Requirement Analysis and Specification Document

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PowerEnJoy structure

- We offer both a website and a mobile app
- The app is used both to unlock cars and while using th service (e.g. allows to choose the Power saving option)
- We have "Operators" that can both help customers via a hotline or intervene themselves on a car (e.g. low battery, accident)
- The system is managed by a System Administrator who can do virtually anything (e.g. add or remove cars)

Goals

1. Allow visitors to sign up.

2. Allow visitors to log in.

3. Allow Users and Active Users to update or modify their profile's information.

4. Show updated information on available cars.

5. Allow Active Users to reserve a car.

6. Allow Active Users to unlock the reserved car

7. Compute the fare.

8. Allow System Administrator(s) to update system's information.

9. Ensure that the fare is paid.

10. Allow the driver to choose the money saving option and get near their destionation.

11. Allow the user to park the rented car in safe zone.

Interesting Requirements

1. The list of available cars always includes only cars that are parked and not reserved and each is shown on a map in the location where it is actually parked.

2. Users should be able to apply filters to show only cars within a certain distance from a specified location or with a minimum percentage of battery left.

3. If a user unlocks the car without igniting the engine, the systems starts charging the regular price after the pick up time (one hour from the reservation) expires.

4. If a user does not ignite the car within 15 minutes from the moment he unlocks it, the systems prompts the user to confirm he is fine. If no answer is received, an operator checks the car.

5. The system shall be able to check the consistency of the information modified [by the System Administrator] given a set of rules.

6. If the AU doesn't park in the suggested station the money

Assumptions

1. There is at least one System Administrator that manages the website and the app.
2. The System Administrator can add and remove cars from the system and manage their status if needed.
3. There are operators that can recover cars.
4. Only Active Users can use the service.
5. Every car has a unique code (different from the licence number) that is visible from the outside. This number is used to ensure that a User is near a Car if he tries to unlock it and no GPS data is available.
6. The licence Office (Motorizzazione Civile) allows for automated check of Licence Numbers, also providing checks for Name and Surname (at least). This check can be done in any moment of the day and gives immediate feedback.
7. Foreign licences are allowed, but will be checked personally by an operator.

Assumptions (cont.)

1. An active user can reserve up to one car at any given time.
2. Every car has a screen.
3. Every car is connected to the internet and can change the displayed information, which can be remotely updated by the system.
4. As soon as an Active User's DL o CC expires, he is downgraded to User (cannot book/rent cars) until he updates the relevant information and is notified of the problem.
5. An AU can temporarily switch the engine off ("park" the car in the common meaning) and keep paying for the rental in order to be able to pick up the same car again. This is only possible outside the Safe Zone.
6. An Assistance Service via phone will be provided and will deal with all the phenomena the system can not handle (e.g. accidents, paying fees and any other problem with cars not explicitly indicated in this document as held by the system).

Actors

- Visitor: person that may not be registered to the system or not logged in.

- User: a registered and logged in Visitor, that may be still waiting for his information to be verified.

- Active User: a User whose data (CC, DL) have been verified.

- Operator: person that physically actuates any operation needed by the system in the physical world.

- System Administrator: person in charge of the maintenance of the system and the management of cars' information.

- Geographical DB (Gmaps)

- Payment Handler

Use Case Diagram
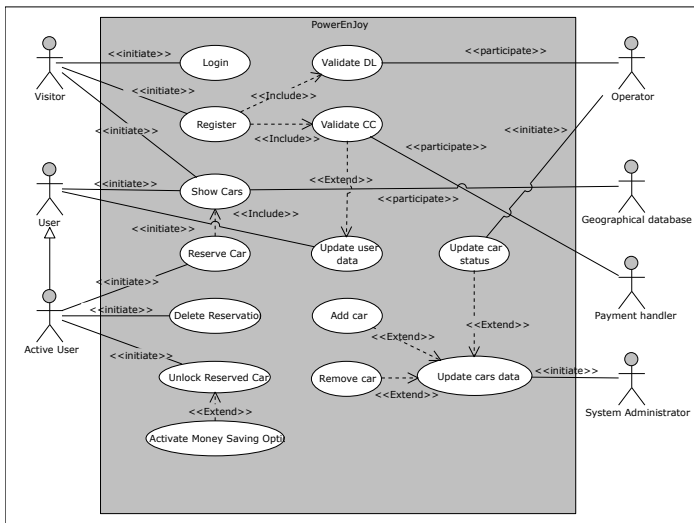
Use Cases - Goals relationship

- G1 (Allow visitors to sign up) $\Rightarrow$ Register
- G2 (Allow visitors to log in) $\Rightarrow$ Login
- G3 (Allow Users to update or modify their profile's information) $\Rightarrow$ Update user data
- G4 (Show updated information on available cars) $\Rightarrow$ Show Cars
- G5 (Allow Active Users to reserve a car) $\Rightarrow$ Reserve Car, Delete Reservation
- G6 (Allow Active Users to unlock the car they reserved) $\Rightarrow$ Unlock Car
- G7 + G10 $\Rightarrow$ Activate Money Saving Option
- G8 (Allow System Administrator(s) to update information) $\Rightarrow$ Update Cars Data

Visitor interaction with the system
Activity Diagram
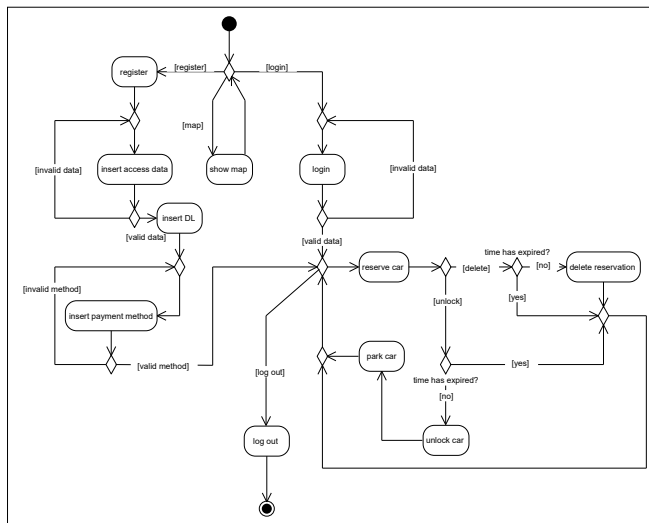
Active User interaction with the system
BPMN
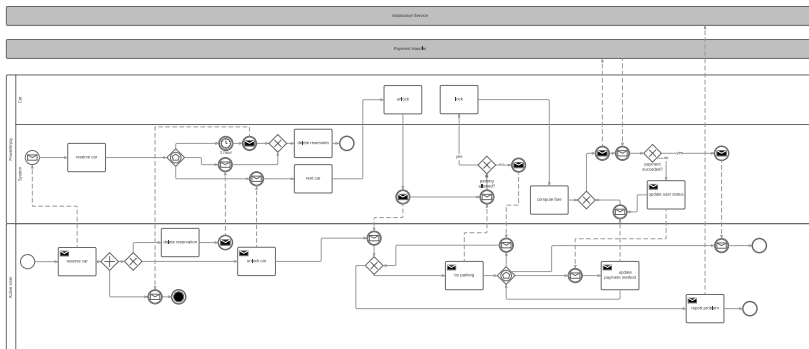
Modeling of the process of car reservation, dealing with the possible timeout, the deletion of the reservation, the actual unlocking of the car and the payment procedure.
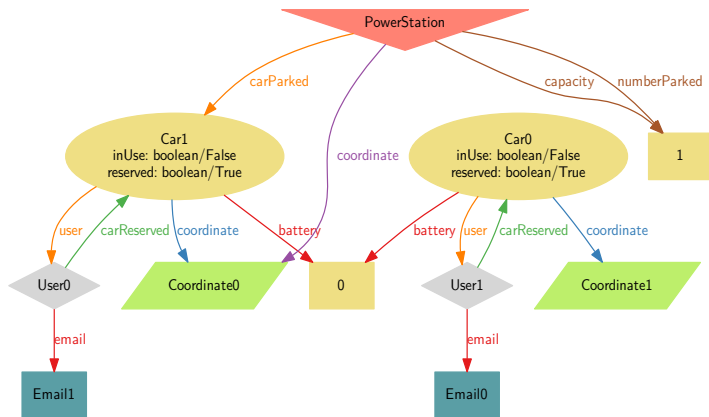
Class diagram

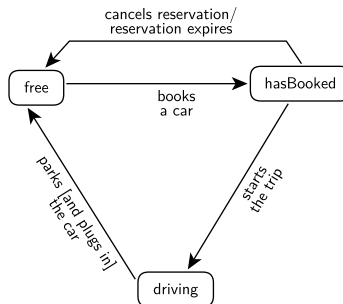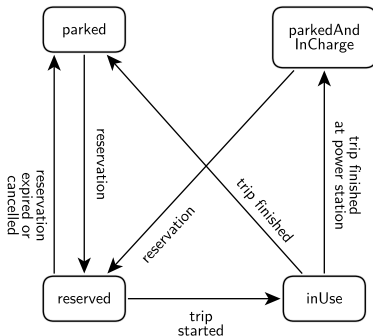We have modelled in **Alloy** this part of our **world**.
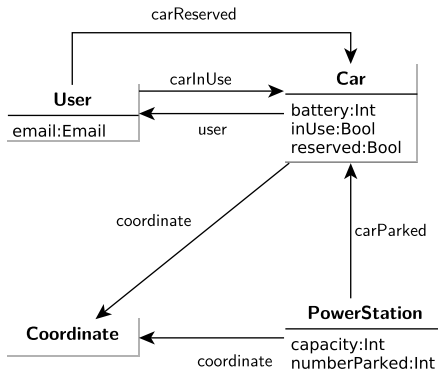
Our model

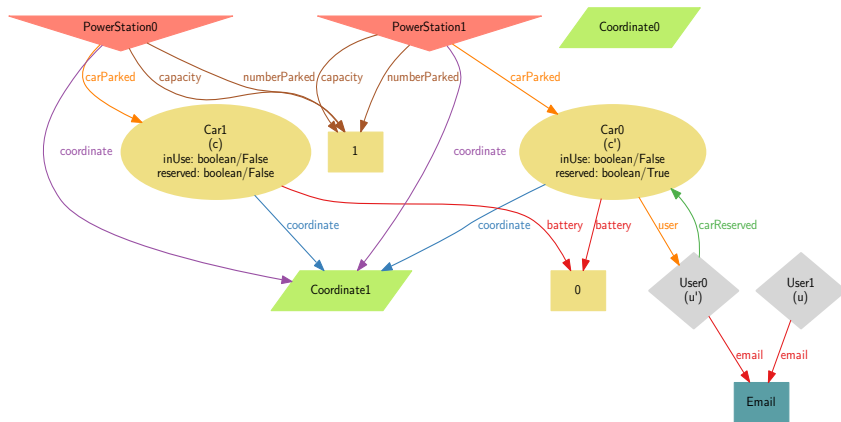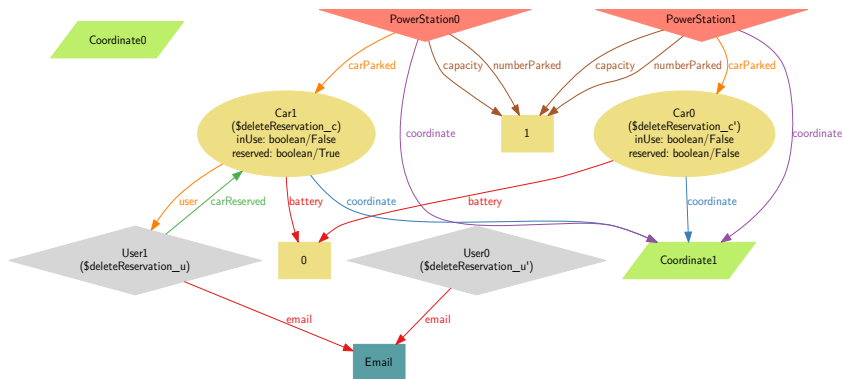This is one of the possible outputs generated by the **Alloy** solver.

State diagrams

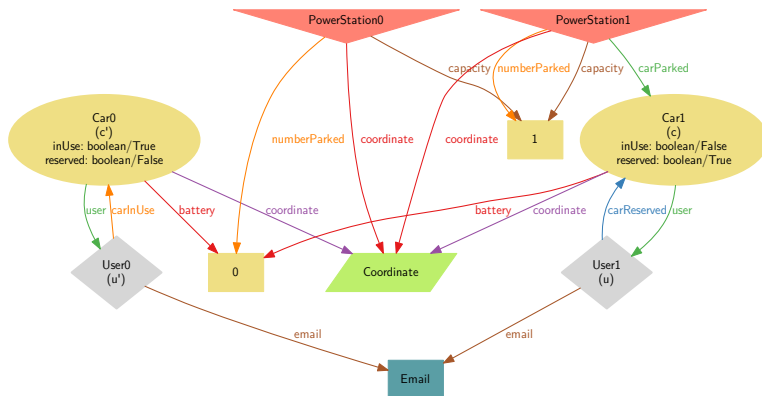These **actions** have been modelled in alloy as *predicates*.
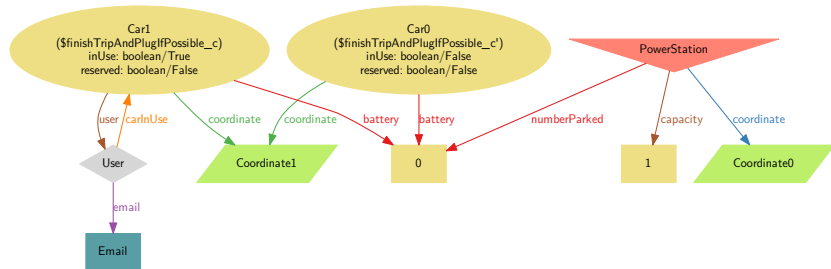
Transitions - reserve a car

Transitions - delete reservation

Transitions - start using a car reserved

Transitions - park a car

Transitions - park a car and plug it in