

Unit Testing Plan

for Public Transportation System

- Test Plan
- Test Design Specification
- Test Cases Specification

Project Team

Team 5

Date

2014-11-18

Team Information

201113247 강병주 / kk921221@naver.com

201312283 허지민 / jim-jim0511@hanmail.net

201311294 윤상은 / signsssss@naver.com

201311262 김민석 / makktub94@gmail.com

Table of Contents

1	Introduction	4
1.1	Objectives.....	4
1.2	Background	4
1.3	Scope.....	4
1.4	Project plan	4
1.5	Configuration management plan.....	4
1.6	References.....	4
2	Test items	5
3	Features to be tested.....	5
4	Features not to be tested	5
5	Approach.....	6
6	Item pass/fail criteria	6
7	Unit test design specification.....	6
7.1	Test design specification identifier	6
7.2	Features to be tested	6
7.3	Approach refinements.....	6
7.4	Test identification	7
7.5	Feature pass/fail criteria	25
8	Unit test case specification.....	25
8.1	Test case specification identifier	25
8.2	Test items	37

8.3	Input specifications.....	37
8.4	Output specifications.....	37
9	Testing tasks	38
10	Environmental needs	38
11	Unit Test deliverables.....	38
12	Schedules	38

1 Introduction

1.1 Objectives

이 문서는 T5의 Public Transportation System의 unit test를 수행하기 위해 작성된 계획문서이며, 본 system이 제대로 작동하는지를 살펴보기 위해 필요한 요소들을 정리해 놓은 문서이다. 앞선 단계에서 진행했던 SRA 3.3의 State Transition Diagram을 바탕으로 test할 부분을 선정하였고, 각 기능이 제대로 수행되는 지 확인하는 것에 중점을 두어 작성하였다. Test를 수행하기 위해 필요한 활동 및 자원을 정의하고, test approach 및 techniques를 정의한다. 또한 test를 위한 환경적인 요구사항 및 test도구들을 정의한다.

1.2 Background

Public Transportation System은 대중교통시스템으로, 사용자의 카드정보, 단말기, 정산시스템을 제어하는 시스템이다. 이 시스템은 버스용 단말기, 지하철용 단말기, 정산시스템으로 구성되어 있으며(00000). unit test는 시스템을 구성하는 최소 단위 모듈들을 대상으로 하는 test이며, 시스템의 성능을 좌우하는 요소들이 요구사항을 만족하는지를 확인할 수 있는 기본적인 test approach이다.

1.3 Scope

이 계획 문서는 Public Transportation System(이하 PTS)의 unit test를 수행하기 위한 모든 것을 포함한다. PTS의 unit test를 수행하기 위한 자원과 절차, test approach와 technique과 필요로 하는 환경 및 도구 등을 정의한다. PTS의 unit test는 시스템을 구성하는 최소단위의 모듈들을 대상으로 하며, 구현된 모듈이 요구사항을 만족하는 지를 test한다

1.4 Project plan

1.5 Configuration management plan

Public Transportation System의 Program source code 및 unit test를 위한 test code는 CTIP (Continuous Testing & Integration Platform) 환경에서 이루어지며, program source code / test code의 변경 및 수정 사항은 지속적으로 통합되고 test 된다.

1.6 References

PTS SRS 1.0

PTS SRA 3.3

PTS SDS 2.2

2 Test items

3 Features to be tested

3.1 Processes in SRA : 각 프로세스가 가지고 있는 요구사항을 만족하는 지를 test한다.

3.2 Modules in SDS : 각 모듈이 가지고 있는 데이터 인터페이스를 test한다.

<Table 1> List of Processes to Be Tested

ID	Name	Description
A1.2	Card Reader Interface	카드가 태그 되었을 때 단말기로 정보를 전달하는 인터페이스. 카드의 정보를 입력 받는다.
A2.1	Decision Controller	카드의 정보 5가지와 2가지 단말기 정보, 그리고 Time Calculator에서 받은 정보를 종합하여 요금과 탑승 가능 여부를 판단한다.
A2.2	Time Calculator	Time 정보를 받아서 그것을 Date 와 sec로 나누어 Decision Controller로 전송한다.
A3.1	Monitor Controller	단말기 모니터를 통하여 Cost, Balance 정보와 탑승 가능 여부를 출력한다.
A3.3	Card Data Output Interface	단말기에서 지금까지 계산한 데이터를 카드에 다시 저장한다.
B1.2	Sort A.P.I. Data	A.P.I. Data Input Interface로부터 받은 하루치 결제정보를 Reader ID를 기준으로 정렬한 후, Calculate Sorted Data 로 전송한다.
B2.1	Calculate Sorted Data	Sorted Data 를 계산하여 하루 치 결제정보를 정산한 후 Report, Bus Company, Metro Company에 각각 데이터를 보내고 Complete Signal 에 계산이 완료되었음을 알린다.

4 Features not to be tested

4.1 Processes in SRA : 외부 장치 드라이버, 단순 데이터 전달 혹은 정렬 프로세스 등은 테스트에서 제외한다.

4.2 Modules in SDS : <Table 2> List of Processes Not to Be Tested 의 Processes Name 참조.

<Table 2> List of Processes Not to Be Tested

ID	Name	Description
A1.1	Signal Receiver	A.P.I.로부터 정산이 완료되었다는 신호를 받은 후 Card Reader interface에 알려서 단말기를 실행시킨다.
A1.3	Name Info	Card Reader Interface에서부터 전송 받은 데이터를 각각의 구성요소로 나누어 저장한다.
A3.2	Integrate Care Info	각각의 구성요소로 나누어진 정보들을 카드에 저장되는 하나의 데이터로 저장하여 Card Data를 Card Data Output Interface로 전송한다.
A3.4	Integrate A.P.I. Info	여러 정보들을 하나의 데이터로 처리하여 하루치 결제 정보를 저장, Tick이 들어올 때 (하루가 끝날 때) 이 정보를 A.P.I. Output Interface로 전송한다.
A3.5	A.P.I. Sender	A.P.I.로 단말기에 누적된 하루치 결제 정보를 전송한다.
B1.1	A.P.I. Data Input Interface	여러 단말기로부터 받은 Single A.P.I. Data를 하나로 누적하여 Total A.P.I.를 만든 후 Sort A.P.I. Data로 전송한다.

5 Approach

Public Transportation System의 Program source code 및 unit test를 위한 test code는 CTIP (Continuous Testing & Integration Platform) 환경에서 이루어지며, program source code / test code의 변경 및 수정 사항은 지속적으로 통합되고 test 된다.

6 Item pass/fail criteria

Functional Test Pass/Fail Criteria : 각 모듈은 요구사항을 모두 만족하여야 한다.

7 Unit test design specification

7.1 Test design specification identifier

PTS.UTD.01.00

7.2 Features to be tested

<Table 1> List of Processes to Be Tested 참조

7.3 Approach refinements

7.3.1 Brute force testing

PTS의 각 모듈이 요구사항을 만족하는지를 확인하기 위하여, 요구사항에 정의된 내용에 기반하여 test case를 작성한다. 그 이외의 예외 상황에 대해서는 test case를 작성하지 않는다.

7.4 Test identification

<Table 3> List of Valid Inputs of Each Identifier

Identifier	Feature (Process ID in DFD)	Valid Value
PTS_UTCV_000_000	A1.2 Card Reader Interface	0001.txt card_data.day = 20141118 card_data.minute = 1523 card_data.transporaion = 'M' card_data.io = 'I' card_data.balance = 1950 card_data.readerID = "BUS1219" card_data.transfer = "MKU"
PTS_UTCV_000_001	A1.2 Card Reader Interface	0002.txt card_data.day = 20141119 card_data.minute = 0813 card_data.transporaion = 'B' card_data.io = 'I' card_data.balance = 1050 card_data.readerID = "BUS0872" card_data.transfer = "NOT"
PTS_UTCV_000_002	A1.2 Card Reader Interface	0003.txt card_data.day = 20141120 card_data.minute = 2349 card_data.transporaion = 'M' card_data.io = 'I' card_data.balance = 1050 card_data.readerID = "MDM1603" card_data.transfer = "NOT"
PTS_UTCV_001_000	A2.1 Decision Controller (STD 0)	card_data.day = 000000 card_data.minute = 0000

		<p>card_data.transportaion = NULL card_data.io = 'O' card_data.balance = 2000 card_data.readerID = "DEFAULT" card_data.transfer = "NOT"</p> <p>pts_data.day = 20141118 pts_data.minute = 2112 pts_data.transportation = 'B' pts_data.readerID = "BUS" pts_data.count = 0014</p>
PTS_UTCV_001_001	A2.1 Decision Controller (STD 1)	<p>card_data.day = 20141118 card_data.minute = 2135 card_data.transportaion = 'B' card_data.io = 'I' card_data.balance = 2000 card_data.readerID = "BUS0014" card_data.transfer = "NOT"</p> <p>pts_data.day = 20141118 pts_data.minute = 2140 pts_data.transportation = 'B' pts_data.readerID = "BUS" pts_data.count = 0030</p> <p>d_sec = 0.625</p>
PTS_UTCV_001_002	A2.1 Decision Controller (STD 1)	<p>card_data.day = 20141118 card_data.minute = 2149 card_data.transportaion = 'B' card_data.io = 'I' card_data.balance = 2000 card_data.readerID = "BUS0014" card_data.transfer = "NOT"</p> <p>pts_data.day = 20141119 pts_data.minute = 0023 pts_data.transportation = 'B' pts_data.readerID = "BUS" pts_data.count = 0002</p>

		d_sec = 19.25
PTS_UTCV_001_003	A2.1 Decision Controller (STD 1)	<p>card_data.day = 20141118 card_data.minute = 2149 card_data.transporaion = 'B' card_data.io = 'I' card_data.balance = 2000 card_data.readerID = "BUS0014" card_data.transfer = "NOT"</p> <p>pts_data.day = 20141118 pts_data.minute = 2245 pts_data.transportation = 'M' pts_data.readerID = "MKU" pts_data.count = 0124</p> <p>d_sec = 7</p>
PTS_UTCV_001_004	A2.1 Decision Controller (STD 2)	<p>card_data.day = 20141118 card_data.minute = 2149 card_data.transporaion = 'B' card_data.io = 'I' card_data.balance = 2000 card_data.readerID = "MKU0386" card_data.transfer = "BUS"</p> <p>pts_data.day = 20141118 pts_data.minute = 2245 pts_data.transportation = 'B' pts_data.readerID = "BUS" pts_data.count = 0463</p> <p>d_sec = 7</p>
PTS_UTCV_001_005	A2.1 Decision Controller (STD 2)	<p>card_data.day = 20141118 card_data.minute = 2149 card_data.transporaion = 'B' card_data.io = 'I' card_data.balance = 2000 card_data.readerID = "MKU0386" card_data.transfer = "BUS"</p>

		<p>pts_data.day = 20141119</p> <p>pts_data.minute = 0012</p> <p>pts_data.transportation = 'B'</p> <p>pts_data.readerID = "BUS"</p> <p>pts_data.count = 0463</p> <p>d_sec = 17.875</p>
PTS_UTCV_001_006	A2.1 Decision Controller (STD 2)	<p>card_data.day = 20141118</p> <p>card_data.minute = 2149</p> <p>card_data.transporaion = 'B'</p> <p>card_data.io = 'I'</p> <p>card_data.balance = 2000</p> <p>card_data.readerID = "MKU0386"</p> <p>card_data.transfer = "BUS"</p> <p>pts_data.day = 20141118</p> <p>pts_data.minute = 2223</p> <p>pts_data.transportation = 'M'</p> <p>pts_data.readerID = "MKU"</p> <p>pts_data.count = 0463</p> <p>d_sec = 4.25</p>
PTS_UTCV_001_007	A2.1 Decision Controller (STD 3)	<p>card_data.day = 20141118</p> <p>card_data.minute = 2229</p> <p>card_data.transporaion = 'B'</p> <p>card_data.io = 'I'</p> <p>card_data.balance = 1500</p> <p>card_data.readerID = "BUS1024"</p> <p>card_data.transfer = "NOT"</p> <p>pts_data.day = 20141119</p> <p>pts_data.minute = 0634</p> <p>pts_data.transportation = 'M'</p> <p>pts_data.readerID = "MKU"</p> <p>pts_data.count = 0187</p> <p>d_sec = 60.625</p>
PTS_UTCV_001_008	A2.1 Decision Controller	card_data.day = 20141118

	(STD 3)	<p>card_data.minute = 2229 card_data.transportaion = 'M' card_data.io = 'I' card_data.balance = 1400 card_data.readerID = "MDM4872" card_data.transfer = "NOT"</p> <p>pts_data.day = 20141119 pts_data.minute = 0634 pts_data.transportation = 'M' pts_data.readerID = "MKU" pts_data.count = 0187</p> <p>d_sec = 60.625</p>
PTS_UTCV_001_009	A2.1 Decision Controller (STD 3)	<p>card_data.day = 20141118 card_data.minute = 2229 card_data.transportaion = 'M' card_data.io = 'i' card_data.balance = 1300 card_data.readerID = "MDM4872" card_data.transfer = "NOT"</p> <p>pts_data.day = 20141118 pts_data.minute = 2313 pts_data.transportation = 'B' pts_data.readerID = "BUS6309" pts_data.count = 6309</p> <p>d_sec = 5.5</p>
PTS_UTCV_001_010	A2.1 Decision Controller (STD 4)	<p>card_data.day = 20141118 card_data.minute = 1523 card_data.transportaion = 'M' card_data.io = 'o' card_data.balance = 800 card_data.readerID = "MDM1549" card_data.transfer = "NOT"</p> <p>pts_data.day = 20141118 pts_data.minute =</p>

		<p>pts_data.transportation = 'B'</p> <p>pts_data.readerID = "BUS"</p> <p>pts_data.count = 3903</p> <p>d_sec = 13</p>
PTS_UTCV_001_011	A2.1 Decision Controller (STD 4)	<p>card_data.day = 20141118</p> <p>card_data.minute = 1523</p> <p>card_data.transporaion = 'M'</p> <p>card_data.io = 'o'</p> <p>card_data.balance = 800</p> <p>card_data.readerID = "MDM1549"</p> <p>card_data.transfer = "NOT"</p> <p>pts_data.day = 20141118</p> <p>pts_data.minute = 1745</p> <p>pts_data.transportation = 'M'</p> <p>pts_data.readerID = "MHJ"</p> <p>pts_data.count = 2010</p> <p>d_sec = 13</p>
PTS_UTCV_001_012	A2.1 Decision Controller (STD 5)	<p>card_data.day = 20141118</p> <p>card_data.minute = 1523</p> <p>card_data.transporaion = 'M'</p> <p>card_data.io = 'o'</p> <p>card_data.balance = 1300</p> <p>card_data.readerID = "MDM1549"</p> <p>card_data.transfer = "NOT"</p> <p>pts_data.day = 20141118</p> <p>pts_data.minute = 1731</p> <p>pts_data.transportation = 'M'</p> <p>pts_data.readerID = "MHJ"</p> <p>pts_data.count = 2010</p> <p>d_sec = 16</p>
PTS_UTCV_001_013	A2.1 Decision Controller (STD 5)	<p>card_data.day = 20141118</p> <p>card_data.minute = 1523</p> <p>card_data.transporaion = 'M'</p> <p>card_data.io = 'o'</p>

		<p>card_data.balance = 1100 card_data.readerID = "MDM1549" card_data.transfer = "NOT"</p> <p>pts_data.day = 20141118 pts_data.minute = 1707 pts_data.transportation = 'M' pts_data.readerID = "MHJ" pts_data.count = 2010</p> <p>d_sec = 13</p>
PTS_UTCV_001_014	A2.1 Decision Controller (STD 6)	<p>card_data.day = 20141118 card_data.minute = 1523 card_data.transporaion = 'M' card_data.io = 'i' card_data.balance = 1700 card_data.readerID = "BUS2178" card_data.transfer = "MDM"</p> <p>pts_data.day = 20141119 pts_data.minute = 0843 pts_data.transportation = 'B' pts_data.readerID = "BUS" pts_data.count = 0791</p> <p>d_sec = 130</p>
PTS_UTCV_001_015	A2.1 Decision Controller (STD 6)	<p>card_data.day = 20141118 card_data.minute = 1523 card_data.transporaion = 'B' card_data.io = 'l' card_data.balance = 1950 card_data.readerID = "MKU4219" card_data.transfer = "BUS"</p> <p>pts_data.day = 20141118 pts_data.minute = 1857 pts_data.transportation = 'M' pts_data.readerID = "MHJ" pts_data.count = 3195</p>

		d_sec = 26.75
PTS_UTCV_001_016	A2.1 Decision Controller (STD 6)	<p>card_data.day = 20141118 card_data.minute = 1523 card_data.transporaion = 'M' card_data.io = 'I' card_data.balance = 1950 card_data.readerID = "BUS1219" card_data.transfer = "MKU"</p> <p>pts_data.day = 20141118 pts_data.minute = 1857 pts_data.transportation = 'M' pts_data.readerID = "MHJ" pts_data.count = 3195</p> <p>d_sec = 26.75</p>
PTS_UTCV_002_000	A3.1 Monitor Controller	<p>enable = 1 balance = 950 cost = 1050</p>
PTS_UTCV_003_001	A3.1 Monitor Controller	<p>enable = 0 balance = 950 cost = 0</p>
PTS_UTCV_003_000	A3.3 Card Data Output Interface	<p>card_data.day = 20141118 card_data.minute = 1523 card_data.transporaion = 'M' card_data.io = 'I' card_data.balance = 1950 card_data.readerID = "BUS1219" card_data.transfer = "MKU"</p>
PTS_UTCV_003_001	A3.3 Card Data Output Interface	<p>card_data.day = 20141119 card_data.minute = 0813 card_data.transporaion = 'B' card_data.io = 'I' card_data.balance = 1050 card_data.readerID = "BUS0872" card_data.transfer = "NOT"</p>

PTS_UTCV_003_002	A3.3 Card Data Output Interface	card_data.day = 20141120 card_data.minute = 2349 card_data.transporaion = 'M' card_data.io = 'I' card_data.balance = 1050 card_data.readerID = "MDM1603" card_data.transfer = "NOT"
PTS_UTCV_004_000	B1.2 Sort Integrated Data	<Table 4> Test Cases with Linked List – Test Case 1 참조
PTS_UTCV_004_001	B1.2 Sort Integrated Data	<Table 4> Test Cases with Linked List – Test Case 2 참조
PTS_UTCV_004_002	B1.2 Sort Integrated Data	<Table 4> Test Cases with Linked List – Test Case 3 참조
PTS_UTCV_005_000	B2.1 Calculate Sorted Data	<Table 5> Test Cases with Linked List – Test Case 1 참조
PTS_UTCV_005_001	B2.1 Calculate Sorted Data	<Table 5> Test Cases with Linked List – Test Case 2 참조
PTS_UTCV_005_002	B2.1 Calculate Sorted Data	<Table 5> Test Cases with Linked List – Test Case 3 참조

<Table 4> Test Cases with Integrated Linked List

Test Case 1	1. api_data.day = 20141115 api_data.minute = 1050 api_data.transportation = 'M' api_data.io = 'i' api_data.cost = 1050 api_data.readerID = MKU0002 api_data.nextData = 2
	2. api_data.day = 20141115 api_data.minute = 0824 api_data.transportation = 'B' api_data.io = 'o' api_data.cost = 0 api_data.readerID = BUS0001 api_data.nextData =3
	3. api_data.day = 20141115 api_data.minute = 0432

	<p>api_data.transportation = 'B' api_data.io = 'i' api_data.cost = 1050 api_data.readerID = BUS0001 api_data.nextData = 4</p> <p>4.</p> <p>api_data.day = 20141115 api_data.minute = 1749 api_data.transportation = 'M' api_data.io = 'i' api_data.cost = 1050 api_data.readerID = MDM0001 api_data.nextData = 5</p> <p>5.</p> <p>api_data.day = 20141115 api_data.minute = 1123 api_data.transportation = 'M' api_data.io = 'o' api_data.cost = 200 api_data.readerID = MKU0002 api_data.nextData = NULL</p>
<p>Test Case 2</p>	<p>1.</p> <p>api_data.day = 20141116 api_data.minute = 0613 api_data.transportation = 'M' api_data.io = 'i' api_data.cost = 1750 api_data.readerID = MHJ0001 api_data.nextData = 2</p> <p>2.</p> <p>api_data.day = 20141116 api_data.minute = 1326 api_data.transportation = 'B' api_data.io = 'i'</p>

	<p>api_data.cost = 1050 api_data.readerID = BUS0002 api_data.nextData = 3</p> <hr/> <p>3.</p> <p>api_data.day = 20141116 api_data.minute = 1141 api_data.transportation = 'M' api_data.io = 'i' api_data.cost = 1050 api_data.readerID = MGN0001 api_data.nextData = 4</p> <hr/> <p>4.</p> <p>api_data.day = 20141116 api_data.minute = 2118 api_data.transportation = 'B' api_data.io = 'o' api_data.cost = 0 api_data.readerID = BUS0002 api_data.nextData = 5</p> <hr/> <p>5.</p> <p>api_data.day = 20141116 api_data.minute = 0908 api_data.transportation = 'B' api_data.io = 'i' api_data.cost = 1050 api_data.readerID = BUS0001 api_data.nextData = NULL</p>
Test Case 3	<p>1.</p> <p>api_data.day = 20141117 api_data.minute = 1038 api_data.transportation = 'M' api_data.io = 'o' api_data.cost = 200 api_data.readerID = MHJ0001</p>

	api_data.nextData = 2
	2. api_data.day = 20141117 api_data.minute = 1407 api_data.transportation = 'B' api_data.io = 'i' api_data.cost = 0 api_data.readerID = MHJ0001 api_data.nextData = 3
	3. api_data.day = 20141117 api_data.minute = 1939 api_data.transportation = 'B' api_data.io = 'i' api_data.cost = 1750 api_data.readerID = BUS0001 api_data.nextData =4
	4. api_data.day = 20141117 api_data.minute = 0821 api_data.transportation = 'M' api_data.io = 'i' api_data.cost = 1050 api_data.readerID = MHJ0001 api_data.nextData = 5
	5. api_data.day = 20141117 api_data.minute =2345 api_data.transportation = 'B' api_data.io = 'o' api_data.cost = 0 api_data.readerID = BUS0001 api_data.nextData = NULL

<Table 5> Test Cases with Sorted Linked List

Test Case 1	1
	<p>api_data.day = 20141115 api_data.minute = 0432 api_data.transportation = 'B' api_data.io = 'i' api_data.cost = 1050 api_data.readerID = BUS0001 api_data.nextData = 2</p>
	2
	<p>api_data.day = 20141115 api_data.minute = 0824 api_data.transportation = 'B' api_data.io = 'o' api_data.cost = 0 api_data.readerID = BUS0001 api_data.nextData =3</p>
	3
<p>api_data.day = 20141115 api_data.minute = 1050 api_data.transportation = 'M' api_data.io = 'i' api_data.cost = 1050 api_data.readerID = MKU0002 api_data.nextData = 4</p>	
4	
<p>api_data.day = 20141115 api_data.minute = 1123 api_data.transportation = 'M' api_data.io = 'o' api_data.cost = 200 api_data.readerID = MKU0002 api_data.nextData =5</p>	
5	

	<p>api_data.day = 20141115 api_data.minute =1749 api_data.transportation = 'M' api_data.io = 'i' api_data.cost = 1050 api_data.readerID = MDM0001 api_data.nextData = NULL</p>
Test Case 2	<p>1</p> <p>api_data.day = 20141116 api_data.minute = 0613 api_data.transportation = 'M' api_data.io = 'i' api_data.cost = 1750 api_data.readerID = MHJ0001 api_data.nextData = 2</p>
	<p>2</p> <p>api_data.day = 20141116 api_data.minute = 0908 api_data.transportation = 'B' api_data.io = 'i' api_data.cost = 1050 api_data.readerID = BUS0001 api_data.nextData =3</p>
	<p>3</p> <p>api_data.day = 20141116 api_data.minute = 1141 api_data.transportation = 'M' api_data.io = 'i' api_data.cost = 1050 api_data.readerID = MGN0001 api_data.nextData = 4</p>
	<p>4</p> <p>api_data.day = 20141116</p>

	<p>api_data.minute = 1326 api_data.transportation = 'B' api_data.io = 'i' api_data.cost = 1050 api_data.readerID = BUS0002 api_data.nextData =5</p>
	<p>5</p> <p>api_data.day = 20141116 api_data.minute =2118 api_data.transportation = 'B' api_data.io = 'o' api_data.cost = 0 api_data.readerID = BUS0002 api_data.nextData = NULL</p>
<p>Test Case 3</p>	<p>1</p> <p>api_data.day = 20141117 api_data.minute = 0821 api_data.transportation = 'M' api_data.io = 'i' api_data.cost = 1050 api_data.readerID = MHJ0001 api_data.nextData = 2</p>
	<p>2</p> <p>api_data.day = 20141117 api_data.minute = 1038 api_data.transportation = 'M' api_data.io = 'o' api_data.cost = 200 api_data.readerID = MHJ0001 api_data.nextData =3</p>
	<p>3</p> <p>api_data.day = 20141117 api_data.minute = 1407 api_data.transportation = 'B'</p>

	<p>api_data.io = 'i'</p> <p>api_data.cost = 0</p> <p>api_data.readerID = MHJ0001</p> <p>api_data.nextData = 4</p>
	<p>4</p> <p>api_data.day = 20141117</p> <p>api_data.minute = 1939</p> <p>api_data.transportation = 'B'</p> <p>api_data.io = 'i'</p> <p>api_data.cost = 1750</p> <p>api_data.readerID = BUS0001</p> <p>api_data.nextData =5</p>
	<p>5</p> <p>api_data.day = 20141116</p> <p>api_data.minute =2345</p> <p>api_data.transportation = 'B'</p> <p>api_data.io = 'o'</p> <p>api_data.cost = 0</p> <p>api_data.readerID = BUS0001</p> <p>api_data.nextData = NULL</p>

<Table 6 List of Invalid Inputs of Each Identifier

Identifier	Feature (Process ID in DFD)	Invalid Value
PTS_UTSI_000_000	A2.1 Decision Controller	<p>card_data.day = 840713</p> <p>card_data.minute = 1523</p> <p>card_data.transportaion = 'B'</p> <p>card_data.io = 'i'</p> <p>card_data.balance = 1950</p> <p>card_data.readerID = "MKU4219"</p> <p>card_data.transfer = "BUS"</p> <p>pts_data.day = 20141118</p> <p>pts_data.minute = 1857</p> <p>pts_data.transportation = 'M'</p>

		<p>pts_data.readerID = "MHJ" pts_data.count = 3195</p> <p>d_sec = 26.75</p>
PTS_UTSI_000_001	A2.1 Decision Controller	<p>card_data.day = 20141118 card_data.minute = 123 card_data.transporaion = 'B' card_data.io = 'I' card_data.balance = 1950 card_data.readerID = "MKU4219" card_data.transfer = "BUS"</p> <p>pts_data.day = 20141118 pts_data.minute = 1857 pts_data.transportation = 'M' pts_data.readerID = "MHJ" pts_data.count = 3195</p> <p>d_sec = 26.75</p>
PTS_UTSI_000_002	A2.1 Decision Controller	<p>card_data.day = 20141118 card_data.minute = 2785 card_data.transporaion = 'B' card_data.io = 'I' card_data.balance = 1950 card_data.readerID = "MKU4219" card_data.transfer = "BUS"</p> <p>pts_data.day = 20141118 pts_data.minute = 1857 pts_data.transportation = 'M' pts_data.readerID = "MHJ" pts_data.count = 3195</p> <p>d_sec = 26.75</p>
PTS_UTSI_000_003	A2.1 Decision Controller	<p>card_data.day = 20141118 card_data.minute = 1523 card_data.transporaion = 'B' card_data.io = 'I' card_data.balance = 3000000000</p>

		<p>card_data.readerID = "MKU4219"</p> <p>card_data.transfer = "BUS"</p> <p>pts_data.day = 20141118</p> <p>pts_data.minute = 1857</p> <p>pts_data.transportation = 'M'</p> <p>pts_data.readerID = "MHJ3195"</p> <p>pts_data.count = 3195</p> <p>d_sec = 26.75</p>
PTS_UTSI_000_004	A2.1 Decision Controller	<p>card_data.day = 20141118</p> <p>card_data.minute = 1523</p> <p>card_data.transportaion = 'B'</p> <p>card_data.io = 'I'</p> <p>card_data.balance = 1950</p> <p>card_data.readerID = "MKU42190"</p> <p>card_data.transfer = "BU"</p> <p>pts_data.day = 20141118</p> <p>pts_data.minute = 1857</p> <p>pts_data.transportation = 'M'</p> <p>pts_data.readerID = "MHJ3195"</p> <p>pts_data.count = 3195</p> <p>d_sec = 26.75</p>
PTS_UTSI_000_005	A2.1 Decision Controller	<p>card_data.day = 20141118</p> <p>card_data.minute = 1523</p> <p>card_data.transportaion = 'B'</p> <p>card_data.io = 'I'</p> <p>card_data.balance = 1950</p> <p>card_data.readerID = "MKU42190"</p> <p>card_data.transfer = "BU"</p> <p>pts_data.day = 20141115</p> <p>pts_data.minute = 1857</p> <p>pts_data.transportation = 'M'</p> <p>pts_data.readerID = "MHJ3195"</p> <p>pts_data.count = 3195</p>

	d_sec = 26.75
--	---------------

7.5 Feature pass/fail criteria

PTS의 각 모듈(프로세스)은 SRA에 정의되어 있는 요구사항 (입력 / 출력 및 동작)을 모두 만족해야 한다. 각 모듈(프로세스)의 입력 / 출력 및 동작은 SRA의 process description 항목을 참조한다.

8 Unit test case specification

8.1 Test case specification identifier

<Table 7> Test Case Identification with Valid Inputs

Test Case Identifier	Input Specification	Output Specification
PTS_UTCV_000_000	0001.txt 201411181523 M I 1950 BUS1219 MKU	card_data.day = 20141118 card_data.minute = 1523 card_data.transportaion = 'M' card_data.io = 'I' card_data.balance = 1950 card_data.readerID = "BUS1219" card_data.transfer = "MKU"
PTS_UTCV_000_001	0002.txt 201411190813 B I 1050 BUS0872 NOT	card_data.day = 20141119 card_data.minute = 0813 card_data.transportaion = 'B' card_data.io = 'I' card_data.balance = 1050 card_data.readerID = "BUS0872" card_data.transfer = "NOT"
PTS_UTCV_000_002	0003.txt 201411202349 M I 1050 MDM1603 NOT	card_data.day = 20141120 card_data.minute = 2349 card_data.transportaion = 'M' card_data.io = 'I' card_data.balance = 1050 card_data.readerID = "MDM1603" card_data.transfer = "NOT"
PTS_UTCV_001_000	card_data.day = 000000 card_data.minute = 0000 card_data.transportaion = NULL	card_data.day = 20141118 card_data.minute = 2112 card_data.transportaion = 'B'

	<p>card_data.io = 'O' card_data.balance = 2000 card_data.readerID = "DEFAULT" card_data.transfer = "NOT"</p> <p>pts_data.day = 141118 pts_data.minute = 2112 pts_data.transportation = 'B' pts_data.readerID = "BUS" pts_data.count = 0014</p>	<p>card_data.io = 'I' card_data.balance = 950 card_data.readerID = "BUS0014" card_data.transfer = "NOT"</p> <p>api_data.day = 20141118 api_data.minute = 2112 api_data.transportation = 'B' api_data.io = 'I' api_data.cost = 1050 api_data.readerID = "BUS0014" api_data.transfer = "NOT"</p> <p>cost = 1050 uncal_cost = 0 enable = 1</p>
PTS_UTCV_001_001	<p>card_data.day = 20141118 card_data.minute = 2135 card_data.transporaion = 'B' card_data.io = 'I' card_data.balance = 2000 card_data.readerID = "BUS0014" card_data.transfer = "NOT"</p> <p>pts_data.day = 20141118 pts_data.minute = 2140 pts_data.transportation = 'B' pts_data.readerID = "BUS" pts_data.count = 0030</p> <p>d_sec = 0.625</p>	<p>card_data.day = 20141118 card_data.minute = 2140 card_data.transporaion = 'B' card_data.io = 'O' card_data.balance = 2000 card_data.readerID = "BUS0014" card_data.transfer = "NOT"</p> <p>api_data.day = 20141118 api_data.minute = 2135 api_data.transportation = 'B' api_data.io = 'O' api_data.cost = 0 api_data.readerID = "BUS0030" api_data.transfer = "NOT"</p> <p>cost = 0 uncal_cost = 0 enable = 1</p>
PTS_UTCV_001_002	<p>card_data.day = 20141118 card_data.minute = 2149 card_data.transporaion = 'B' card_data.io = 'I'</p>	<p>card_data.day = 20141119 card_data.minute = 0023 card_data.transporaion = 'B' card_data.io = 'I'</p>

	<p>card_data.balance = 2000 card_data.readerID = "BUS0014" card_data.transfer = "NOT"</p> <p>pts_data.day = 20141119 pts_data.minute = 0023 pts_data.transportation = 'B' pts_data.readerID = "BUS" pts_data.count = 0002</p> <p>d_sec =</p>	<p>card_data.balance = 950 card_data.readerID = "BUS0002" card_data.transfer = "NOT"</p> <p>api_data.day = 20141119 api_data.minute = 0023 api_data.transportation = 'B' api_data.io = 'I' api_data.cost = 1050 api_data.readerID = "BUS0002" api_data.transfer = "NOT"</p> <p>cost = 1050 uncal_cost = 0 enable = 1</p>
PTS_UTCV_001_003	<p>card_data.day = 20141118 card_data.minute = 2149 card_data.transporaion = 'B' card_data.io = 'I' card_data.balance = 2000 card_data.readerID = "BUS0014" card_data.transfer = "NOT"</p> <p>pts_data.day = 20141118 pts_data.minute = 2245 pts_data.transportation = 'M' pts_data.readerID = "MKU" pts_data.count = 0124</p> <p>d_sec = 7</p>	<p>card_data.day = 20141118 card_data.minute = 2245 card_data.transporaion = 'M' card_data.io = 'I' card_data.balance = 950 card_data.readerID = "MKU0124" card_data.transfer = "NOT"</p> <p>api_data.day = 20141118 api_data.minute = 2245 api_data.transportation = 'M' api_data.io = 'I' api_data.cost = 1050 api_data.readerID = "MKU0124" api_data.transfer = "NOT"</p> <p>cost = 1050 uncal_cost = 0 enable = 1</p>
PTS_UTCV_001_004	<p>card_data.day = 20141118 card_data.minute = 2149 card_data.transporaion = 'B' card_data.io = 'I' card_data.balance = 2000</p>	<p>card_data.day = 20141118 card_data.minute = 2245 card_data.transporaion = 'B' card_data.io = 'O' card_data.balance = 2000</p>

	<p>card_data.readerID = "MKU0386" card_data.transfer = "BUS"</p> <p>pts_data.day = 20141118 pts_data.minute = 2245 pts_data.transportation = 'B' pts_data.readerID = "BUS" pts_data.count = 0463</p> <p>d_sec = 7</p>	<p>card_data.readerID = "MKU0386" card_data.transfer = "BUS"</p> <p>api_data.day = 20141118 api_data.minute = 2245 api_data.transportation = 'B' api_data.io = 'O' api_data.cost = 0 api_data.readerID = "MKU0386" api_data.transfer = "BUS"</p> <p>cost = 0 uncal_cost = 0 enable = 1</p>
PTS_UTCV_001_005	<p>card_data.day = 20141118 card_data.minute = 2149 card_data.transporaion = 'B' card_data.io = 'I' card_data.balance = 2000 card_data.readerID = "MKU0386" card_data.transfer = "BUS"</p> <p>pts_data.day = 20141119 pts_data.minute = 0012 pts_data.transportation = 'B' pts_data.readerID = "BUS" pts_data.count = 0463</p> <p>d_sec =</p>	<p>card_data.day = 20141119 card_data.minute = 0012 card_data.transporaion = 'B' card_data.io = 'I' card_data.balance = 250 card_data.readerID = "BUS0463" card_data.transfer = "NOT"</p> <p>api_data.day = 20141119 api_data.minute = 0012 api_data.transportation = 'B' api_data.io = 'I' api_data.cost = 1750 api_data.readerID = "BUS0463" api_data.transfer = "NOT"</p> <p>cost = 1050 uncal_cost = 700 enable = 1</p>
PTS_UTCV_001_006	<p>card_data.day = 20141118 card_data.minute = 2149 card_data.transporaion = 'B' card_data.io = 'I' card_data.balance = 2000 card_data.readerID = "MKU0386"</p>	<p>card_data.day = 20141118 card_data.minute = 2223 card_data.transporaion = 'M' card_data.io = 'I' card_data.balance = 250 card_data.readerID = "MKU0463"</p>

	<p>card_data.transfer = "BUS"</p> <p>pts_data.day = 20141118 pts_data.minute = 2223 pts_data.transportation = 'M' pts_data.readerID = "MKU" pts_data.count = 0463</p> <p>d_sec = 4.25</p>	<p>card_data.transfer = "NOT"</p> <p>api_data.day = 20141118 api_data.minute = 2223 api_data.transportation = 'M' api_data.io = 'I' api_data.cost = 1750 api_data.readerID = "MKU0463" api_data.transfer = "NOT"</p> <p>cost = 1050 uncal_cost = 700 enable = 1</p>
PTS_UTCV_001_007	<p>card_data.day = 20141118 card_data.minute = 2229 card_data.transportaion = 'B' card_data.io = 'I' card_data.balance = 1500 card_data.readerID = "BUS1024" card_data.transfer = "NOT"</p> <p>pts_data.day = 20141119 pts_data.minute = 0634 pts_data.transportation = 'M' pts_data.readerID = "MKU" pts_data.count = 0187</p> <p>d_sec =</p>	<p>card_data.day = 20141119 card_data.minute = 0634 card_data.transportaion = 'M' card_data.io = 'I' card_data.balance = 450 card_data.readerID = "MKU0187" card_data.transfer = "NOT"</p> <p>pts_data.readerID = "MKU0188"</p> <p>api_data.day = 20141119 api_data.minute = 0634 api_data.transportation = 'M' api_data.io = 'I' api_data.cost = 1050 api_data.readerID = "MKU0187" api_data.transfer = "NOT"</p> <p>cost = 1050 uncal_cost = 0 enable = 1</p>
PTS_UTCV_001_008	<p>card_data.day = 20141118 card_data.minute = 2229 card_data.transportaion = 'M' card_data.io = 'I' card_data.balance = 1400</p>	<p>card_data.day = 20141118 card_data.minute = 2229 card_data.transportaion = 'M' card_data.io = 'I' card_data.balance = 1400</p>

	<p>card_data.readerID = "MDM4872" card_data.transfer = "NOT"</p> <p>pts_data.day = 20141119 pts_data.minute = 0634 pts_data.transportation = 'M' pts_data.readerID = "MKU" pts_data.count = 0187</p> <p>d_sec =</p>	<p>card_data.readerID = "MDM4872" card_data.transfer = "NOT"</p> <p>cost = 1050 uncal_cost = 200 enable = 0</p> <p>잔액 부족 탑승 불가</p>
PTS_UTCV_001_009	<p>card_data.day = 20141118 card_data.minute = 2229 card_data.transporaion = 'M' card_data.io = 'I' card_data.balance = 1300 card_data.readerID = "MDM4872" card_data.transfer = "NOT"</p> <p>pts_data.day = 20141118 pts_data.minute = 2313 pts_data.transportation = 'B' pts_data.readerID = "BUS6309" pts_data.count = 6309</p> <p>d_sec = 5.5</p>	<p>card_data.day = 20141118 card_data.minute = 2313 card_data.transporaion = 'B' card_data.io = 'I' card_data.balance = 50 card_data.readerID = "BUS6309" card_data.transfer = "NOT"</p> <p>pts_data.readerID = "BUS6310"</p> <p>api_data.day = 20141118 api_data.minute = 2213 api_data.transportation = 'B' api_data.io = 'I' api_data.cost = 1250 api_data.readerID = "BUS6309" api_data.transfer = "NOT"</p> <p>cost = 1050 uncal_cost = 200 enable = 1</p>
PTS_UTCV_001_010	<p>card_data.day = 20141118 card_data.minute = 1523 card_data.transporaion = 'M' card_data.io = 'O' card_data.balance = 800 card_data.readerID = "MDM1549" card_data.transfer = "NOT"</p>	<p>card_data.day = 20141118 card_data.minute = 1523 card_data.transporaion = 'M' card_data.io = 'O' card_data.balance = 800 card_data.readerID = "MDM1549" card_data.transfer = "NOT"</p>

	<p>pts_data.day = 20141118 pts_data.minute = 1707 pts_data.transportation = 'B' pts_data.readerID = "BUS" pts_data.count = 3903</p> <p>d_sec = 13</p>	<p>cost = 1050 uncal_cost = 0 enable = 0</p> <p>잔액 부족 탑승 불가</p>
PTS_UTCV_001_011	<p>card_data.day = 20141118 card_data.minute = 1523 card_data.transpotaion = 'M' card_data.io = 'O' card_data.balance = 800 card_data.readerID = "MDM1549" card_data.transfer = "NOT"</p> <p>pts_data.day = 20141118 pts_data.minute = 1707 pts_data.transportation = 'M' pts_data.readerID = "MHJ" pts_data.count = 2010</p> <p>d_sec = 13</p>	<p>card_data.day = 20141118 card_data.minute = 1523 card_data.transpotaion = 'M' card_data.io = 'O' card_data.balance = 800 card_data.readerID = "MDM1549" card_data.transfer = "NOT"</p> <p>cost = 1050 uncal_cost = 200 enable = 0</p> <p>잔액 부족 탑승 불가</p>
PTS_UTCV_001_012	<p>card_data.day = 20141118 card_data.minute = 1523 card_data.transpotaion = 'M' card_data.io = 'O' card_data.balance = 1300 card_data.readerID = "MDM1549" card_data.transfer = "NOT"</p> <p>pts_data.day = 20141118 pts_data.minute = 1731 pts_data.transportation = 'M' pts_data.readerID = "MHJ" pts_data.count = 2010</p> <p>d_sec = 16</p>	<p>card_data.day = 20141118 card_data.minute = 1731 card_data.transpotaion = 'M' card_data.io = 'I' card_data.balance = 250 card_data.readerID = "MHJ2010" card_data.transfer = "NOT"</p> <p>pts_data.readerID = "MHJ2011"</p> <p>api_data.day = 20141118 api_data.minute = 1731 api_data.transportation = 'M' api_data.io = 'I' api_data.cost = 1050 api_data.readerID = "MHJ2010" api_data.transfer = "NOT"</p>

		<p>cost = 1050 uncal_cost = 0 enable = 1</p>
PTS_UTCV_001_013	<p>card_data.day = 20141118 card_data.minute = 1523 card_data.transporaion = 'M' card_data.io = 'O' card_data.balance = 1100 card_data.readerID = "MDM1549" card_data.transfer = "NOT"</p> <p>pts_data.day = 20141118 pts_data.minute = 1707 pts_data.transportation = 'M' pts_data.readerID = "MHJ" pts_data.count = 2010</p> <p>d_sec = 13</p>	<p>card_data.day = 20141118 card_data.minute = 1523 card_data.transporaion = 'M' card_data.io = 'O' card_data.balance = 1100 card_data.readerID = "MDM1549" card_data.transfer = "NOT"</p> <p>cost = 1050 uncal_cost = 0 enable = 0</p> <p>잔액 부족 탑승 불가</p>
PTS_UTCV_001_014	<p>card_data.day = 20141118 card_data.minute = 1523 card_data.transporaion = 'M' card_data.io = 'I' card_data.balance = 1700 card_data.readerID = "BUS2178" card_data.transfer = "MDM"</p> <p>pts_data.day = 20141119 pts_data.minute = 0843 pts_data.transportation = 'B' pts_data.readerID = "BUS" pts_data.count = 0791</p> <p>d_sec =</p>	<p>card_data.day = 20141119 card_data.minute = 0843 card_data.transporaion = 'B' card_data.io = 'I' card_data.balance = 50 card_data.readerID = "BUS0791" card_data.transfer = "NOT"</p> <p>pts_data.readerID = "BUS0792"</p> <p>api_data.day = 20141119 api_data.minute = 0843 api_data.transportation = 'B' api_data.io = 'I' api_data.cost = 1650 api_data.readerID = "BUS0791" api_data.transfer = "NOT"</p> <p>cost = 1050 uncal_cost = 600</p>

		enable = 1
PTS_UTCV_001_015	<p>card_data.day = 20141118 card_data.minute = 1523 card_data.transportaion = 'B' card_data.io = 'I' card_data.balance = 1950 card_data.readerID = "MKU4219" card_data.transfer = "BUS"</p> <p>pts_data.day = 20141118 pts_data.minute = 1857 pts_data.transportation = 'M' pts_data.readerID = "MHJ" pts_data.count = 3195</p> <p>d_sec = 26.75</p>	<p>card_data.day = 20141118 card_data.minute = 1857 card_data.transportaion = 'M' card_data.io = 'I' card_data.balance = 200 card_data.readerID = "MHJ3195" card_data.transfer = "NOT"</p> <p>pts_data.readerID = "MHJ3196"</p> <p>api_data.day = 20141118 api_data.minute = 1857 api_data.transportation = 'M' api_data.io = 'I' api_data.cost = 1750 api_data.readerID = "MHJ3195" api_data.transfer = "NOT"</p> <p>cost = 1050 uncal_cost = 700 enable = 1</p>
PTS_UTCV_001_016	<p>card_data.day = 20141118 card_data.minute = 1523 card_data.transportaion = 'M' card_data.io = 'I' card_data.balance = 1300 card_data.readerID = "BUS1219" card_data.transfer = "MKU"</p> <p>pts_data.day = 20141118 pts_data.minute = 1857 pts_data.transportation = 'M' pts_data.readerID = "MHJ" pts_data.count = 3195</p> <p>d_sec = 26.75</p>	<p>card_data.day = 20141118 card_data.minute = 1857 card_data.transportaion = 'M' card_data.io = 'O' card_data.balance = 1000 card_data.readerID = "BUS1219" card_data.transfer = "MKU"</p> <p>api_data.day = 20141118 api_data.minute = 1857 api_data.transportation = 'M' api_data.io = 'O' api_data.cost = 300 api_data.readerID = "BUS1219" api_data.transfer = "MKU"</p> <p>cost = 300</p>

		uncal_cost = 0 enable = 1
PTS_UTCV_002_000	enable = 1 balance = 950 cost = 1050	O Cost : 1050 Balance :950
PTS_UTCV_002_001	enable = 0 balance = 950 cost = 0	X Balance :950
PTS_UTCV_003_000	card_data.day = 20141118 card_data.minute = 1523 card_data.transporaion = 'M' card_data.io = 'I' card_data.balance = 1950 card_data.readerID = "BUS1219" card_data.transfer = "MKU"	0001.txt 201411181523 M I 1950 BUS1219 MKU
PTS_UTCV_003_001	card_data.day = 20141119 card_data.minute = 0813 card_data.transporaion = 'B' card_data.io = 'I' card_data.balance = 1050 card_data.readerID = "BUS0872" card_data.transfer = "NOT"	0002.txt 201411190813 B I 1050 BUS0872 NOT
PTS_UTCV_003_002	card_data.day = 20141120 card_data.minute = 2349 card_data.transporaion = 'M' card_data.io = 'I' card_data.balance = 1050 card_data.readerID = "MDM1603" card_data.transfer = "NOT"	0003.txt 201311202349 M I 1050 MDM1603 NOT
PTS_UTCV_004_000	<Table 4> Test Cases with Integrated Linked List – Test Case 1 참조	<Table 5> Test Cases with Sorted Linked List – Test Case 1 참조
PTS_UTCV_004_001	<Table 4> Test Cases with Integrated Linked List – Test Case 2 참조	<Table 5> Test Cases with Sorted Linked List – Test Case 2 참조
PTS_UTCV_004_002	<Table 4> Test Cases with Integrated Linked List – Test Case 3 참조	<Table 5> Test Cases with Sorted Linked List – Test Case 3 참조

PTS_UTCV_005_000	<Table 5> Test Cases with Sorted Linked List – Test Case 1 참조	T : 3550 B : 1050 M : 2500
PTS_UTCV_005_001	<Table 5> Test Cases with Sorted Linked List – Test Case 2 참조	T : 5300 B : 2100 M : 3200
PTS_UTCV_005_002	<Table 5> Test Cases with Sorted Linked List – Test Case 3 참조	T : 3700 B : 2938 M : 761

<Table 8> Test Case Identification with Invalid Inputs

Test Case Identifier	Input Specification	Output Specification
PTS_UTSI_000_000	card_data.day = 840713 card_data.minute = 1523 card_data.transporaion = 'B' card_data.io = 'i' card_data.balance = 1950 card_data.readerID = "MKU4219" card_data.transfer = "BUS" pts_data.day = 20141118 pts_data.minute = 1857 pts_data.transportation = 'M' pts_data.readerID = "MHJ" pts_data.count = 3195 d_sec = 26.75	
PTS_UTSI_000_001	card_data.day = 20141118 card_data.minute = 123 card_data.transporaion = 'B' card_data.io = 'i' card_data.balance = 1950 card_data.readerID = "MKU4219" card_data.transfer = "BUS"	

	<p>pts_data.day = 20141118 pts_data.minute = 1857 pts_data.transportation = 'M' pts_data.readerID = "MHJ" pts_data.count = 3195</p> <p>d_sec = 26.75</p>	
PTS_UTSI_000_002	<p>card_data.day = 20141118 card_data.minute = 2785 card_data.transportaion = 'B' card_data.io = 'I' card_data.balance = 1950 card_data.readerID = "MKU4219" card_data.transfer = "BUS"</p> <p>pts_data.day = 20141118 pts_data.minute = 1857 pts_data.transportation = 'M' pts_data.readerID = "MHJ" pts_data.count = 3195</p> <p>d_sec = 26.75</p>	
PTS_UTSI_000_003	<p>card_data.day = 20141118 card_data.minute = 1523 card_data.transportaion = 'B' card_data.io = 'I' card_data.balance = 3000000000 card_data.readerID = "MKU4219" card_data.transfer = "BUS"</p> <p>pts_data.day = 20141118 pts_data.minute = 1857 pts_data.transportation = 'M' pts_data.readerID = "MHJ3195" pts_data.count = 3195</p> <p>d_sec = 26.75</p>	
PTS_UTSI_000_004	<p>card_data.day = 20141118 card_data.minute = 1523</p>	

	<pre> card_data.transporaion = 'B' card_data.io = 'I' card_data.balance = 1950 card_data.readerID = "MKU42190" card_data.transfer = "BU" pts_data.day = 20141118 pts_data.minute = 1857 pts_data.transportation = 'M' pts_data.readerID = "MHJ3195" pts_data.count = 3195 d_sec = 26.75 </pre>	
PTS_UTSI_000_005	<pre> card_data.day = 20141118 card_data.minute = 1523 card_data.transporaion = 'B' card_data.io = 'I' card_data.balance = 1950 card_data.readerID = "MKU42190" card_data.transfer = "BU" pts_data.day = 20141115 pts_data.minute = 1857 pts_data.transportation = 'M' pts_data.readerID = "MHJ3195" pts_data.count = 3195 d_sec = 26.75 </pre>	

8.2 Test items

<Table 3> 참조

8.3 Input specifications

<Table 4> 참조

8.4 Output specifications

<Table 4> 참조

9 Testing tasks

10 Environmental need

Public Transportation System의 Unit Test를 위한 환경적 요구사항은 다음과 같다.

10.1 Hardware & Platform – Socket 과 Thread를 제외한 나머지 모듈들은 Visual Studio에서,
Socket 과 Thread는 Cygwin에서 진행한다.

11 Unit Test deliverables

12 Schedules