Politecnico di Milano
Computer Science and Engineering

Project of Software Engineering 2

Integration Test Plan Document

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TABLE OF CONTENT

1. Introduction

1.1. Revision History

19-01-2016: Version 1.0
19-02-2016: Version 2.0 – Added purpose of TPC1. Improved input and expected output specification. Added load test.

1.2. Purpose and Scope

The purpose of the integration test plan is to describe the necessary tests to verify that all of the components of *myTaxiService* are properly assembled. Integration testing ensures that the unit-tested modules interact correctly.
The team that will perform integration test should read this document.

1.3. List of definitions and abbreviations

- Driver: A software component or test tool that replaces a component that takes care of the control and/or the calling of a component or system.
- CI: Component Integration
- SI: System Integration

1.4. List of reference documents

- **Project description:**
  Assignment 1 and 2 (Section 2: The problem – MyTaxiService)
  https://goo.gl/pr652J

- **RASD:**
  RASD – MyTaxiService – Iannacci_Romanini_Seri.pdf
  https://github.com/daler3/se2project/blob/master/Deliveries/RASD - MyTaxiService - Iannacci_Romanini_Seri.pdf

- **Design Document:**
  Design Document – MyTaxiService – Iannacci_Romanini_Seri.pdf
  https://github.com/daler3/se2project/blob/master/Deliveries/Design Document - MyTaxiService - Iannacci_Romanini_Seri.pdf

- **Documentation of tools planned to be used for testing:**
  - Mockito: http://mockito.org/
  - Arquillan: http://arquillian.org/
  - JMeter: http://jmeter.apache.org/
  - JUnit: http://junit.org/

2. Integration Strategy

2.1. Entry Conditions

- Database drivers must be on the Server machine
- Database must have all the needed tables
- Functions must have been unit tested
- The Server and the client must be connected to a network

2.2. Elements to be integrated

Referring to the Design Document (section 2.3), we identified the following subsystems:

- Call: It is composed by the classes: Call, User and TimeDeamon.
- SharedCall: It extends the functionality of Call and it is composed by the entity SharedCall, SharedSet, User_TSharing and Call Recognizer.
- Zone: It is composed by the components: Zone, TaxiDriver and QueueManager.
- Server: It is composed by the component: server class and database.

2.3. Integration Testing Strategy

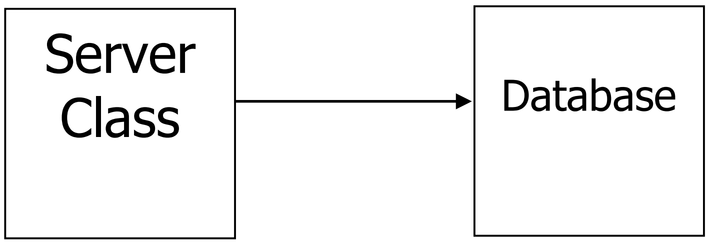
We choose to apply bottom-up strategy for testing: after each component at lower hierarchy has been tested, we proceed to test other components that rely upon these.
After having built the subsystems named in section 2.2, we integrate them, making interacting each other. The relations among the subsystems can be found at section 2.3 of Design Document. (In order to see the specific functions/methods called in the classes, section "2.7 – Component Interfaces" of Design Document can be consulted).

2.4. Sequence of Component Integration

2.4.1. Software Integration Sequence

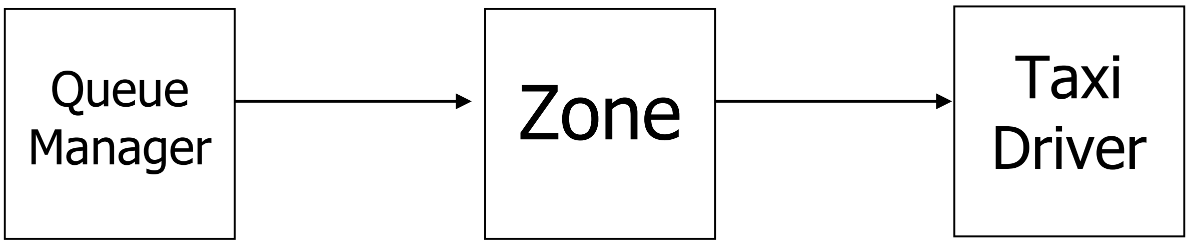
Integration test of "Server" subsystem

ID	Integration Test	Paragraphs
CI1	Server Class -> Database	3.1.1



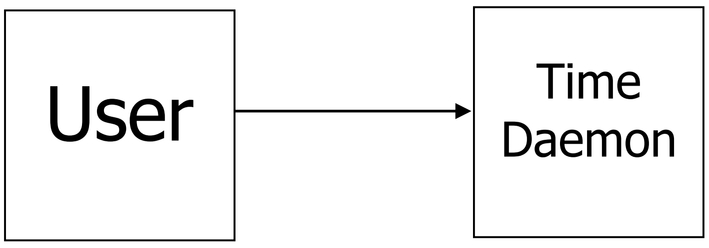
Integration test of "Zones" subsystem

ID	Integration Test	Paragraphs
CI2	Queue Manager -> Zone	3.1.2
CI3	Zone -> Taxi Driver	3.1.3



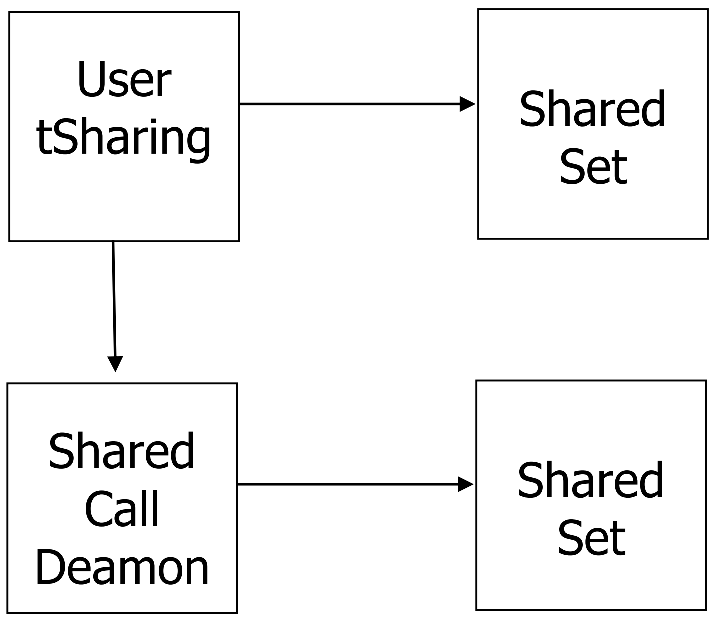
Integration test of "Calls" subsystem

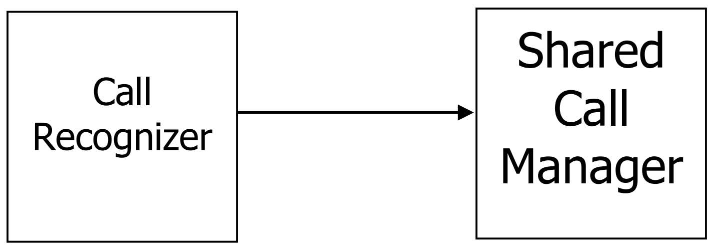
ID	Integration Test	Paragraphs
CI4	User -> Time Daemon	3.1.4



Integration test of “Shared Calls” subsystem

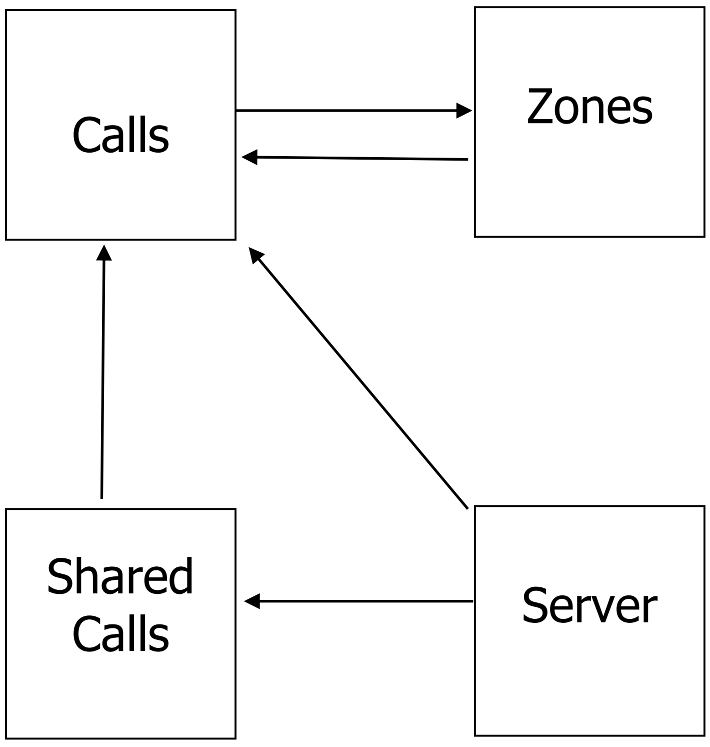
ID	Integration Test	Paragraphs
CI5	User_tSharing -> SharedSet	3.1.5
CI6	User_tSharing -> SharedCall Daemon	3.1.6
CI7	SharedCall Daemon -> SharedSet	3.1.7
CI8	Call Recognizer -> SharedCall Manager	3.1.8





2.4.2. Subsystem Integration Sequence

ID	**Integration Test**	**Paragraphs**
SI1	Calls -> Zones	3.3.1
SI2	Zones -> Calls	3.3.2
SI3	Shared Calls -> Calls	3.3.3
SI4	Server -> Shared Calls	3.3.4
SI5	Server -> Calls	3.3.5



3. Individual Steps and Test Description

3.1. Component Integration

3.1.1. CI1

Test Case Identifier	**CI1T1**
Test Item(s)	Server Class -> Database
Input Specification	Call properly the server methods that modify the database.
Output Specification	Check if the database has been modified properly
Environmental Need	Server Driver; Database Driver; Network Connection available;

3.1.2. CI2

Test Case Identifier	**CI2T1**
Test Item(s)	Queue Manager -> Zone
Input Specification	Call properly the functions to book a TD.
Output Specification	Check if the correct methods are called in the correct Zone.
Environmental Need	Queue Manager Driver

3.1.3. CI3

Test Case Identifier	**CI3T1**
Test Item(s)	Zone -> Taxi Driver
Input Specification	Call properly the functions to book a TD.
Output Specification	Check if the correct TD is called and the function are called properly.
Environmental Need	CI2 succeeded

3.1.4. CI4

Test Case Identifier	**CI4T1**
Test Item(s)	User -> Time Daemon
Input Specification	Call the methods of User to book a Call.
Output Specification	Check if the Time Daemon manages correctly the Call.
Environmental Need	User drivers

3.1.5. CI5

Test Case Identifier	**CI5T1**
Test Item(s)	User_tSharing -> SharedSet
Input Specification	Create a Shared Call using User_tSharing methods.
Output Specification	Check if the SharedSet manages properly the request of a new Shared Call.
Environmental Need	User_tSharing drivers

3.1.6. CI6

Test Case Identifier	**CI6T1**
Test Item(s)	User_tSharing -> SharedCall Daemon
Input Specification	Create a Shared Booked Call using User_tSharing methods.
Output Specification	Check if the Time Daemon manages correctly the Shared Call.
Environmental Need	User_tSharing drivers

3.1.7. CI7

Test Case Identifier	**CI7T1**
Test Item(s)	SharedCall Daemon -> SharedSet
Input Specification	There must exist Shared Booked Call in the Shared Call Deamon that are going to be awaken.
Output Specification	Check if the Shared Set manages properly the awaken Shared Call.
Environmental Need	CI6 succeeded

3.1.8. CI8

Test Case Identifier	**CI8T1**
Test Item(s)	Call Recognizer -> SharedCall Manager
Input Specification	A call is properly recognized and instantiated by Call Recognizer.
Output Specification	Check if the correct Call type and fare is calculated for the passenger of the Call.
Environmental Need	Call Recognizer drivers

3.2. Component Integration – Test Procedures

3.2.1. TPC1

Test Procedure Identifier	TPC1
Purpose	This test procedure verifies whether the Server: • Can access properly to the DB. • Can store properly each user action and information. • Can store properly each call update. • Can store and provide properly Zones and Shift information.
Procedure Steps	Execute: CI1

3.2.2. TPC2

Test Procedure Identifier	TPC2
Purpose	This test procedures verifies whether the QueueManager: • Can find the zone corresponding to a call • Can access the taxi-queue of the zone corresponding to a call • Can find the first available taxi-driver in the call zone • Can handle the assignment of a taxi driver to a call • Can handle the taxi-driver response.
Procedure Steps	Execute CI2 before CI3

3.2.3. TPC3

Test Procedure Identifier	TPC3
Purpose	This test procedures verifies whether the User: • Can book a call
Procedure Steps	Execute: CI4

3.2.4. TPC4

Test Procedure Identifier	TPC4
Purpose	This test procedure verifies whether the classes related to SharedCall extensions work properly. In particular we test: • If a generic call is recognized as shared or not; • If a User making a Shared-Call is assigned properly to a Taxi; • If booked Shared Call are managed properly; • If the appropriate fare is calculated for each user that has made a Shared Call
Procedure Steps	Execute: CI5 and CI6; then CI7; finally CI8

3.3. Subsystems Integration

3.3.1. SI1

Test Case Identifier	**SI1T1**
Test Item(s)	Calls -> Zones
Input Specification	Create typical Calls input
Output Specification	Check if the correct methods are called in Zones
Environmental Need	User driver

3.3.2. SI2

Test Case Identifier	**SI2T1**
Test Item(s)	Zones -> Calls
Input Specification	Create typical Zones input
Output Specification	Check if the correct methods are called in Calls
Environmental Need	Queue Manager driver

3.3.3. SI3

Test Case Identifier	**SI3T1**
Test Item(s)	Shared Calls -> Calls
Input Specification	Create typical Shared Calls input
Output Specification	Check if the correct methods are called in Calls
Environmental Need	Shared Set drivers

3.3.4. SI4

Test Case Identifier	**SI4T1**
Test Item(s)	Server -> Shared Calls
Input Specification	Create typical Server input
Output Specification	Check if the correct methods are called in Shared Calls
Environmental Need	Call Recognizer Drivers

3.3.5. SI5

Test Case Identifier	**SI5T1**
Test Item(s)	Server -> Calls
Input Specification	Create typical Server input
Output Specification	Check if the correct methods are called in Calls
Environmental Need	SI4T1 succeeded

Subsystem Integration – Test procedures

3.3.6. TPS1

Test Procedure Identifier	TPS1
Purpose	This test procedure verifies whether the subsystems "Calls" and "Zones" can interact each other. In particular we test: • If the whole call procedure made by a user is properly managed;
Procedure Steps	Execute SI1 and SI2

3.3.7. TPS2

Test Procedure Identifier	TPS2
Purpose	This test procedure verifies if the SharedCall extension works properly.
Procedure Steps	After having executed TPS1, execute S3.

3.3.8. TPS3

Test Procedure Identifier	TPS3
Purpose	This test procedure verifies if the entire Server is properly integrated. In particular we test: • If an appropriate fare is calculated at the end of a Call.
Procedure Steps	After having executed TPS2, execute SI4 and SI5

After having verified TPS3, we can proceed and test the communication part.

At the end, we make an integration test between the Server-side and Client-side using the communication.

The test described above are functional tests.
It is necessary to perform also a Load Test: we make connect 200 User client. 60 of them make a call contemporarily and 20 of them are from the same zone.
It is expected that the response for each does not arrive later than 5 minutes per client.
This test is also necessary to test Database performances.

Antoher test to stress the Database is make 3 client registering and 40 logging in contemporarily and then modify the information for them every 0.2 seconds.

4. Tools and Test Equipment Required

Supposing that the developer team has used Java language to develop the program, the following tools can be used to performing the test:

- **Jmeter** is used to test if network works, and the performance of the Server in a heavy load situation. We build multiple virtual users that connects to the server, also to understand the maximum load that can be sustained by the Server.

- **Mockito** can be used to for write all mock objects needed (drivers and stubs) to perform various phases of the integration steps.

- **Arquillian** will be used to test if the interaction with the database is correct.

Moreover, manual test can be used to check if all the system works properly and the user experience is good enough.

5. Program Stubs and Test Data Required

First, we need that all unit tests has been successfully performed (for example with JUnit).

Following we list all drivers required to perform integration steps.
In the "Functions" columns, we list the function that the driver will call in the corresponding class.

Name	**Functions to be tested**	**Paragraphs**

Server Driver	Login;
	Logout;
	Functions to manage user account;
	Save call;
	Add User;
	Functions to Manage taxi-drivers and manage zones.
		CI1

QueueManager Driver	Functions to manage zones queue; Functions to send requests to taxi-drivers	CI2 SI2
User Driver	makeCall	CI4 SI1
User_tSharing Driver	makeSharedCall	CI5
Call Recognizer Driver	recognizeSharedCall; calculateAppropriateFare	CI8 SI4

SharedSet Driver	manageCall;
	compareCall;
	createNewSCall
		SI3

Following we list the various input data required to perform test cases for each function named in the column “Functions to be tested” in the table above.

Name	**Input Data**	**Driver Name**
Login	- User already registered - User not registered - User already logged in	Server Driver
Logout	- User not logged in - User logged in	Server Driver
Functions to manage user account	- correct information - incorrect information	Server Driver
Save Call	- call details already registered - call details not registered	Server Driver
Add User	- not existing user - existing user	Server Driver
Functions to Manage taxi-drivers	- request a taxi when at least one taxi-driver is available request a taxi when no taxi-drivers is available - request a taxi and taxi driver refuses - request a taxi and the first taxi driver accepts	Server Driver
Functions to Manage zones	- add a not existing zones - add an existing zones - remove a not existing zones - remove an existing zone	Server Driver
Functions to manage zones queue	- add a taxi-driver to a zone - remove a taxi-driver to a zone - add a shift to a taxi driver - remove a shift to a taxi driver - add an existing shift to a taxi driver	QueueManager Driver
Functions to send requests to taxi-drivers	- taxi driver in service - taxi-driver not in service	QueueManager Driver
makeCall	- correct call details - incorrect call details - make a fast-call outside the zone covered by the service - make a fast-call inside the zone covered by the service - make a booked call more than2 hours before the scheduled time - make a call less than 2 hours before the scheduled time	User Driver
makeSharedCall	- make a fast and shared call	User_tSharing

	- make a booked and shared call - make a shared call and no compatible existing shared-call - make a shared call and compatible existing shared-call	Driver
recognizeShared Call	- make a shared call - make a normal call	Call Recognizer Driver
calculateAppropr iateFare;	- calculate fare for a normal call - calculate fare for a shared call	Call Recognizer Driver
manageCall	- modify call with incorrect details - modify call with correct details - modify call 2 hours before the scheduled time - modify call less than 10 minutes before the scheduled time	SharedSet driver
compareCall	- existing compatible path - not existing compatible path	SharedSet driver