PowerEnJoy

Design Document

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1. Introduction

1.1 Purpose

The Introduction Test Planning Document [ITPD] describes the test planning of the integration of the components. These components are described in details in the Design Document [DD] in paragraph 2.2.

The purpose of this document is to test how these components interface each other for improving this interaction.

1.2 Scope

The scope is the same described in the Design Document [DD] in chapter 1.2.

1.3 List of definitions and abbreviations

Definitions

Reservation: it's the ability to reserve an available car for up to 1 hour, provided only for registered user. For reserve a car the user must choose the available car from the map and click on it. For use this service, user must be logged on web/mobile app.

Reservation Timer: this timer count how much time remain for open the car.

Unlock Car Button: it's a button on the mobile app that allow the system to check the user position and the reservation for unlock the car.

Safe Area: every zone where it's possible park the car safely.

Power Grid Area: special safe area where it's possible park the car safely and user takes care of plugging the car into power grid if he wants.

Plugging Time: the time that the user has to plug the car before the system create the bill.

Bill: Amount of cost that the user must pay for the ride, discount and/or fee included.

System: it's the new system that we want implement. The system interacts with user for providing services, External Agency for payment, cars for receive ride data. A piece of system software is installed into each car, so in this way the system and the cars can communicate and send data.

External Agency: It's an agency that provides all type of payments service, when user must pay a fee or pays a ride. Interact with system for receive the amount to subtract on user bank account.

User: he is a client of the service. His personal data is already memorized into the database system (already registered on system), the personal data inserted: Name, Surname, E-mail, Birth Date, Driving License number, Credit card number.

Discount: it's a reward for good behavior.

Ride: service provided by the system that allow to engine ignites and start to charging the user for a given amount of money per minute.

Fee: amount of money that the user pays in addiction, fee can be assigned through missed reservation or bad behaviors.

Car: an automobile, in each car we have a screen and a GPS for provide services. Car send to the system the data of the ride.

Central System: The main system of our application, it contains all the main actions. It is the controller of our MVC.

Abbreviations

API: Application Programming interface.

Rasd: Requirements analysis and specification document.

MVC: Model view controller.

DD: Design document.

ITPD: Integration test plan document.

1.4 Reference Documents

For creating this ITPD we used

- Structure of Document: Assignments2016/2017.pdf
- Example: TP.pdf
- Example: Integration Test Plan Example.pdf
- Verification and validation part I.pdf
- Verification and validation part II.pdf

1.5 Overview

In the second chapter the items to be tested are mentioned. A specification for each test case is given in the third chapter. The fourth chapter specifies the procedures for these test cases. In the fifth chapter the reports for all test cases are presented.

2. Integration strategy

2.1 Entry criteria

This are the entry criteria for our test integration

- Requirements analysis and documentation document and designed document are revised and completed in all their parts
- The code of the application is complete and it is working
- The code is fully tested
- The product satisfies the requirements and the chosen design

2.2 Elements to be integrated

The following diagram represents the central system of our application. It is the same diagram that is in the DD but we have color the components for better understanding the integration strategy of our testing.

We divide this diagram in 5 part:

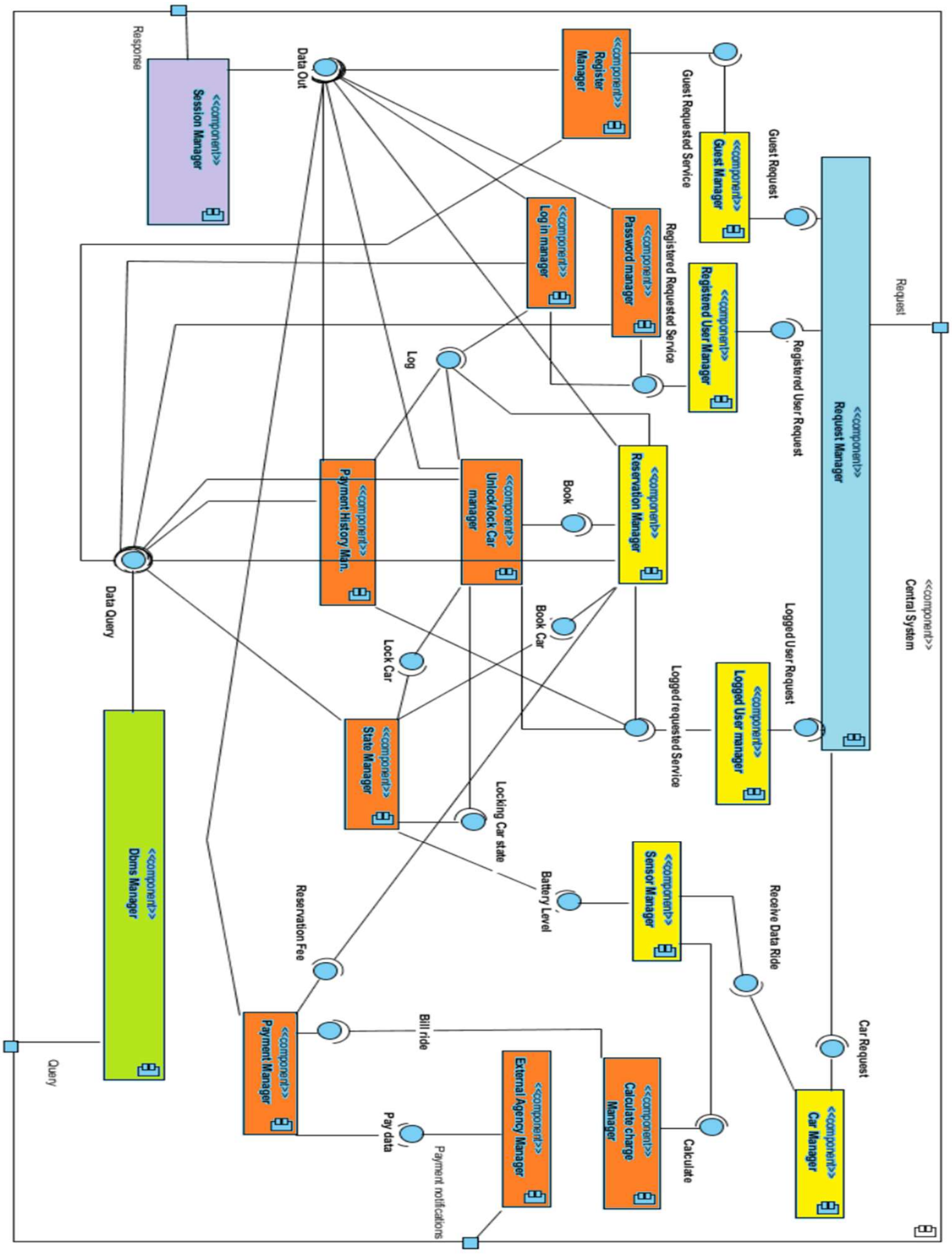
Light blue: for request manager, that aims to receive request from clients.

Yellow: for all component manager that aims to sort the various type of the requests. We treat this part all-in-one because all components have the same input requirements and have the same outputs.

Orange: for all component that provide a service and check the requirements for that service.

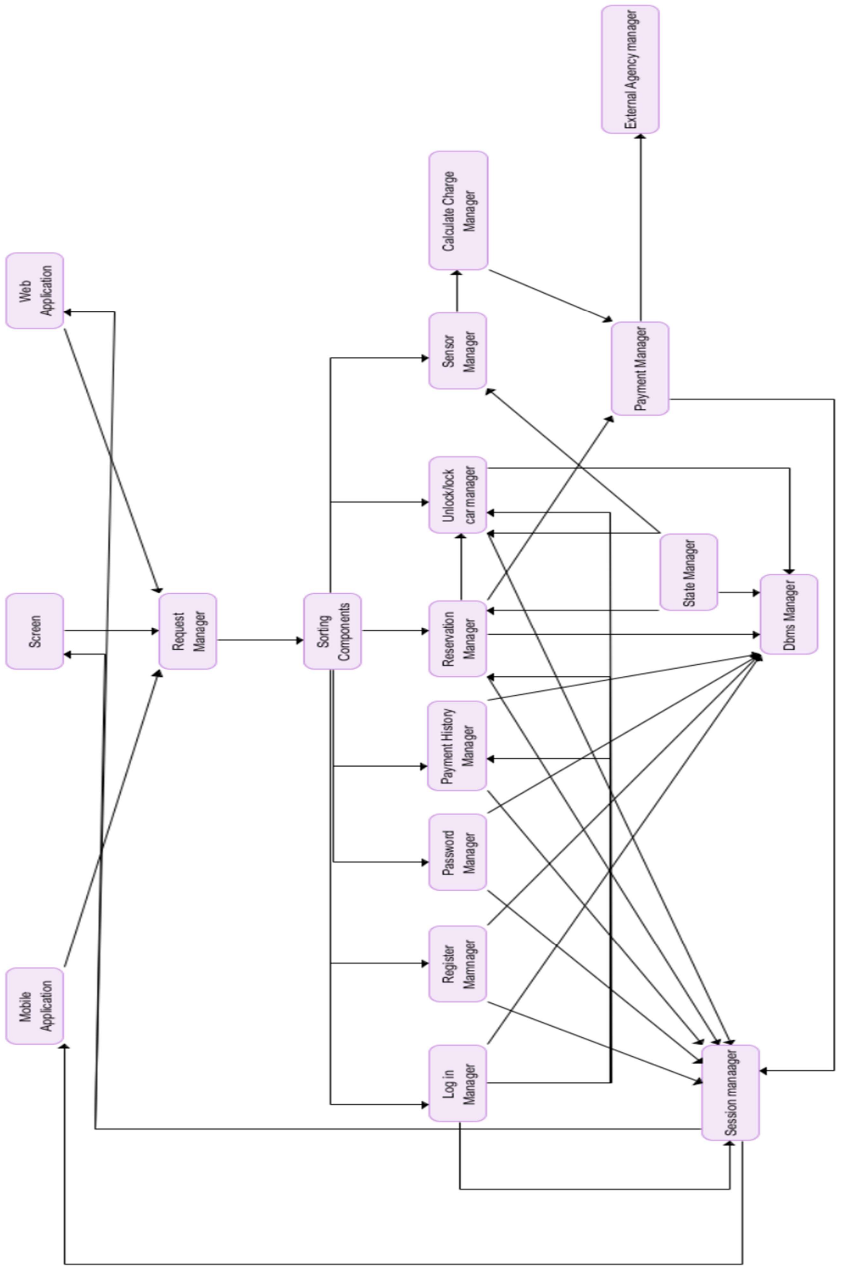
Green: dbms manager that aims to create the query for the database.

Purple: Session manager that aims to manager the response to send to clients.



In test process the Web Server tier will be together with the web application because we have thought integration test process part don’t need to test the dynamically loading of data, moreover we want to test all staff concerning the requests (creation, providing and response request and requirements checking).

The integration test will be focus on each of this component:



2.3 Integration test strategy

We decide to do a bottom-up strategy for out test integration. This strategy permit us to avoid some architectural mistakes that can we do making a top-down strategy. This is our strategy:

- We will start to test the database and its interaction with the Dbms manager.
- Test the interaction of the components of the central system
- Test the interaction of the different views of our system (screen, mobile app and web app) with the request manager of the central system.

2.4 Sequence of component/functions integration

This are the components to be integrated:

ID	Components to Integrate
I1	Database ←→ Central System
I2	Central System←→ Central System
I3	Central System ←→ Screen
I4	Central System ←→ Web Application
I5	Central System ←→ Mobile Application

I2 means testing procedure into Central System, as we already said we want focalize the test procedure on the Central System part, integration among all the Central System components.

The → indicates that the left side component returns the results into the right-side components… e.g.: A→B so B call the A and the results of A appears in B.

Now we enter in details:

2.4.1. Database

ID= I1	Components
I1C1	Database →Dbms Manager

2.4.2. Central System

ID= I2	Components
I2C1	Log in Manager → Dbms Manager
I2C2	Register Manager → Dbms Manager
I2C3	Password Manager → Dbms Manager
I2C4	Payment History Man.→ Dbms Manager
I2C5	Reservation Manager → Dbms Manager
I2C6	Unlock/Lock Manager → Dbms Manager
I2C7	State Manager → Dbms Manager
I2C8	Log in manager → Session Manager
I2C9	Register Manager → Session Manager

I2C10	Password Manager → Session Manager
I2C11	Payment History Man.→ Session Manager
I2C12	Reservation Manager → Session Manager
I2C13	Unlock/Lock Manager → Session Manager
I2C14	Payment Manager → Session Manager
I2C15	Log in Manager → Payment History Man.
I2C16	Log in Manager → Reservation Manager
I2C17	Log in Manager → Unlock/Lock Manager
I2C18	State Manager → Reservation Manager
I2C19	State Manager → Unlock/Lock Manager
I2C20	State Manager → Sensor Manager
I2C21	Payment Manager → Reservation Man.
I2C22	Payment Manager → Calculate Charge M.
I2C23	External Agency Man → Payment Man.
I2C24	Sensor Manger → Calculate Charge Man.
I2C25	Reservation Manager → Unlock/Lock Man.
I2C26	Sorting Components → Log in Manager
I2C27	Sorting Components → Register Manager
I2C28	Sorting Components → Password Man.
I2C29	Sorting Components → Reservation Man.
I2C30	Sorting Components → Unlock/Lock Man.
I2C31	Sorting Components → Sensor Manager
I2C32	Request Manager → Sorting Components

2.4.3. Screen

ID= I3	Components
I3C1	Screen → Request Manager

2.4.4. Web Application

ID = I4	Components
I4C1	Web Application → Request Manager

2.4.5. Mobile Application

ID = I5	Components
I5C1	Mobile Application → Request Manager

3. Individual steps and test description

3.1. Integration test case I1

Test Case Identifier	I1C1
Test Case Description	Perform a query into the database
Test Item(s)	Dbms Manager → Database
Input Specification	A query to perform
Output Specification	Check that the query is performed and the response data are syntactically valid
Environmental Needs	None

3.2. Integration test case I2

Test Case Identifier	I2C1
Test Case Description	Create a query into the database
Test Item(s)	Log in Manager → Dbms Manager
Input Specification	Log in Data to check
Output Specification	Check that the correct methods are called to create the query in dbms manager
Environmental Needs	None

Test Case Identifier	I2C2
Test Case Description	Create a Log in query into the database
Test Item(s)	Log in Manager → Dbms Manager
Input Specification	Log in Data to check
Output Specification	Check that the correct methods are called to create the query in dbms manager
Environmental Needs	None

Test Case Identifier	I2C3
Test Case Description	Create a Password Recovery query into the database
Test Item(s)	Password Manager → Dbms Manager
Input Specification	Password Data to check
Output Specification	Check that the correct methods are called to create the query in dbms manager
Environmental Needs	None

Test Case Identifier	I2C4
Test Case Description	Create a Payment History query into the database
Test Item(s)	Payment History Man. → Dbms Manager
Input Specification	Payment History Data to check
Output Specification	Check that the correct methods are called to create the query in Dbms manager
Environmental Needs	None

Test Case Identifier	I2C5
Test Case Description	Create a Reservation query into the database
Test Item(s)	Reservation Manager → Dbms Manager
Input Specification	Reservation Data to check
Output Specification	Check that the correct methods are called to create the query in Dbms manager
Environmental Needs	None

Test Case Identifier	I2C6
Test Case Description	Create a Unlock/Lock query into the database
Test Item(s)	Unlock/Lock Car Man. → Dbms Manager
Input Specification	Unlock/Lock Data to check
Output Specification	Check that the correct methods are called to create the query in Dbms manager
Environmental Needs	None

Test Case Identifier	I2C7
Test Case Description	Create a State query into the database
Test Item(s)	State Manager → Dbms Manager
Input Specification	State Data to check
Output Specification	Check that the correct methods are called to create the query in Dbms manager
Environmental Needs	None

Test Case Identifier	I2C8
Test Case Description	Manage a log in session
Test Item(s)	Log in Manager → Session Manager
Input Specification	Login Data response to manage
Output Specification	Check that the correct methods are called to manage the query response in session manager
Environmental Needs	Dbms Manager

Test Case Identifier	I2C9
Test Case Description	Manage a register session
Test Item(s)	Registration Manager → Session Manager
Input Specification	Registration Data to manage
Output Specification	Check that the correct methods are called to manage the query response in session manager
Environmental Needs	Dbms Manager

Test Case Identifier	I2C10
Test Case Description	Manage a Password recovery session
Test Item(s)	Password Manager → Session Manager
Input Specification	Password recovery Data to manage
Output Specification	Check that the correct methods are called to manage the query response in session manager
Environmental Needs	Dbms Manager

Test Case Identifier	I2C11
Test Case Description	Manage a Payment history session
Test Item(s)	Payment history Man. → Session Manager
Input Specification	Payment history Data to manage
Output Specification	Check that the correct methods are called to manage the query response in session manager
Environmental Needs	Dbms Manager

Test Case Identifier	I2C12
Test Case Description	Manage a Reservation session
Test Item(s)	Reservation Manager → Session Manager
Input Specification	reservation Data to manage
Output Specification	Check that the correct methods are called to manage the query response in session manager
Environmental Needs	Dbms Manager

Test Case Identifier	I2C13
Test Case Description	Manage a Unlock/Lock car session
Test Item(s)	Unlock/Lock car Man. → Session Manager
Input Specification	Unlock/lock car Data to manage
Output Specification	Check that the correct methods are called to manage the query response in session manager
Environmental Needs	Dbms Manager

Test Case Identifier	I2C14
Test Case Description	Manage a Payment session
Test Item(s)	Payment Manager → Session Manager
Input Specification	Payment Data to manage
Output Specification	Check that the correct methods are called to manage the query response in session manager
Environmental Needs	Dbms Manager

Test Case Identifier	I2C15
Test Case Description	Check User Data
Test Item(s)	Log in Manager → Payment History man.
Input Specification	Log in Data to check
Output Specification	Check that the correct methods are called to provide a first check about user data in payment history manager, if they are correct use these data for the query.
Environmental Needs	Log in Manager

Test Case Identifier	I2C16
Test Case Description	Check User Data
Test Item(s)	Log in Manager → Reservation Manager
Input Specification	Log in Data to check
Output Specification	Check that the correct methods are called to provide a first check about user data in reservation manager, if they are correct use these data for the query.
Environmental Needs	Log in Manager

Test Case Identifier	I2C17
Test Case Description	Check User Data
Test Item(s)	Log in Manager → Unlock/lock car man.
Input Specification	Log in Data to check
Output Specification	Check that the correct methods are called to provide a first check about user data in unlock/lock car manager, if they are correct use these data for the query.
Environmental Needs	Log in Manager

Test Case Identifier	I2C18
Test Case Description	Notify or demand about state change
Test Item(s)	State Manager. → reservation Manager
Input Specification	Reservation Car Data
Output Specification	Check that the correct methods are called to manage the notify or demand about state change in reservation and state manager.
Environmental Needs	State Manager

Test Case Identifier	I2C19
Test Case Description	Notify or demand about state change
Test Item(s)	State Manager. → Unlock/lock Manager
Input Specification	Reserved car Data
Output Specification	Check that the correct methods are called to manage the notify or demand about state change in unlock/lock and state manager.
Environmental Needs	State Manager

Test Case Identifier	I2C20
Test Case Description	Notify or demand about state change
Test Item(s)	State Manager. → Sensor Manager
Input Specification	Sensor car Data
Output Specification	Check that the correct methods are called to manage the notify or demand about state change in sensor and state manager.
Environmental Needs	State Manager

Test Case Identifier	I2C21
Test Case Description	Create a bill for reservation fee
Test Item(s)	Reservation Manager→ Payment Manager
Input Specification	Reservation car Data
Output Specification	Check that the correct methods are called to create a bill regarding miss reservation in payment manager.
Environmental Needs	Reservation Manager

Test Case Identifier	I2C22
Test Case Description	Create a bill for the ride
Test Item(s)	Calculate Charge M.→ Payment Manager
Input Specification	Ride Data
Output Specification	Check that the correct methods are called to create a bill regarding ride data in payment manager.
Environmental Needs	Calculate Charge Manager

Test Case Identifier	I2C23
Test Case Description	Send bill to external agency
Test Item(s)	Payment Man → External Agency man.
Input Specification	Reservation fee bill or ride bill
Output Specification	Check that the correct methods are called to send the bill.
Environmental Needs	Payment Manager

Test Case Identifier	I2C24
Test Case Description	Send data to check various discounts
Test Item(s)	Sensor Manager → Calculate Charge man.
Input Specification	Ride data
Output Specification	Check that the correct methods are called to check various discounts.
Environmental Needs	Sensor manager

Test Case Identifier	I2C25
Test Case Description	Checking the reservation distance and validity
Test Item(s)	Reservation manager → Unlock/lock man.
Input Specification	Reservation data.
Output Specification	Check that the correct methods are called to check the validity of the reservation.
Environmental Needs	Reservation Manager

Test Case Identifier	I2C26
Test Case Description	Sorting various type of incoming request
Test Item(s)	Sorting Components → Log in manager
Input Specification	Request
Output Specification	Check that the correct methods are called to sorting the incoming request to the right component.
Environmental Needs	Sorting Components

Test Case Identifier	I2C27
Test Case Description	Sorting various type of incoming request
Test Item(s)	Sorting Components → Register manager
Input Specification	Request
Output Specification	Check that the correct methods are called to sorting the incoming request to the right component.
Environmental Needs	Sorting Components

Test Case Identifier	I2C28
Test Case Description	Sorting various type of incoming request
Test Item(s)	Sorting Components → Password man
Input Specification	Request
Output Specification	Check that the correct methods are called to sorting the incoming request to the right component.
Environmental Needs	Sorting Components

Test Case Identifier	I2C29
Test Case Description	Sorting various type of incoming request
Test Item(s)	Sorting Components → Reservation man..
Input Specification	Request
Output Specification	Check that the correct methods are called to sorting the incoming request to the right component.
Environmental Needs	Sorting Components

Test Case Identifier	I2C30
Test Case Description	Sorting various type of incoming request
Test Item(s)	Sorting Components → Unlock/lock man.
Input Specification	Request
Output Specification	Check that the correct methods are called to sorting the incoming request to the right component.
Environmental Needs	Sorting Components

Test Case Identifier	I2C31
Test Case Description	Sorting various type of incoming request
Test Item(s)	Sorting Components → Sensor Manager
Input Specification	Request
Output Specification	Check that the correct methods are called to sorting the incoming request to the right component.
Environmental Needs	Sorting Components

Test Case Identifier	I2C32
Test Case Description	Sorting the incoming request
Test Item(s)	Request Manager → Sorting components.
Input Specification	Request
Output Specification	Check that the correct methods are called to sort the incoming request in base of user type.
Environmental Needs	Request Manager

Test Case Identifier	I2C33
Test Case Description	Send responses
Test Item(s)	Session Manager → Mobile Application.
Input Specification	Response to send
Output Specification	Check that the correct methods are called in base of user type.
Environmental Needs	Dbms manager

Test Case Identifier	I2C34
Test Case Description	Send responses
Test Item(s)	Session Manager → Screen
Input Specification	Response to send
Output Specification	Check that the correct methods are called request in base of user type.
Environmental Needs	Dbms manager

Test Case Identifier	I2C35
Test Case Description	Send responses
Test Item(s)	Session Manager → web application
Input Specification	Response to send
Output Specification	Check that the correct methods are called in base of user type.
Environmental Needs	Dbms manager

3.3. Screen

Test Case Identifier	I3C1
Test Case Description	Send(screen) and receive (central system) the requests
Test Item(s)	Screen → Central System
Input Specification	Command from Screen
Output Specification	Check that the correct methods are called and the client receives a notification about response
Environmental Needs	Car monitor

3.4. Web application

Test Case Identifier	I4C1
Test Case Description	Send(screen) and receive (central system) the requests
Test Item(s)	Request Manager → Sorting components.
Input Specification	Command from Web application
Output Specification	Check that the correct methods are called and the client receives a notification about response
Environmental Needs	Pc with internet

3.5. Mobile application

Test Case Identifier	I5C1
Test Case Description	Send(screen) and receive (central system) the requests
Test Item(s)	Request Manager → Sorting components.
Input Specification	Command from mobile application
Output Specification	Check that the correct methods are called and the client receives a notification about response
Environmental Needs	Mobile phone with Power enjoy application

3.6. Testing procedure for reaching the goals

Test Procedure ID	TP1
Goals	Allow to register on the system
Procedure Steps	I4C1, I2C32, I2C27, I2C2, I1C1, I2C9

Test Procedure ID	TP2
Goals	Allow to log in on the system.
Procedure Steps	(I4C1 o I5C1), I2C32, I2C26, I2C1 , I1C1, I2C8

Test Procedure ID	TP3
Goals	Allow to find the locations of available cars within a certain distance from their current position or from a specified address.
Procedure Steps	(I4C1 o I5C1), I2C32, I2C29, I2C16, I2C18, I2C5, I1C1, I2C12

Test Procedure ID	TP4
Goals	Allow to reserve a single car for up to 1 hour.
Procedure Steps	(I4C1 o I5C1), I2C32, I2C29, I2C21

Test Procedure ID	TP5
Goals	Allow to pay a fee if he misses the reservation.
Procedure Steps	(I4C1 o I5C1), I2C32, I2C29, I2C21, I2C23, I2C14

Test Procedure ID	TP6
Goals	Allow to tell the system she's nearby.
Procedure Steps	I5C1, I2C32, I2C30, I2C25, I2C6, I1C1, I2C13

Test Procedure ID	TP7
Goals	Allow to see the current charges.
Procedure Steps	I3C1

Test Procedure ID	TP8
Goals	Allow to reach grid stations location.
Procedure Steps	I3C1

Test Procedure ID	TP9
Goals	Allow to receive a discount if the user has at least two passengers.
Procedure Steps	I3C1, I2C32, I2C31, I2C24, I2C22

Test Procedure ID	TP10
Goals	Allow to receive a discount if the user left the car with no more than 50% battery empty.
Procedure Steps	I3C1, I2C32, I2C31, I2C24, I2C22

Test Procedure ID	TP11
Goals	Allow to receive a discount if the user left the car in a Power grid station and takes care of plugging the car.
Procedure Steps	I3C1, I2C32, I2C31, I2C24, I2C22

Test Procedure ID	TP12
Goals	Allow to receive a fee if the user left the car more than 3km from the nearest power station or left the car with more than 80% of the battery empty.
Procedure Steps	I3C1, I2C32, I2C31, I2C24, I2C22

Test Procedure ID	TP13
Goals	Allow to see an e-mail sent by the system with the bill ride and payment resume, at the end of this one.
Procedure Steps	I3C1, I2C32, I2C31, I2C24, I2C22, I2C21 ,I2C23 ,I2C14

Test Procedure ID	TP14
Goals	Allow to user to pay immediately after at the end of the ride.
Procedure Steps	I3C1, I2C32, I2C31, I2C24, I2C22, I2C21, I2C23, I2C14 I4C1, I2C32, I2C4, I2C1, I2C11

4. Tools and test equipment require

In this section, we will suggest possible tools that can be used for testing PowerEnJoy.

Moquito: It is used for creates mockups. This mockups perform the unit testing.

Junit: It is use for write repeatable testing of the unit or component we want to test.

Manual testing: The developers test himself the program using it. He uses a black-box test strategy to ensure the correct behavior of the system.

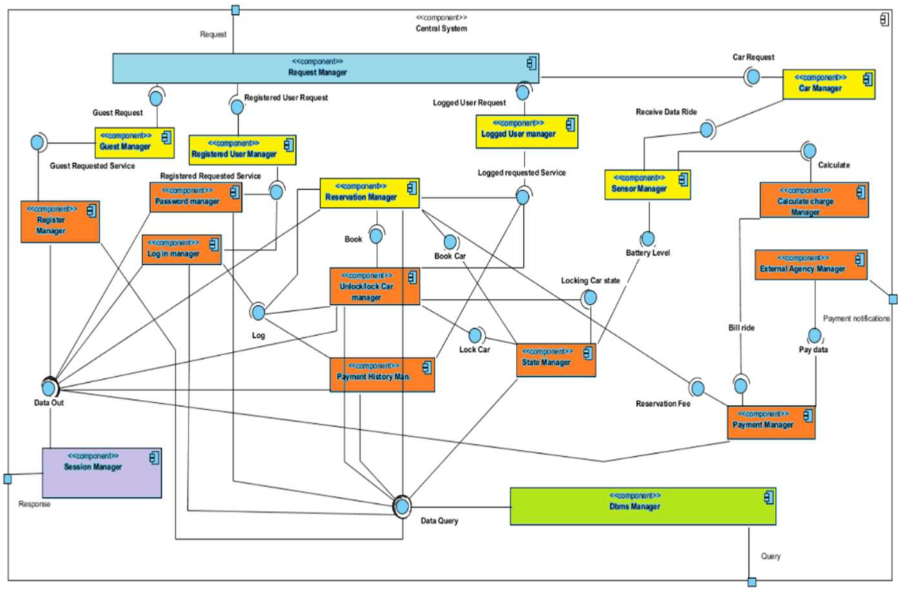
5. Program stub and test data required

In this section, we describe the stub we must use for our test integration.

Cause we decide to do a bottom-up strategy for our test integration, we won`t use the stubs, but instead of this, we use drivers.

The driver is a temporary program used to simulate the main module.

We have 5 drivers, one for color of the following image



First driver is the Green for the Dbms manager, this driver create a query for the Dbms.

Second is the Red, this driver contains the main action of our system, this action will be use with the session manager or the Dbms manager.

Third Yellow, this driver parses the request to the right component one.

Fourth Blue, this driver receives the request from the client and parses it.

Final is Purple, this driver receives the result of the action and sends them to the right client.

6. Appendix

6.1 Hour of work

Marco Wenzel: 10 hours.
Francesco Tinarelli: 10 hours.