

**I**ntegration **T**est **P**lan **D**ocument **(ITPD)**

Computer Science and Engineering (CSE)

Software Engineering 2 Project

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# Introduction

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## Revision History

We will keep the **revision history** of the **Integration Test Plan Document** (**ITPD**) in this chapter.

|  |  |  |  |
| --- | --- | --- | --- |
| **Version** | **Date** | **Author(s)** | **Summary** |
| 1.0 | 21/01/2016 | Andrea Martino, Francesco Marchesani | Document  Creation |

## Purpose and Scope

This **Integration Test Plan Document** (**ITPD**) contains information about the **test plan**, the **integration strategy** and **other required material** of *myTaxiService*.

This **document** is coherent with *the official template* of the project on the *Beep platform* (see *Assignment 4 – integration test plan.pdf*).

As we said for the **RASD** and the **DD**, it is important to underline that some parts of this document may evolve in the future (this may occurs for several causes).

Anyway, we will try to maintain coherence as much as possible.

Here is a resume of the steps of the project, with the related deadlines (in green documents already delivered, in yellow the current document):

The main scope of this **ITPD** (*Integration Test Plan Document*) is to give an overall guidance to the **testing phase** of the **project**, which is *myTaxiDriver* (**Software Engineering 2 project** of year 2015/16 - **Politecnico di Milano**).

* We described the main **goals** and **objectives** of the project in the previous *Requirements Analysis and Specification Document*.
* We also specified the **general architecture**, with the **components** of the system in the other previous document (*Design Document*).

## List of Definitions and Abbreviations

* **RASD**: *Requirements Analysis and Specification Document*
* **DD**: *Design Document*
* **ITPD**: *Integration Test Plan Document*
* **mTS**: *myTaxiService*
* **SE**: *Software Engineering*
* **IDE**: Integrated Development Environment
* **JEE**: Java Enterprise Edition
* **Mockito**: tool for mockups creation (useful in *Unit Testing*).
* **Arquillian**: tool for integration testing.
* **ShrinkWrap**: Java API for archive manipulation. It powers the *arquillian* deployment mechanism.
* **NetBeans**: open source IDE.
* **Unit Testing (UT)**: a software testing method by which individual units of source code, sets of one or more computer program modules together with associated control data, usage procedures, and operating procedures, are tested to determine whether they are fit for use.
* **Integration Testing (IT)**: is the phase in software testing in which individual software modules are combined and tested as a group.
* **System Testing**: is testing conducted on a complete, integrated system to evaluate the system's compliance with its specified requirements.
* **Performance Testing**: is a testing practice performed to determine how a system performs in terms of responsiveness and stability under a particular workload.
* **Load Testing**: is the process of putting demand on a software system or computing device and measuring its response.
* **Stress Testing**: is a test that put a greater emphasis on robustness, availability, and error handling under a heavy load, rather than on what would be considered correct behavior under normal circumstances.
* **Test Plan**: is a document detailing the objectives, target market, internal beta team, and processes for a specific beta test for a software product.

**Other stuff, of course!**

**Note:** *for the full Glossary may be helpful to see also the paragraph 1.5 of the RASD 2.0 and paragraph 2.3 of DD.*

## List of Reference Documents

Here is a list of the **reference documents** for the *Integration Test Plan Document* of *myTaxiService*:

* **Project Description** (from *Beep* platform)
* **RASD 2.0 [RASD Revision]** (hosted on *GitHub Repository*)
* **Design Document [DD]** (hosted on *GitHub Repository*)
* **JUnit Documentation** (*http://junit.org/javadoc/latest/)*
* **Arquillian Documentation** (*http://docs.jboss.org/arquillian/aggregate/latest/)*
* **NetBeans Documentation** (*https://netbeans.org/kb/)*
* /\* Documentation of other tools used for testing \*/

# Integration Strategy

## Entry Criteria

It is important to underline the **entry criteria** before the application of the integration testing process. This is a list of the required entry criteria, with respect to *myTaxiService* project:

* Functions must been have **unit tested**, otherwise there is a high probability of issues with the standalone units (without looking at their interactions, as target of the integration tests).
* *Requirements Analysis and Specification Document* (**RASD**) and *Design Document* (**DD**) must be completed.
* The code has a **proper documentation**, in order to be readable from the point of view of the testers. Otherwise, they may occur problems with the readability of some parts of the code.
* All the **required tools** are available and work without problems.
* OTHERS?

## Elements to be integrated

We want to integrate the **components** described in the Design Document in order to test incrementally the integration of the elements.

We identified the **clusters** of elements to be integrated. The integration will be coherent with the clustering aggregation, starting from the **external** **interface** and the **top component** (*System Manager*). This are the **three clusters** of *myTaxiService* components:

1. **myTaxiService features cluster**: it is a service-oriented cluster, when we have components like *System Manager, Data Layer, Maps Manager, Payment Services, Google Maps, Reservation Manager, Queue Manager*.
2. Client/Server
3. …. DISCUSS WITH ANDREA

We want to remark the integration of the **two external APIs** (*Payment API* and *Google Maps API*). The second one in particular must interact with the Server-Side *Maps Manager* with a bridge component (*System Manager*).

## Integration Testing Strategy

We decided to choose a **Top-Down** integration testing strategy.

The main advantage of this approach is that design errors are easily identified, in order to check from the beginning if the architecture of *myTaxiService* is optimal. With the *Top-Down approach*, we can avoid **drivers** and focus only on required **stubs** gradually (see *chapter 5. Program Stubs and Test Data Required*).

Another big advantage of this approach is the following: when we have **a stable structure** then in case of modifies on the lower elements we will not change also the structure during the integration phase (and after, with revision and maintenance processes).

Let us see the general structure of **Top Down approach**, with a graphical representation:

Top Down

As it is possible to see from the *component diagram* there is “*star structure*” for the central components. The core of this structure is the **System Manager** component. It directly interacts with *Customer Manager, Taxi Driver Manager, Maps Manager, Reservation Manager*, *Queue Manager* and the *External Components* (*Google Maps* and *Payment Services*).

Let us see a graphical representation:

Our testing strategy considers this structure as a starting point. Then starting from the **highest level of abstraction**, we go through lower levels of abstraction adding details. For the full Component Diagram, with the related components and interfaces see the *Component Diagram* in *Design Document (DD)*.

## Sequence of Component/Function Integration

### Software Integration Sequence

* **Integration tests of (…) (Top-Down)**

|  |  |  |
| --- | --- | --- |
| ID | Integration Test | Paragraphs |
| I1 | Customer Client -> Client Manager (Stub), Google Maps |  |
| I2 | Taxi Driver Client -> Taxi Driver Manager (Stub), Google Maps |  |
| I3 | SysAdmin Client -> System Manager (Stub) |  |

* **Integration tests of (…) (Sandwich)**

|  |  |  |
| --- | --- | --- |
| ID | Integration Test | Paragraphs |
| I1 | Customer Client (Driver) -> Customer Manager |  |
| I2 | Client Manager -> System (Stub) |  |
| I3 | Taxi Driver Client (Driver) -> Taxi Driver Manager |  |
| I4 | Taxi Driver Manager -> System Manager (Stub) |  |

* **Integration tests of (…) (Sandwich)**

|  |  |  |
| --- | --- | --- |
| ID | Integration Test | Paragraphs |
| I1 | System Manager -> Google Maps |  |
| I2 | System Manager -> Payment Services (Stub) |  |

As we have seen in the Design Document, Payment Services is an already made external component. However is

* **Integration tests of (…) (Sandwich)**

|  |  |  |
| --- | --- | --- |
| ID | Integration Test | Paragraphs |
| I1 | System Manager -> Google Maps |  |
| I2 | System Manager -> Payment Services (Stub) |  |

### Subsystem Integration Sequence

\* IDEM SEE ABOVE \*

# Individual Steps and Text Description

1st kind of tables

|  |  |
| --- | --- |
| **Test Case Identifier** |  |
| **Test Item(s)** |  |
| **Input Specification** |  |
| **Output Specification** |  |
| **Environmental Needs** |  |

2nd kind of tables

|  |  |
| --- | --- |
| **Test Procedure Identifier** |  |
| **Purpose** |  |
| **Procedure Steps** |  |

# Tools and Test Equipment Required

In this chapter, we will show the **tools** and the **test equipment** required for the *Integration Testing*.

Note that this section regards only the Integration Testing. In fact, we will not talk about other useful tools like **mockito**,which are used in the **Unit Testing** **phase** (before the Integration Testing, as said in *Chapter 2.1 Entry Criteria*). In addition, we will also not talk about tools related to other types of testing, such as *System Testing*, *Performance Testing*, *Load Testing*, *Stress Testing* and so on.

We used the following tools and test equipment:

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Logo** | **Website** | **Function** |
| **Arquillian** |  | *http://arquillian.org/* | Integration testing framework for containers |
| **JUnit** |  | *http://junit.org/* | Framework to write repeatable tests |
| **NetBeans** |  | *https://netbeans.org/* | IDE for manual integration testing |

Now it is useful to give a **motivation** related to the use of these tools in practice:

* **Arquillian** combines a unit testing framework (*JUnit* in our case), *ShrinkWrap*, and one or more supported target containers (*Java EE containers*) to provide a simple, flexible and pluggable integration testing environment. We selected this tool because it is a helpful open source standard for integration testing of big projects.
* We know that **JUnit** should be used before Integration testing (so in *Unit Tests*). Anyway, we will also use it to do integration testing when possible. In fact, it is a versatile tool and may be helpful for testing in several cases. We will use it mainly for assertions for testing expected results.
* **NetBeans** is an open source IDE for several programming languages, as JEE. We selected this IDE as testing environment because it is optimized for big enterprise projects like *myTaxiService*. It does not require special plugins to deal with JEE. See also [*https://netbeans.org/enterprise/index.html*](https://netbeans.org/enterprise/index.html)for more details.
* We will also consider **manual testing** for some part of the code. Sometimes, in fact, it may add knowledge to other systematic ways of testing. In this case, the tester directly plays the role of the end user. We will focus only on “*smart*” *test cases*, in order to avoid waste of time. See *chapter 5* for more details.

# Program Stubs and Test Data Required

From Wikipedia:

**STUB**

A dummy piece of software used to simulate a yet-to-be-developed low level module.

DRIVER

*A method stub or simply stub in software development is a piece of code used to stand in for some other programming functionality. A stub may simulate the behavior of existing code (such as a procedure on a remote machine) or be a temporary substitute for yet-to-be-developed code. Stubs are therefore most useful in porting, distributed computing as well as general software development and testing.*

**TEST DATA**

*Test data is data which has been specifically identified for use in tests, typically of a computer program.*

*Some data may be used in a confirmatory way, typically to verify that a given set of input to a given function produces some expected result. Other data may be used in order to challenge the ability of the program to respond to unusual, extreme, exceptional, or unexpected input.*

*Test data may be produced in a focused or systematic way (as is typically the case in domain testing), or by using other, less-focused approaches (as is typically the case in high-volume randomized automated tests). Test data may be produced by the tester, or by a program or function that aids the tester. Test data may be recorded for re-use, or used once and then forgotten.*

# Appendix

## Hours of work

* **Andrea Martino**: Hours
* **Francesco Marchesani**: Hours