**Politecnico di Milano**

**Software Engineering 2**

**DESIGN DOCUMENT**

**PowerEnjoy**

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# Introduction

## Purpose

The purpose of this document is to give a better explanation of the PowerEnjoy system with respect to the RASD document. The aim of this document is to define aspects of the software that are useful for the programmers to develop the system according to the specification that are proposed in this document. The document purpose is to identify:

* High level infrastructure of the system
* The main components of the system and the interfaces between them
* The main interfaces of the system with existing components or 3rd part software
* The runtime behaviour of the system

## Scope

The aim of PowerEnjoy software is to provide a system for a car-sharing service that exclusively employs electric cars, so it should provide the functionality normally provided by car-sharing services. The users must be able to register to the system by providing their credentials and payment information, then they receive back a password that can be used to access the system. This procedure can be done both by the mobile application or web application.

Registered users must be able to find the locations of available cars within a certain distance from their current location or from a specified address. The system provides also the possibility to reserve a single car, but with some constraint: for example, if a car is not picked up, the user must pay a fee. On the other hands, if a user reaches a reserved car, he must be able to tell the system he’s nearby his reserved car, so the car will be unlocked and the user can enter and start his rent.

Car-sharing system initiate the charging of money as soon as the engine ignites, and the system starts charging the user for a given amount of money per minute. Indeed, the user is notified of the current charges through a screen on the car. The system stops charging the user as soon as the car is parked in a safe area and the user exits the car.

The set of safe areas for parking cars is predefined by the management system, so we can contact a database to catch some information about the current position of the car, and then the system can decide if it is parked in a safe area.

Although, the system must be able to define certain user’s behaviour with the car-sharing services and apply some discount (or charging) in consequence of determinate action.

## Definition, Acronyms, Abbreviation

Here there are some definition and acronyms that we will use later on this document:

* **RASD**: requirements analysis and specifications document
* **DD**: design document
* **SMS**: short message service; it is a notification sent to a mobile phone, an SMS gateway is needed to use it.
* **SMS** **gateway**: it is a service which allows to send SMS via standard API.
* **API**: application programming interface; it is a common way to communicate with another system.
* **MVC**: model view controller
* **URL**: uniform resource locator
* **Push** **notification**: it is a notification sent to a smartphone using the mobile application, so it must be installed.
* **Push** **service**: it is a service that allows to send push notifications with own API
* Matching itineraries:
* **Path**: it’s a structure containing at least 2 positions
* **Sharing** discount percentage: discount percentage applied only if the sharing option is enabled and there is more than one request in the merged request
* **REST**: Representational State Transfer
* **RESTful**: REST with no session
* **ETA**: estimated time available; it is the time the taxi needs to arrive to client starting position.
* **Zone**: it is a zone of approximately 2 kmˆ2, the city is split into these zones. From taxi position the system gets his zone and inserts the taxi into the zone queue. So the system guarantees a fair management of taxi queues.
* **UX**: user experience design
* **BCE**: business controller entity

## Reference Documents

* Our RASD document
* Specification Document: Assignments AA 2016-2017.pdf
* Structure of the design document.pdf
* Sample Design Deliverable Discussed on Nov. 2

## Document Structure

**Introduction**: this section introduces the design document. It contains the purpose and the scope of this document and the parts that are more specified with respect to the RASD document.

**Architecture Design**: this section is divided into different parts:

1. Overview: this part explains the main tier of our application;
2. High level components and their interaction: this second part gives a high-level view of our architecture and its main components and the interaction between them;
3. Component view: this sections gives a more detailed view of the components of our applications;
4. Deploying view: this section explain which components must be deployed in order to let the application running in the correct way;
5. Runtime view: “architectural” sequence diagrams are represented in this section to better define the process of the different tasks of our application;
6. Component interfaces: this section shows the main interfaces between our components and existing software;
7. Selected architectural styles and patterns: this section explains the architectural choices taken during the creation of the application
8. Other design decisions

**Algorithms Design**: this section describes the main algorithm and the most critical ones that are needed for the application. We use Pseudo code in order to show the main idea of the algorithm and at the same time to hide unnecessary information and keep the algorithm “light” as much as possible.

**User Interface** **Design**: this section presents the mockups that have been already seen in the RASD document and present the user experience explained via UX and BCE diagrams.

**Requirements Traceability**: this section aims to explain how the decisions taken in the RASD are linked to design elements.

# Architectural Design

## Overview

## Component view

## Deployment view

## Runtime view

## Component interfaces

## Selected architectural styles and patterns

## Other design decision

# Algorithm design

# User interface design

# Requirements traceability

# Effort spent

# References