Politecnico di Milano

Software Engineering II project:
PowerEnjoy

Requirements Analysis and Specification Document

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Abstract

The main purpose of this document is to give a specification of the requirements that our system has to fulfill adopting the IEEE-830 standard for RASD documentation. It also introduces functional and non-functional requirements via high level specification of the system. In the last part a formal model is presented using Alloy.
The information contained in this document is intended for the stakeholders and developers: for the stakeholders this document presents an useful description to understand the project development, meanwhile for the developers its quite a comfortable way to match the stakeholders' requests and the proposed solutions.

Part I

Requirements analysis

Introduction

1.1 Purpose of the system

The aim of this project is to develop a digital management system called PowerEnJoy.
PowerEnJoy is a car-sharing service which uses only eletric-cars and allow the users to easily find a car, thanks to the location services, and to use it.
To encourage the virtuous behaviors of the users some discounts and lots are provided and can be applied to the bill.

1.2 Scope of the system

Users have to be registered to the system and provide credentials (as well as payment informations), then a password will be sent that can be used to access the car-sharing service. They can easily find eletric-cars thanks to the location service and reserve them for up to an hour.
When an user is near to a vehicle that she want to drive, she contacts the system telling that she's nearby that specific car, than the system unlock the car letting her to get into it. Then the system automatically calculates the charge during the ride, notifying the user through a screen on the car. Finally when the car is parked in a safe area and the user exits the car, the system stops charging the user and automatically lock the car that become available again.
The system should encourage virtuous behaviour of the users, to do that some discounts can be applied on their last ride. For example a discount of the 10% is applied if the user took at least two other passengers onto the car. Other discounts are applied if a car is left with no more than 50% of the battery empty or if the user left the car in a special park where it can be recharged(20%) and she takes care of plugging the car into the power grid (30%).
On the other side the system charges 30% more on the last ride if the car is left at more than 3 Km from the nearest power grid station or with more than 80% of the battery empty in order to compensate for the cost required to re-charge the car on-site.

1.3 Objectives and success criteria of the project

After a first analysis on our average users, the main features that should be provided by our application are:

1. [G1] User's registration
2. [G2] User's account and session management
3. [G3] Immediate payments/charges
4. [G4] Location-related services (car localization: user's location or address should be provided)
5. [G5] Car real-time reservation and related processing
6. [G6] Car un-locking and (automatic) locking

1.4 Assumptions

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1.5 Stakeholders Identification

1.5.1 Customers

The purpose of the customer is to maximise the performances of the system and reach the biggest profit possible.
In our project the main stakeholder is the professor. She expects us to develop a digital menagment system, PowerEnJoy, that provide the functionality normally provided by car-sharing services.
The role of the professor is to evaluate our ability and level of comprehension of the subject.

1.5.2 Producers

The project is developed and produced by us. We want to apply in practice what we learn during lectures and became able to manage software engineering problems, solving them in a rigorous way and being as accurate as possible. Our project includes a Requirement Analysis and Specification Document (RASD), a Design Document (DD), a testing-related activity, an assessment of the effort and cost required for the development of the project, a code inspection and bug identification activity on an existing open souce project.
We will try to develop our project as close as possible to a real application that is ready to be launched in the market.

Actors Identification

2.1 Guest

A guest is a person that hasn't already registered to the system. She can only proceed with a new registration or log in.

2.2 User

We believe that PowerEnJoy can be used by a wide range of people that need only to access the system for benefit. A person became an user after her registration to the system, when she provides her credentials and payment information. A tipical user is a person who want to easily move around in a social end eco-friendly way. Usually she uses the service only for short travels near the .
Our scope is to create an easy-to-use and efficent system that make the users satisfied and willing to use PowerEnJoy.

Overview of the purposed system

In this section the product and its requirements are described in order to provide a background for the "Requirements specification" part and make it easier to understand.

3.1 Product perspective

3.1.1 User interfaces

The user should be able to access the application in

3.2 Product functions

3.3 User characteristics

3.4 Constraints

3.5 Assumptions and dependencies

3.6 Requirements subsets

Functional requirements

4.1 [1] Some functional requirement

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4.2 [2] Some other functional requirement

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4.3 [3] Some other functional requirement

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4.4 [4] Some other functional requirement

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Non-Functional requirements

5.1 [1] Some non-functional requirement

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5.2 [2] Some other non-functional requirement

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5.3 [3] Some other non-functional requirement

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5.4 [4] Some other non-functional requirement

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Part II

Requirements specification

Introduction

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Developer Overview

7.1 High-level diagrams: UML and dataflow

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System Models

8.1 The world and the machine

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8.2 Scenarios

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8.3 Use case diagram

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8.4 Sequence diagrams

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8.5 State Chart diagram

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8.6 User interface: navigational paths and screen mock-ups

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Alloy Modelling

9.1 Signatures

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9.2 Facts

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9.3 Asserts

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9.4 Predicates

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9.5 Results

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9.6 Generated Worlds

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9.6.1 General world

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9.6.2 Maybe some other world

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Appendix A: Used Tools

A.1 LaTeX

Used to format and redact this document

A.2 *git*

Used as version control system in order to lead development

Appendix B: Hours of work

These are the hours of work spent by each group member in order to redact this document:

- Ruaro Nicola: 8 hours
- Gregori Giacomo: 5 hours
- Total worktime: 13 hours

Glossary

charging station an area used to re-charge and store electric cars.

Acronyms

GPS Global Positioning System.

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