technologies?

**Java Spring Boot** – This framework helps with removing a lot of boiler plate code, which makes the solution comprehensive and understandable. Moreover, Spring Boot makes implementing Dependency Injection quick and easy. Finally, this framework is required to be used for this project.

**React** – React is a JavaScript library, which allows developers to create websites and application. The JSX syntax that React implements is revolutionary and is very handy when writing the components of the application. This brings me to another positive, which is that components can be reused and thus the application consistency much better. Moreover, this makes further support and optimization a piece of cake. React is used by many, which makes it very easy to find materials and documentation online.

**MySQL** – I have worked with MySQL databases since I started learning at Fontys and therefore I chose to work with it again. I have a good understanding of this system and it gives me confidence.

**Spring Data JPA** – Even though I don’t mind writing queries and creating databases myself using ORM’s like the JPA helps automate and make the process faster. Moreover, ORM’s are widely used in the industry, which makes it more appealing to use it now, so that I can get used to working with it.

**JSON Web Tokens**- Security is very important in the Internet world. This can be achieved through authentication and authorization. Very common way of implementing these functionalities is by using JSON Web Tokens. I chose JWT technology because it offers great security, it is very compact and can incorporated with Restful Services and it is easy to process.

# **Quality Assurance**

The quality of the project will be assured through:

* **Unit test** through Junit
* **Integration tests** through Junit
* **Acceptance tests**
* **Front-end testing**
* **SOLID** principles

For more information about the testing of the project, refer to this

document : [Test Plan](https://stichtingfontys-my.sharepoint.com/personal/477927_student_fontys_nl/Documents/Test%20Plan%20ULTRAS.docx?web=1)

## How is SOLID applied

### Single-Responsibility principle

Firstly, the Single-responsibility principle says that every class created should have only one responsibility. This is implemented in the project by having services, controllers and repositories containing methods only about their respectable entities. For example, UserService and UserController classes only contain methods about the User Entity. Additional configuration classes have only one responsibility. For example, the WebSecurityConfig class is only responsible for configuring the security of the application.

### Open-Closed Principle

“Open for extension and closed for modification” -this is what this principle follows. In the application classes are made so that it is possible to add fields to the data structures it contains, or new elements to the set of functions it performs without the need to change other classes or modules.

### Liskov Substitution Principle

The principle states that an object (such as a class) and a sub-object (such as a class that extends the first class) must be interchangeable without breaking the program. At present there is no inheritance used in the project.

### Interface Segregation Principle

Clients shouldn't rely on interfaces they don't utilize, according to the principle of Interface Segregation. This is achieved in the project by properly splitting interfaces and making sure there are no unnecessary methods that belong to them.

### Dependency Inversion Principle

The Dependency Inversion principle states that classes should depend on abstraction and not concretions. And this principle is implemented in the solution by implementing interfaces. That way the classes use abstractions, which creates a barrier preventing coupling to dependencies.

# **C4 Architecture**

## C1 Diagram

The System Context or so-called C1 diagram provides a starting point, showing how the software system in scope fits into the world around it

Diagram

Description automatically generated

## C2 Diagram

The Container or otherwise known as C2 diagram zooms into the software system in scope, showing the high-level technical building blocks

Diagram

Description automatically generated

## C3 API Application

A Component or C3 diagram zooms into an individual container, showing the components inside it. This diagram shows how the components of the API Application work.

Diagram

Description automatically generated

## C3 Multi-Page Application

Just like above this is another C3 diagram, which however displays how the components of the Multi-Page Application work.

Diagram

Description automatically generated

## C4 Class Diagram

The diagram displayed below presents a class diagram for the flow of registering a user to the system. When a user wants to register a RegisterUserRequest is send by the UserController and received by the UserService. Afterwards, the service creates a user account and sends a UserResponse to the Controller.

Diagram

Description automatically generated

# **CI/CD Diagram**

Diagram

Description automatically generated

# **Design Decisions**

## URL Design

Below in the table are listed the URLs that will be used to service the software solution.

|  |  |  |  |
| --- | --- | --- | --- |
| URL | Resource | Operation |  |
| /matches/ | Matches | GET | Read a list with all available matches |
| /matches/123 | Matches | GET | Read the match with ID 123 |
| /matches/456 | Matches | DELETE | Delete the match with ID 456 |
| /matches/789 | Matches | PUT | Update match with ID 789 |
| /matches/ | Matches | POST | Add a new match |
| /tickets/ | Tickets | GET | Read all tickets in the system |
| /tickets/123 | Tickets | GET | Read the ticket with ID 123 |
| /tickets/ | Tickets | POST | Add a new ticket |
| /users/ | Users | GET | Real all users from the system |
| /users/123 | Users | GET | Read the user with ID 123 |
| /users/456 | Users | DELETE | Delete the user with ID 456 |
| /users/789 | Users | PUT | Update user with ID 789 |
| /users/ | Users | POST | Create new user |

## Entity Design

The project consists of 5 entities (User, Match, Ticket, Football Team, and Stadium). Below each of them are explained.

**User**

**Text

Description automatically generated**

**Match**

**Text

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**Ticket**

**Text

Description automatically generated**

**Football Team**

**Text

Description automatically generated**

**Stadium**

**Text

Description automatically generated**

# **Sonarqube**

Graphical user interface, application

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