Songify Design Document

Issue Record

Version	Date	Notes
0.1	18/3/21	Added ERD, frontend framework research, explanation on design choices and how SOLID is guaranteed .
0.2	13/4/21	Numbered the chapters, C4 Model, APA style references and DOT Framework methods used.
0.3	14/05/21	Added CI/CD setup diagram, updated C4 model, updated backend design choice (H2 → MySQL), updated ERD.

Table of Contents

1. Introduction

The project Songify aims to create a web application that anyone can use to create, edit, view, delete and share playlists with friends. In this document the architecture of the applications involved will be discussed, and the choices made during the making of them will be justified.

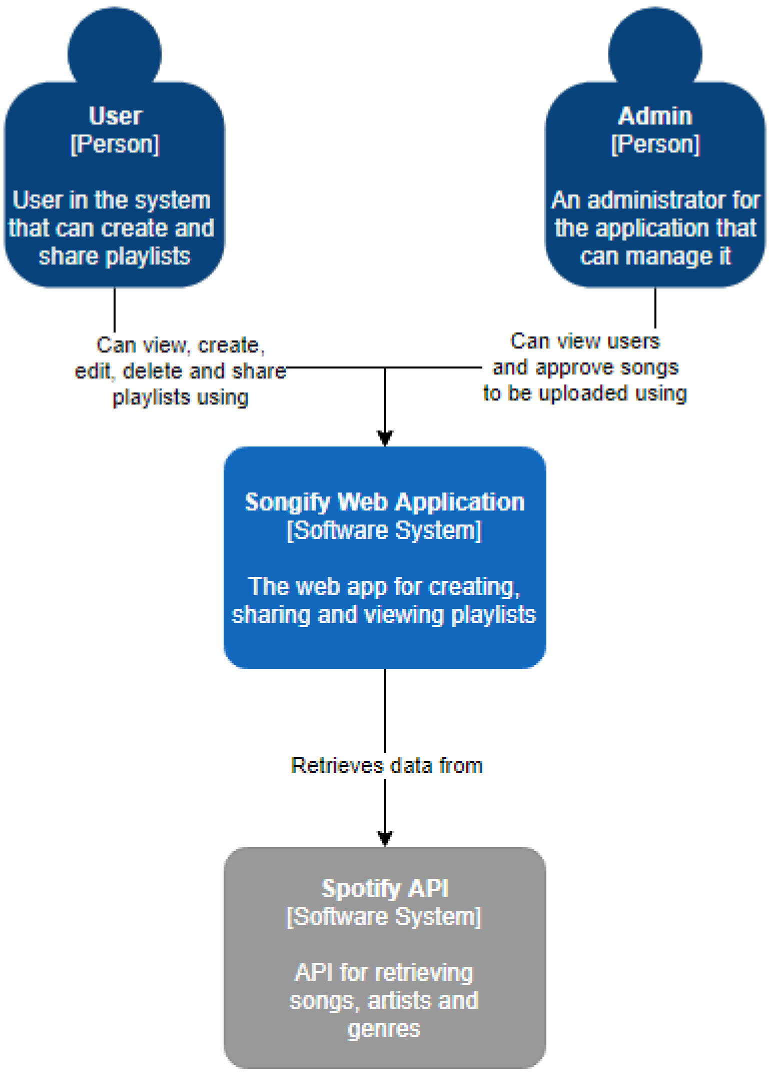
2. Architecture

2.1. C4 Model

The C4 model was made to show the architecture behind the Songify application. The reasoning for why specific systems and technologies were used are discussed later in this document.

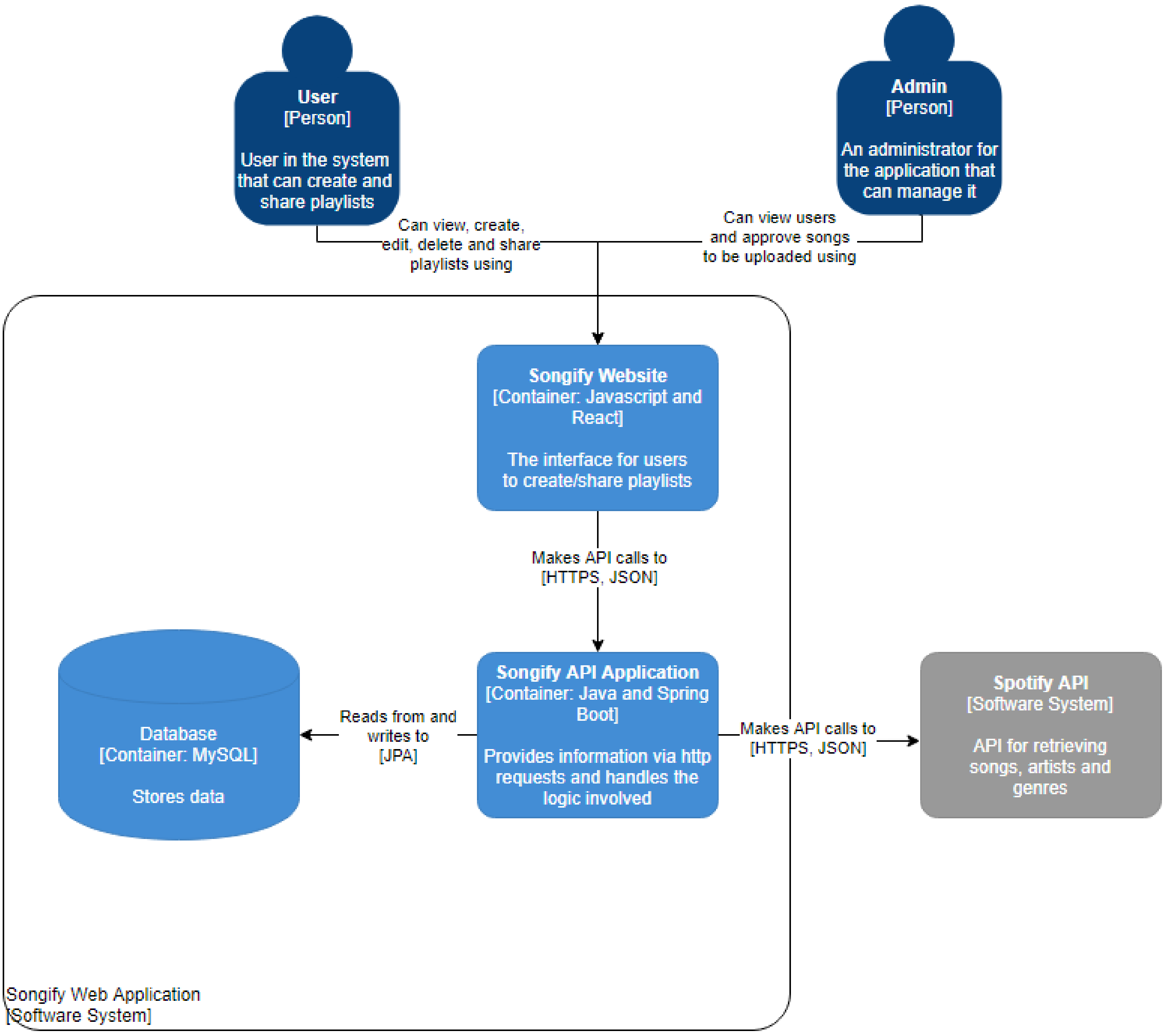
C1: System Context Diagram

The system context diagram shows the software being made, the actors it interacts with and the external system it uses. In the diagram the two actors are regular users and admins. The external system shown is the Spotify API.


User
[Person]
User in the system that can create and share playlists
Admin
[Person]
An administrator for the application that can manage it
Can view, create, edit, delete and share playlists using
Can view users and approve songs to be uploaded using
Songify Web Application
[Software System]
The web app for creating, sharing and viewing playlists
Retrieves data from
Spotify API
[Software System]
API for retrieving songs, artists and genres

C2: Container diagram

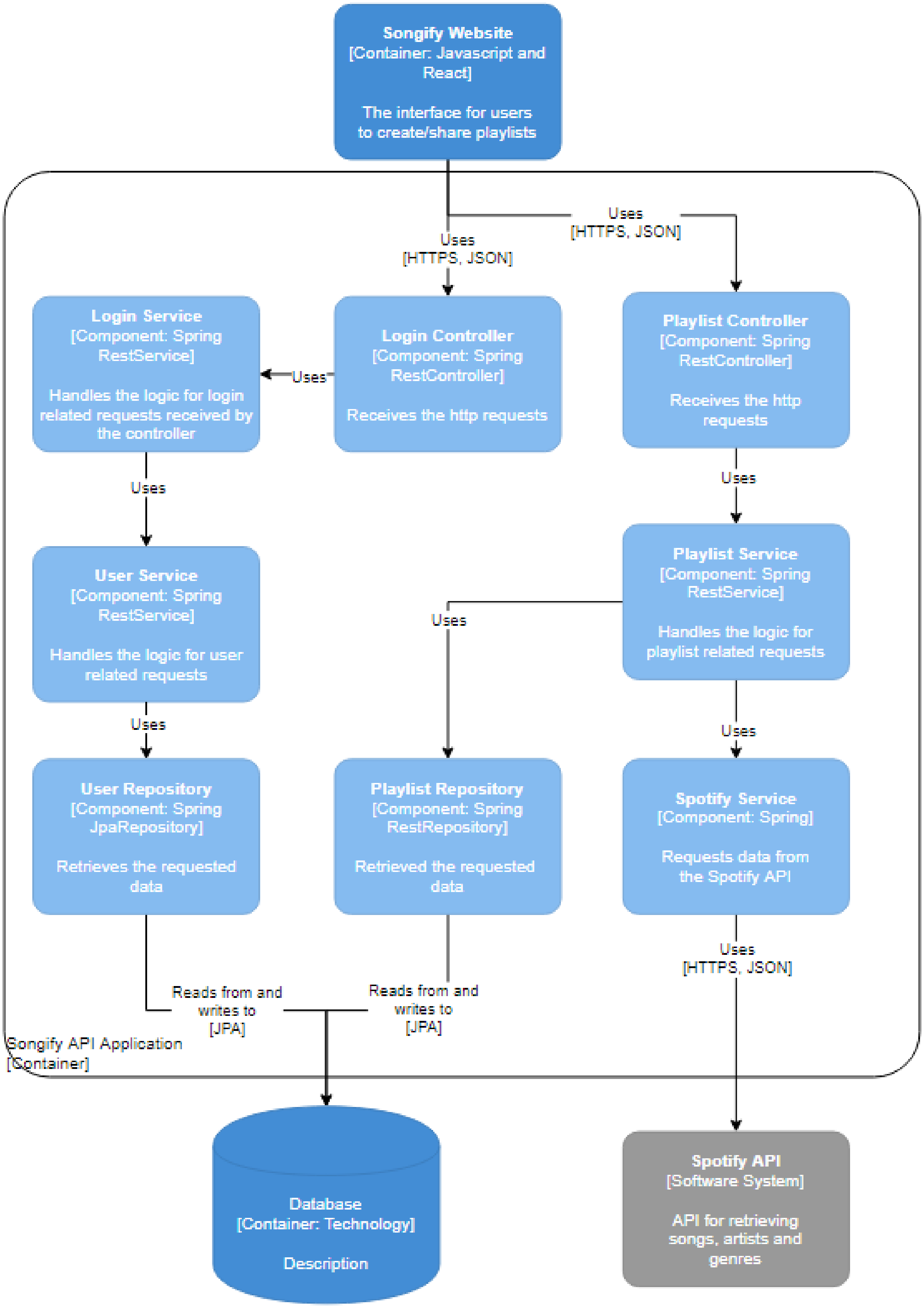
The container diagram provides a deeper look into the Songify Web Application software system shown in C1. The application consists of a single page web application made with React, a Spring Boot restful api and a MySQL database to store data.



User
[Person]
User in the system that can create and share playlists
Admin
[Person]
An administrator for the application that can manage it
Can view, create, edit, delete and share playlists using
Can view users and approve songs to be uploaded using
Songify Website
[Container: Javascript and React]
The interface for users to create/share playlists
Makes API calls to [HTTPS, JSON]
Songify API Application
[Container: Java and Spring Boot]
Provides information via http requests and handles the logic involved
Reads from and writes to [JPA]
Database
[Container: MySQL]
Stores data
Makes API calls to [HTTPS, JSON]
Spotify API
[Software System]
API for retrieving songs, artists and genres
Songify Web Application
[Software System]

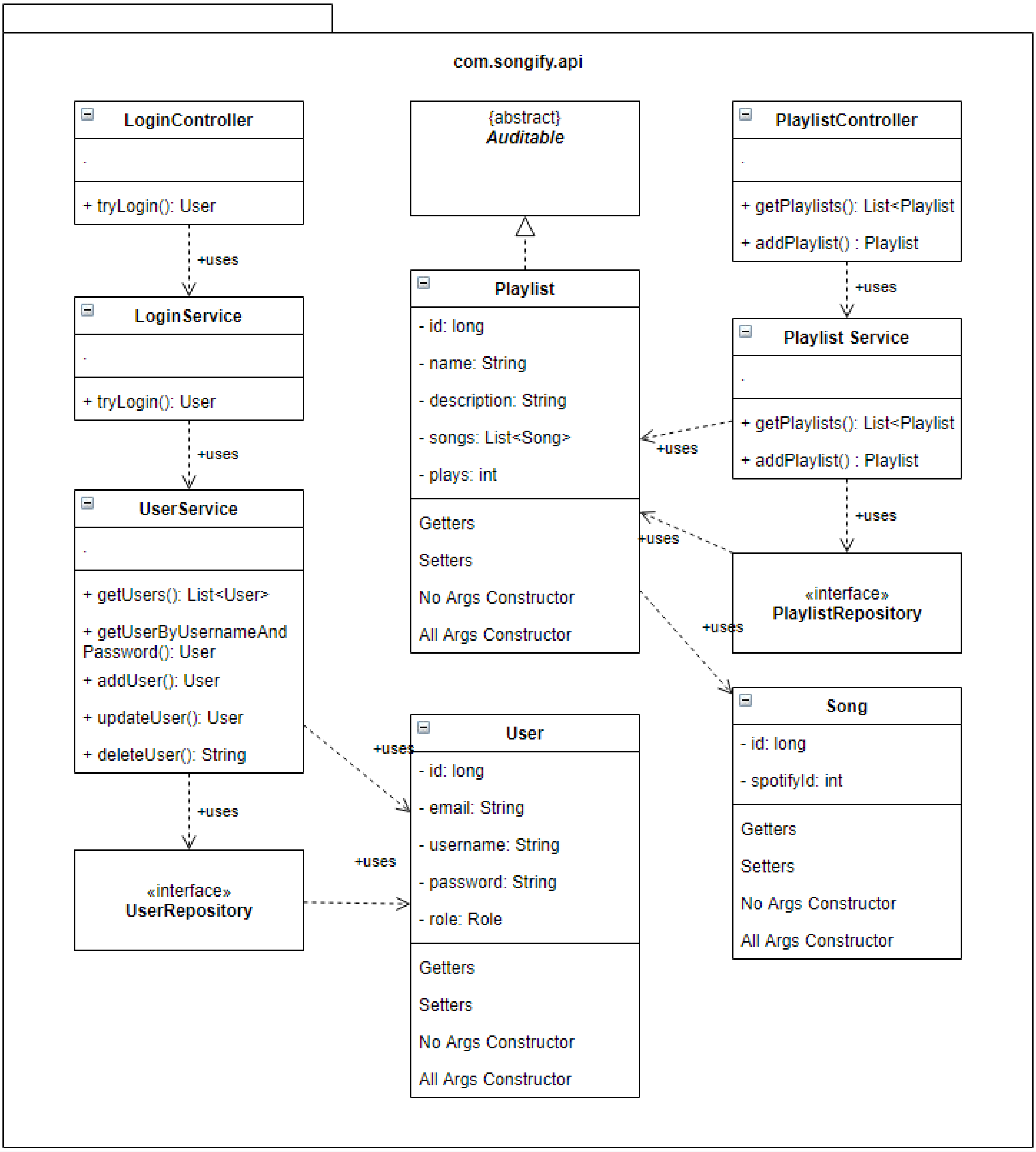
C3: Component diagram

The component diagram goes even deeper and shows the components that make up the Songify API Application container shown in C2. Because there would be too many to fit on the page only a few routes are shown, instead of all.

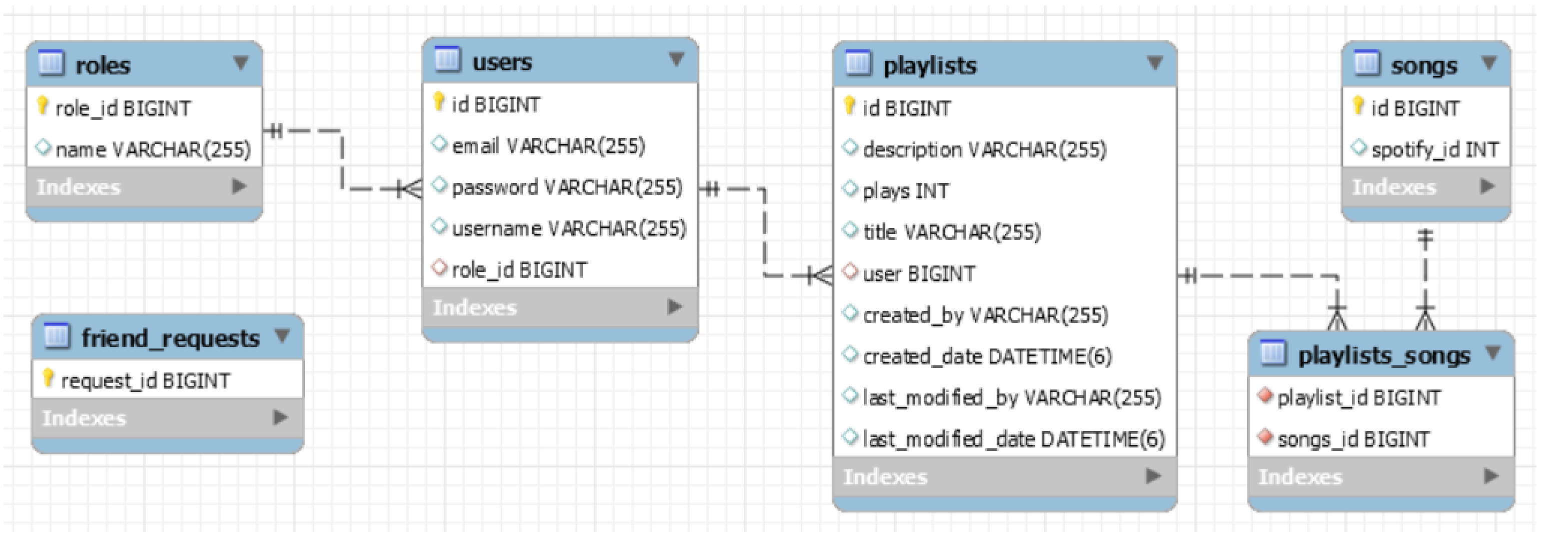

Songify Website
[Container: Javascript and React]
The interface for users to create/share playlists
Uses [HTTPS, JSON]
Uses [HTTPS, JSON]
Login Service
[Component: Spring RestService]
Handles the logic for login related requests received by the controller
Uses
Login Controller
[Component: Spring RestController]
Receives the http requests
Playlist Controller
[Component: Spring RestController]
Receives the http requests
Uses
Uses
User Service
[Component: Spring RestService]
Handles the logic for user related requests
Playlist Service
[Component: Spring RestService]
Handles the logic for playlist related requests
Uses
Uses
Uses
User Repository
[Component: Spring JpaRepository]
Retrieves the requested data
Playlist Repository
[Component: Spring RestRepository]
Retrieved the requested data
Spotify Service
[Component: Spring]
Requests data from the Spotify API
Uses [HTTPS, JSON]
Reads from and writes to [JPA]
Reads from and writes to [JPA]
Songify API Application
[Container]
Database
[Container: Technology]
Description
Spotify API
[Software System]
API for retrieving songs, artists and genres

C4: Code diagram

The C4 diagram is essentially a UML Class diagram. The classes shown are not all of the ones used for the api, but the ones related with the C3 diagram. The inheritance from playlist to Auditable is shown and the use of interfaces that extend the JpaRepository class created by the spring framework.



2.2 Entity Relationship Diagram



In the ERD above the entities currently in the system are shown. Because the songs are retrieved via the Spotify API, the table only contains the id used in the Spotify database. The roles table handles the difference between regular users and admins. Lastly, the friend_requests table will for now only store friendships but in later iterations could also be used to store other relationships such as followers.

2.3 SOLID Principles

To ensure solid, a 3 layered design has been implemented. The presentation, logic and data access layer. The logic and data access layers are within the Spring boot application while the presentation layer is the react application.

3. Design Choices

3.1 DOT Framework methods used

The research strategies used to find, test and eventually decide on a final option are the following:

Library **Workshop**

3.2 Backend

Why Spring Boot?
Spring Boot significantly decreases development time because it has a default setup for tests and it comes with many dependencies that can be plugged into the Spring application. (Scand, 2020) Another option was to create the API with ASP.NET Core. I have previous experience with this but because of this I decided to take on a new challenge in Spring boot.

Why H2 Database?
H2 is in-memory therefore it will not persist. Because it is embedded it is a great option for development and testing. Once the application is ready for production/release, H2 database will be a less practical option and will likely be swapped for another database engine. When the time comes I plan to use MySQL because of previous experience and it is reliable.

3.3 Frontend

For this project I have chosen React.

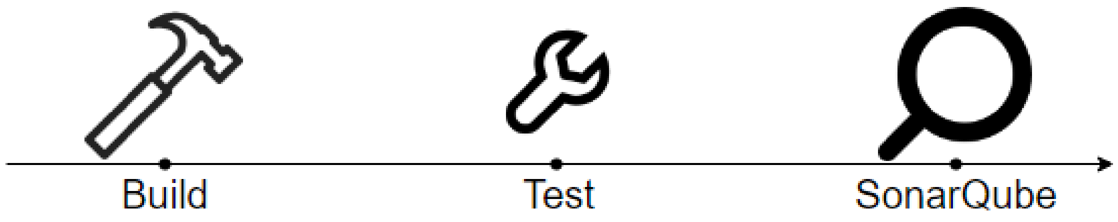
	Angular	React	Vue
Ease of Learning	Medium	Medium	Easy
Performance	Good	Good	Good
State Management	✓	✓	✓
Form validation & handling	✓	✗	✗
Routing	✓	✗	✓
Language	TS	JS/JSX	JS/JSX
Personal experience	Minor	None	None

In the table above are the most important factors for me when choosing a framework, with performance and previous experience being the least important. At times, Angular can feel a bit big, because there are many features built into Angular which from personal experience I have never needed. Because of this and the fact that Vue has a small number of components/plugins, I chose React. In the table you may have seen that React lacks form validation and routing, but this isn’t an issue because third-party libraries such as Redux and Formik can be used to implement these features. The option to add these third-party libraries is another good reason I chose React. (*Angular Vs React Vs Vue*, 2020)

Methods from the DOT framework used:

1. Library: researching options and comparing them to see what is practical/best for this project.

4. CI/CD



The diagram above shows the stages within the CI pipeline. Once code is pushed, firstly a build is made, then the unit tests are executed and lastly sonarqube is used to test code quality. In a future iteration integration tests will also be added to this pipeline, but since they are not implemented yet, i have not it as a stage in the diagram

Bibliography

Angular vs React vs Vue. (2020, March 19). Academind. Retrieved March 18, 2021, from https://academind.com/tutorials/angular-vs-react-vs-vue-my-thoughts/

Scand. (2020, June 26). *Key advantages of using spring boot*. SC & Scand. Retrieved March 18, 2020, from https://scand.com/company/blog/pros-and-cons-of-using-spring-boot/