POLITECNICO
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R&DD Project

e-mobility for all

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2023/01/12

eMall

Summary

RASD:

-What are the goals of e-Mall?

-What are the user cases?

-What are the Application Scenarios of e-Mall?

-Alloy code

DD:

-What architectural styles and patterns will fit the system?

-What are the components and interfaces of the system?

-What's the implementation, integration and test plan of the system?

I. Goals of e-Mall

For eMSP:

-Allow the end user to search the charging stations nearby, their cost, any special offer they have.

-Allow the end user to book a charge in a specific charging station for a certain timeframe.

-Allow the end user to start the charging process at a certain station.

-Notify the end user when the charging process is finished.

-Allow the end user to pay for the obtained service.

I. Goals of e-Mall

For CPMS:

-Allow the CPO to know the location and “external” status of a charging station.

-Allow the CPO to start charging a vehicle according to the amount of power supplied by the socket and monitor the charging process to infer when the battery is full.

II. User cases

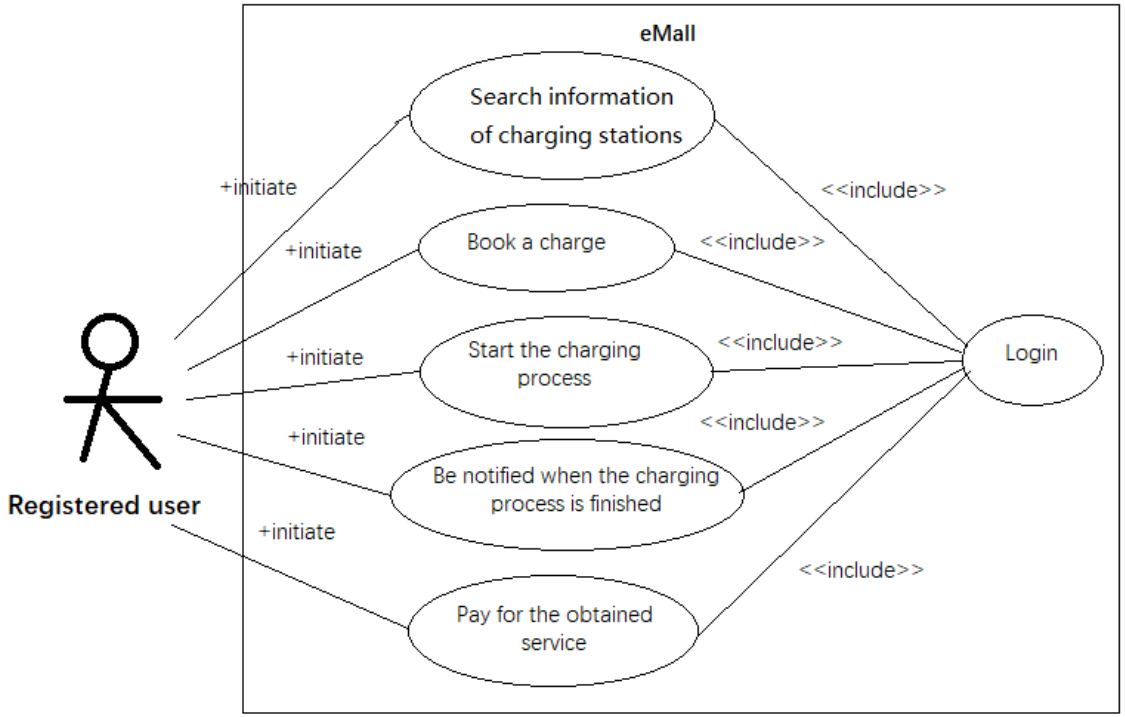
-User registration and login

-Search the charging stations

-Book a charge

-Start the charging process and be notified when it is finished

-Pay the service



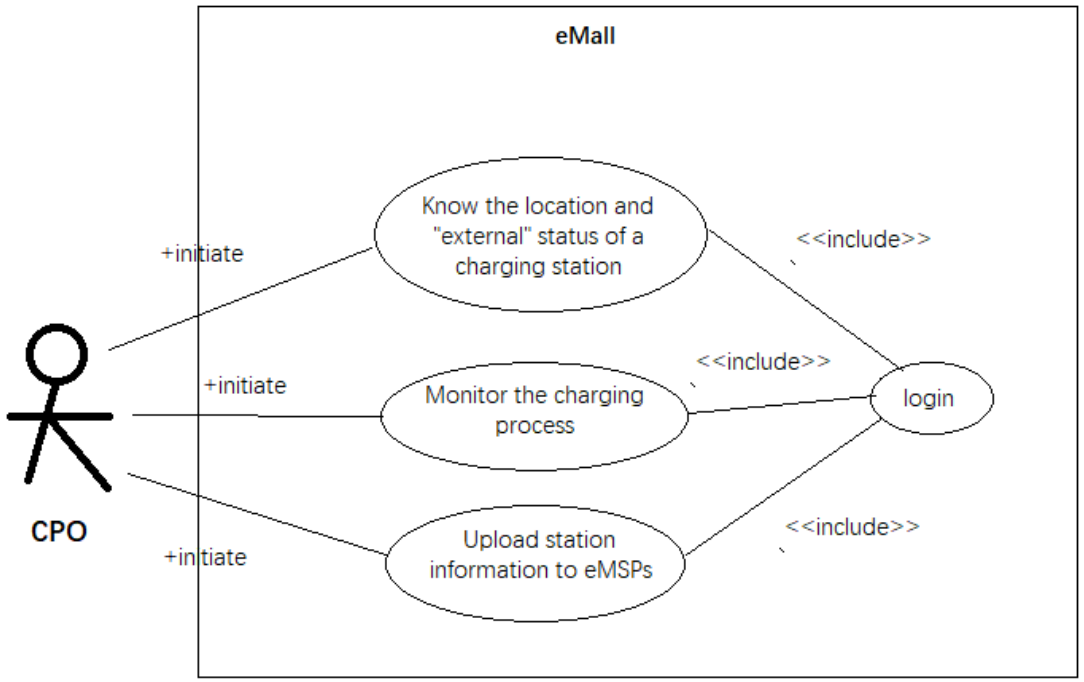
II. User cases

-CPO registration and login

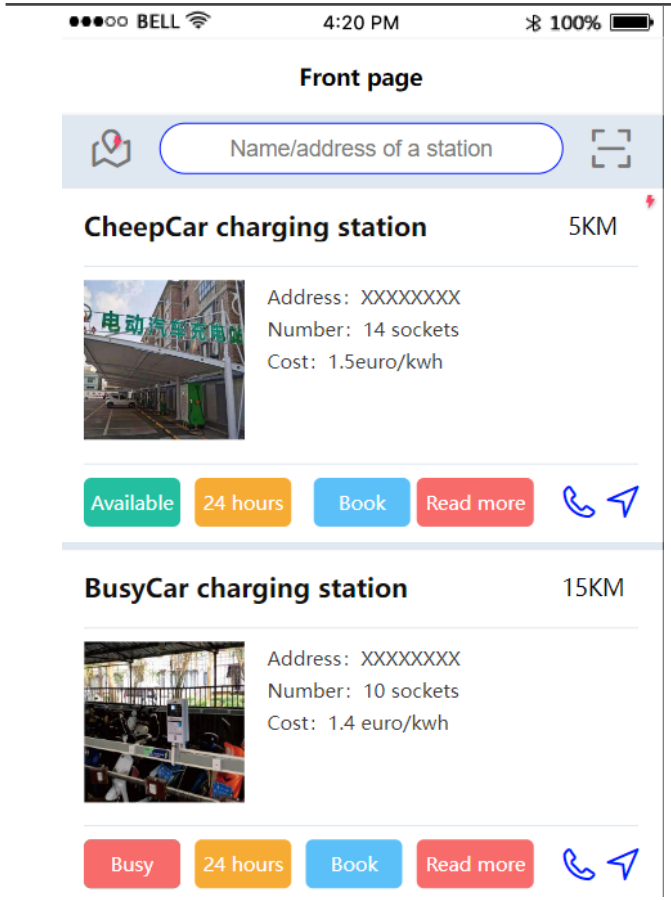
-Know the information of a charging station

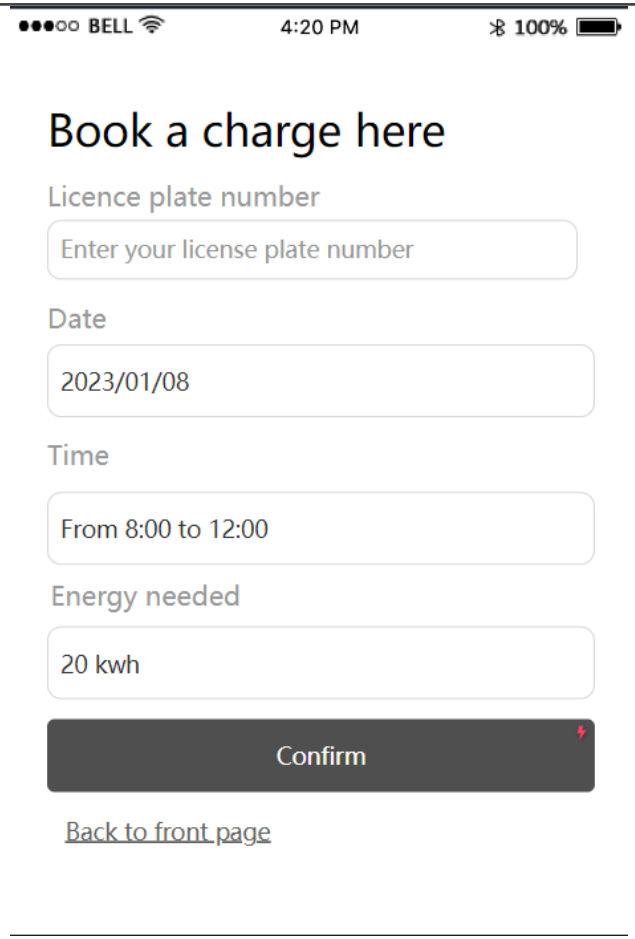
-Monitor the charging process

-Upload station information



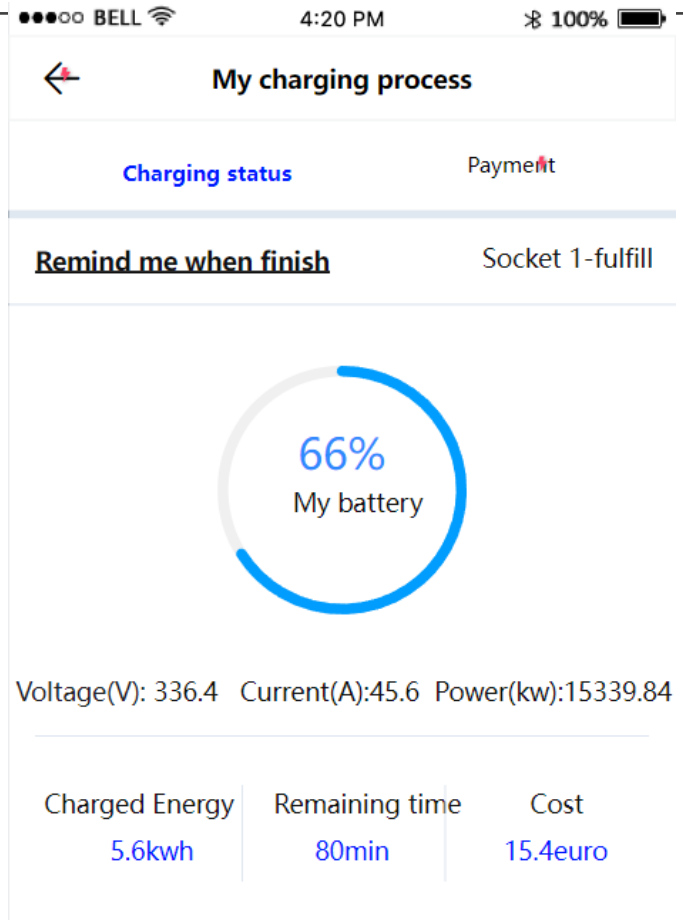
III. Application Scenarios





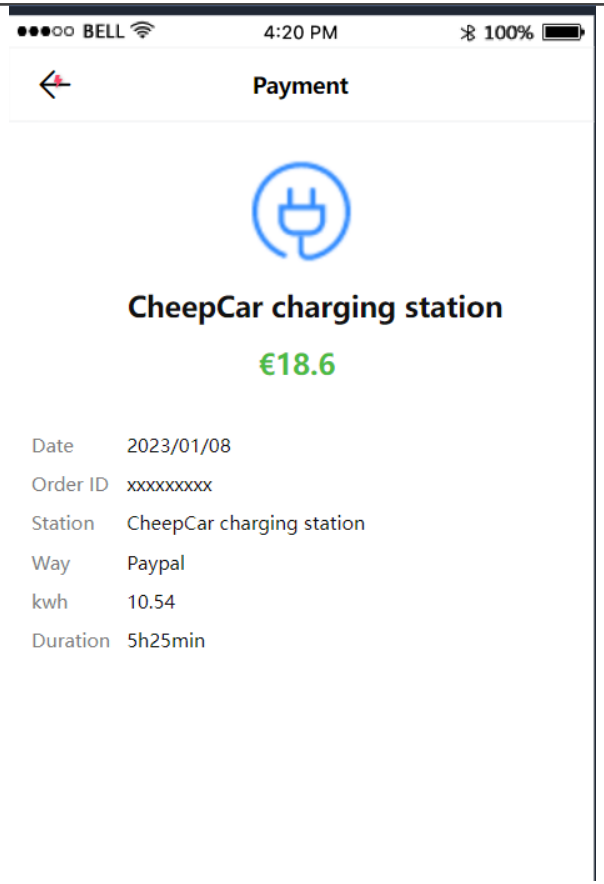
Search a charging station and book a charge.
(End user)

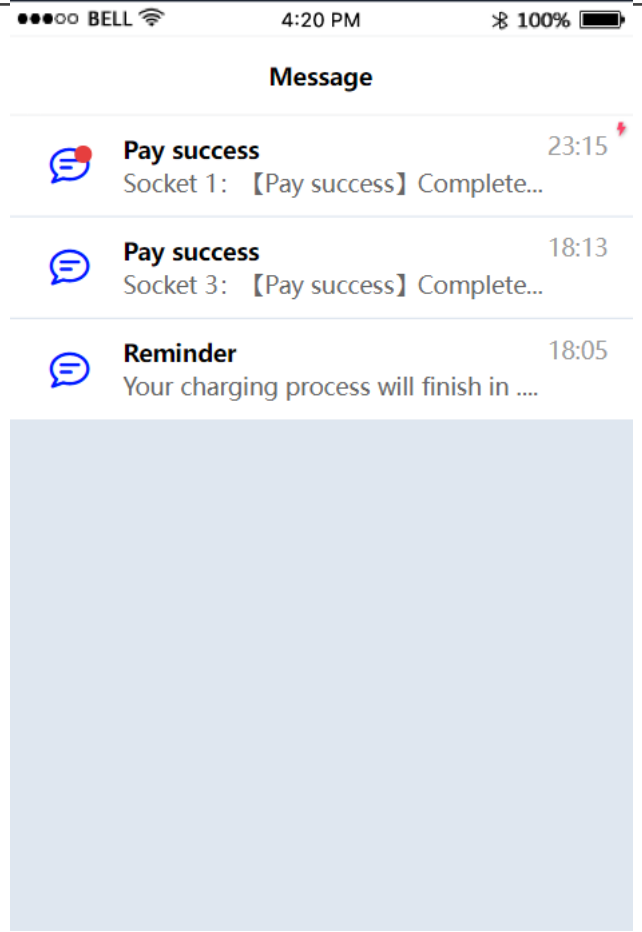
III. Application Scenarios



Start a charging process
(End user)

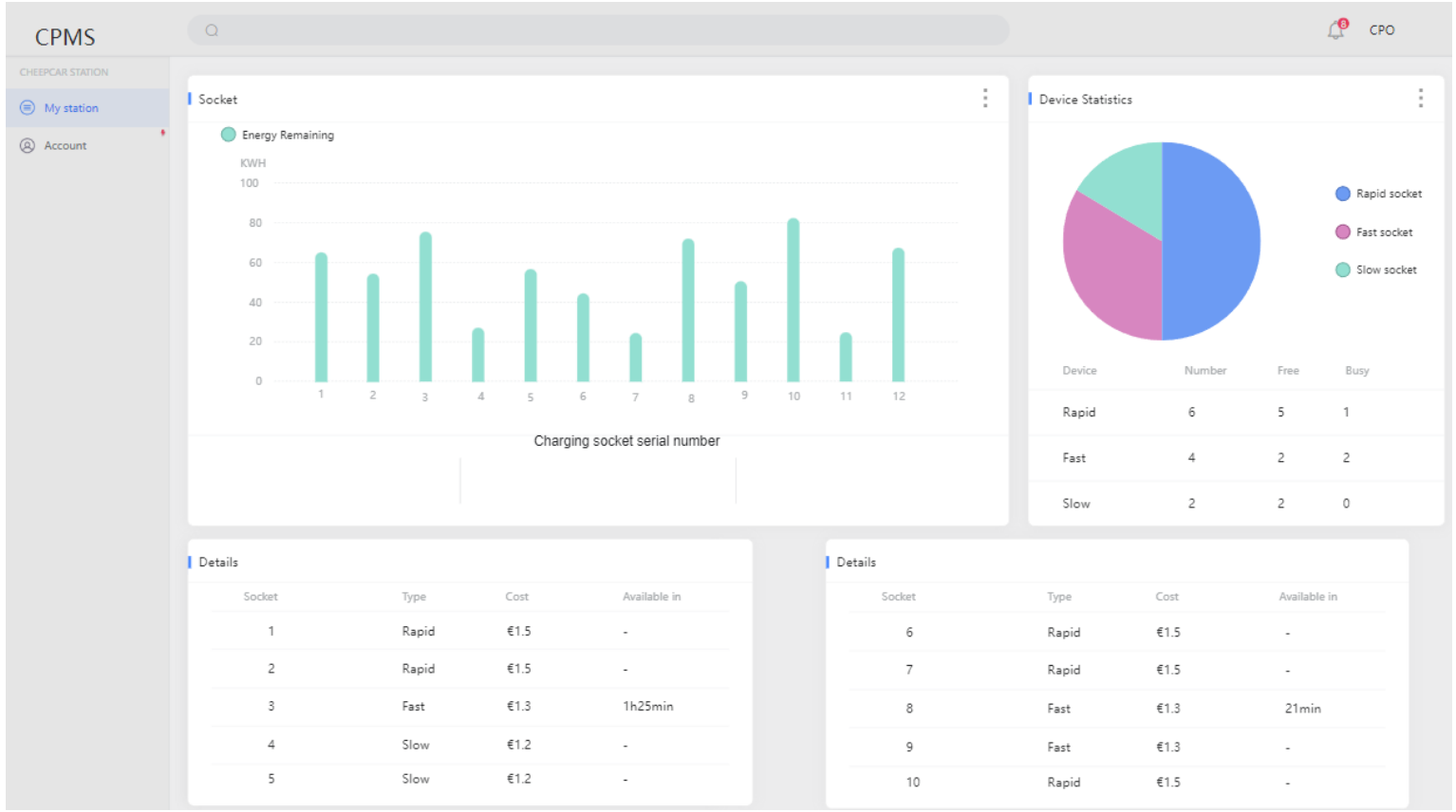
III. Application Scenarios





Pay the service
(End user)

III. Application Scenarios

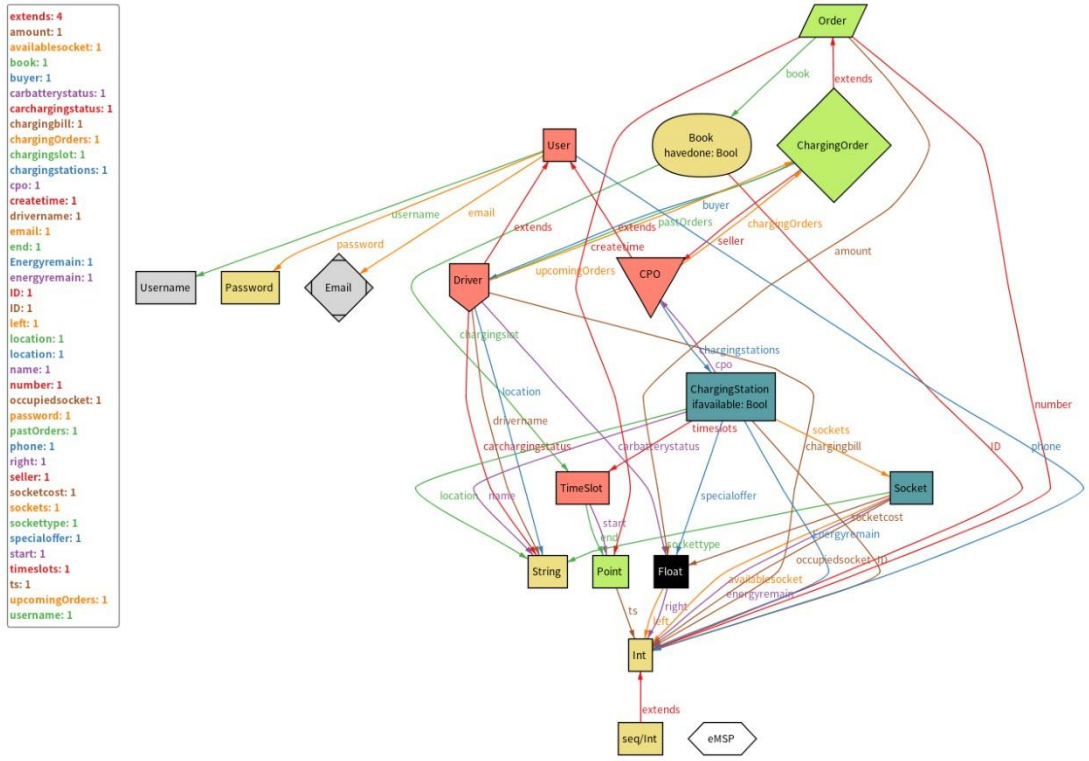


Know the external status of a charging station and monitor the charging process.
(CPO)

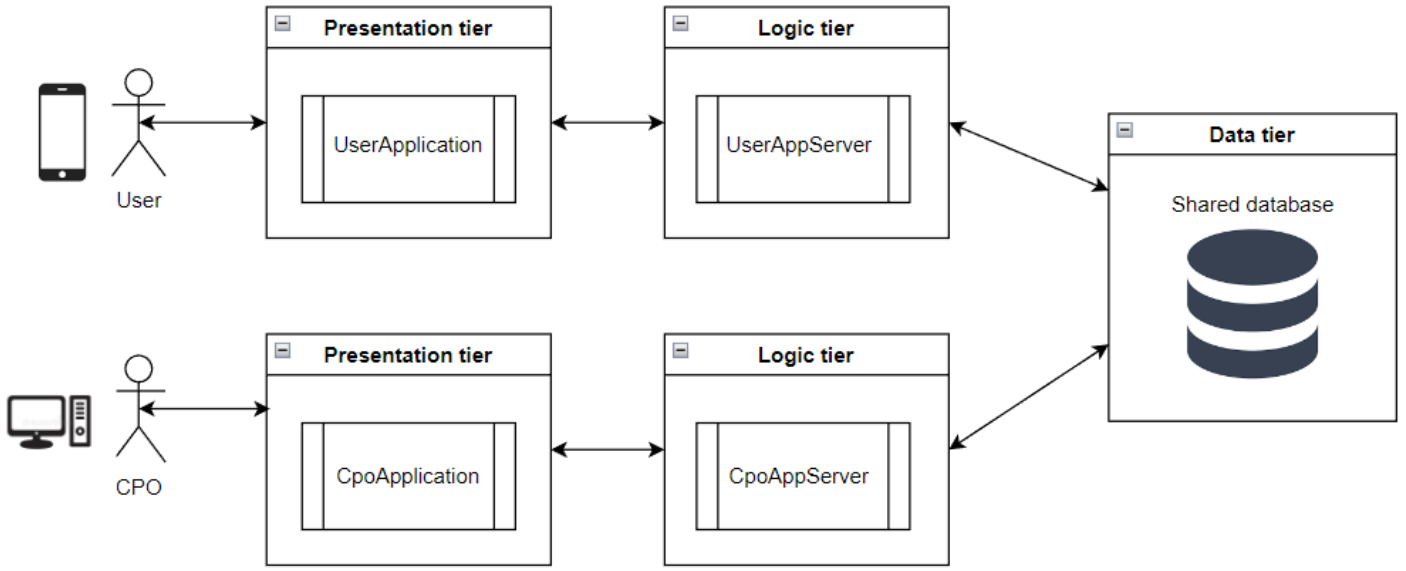
IV. Alloy code

- The alloy code focus on the classes(ex: User, charging station, socket, etc) and their relationship.

- It also contains some of the constraints that should be imposed. For example, every charging station must be owned by a CPO.



V. Architectural styles



Three-tier architecture.

V. Architectural style

Why three-tier architecture?

- The business logic of the system is separated from the data so that the data can be used for other applications if needed.

-Each layer can be independently developed.

-Subsequent updates will mainly focus on the business logic layer. Therefore, subsequent system maintenance and updates will be less complicated.

-Three-tier architecture has higher security.

V. Architectural patterns

MVC(**Model View Controller**) as the design pattern:

- Increase the applicability and maintainability of the system.

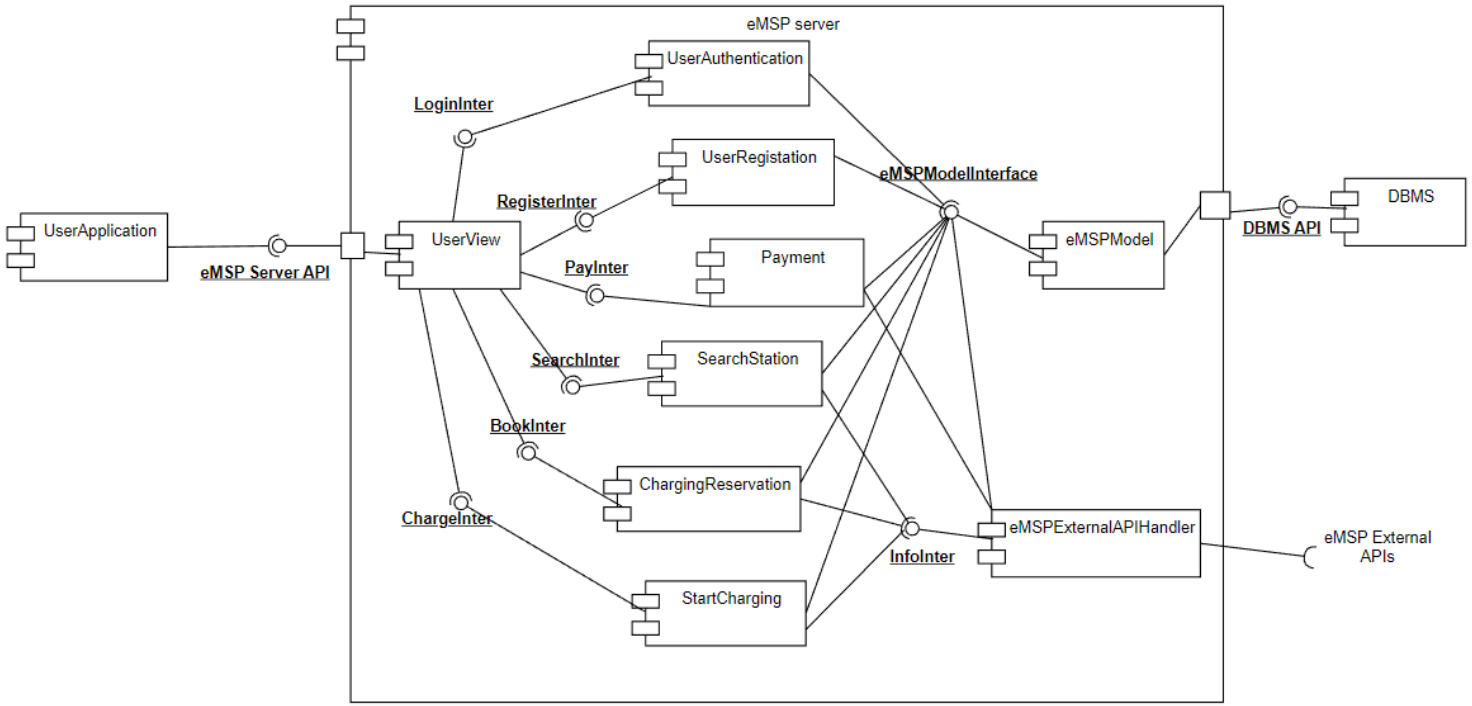
-Help the system have the characteristics of "high cohesion, low coupling".

Shared database:

-The databases required by eMSP and CPMS have a certain overlap

-To realizer some interactions between eMSP and CPMS

VI. Components and interfaces



Component diagram of eMSP

-UserApplication & UserView

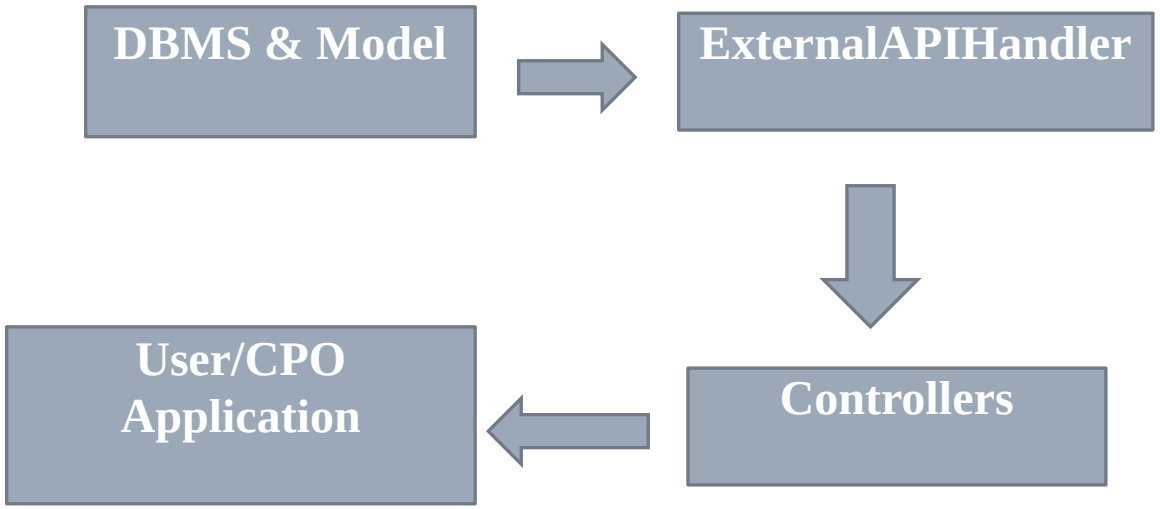
-Controllers (ex: Payment, SearchStation, StartCharging…)

-Model: Solely responsible for communicating with the data tier.

-ExternalAPIHandler: Handle communication with external services.

-DBMS: Database Management System

VII. Implementation plan



- The shared DBMS obviously is the most important part of our system.

- Model is the most basic component which is responsible for communicating with the data tier.

- ExternalAPIHandler will supply the controllers with the rest of the data they need to function

- Controllers can be developed in parallel.

VII. Integration and test plan

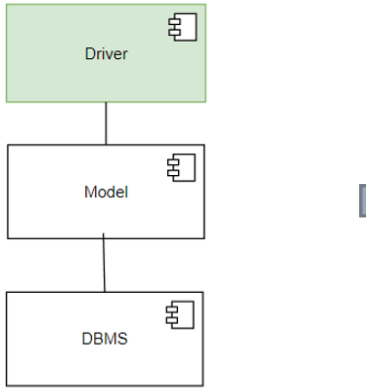


Figure 22: Integration test of Model and DBMS

DBMS & Model

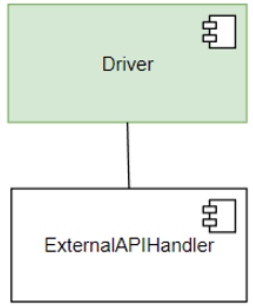


Figure 23: Integration test of the external API component

ExternalAPIHandler

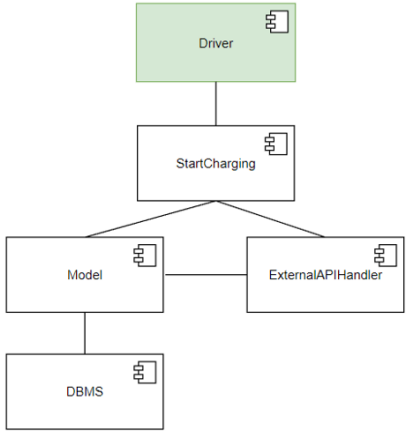


Figure 24: Integration test of controllers

Controllers

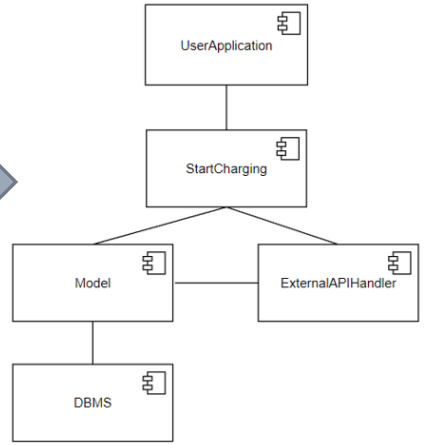


Figure 25: The final integration to complete the system, UserApplication

User/CPO Application

Thank you for your attention!