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POLITECNICO DI MILANO

COMPUTER SCIENCE AND ENGINEERING

SOFTWARE ENGINEERING 2

MyTaxiService

Design Document

Authors

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MyTaxiService-DD.pdf · V.0.5

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1. Introduction

1.1 Purpose

The purpose of this document is to illustrate the design of the application to transport service " MyTaxiService"

1.2 Scope

This paper aims to describe in detail the architectural and functional characteristics of the system, with particular attention to the description of the choices related to the structure of the database and the interaction between users and MyTaxiService. This document complies with the specifications described in the RASD and its draft is totally based on it, although the RASD has undergone some changes, as will be seen later in this document.

1.3 Definition, acronyms and abbreviations

- Aaa
- bbb
-

1.4 Sources and reference documents

- IEEE Standard for Information Technologies – Systems Design – Software Design Descriptions

- IEEE Standard Systems and Software Engineering – Architecture Description

- Requirements Analysis and Specification Document (RASD), already available in this folder

1.5 Document structure

- Aaa
- bbb

2. Architectural design

2.1 Overview

This chapter will be focused on how users can navigate MyTaxyService, explaining iterations between different pages and the system behavior after a user's action.

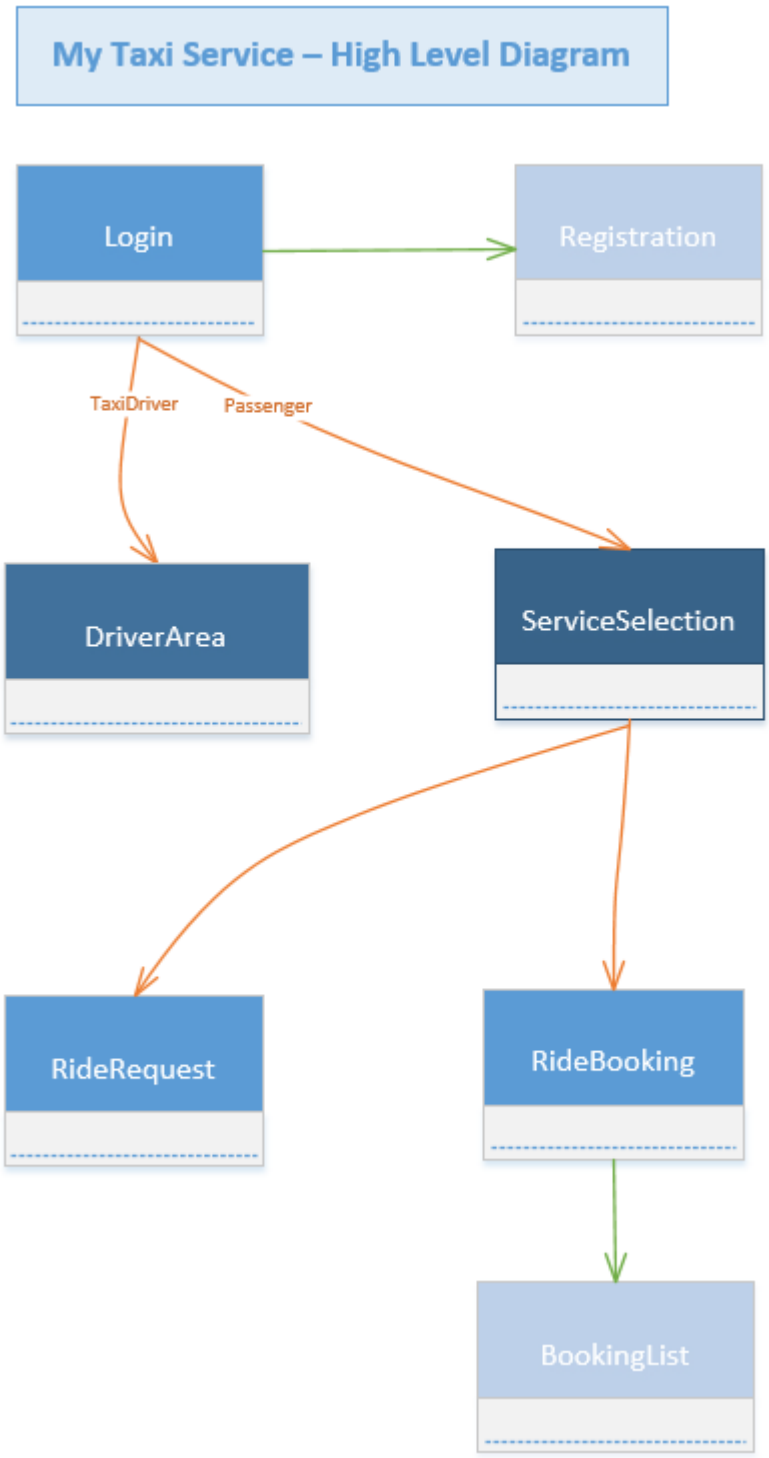
The first page that everyone can see is the Registration or Login page, because we hypothesized that a not registered user can't use MyTaxiService or a part of this service, so a Registration and a Login are required.

After Login, the system recognizes two kind of users: Passenger and Drivers, and directs each one to the appropriate home page.

MyTaxyService's Menu (the passengers' home page), allows users to reach two different form (to book a taxi immediately or at a certain time) by pressing a button.
In case of multiple booking, this menu allows to consult a page with the list of rides and with the button "Info", associated to each reservation, a popup shows all reservation data.

MyTaxyService's Driver Area (the drivers' home page), allows users to see the imminent ride (to the left page) and a list of booking (to the right page).
A driver can see details of each ride pressing a button connected to an information popup and, if a passenger requires his taxi, a popup appears on his screen: he can decline or accept the ride pressing a button on it.

2.2 High level components and their interaction



2.3 Component view

- **Registration and Login form**

  This part of the UX Diagram describes the first page that the user can see.
  If a user is not already registered, he has to compile a form with the fields ”e-Mail”, ”Password”, ”Retype Password”, “PayPal Account”, ”Date of Birth”, “Name”, Surname”, ”CF/ID”, ”Address” and if all data are corrected its submission allow user to create a new account, otherwise a popup with an error message will appear on the screen.
  If a user has already an account, he can navigate to the other pages after the compilation of the login form. In this area only the field "Username" and "password" are required.

- **Driver Area**

  This area is reachable only if the system recognizes the user as a taxi driver.
  This is a sort of Home page, divided into two different pages placed side by side and selectable with a scroll gesture on the screen.
  In the left page a taxi driver can examines the current ride, while in the right page he can examine his list of booked ride.

- **Menu**

  This area is reachable only if the system recognizes the user as a passenger.
  This is a sort of Home page, where the user can choose a reservation service through a button.

- **Ride request and Ride booking form**

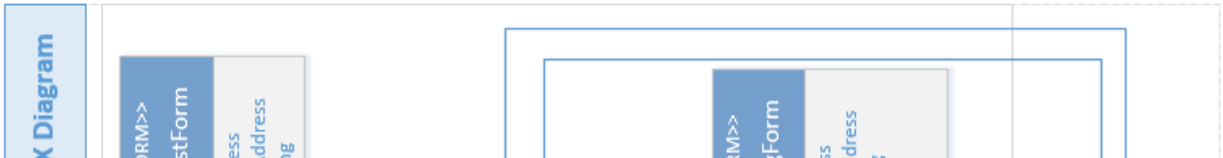
These forms are reachable clicking a button between “RideRequest” (immediate booking) or “RideBooking” (delayed booking). Both of the form have the fields “Start Address”, “Destination Address”, “Time of Booking” and “Date of Booking”, but in the case of a ride request the system automatically sets the last two field with the current hour and date.

- **Booked rides List**

  This page has a similar functionality either passenger side or driver side: allows drivers to see the list of all the rides' details that they have confirmed and allows passengers to see the list of all the rides' details that they have booked simply pressing the button “Info”.

- **Popups**

  these elements are used in different way, but are all of the same kind: there are a message and a choice between two buttons (✓ and ✗).


K Diagram
RM>>
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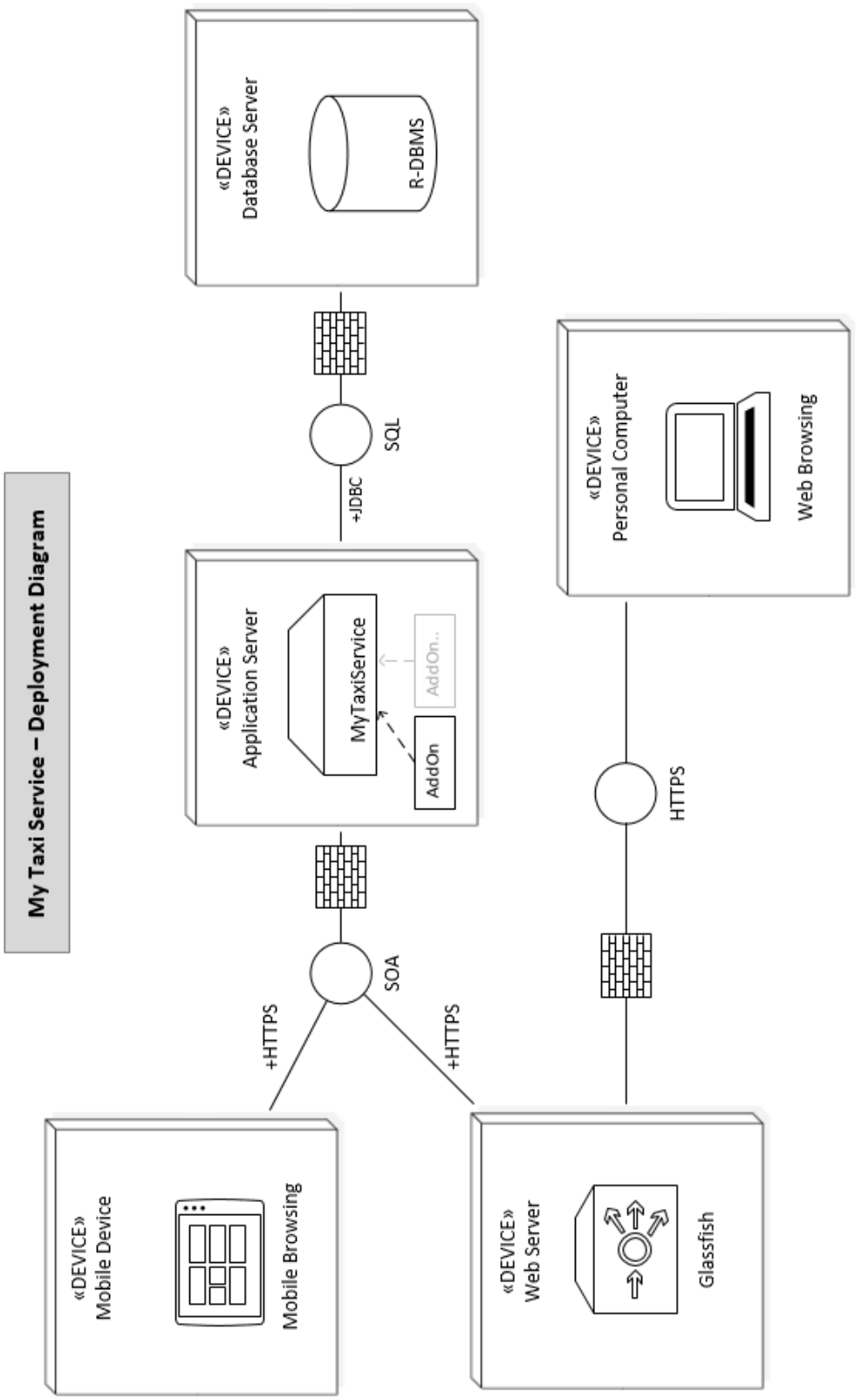
RM>>
dForm
ss
dress

2.4 Deployment view



2.5 Runtime view

. You can use sequence diagrams to describe the way components interact to accomplish specific tasks typically related to your use cases ☒

[DA STABILIRE (gio/ven)]

2.6 Component interfaces

[DA STABILIRE (gio/ven)]

2.7 Selected architectural styles and patterns

MyTaxiService application is structured by the pattern BCE (Boundary-Control-Entity). This diagram is used to give a representation of "model-view-controller" pattern that was used to design the application. The stereotype Boundary is the user interface that has been described in detail through the UX diagram. The Control comprehends the classes that manage the logic of the system and that mediate between the user interface and the data.
The Entity comprehends the classes of data in the database.

DOBBIAMO DISCUTERE DI COME STRUTTURARE LE VARIE OPERAZIONI SECONDO QUESTO PATTERN; POI POTRO' SCRIVERE IL CAPITOLO NEL DETTAGLIO (SERVONO I DIAGRAMMI ANCHE QUI)

2.8 Other design decisions

[DA STABILIRE (gio/ven)]

3. Algorithm design

This section will be focused on the definition of the most relevant algorithmic part of MyTaxiService project: the management of the taxi, both among different areas and in a single zone.

- **The positioning strategy of taxies in the city**

1. The basic algorithm, obtained through the application of the linear regression, assumes the following relationship:

$$N = \frac{Population}{5000}(\alpha \cdot \beta \cdot \gamma) + \Delta$$

where

N : theoretical requirement bid for the performance of taxi service in the City;

Population : Resident population in the town (n° inhabitants);

$\alpha \cdot \beta \cdot \gamma$ *: corrective factors for public transport/hospitals/public buildings/rail stations*

Δ *coefficient : additional factor for summer season or touristic events*

NOTE: the reduction coefficient 5000 is valid only for applications in cities with an average number of population between 700.000 and 1.000.000.

2. Once calculated the need for taxis for each zone, the system tracks taxies using its GPS coordinates

3. The system sends a message to the drivers who are in areas where the presence of their taxi is unnecessary to relocate them.

4. The relocation is optimized by zone: if an area needs more taxi and, instead, there

are surplus of taxi in a very close and in a very distant area, drivers of the most comfortable zone will move.

- **The Management of queues in zones and the relative management of rides**

(una volta fatta la struttura da sara>>>>)

[LEO]

>FSM(per ogni alg)

>SEQUENCE (per ogni)

>1 algoritmo con complessità (codice alto liv)

4. User interface design

This is an overview of the user interface of the system.

NOTE

All the mockups for the UI are included in the section 3.1.1 of the RASD document, refer to:

3.1.1.1 Login

3.1.1.2 Registration form

3.1.1.3 Service selection

3.1.1.4 Ride Request

3.1.1.5 Ride Booking

3.1.1.6 Booked Rides List

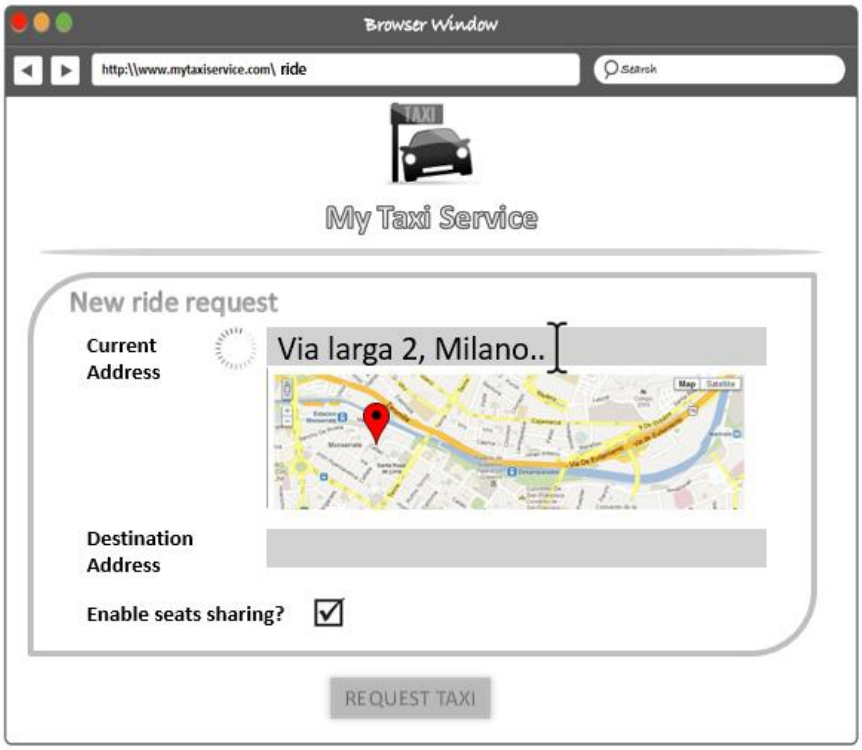
3.1.1.7 Driver area

3.1.1.8 Popups

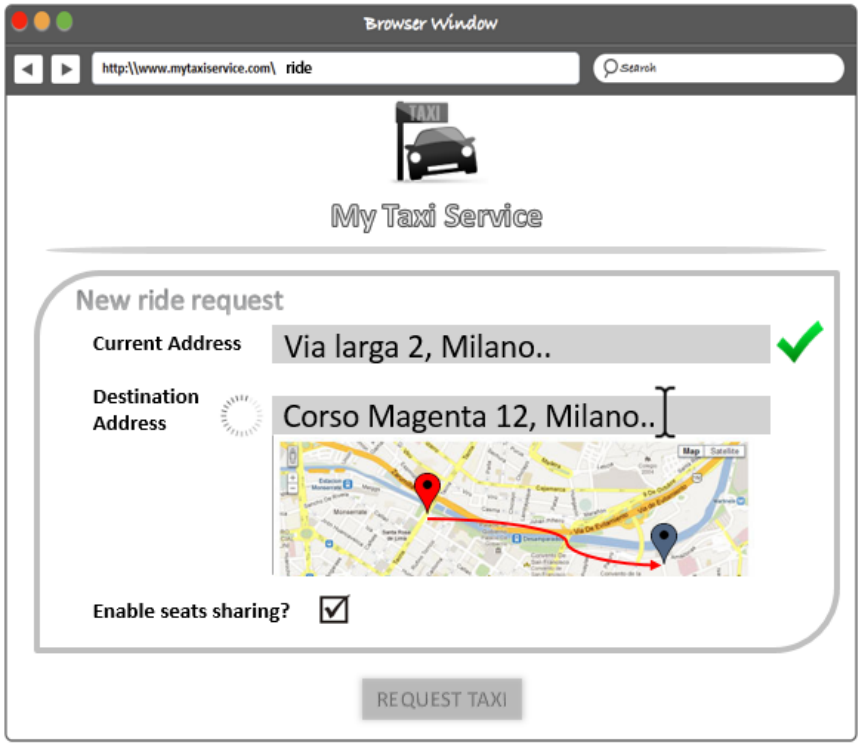
In this document are provided some extensions for related mockups.

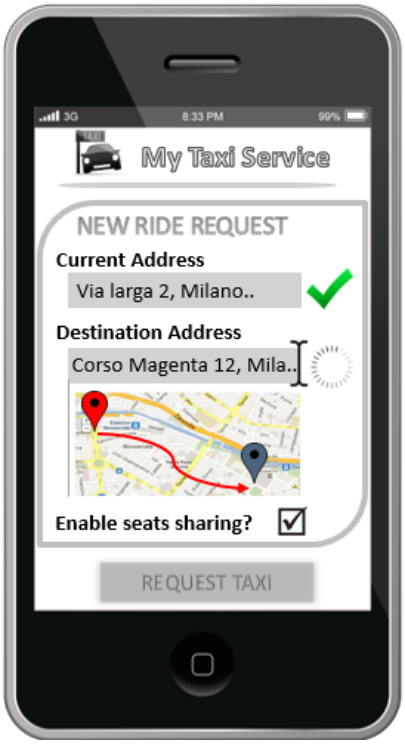
Extension for 3.1.1.4 - Ride request

In depth view of the address map selector


Browser Window
http:\\www.mytaxiservice.com\ ride
Search
My Taxi Service
New ride request
Current Address
Via larga 2, Milano..
Destination Address
Enable seats sharing?
REQUEST TAXI


3G
8:33 PM
99%
My Taxi Service
NEW RIDE REQUEST
Current Address
Via larga 2, Milano..
Destination Address
Enable seats sharing?
REQUEST TAXI


Browser Window
http:\\www.mytaxiservice.com\ ride
Search
My Taxi Service
New ride request
Current Address
Via larga 2, Milano..
Destination Address
Corso Magenta 12, Milano..
Enable seats sharing?
REQUEST TAXI

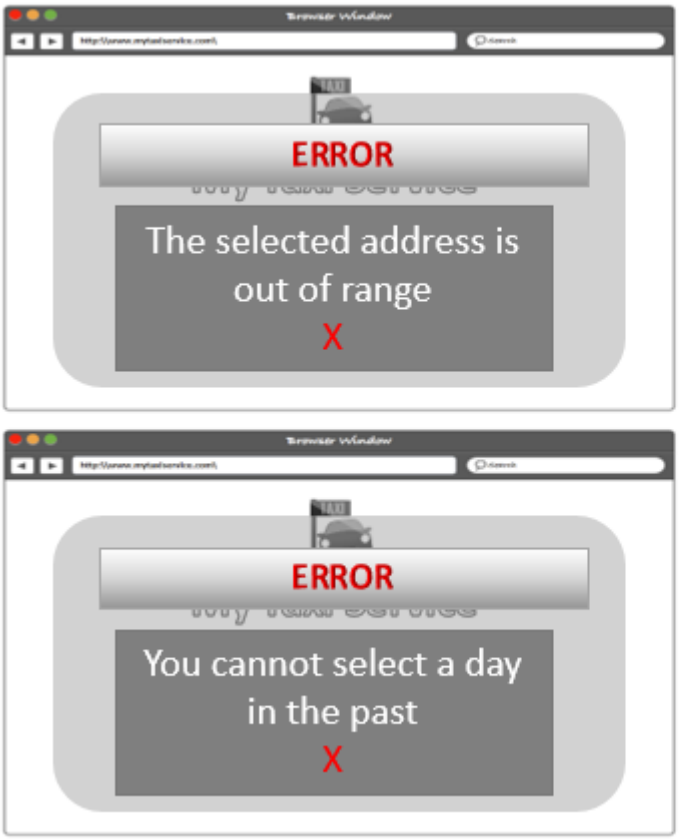

3G
8:33 PM
99%
My Taxi Service
NEW RIDE REQUEST
Current Address
Via larga 2, Milano..
Destination Address
Corso Magenta 12, Mila..
Enable seats sharing?
REQUEST TAXI

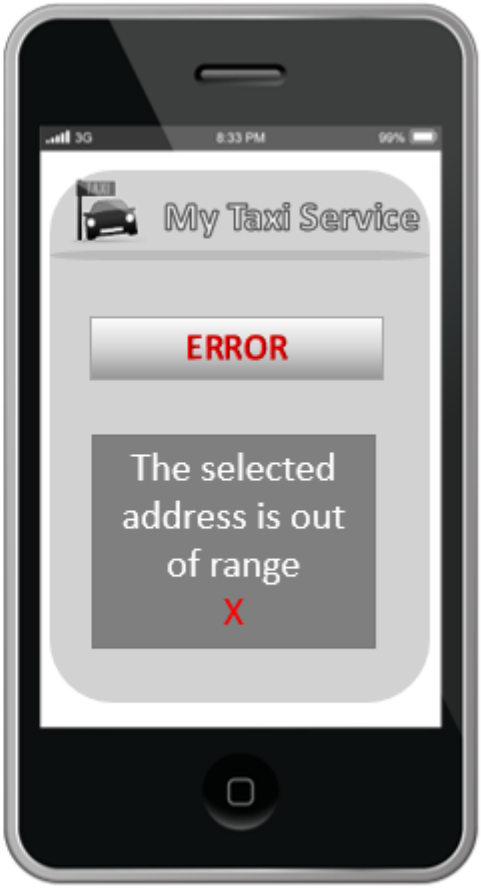
Extension for 3.1.1.5 - Ride booking

In depth view of the date/time picker

Extension for 3.1.1.8 – Popups

In depth view of some error popup





5. Requirements traceability

Explain how the requirements you have defined in the RASD map into the design elements that you have defined in this document

6. References

COSA METTIAMO?

[DA STABILIRE (lun/mar)]

7. Hours of works

Here is the time spent for redact this document:

[sum of hours spent by team's members]

+2h (20/11)	+h (/12)
+4h (22/11)	+h (/12)
+10h (23/11)	+h (/12)
+10h (24/11)	+h (/12)
+h (25/11)	+h (/12)
+h (26/11)	+h (/12)
+h (/12)	+h (/12)
+h (/12)	+h (/12)

TOTAL ~ 112 hours

- Leonardo Turchi: ~ 56hours
- Sara Pisani: ~ 56hours