

POLITECNICO MILANO 1863

SOFTWARE ENGINEERING 2 PROJECT
ACADEMIC YEAR 2021 - 2022

DREAM

Design Document

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Version 1
January 2, 2022

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1 Introduction

1.1 Purpose

1.2 Scope

1.3 Definitions, Acronyms, Abbreviations

1.4 Revision history

1.5 Reference Documents

1.6 Document Structure

2 Architectural Design

2.1 High-level components and their interaction

In the following section it is provided a high level view of the architecture of the system, which is structured following the three logic layer:

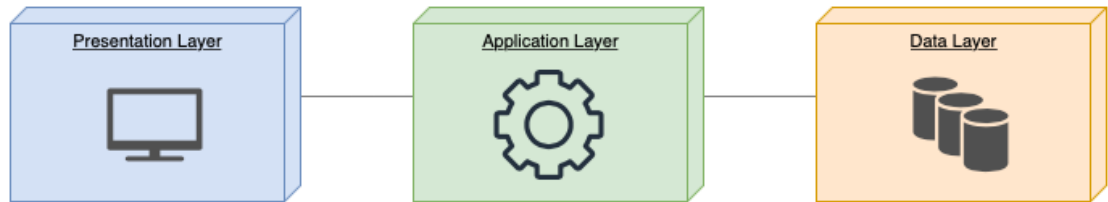


Figure 1: three layer architecture

- **Presentation Layer (P):** The presentation tier is the user interface and communication layer of the application, where the end user interacts with the application. Its main purpose is to display information to and collect information from the user. This top-level tier can run on a web browser, as desktop application, or a graphical user interface (GUI), for example.

Web presentation tiers are usually developed using HTML, CSS and JavaScript. Desktop applications can be written in a variety of languages depending on the platform.

- **Business Logic or Application Layer(L):** The application tier is the heart of the application. In this tier, information collected in the presentation tier is processed - sometimes against other information in the data tier - using business logic, a specific set of business rules. The application tier can also add, delete or modify data in the data tier.

The application tier is typically developed using Python, Java, Perl, PHP or Ruby, and communicates with the data tier using API calls.

- **Data Layer (D):** The data tier, sometimes called database tier, data access tier or back-end, is where the information processed by the application is stored and managed. This can be a relational database management system such as PostgreSQL, MySQL, MariaDB, Oracle, DB2, Informix or Microsoft SQL Server, or in a NoSQL Database server such as Cassandra, CouchDB or MongoDB.

In this case the system is a distributed application that follows the client-server paradigm: it is a two-tier architecture, consisting of a presentation and a data tier. the business logic lives in the data tier only. In a two-tier application,

all communication goes through the application tier. The presentation tier and the data tier cannot communicate directly with one another.

Client and server are being allocated into different physical machines and their communication takes place via other components and interfaces, located in the middle of the structure and composed by hardware and software modules. The client is a Web Application, with is by definition a thin client, because of its total dependency from the server; so it only contains the presentation layer.

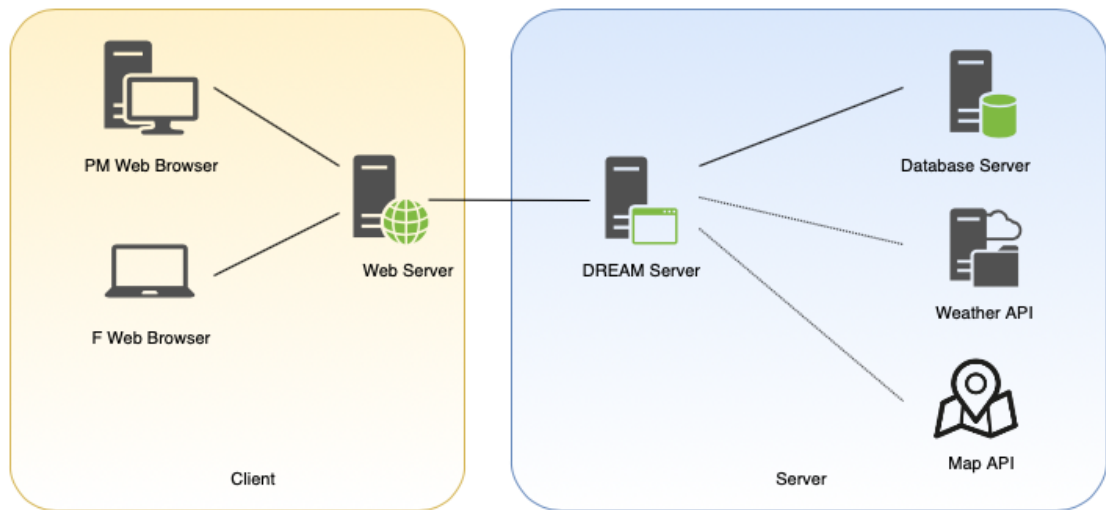


Figure 2: Dream system diagram.

- **Server side:**

- ApplicationServer (DREAM Server): it is the central point of the system. Is a server whit all the application logic, that communicates with the other servers.
- Database Server: this is the server where all the application data are stored.
- Weather API: external API used to retrieve data about weather in the territory. This information will be used to fill each farm page.
- Map API: external API used to retrieve data about the territory.

- **Client side:**

- Policy Maker Web Browser: browser used by the policy maker from their work desk to access to the system
- Farmer Web Browser: browser used by the farmer to access to the system

2.2 Component view

In this section it is provided a description of the components and interfaces of the system, how they are organized internally and how they communicate with each other.

2.2.1 High Level

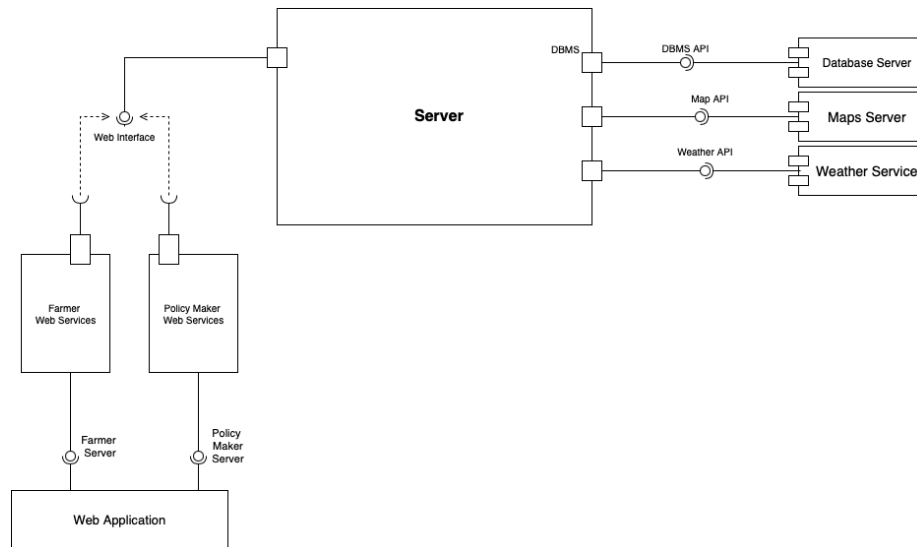


Figure 3: Component view.

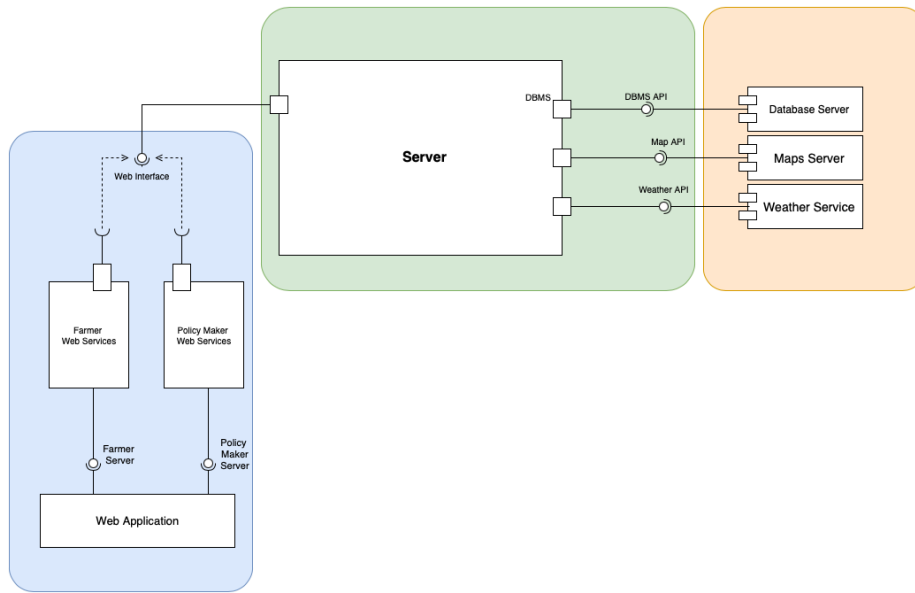


Figure 4: Component view.

2.2.2 Server

More specific and detailed on the server inner components.

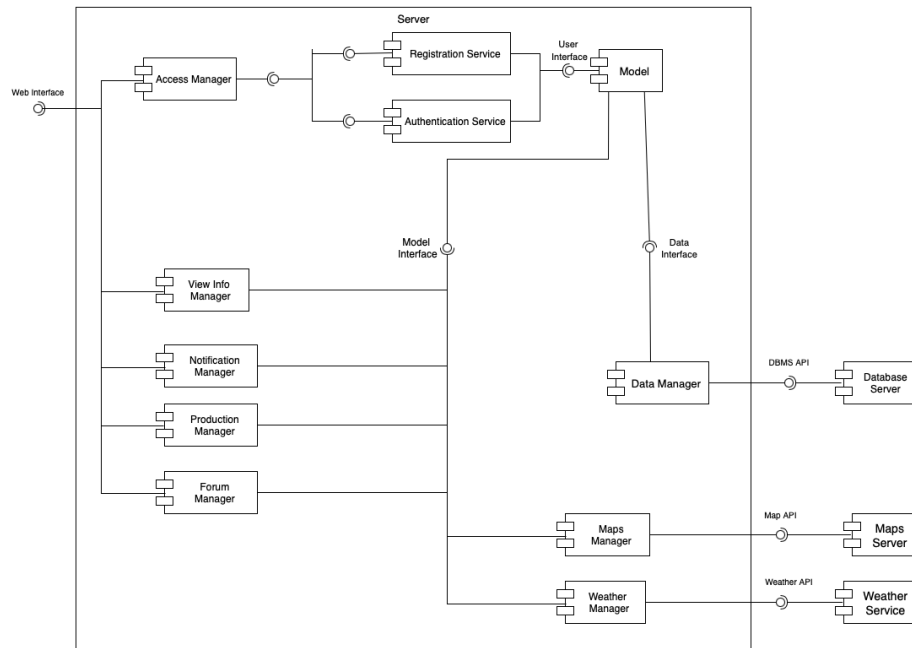


Figure 5: Inner server component view.

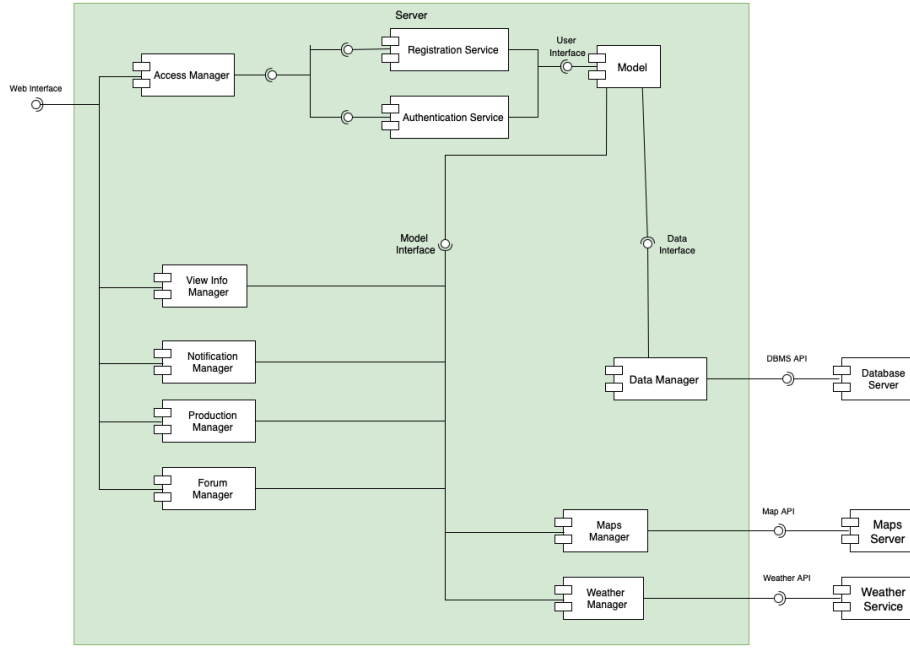


Figure 6: Inner server component view2.

2.3 Deployment view

The deployment diagram in figure .. shows the allocation of the software components in the physical tiers of the system. The system is organized into a three-tier application. This type of architecture can be beneficial because each tier can be developed in parallel and maintained as single modules on separate platforms.

- **Presentation Tier:** it is the user interface of the application, where the user interacts with the application. In this case it can only be a computer with a web browser running on an operating system (for example MacOS). It is composed by the web app and the web server. The web server is responsible for the communication between application server and the client.
- **Application Tier:** it is the logic tier of the application. Where all the information collected in the previous tier are processed using business logic. This tier is also responsible for the communication with the data tier through the DBMS gateway. The most important thing is that all communication of the system goes through this tier.
- **Data Tier:** it is a database server for managing read and write access to the database. Therefore all the information processed by the application

tier are stored and managed here. Data tier is also independent of the two previous tiers.

2.4 Runtime view

In this section the focus is on the specific (dynamic) interaction between the components of the system; in other words the behaviour of the system at runtime. The functionality offered by the component are the same as the ones in the RASD, but this time the focus is on how the internal components provides it. (MAKE SURE THAT THE OPERATION AND COMPONENT ARE ALL DEFINED IN THE COMPONENT DIAG/VIEW, in particular the interfaces that receives the msg)

1. farmer registration

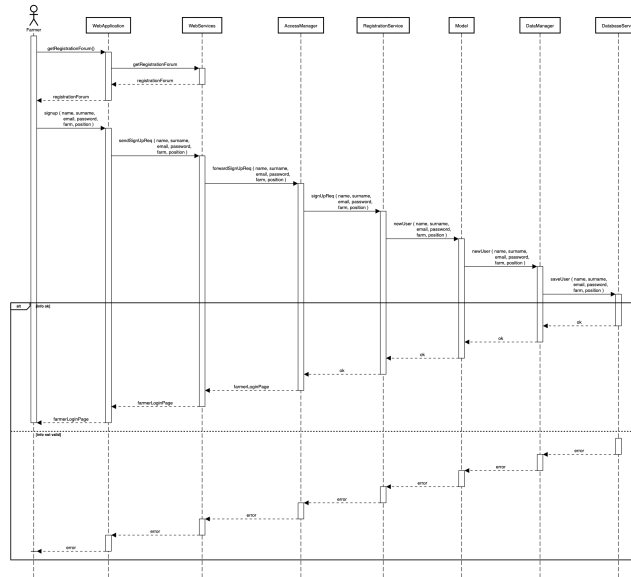


Figure 7: *SignUp* sequence diagram

2. f/pm login

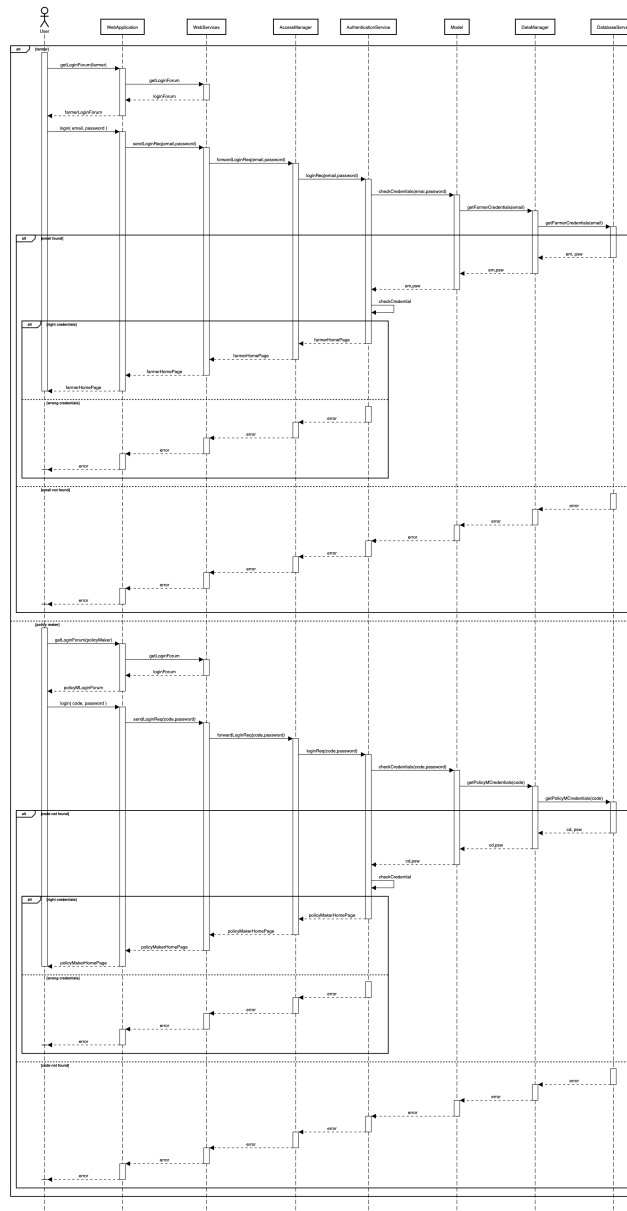


Figure 8: *Login* sequence diagram

3. f send msg on forum

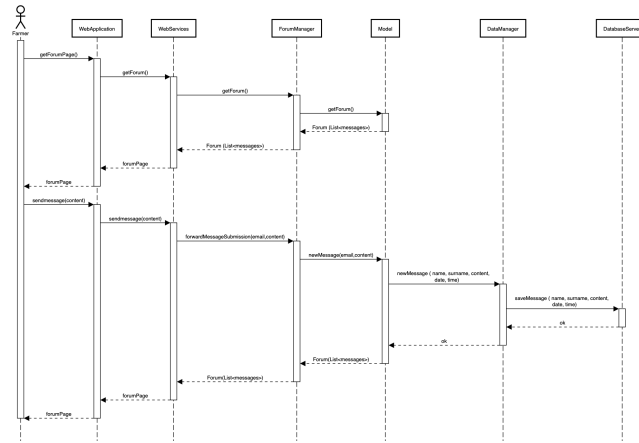


Figure 9: *Save message* sequence diagram

4. f submit production data

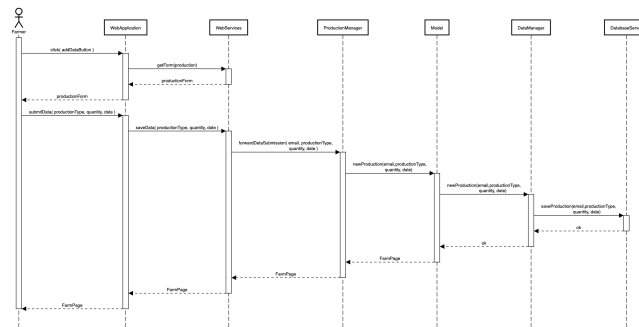


Figure 10: *Submit production data* sequence diagram

5. f/pm find farm on the map

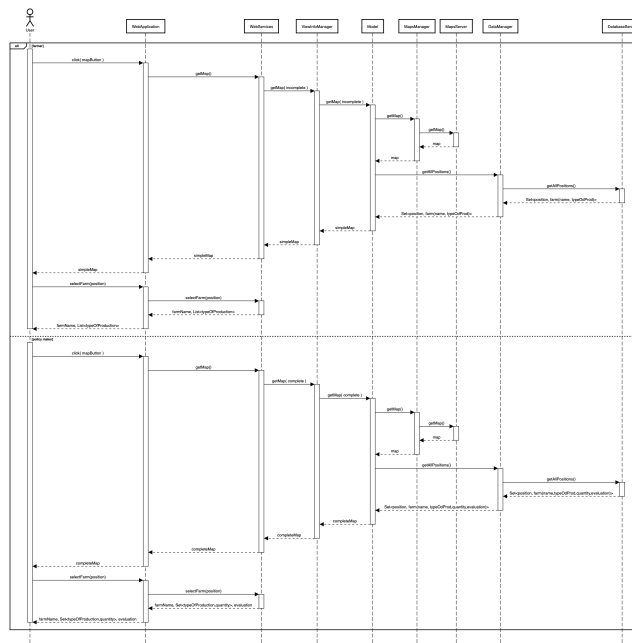


Figure 11: *Visualize map* sequence diagram

6. pm update the map (evaluation)

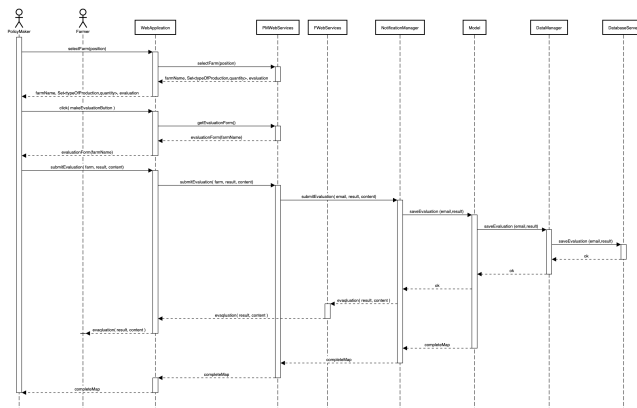


Figure 12: *Make evaluation* sequence diagram

7. f/pm visualize farm info (page)

8. submit notification (f: help, advice — pm: solution)

9. f/pm visualize notification

2.5 Component interfaces

2.6 Architectural styles and patterns

2.7 Other design decisions

3 User Interface Design

In this section there is a complete view of how the web application is going to look. It includes diagrams that show how the users can navigate in the user interfaces offered by the application. Its main purpose is to describe in details the mockups that are already presented in the RASD (reference). Therefore it is easier to understand the main features that the system offers.

3.1 UX diagrams

This subsection focuses on the flow of the windows of the web application, both for farmers and policy makers.

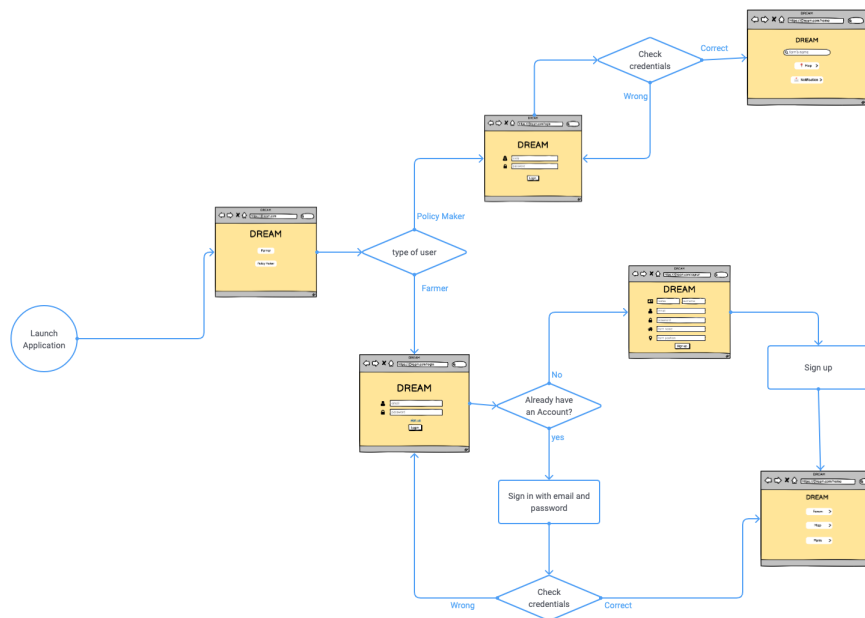


Figure 13: Sign Up & Sign In

4 Requirements Traceability

5 Implementation, Integration and Test Plan

6 Effort Spent

Student	Time for S.1	Time for S2	Time for S.3	Time for S.4	Time for S.5
Valeria Detomas	h	h	h	h	h
Sofia Martellozzo	h	h	h	h	h

7 Software and Tools used

- \LaTeX as document preparation system
- Lucidfor the state chart
- SequenceDiagram.org for the sequence diagrams
- Umletino for UML diagram
- Diagrams for the use case diagram
- Balsamig for the mockups
- **Alloy** as a model analyzer
- GitHub as verion control system.

8 References

- Specification document: R&DD Assignment A.Y. 2021-2022
- alloytool.org : Alloy Documentation