



Politecnico di Milano

## PowerEnjoy Service - Design Document

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### **Version 1.1**

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# 1 Introduction

## 1.1 Purpose

This Design Document serves the purpose to present to all parties interested the description of the structure for the PowerEnjoy Service. It provides documentation of Software, Architecture and other important aspects of Design to help the understanding and development of the System. Every component that is implemented for the System will be explained as well as the purpose they serve to contribute to the fulfillment of all the project Requirements. All strategies and design decisions will be documented as well. Software Design Description, decisions and key information to be used to communicate the general purpose of the structure to our stakeholders, and serve as detailed documentation for the components of the System for the developers.

## 1.2 Scope

This Document presents the PowerEnjoy Service System, an electric car sharing service. To better understand the broader scope of the service, it is presented in the RASD Document. This Document will not include detailed information on all the tools and protocols that will be used in the development of the System but rather their purpose and functionality inside the PowerEnjoy System. As example, general knowledge of the Client-Server structure is expected as it will not be rigorously explained but instead how such structure will be used to satisfy our System's Requirements.

## 1.3 Glossary: Definitions, Acronyms, Abbreviations

- **RASD:** Requirements And Specifications Document.
- **DD:** Design Document.
- **Java EE:** Java Enterprise Edition. Software Development Platform.
- **EJB:** Enterprise Java Beans. Component in the Business Tier for the Application Logic.

For other concepts concerning the Service definition look in the **Glossary** section of the RASD.

## 1.4 Reference Documents

- Specification Document: Assignments AA 2016-2017.pdf
- PowerEnjoy Requirements And Specifications Document (RASD)
- IEEE Std 1016-2009 IEEE Standard for Information Technology-Systems Designs-Software Design Descriptions (SDD IEEE 1016-2009.pdf)
- Example Documents:
  - Sample Design Deliverable Discussed on Nov. 2.pdf
  - Software Design Document (SDD) Template (sdd.template.pdf)
  - Remote-Controlled Dissolved Oxygen Monitoring System (fett\_student\_application\_paper.pdf)

## 1.5 Document Structure

**Section 1 - Introduction:** This section provides a general description of the purpose and structure of this Design Document.

**Section 2 - Architectural Design:** This section illustrates a broader to specific view of the components that form part of the System, presenting from the overview of the architecture of the system to a description of how each component will interface inside the structure.

**Section 3 - Algorithm Design:** Important functionalities of the System that require the development of algorithms will be described in this section.

**Section 4 - User Interface Design:** All details referring to how the User will interface with the System, from the Web Application to the screens inside the Cars will be shown in this section. As well as general mockups of the Graphical User Interface (GUI) screens.

**Section 5 - Requirements Traceability:** In this section is explained how the Design decisions and structure help fulfill the Requirements for the System that were defined in the RASD.

**Section 6 - Effort Spent:** Detailed record of the hours worked for each member of the team is documented in this section.

**Section 7 - References:** Any reference to additional external sources that can help the better understanding of this Document is documented in this section.

## 2 Architectural Design

### 2.1 Overview

As was show in the Proposed System part of the RASD, the PowerEnjoy structure will consist on a 3-tier Client-Server Architecture. The server part built on a JEE Platform with access to the Company's Database Server and the Client consisting of Users, CRM and Cars that will use a browser to access our Web Application and a Mobile Device and Screen inside the Cars will access the Mobile Application. As we need to interface our application with the Car functions (i.e. Lock, Unlock, Battery state) the application must have some Logic implemented client side. This distributed Logic structure will allow GUI to be created on the Client side as well.

- Client Tier (Web App, Mobile App, Car)
- Server Tier (Java EE Web and Application Server)
- Enterprise Information System (EIS) Tier (DataBase Server)

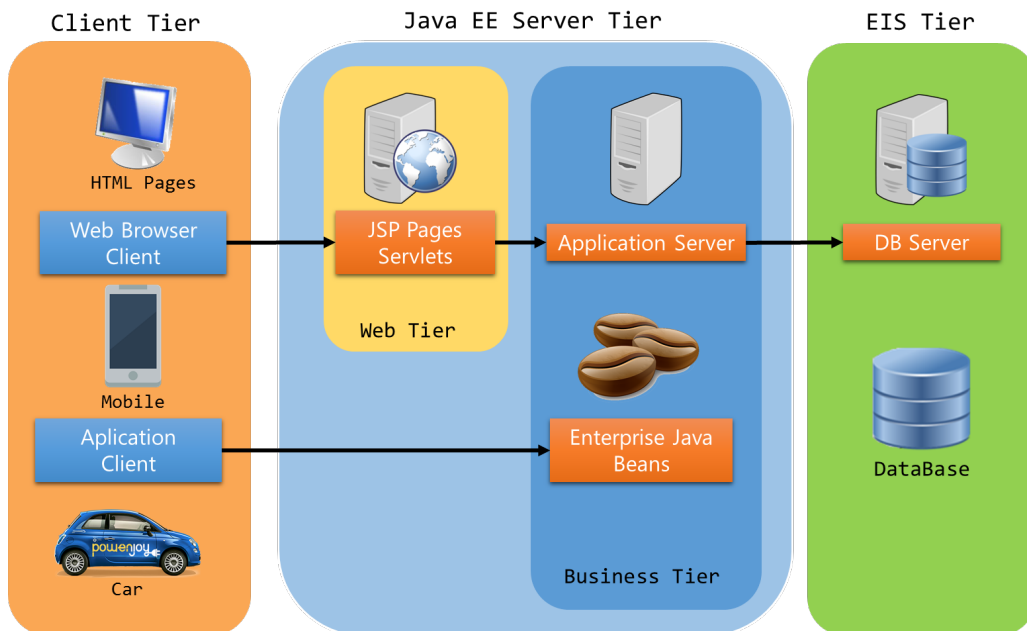


Figure 1: Proposed System Architecture

## 2.2 High level components and their interaction

## 2.3 Component View

## 2.4 Deployment View

## 2.5 Runtime View

## 2.6 Component Interfaces

## 2.7 Selected Architectural Styles and Patterns

## 2.8 Other Design Decisions

## 3 Algorithm Design

## 4 User Interface Design

For our User Interface (UI) we'll offer a mobile App for Users and a desktop web App for Users and CRM. They will offer:

- **LogIn Page:** First screen of the app with the LogIn and SignIn options.



Figure 2: UI LogIn Page

- **Main Page:** Main page of the app where the user sees the map his location and selects the available cars. In Case of CRM, it can see all Cars.

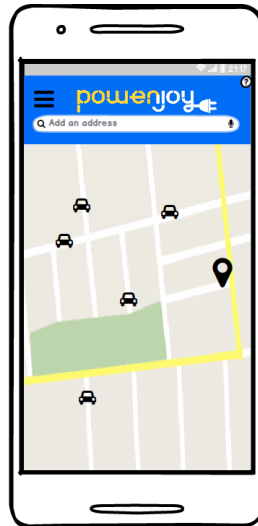


Figure 3: UI Main Page

- **Car Details Page:** Once a Car is selected this page allows to reserve a car and contains informations for the decision.

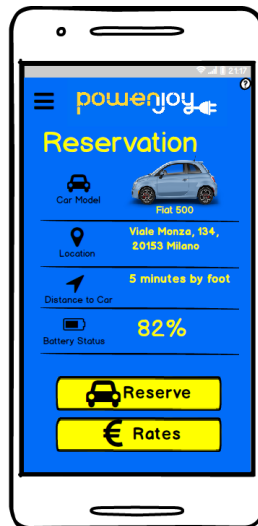


Figure 4: UI Car Details Page

- **Reservation Page:** Once the Reservation is made, the User can see the details of her/his Reservation and have the option to cancel it.

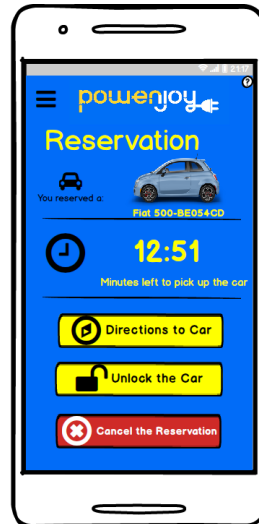


Figure 5: UI Reservation Page

- **Ride Page:** Once a Ride started this page shows the details of the current ride, it's present also in the Car screen App.

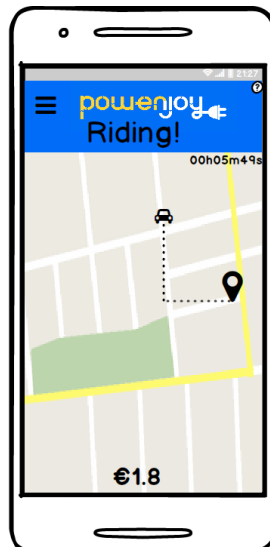


Figure 6: UI Mobile Ride Page



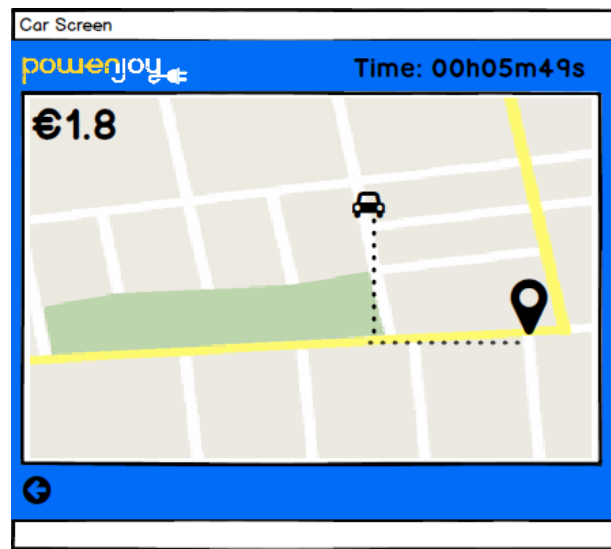


Figure 7: UI Car Ride Page.

- **Email Page:** While not part of the App UI, the System should respond with an email to the User at the end of the Ride showing the final details for it.

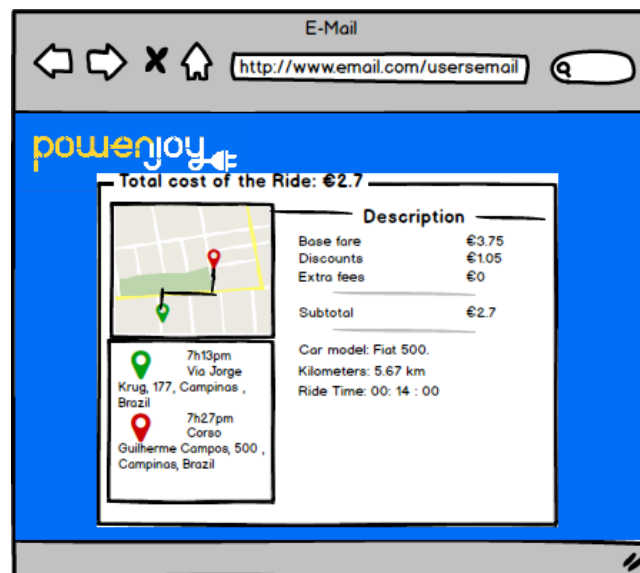


Figure 8: UI Email Page

- **Contact Page:** Page where the User can contact the CRM operator.

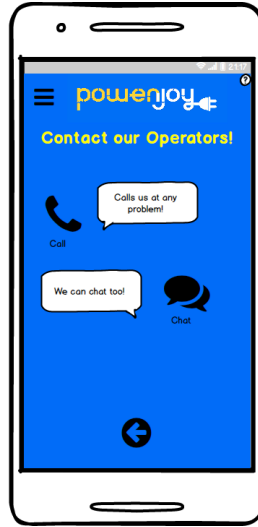


Figure 9: UI Contact Page

## 5 Requirements Traceability

## 6 Effort Spent

Date	Domenico	Caio	Matheus
27/11/16	1h	1h	1h
28/11/16	2h	-	-
29/11/16	2h	-	-
30/11/16	-	-	-
31/11/16	-	-	-
01/12/16	-	-	-
02/12/16	-	-	-
03/12/16	-	-	-
04/12/16	-	-	-
05/12/16	-	-	-
06/12/16	-	-	-
07/12/16	-	-	-
08/12/16	-	-	-
09/12/16	-	-	-
10/12/16	-	-	-
11/12/16	-	-	-

## 7 References

## 8 Used Tools

Keeping track of the Tools used during develop the DD document were:

- **GitHub:** for Version Control
- **Dia Diagram Editor:** for UML Diagrams
- **TeXworks:** for LaTeX editing of this Document

## 9 Changelog

As the project and design decisions may change during the development this document is also prone to change. We'll document every version in this part.

- **Version 1.1:** 11/12/2016