

Unit Testing Plan

for Public Transportation System

- Test Plan
- Test Design Specification
- Test Cases Specification

Project Team

Team1

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1 Introduction

1.1 Objectives

본 문서는 2014년 건국대학교의 소프트웨어공학 개론 강의의 실습과제를 설명한다. 실습과제는 대중교통시스템(PTS : Public Transportation System)을 소프트웨어만을 이용한 가상의 시스템으로 구현하는 것을 의미한다.

1.2 Background

대중교통시스템(PTS : Public Transportation System)은 대중교통의 승하차, 요금 계산, 정산 등을 관리하는 시스템이다. 이 시스템은 입력 값이 상황, 시간에 따라 달라지며 그에 따른 결과 값이 달라진다.

Unit test는 시스템을 구성하는 최소 단위 모듈들을 대상으로 하는 test이며, 시스템에 관련된 데이터 및 프로세스들이 요구사항을 만족하고 제대로 작동하는지 확인할 수 있는 기본적인 테스트 방법이다.

1.3 Scope

현재 운영중인 PTS는 <그림1>(김형환 2010)과 같다. 본 프로젝트는 전체 PTS 중 지하철, 버스 및 정산 시스템만을 대상으로 구현하는 것으로 규모를 제한한다. 또한 **버스 1대와 지하철 2호선 중 5개 역(건대입구, 왕십리, 합정, 신림, 강남)**만을 대상으로 한다.

모든 시스템은 SW만으로 구현한다. HW가 필요한 부분은 SW모듈을 만들어 가상의 HW를 구현한다.

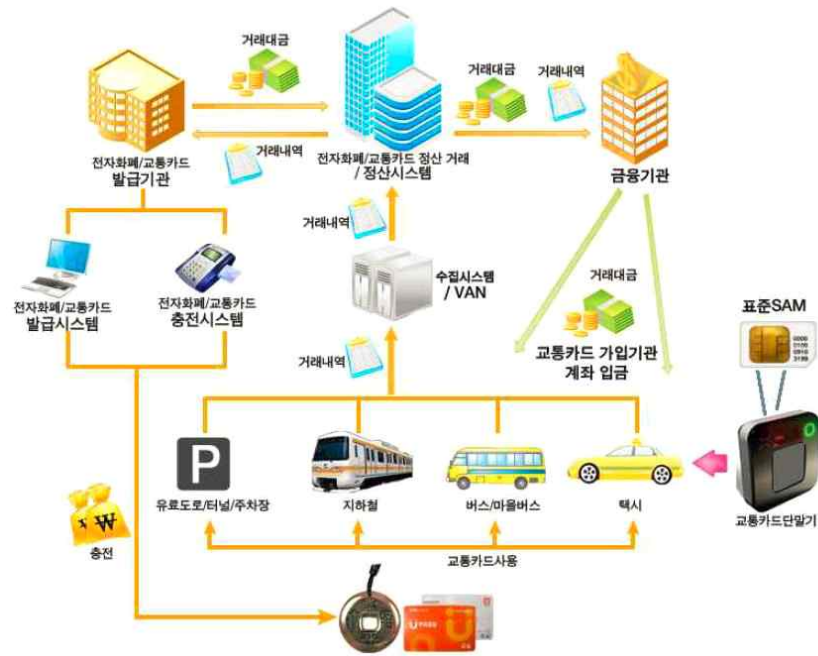


그림 1 서울의 교통카드 운영시스템

1.4 Project plan

1.5 Configuration management plan

대중교통시스템(PTS : Public Transportation System)의 program source code 및 unit test를 위한 test code는 Cygwin 환경에서 이루어지며, program source code 및 test code의 변경 및 수정 사항은 지속적으로 통합되고 test된다.

1.6 References

(김형환 2010) 김형환, 신동석 “교통카드 무인판매/충전기 통합 운영시스템 개발”, 韓國 컴퓨터情報學會論文誌 15(3), 99-109, 2010

(김경선, 2009) 김경선, “교통카드 시스템 사례 연구-수도권 교통카드 중심”. 수도권 교통 본부, 2009

T1_2014_SRA_3.0V

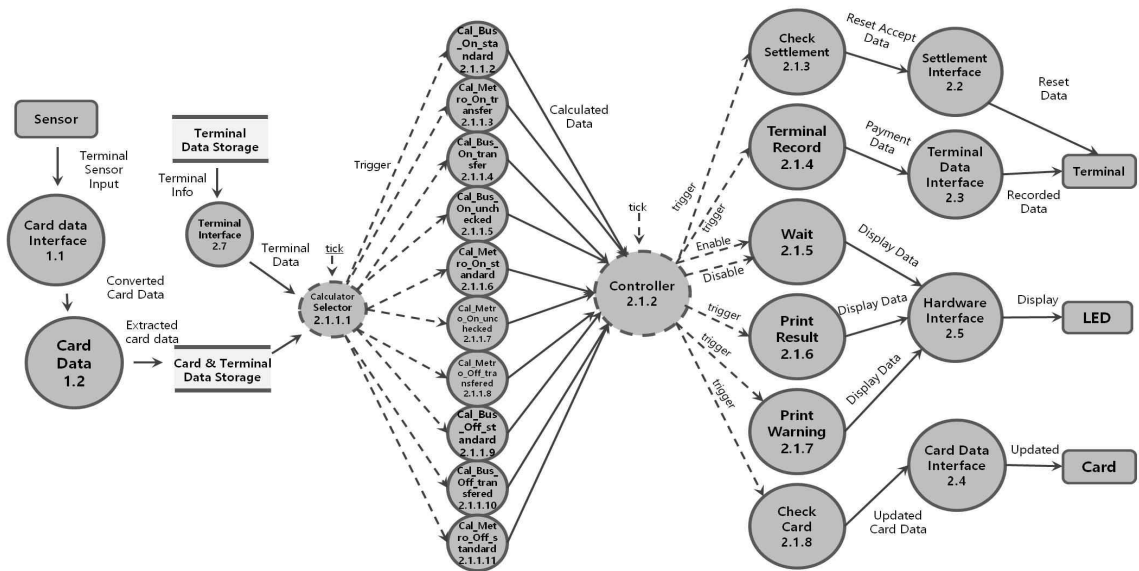
T1_2014_SDS_2.0V

2 Test items

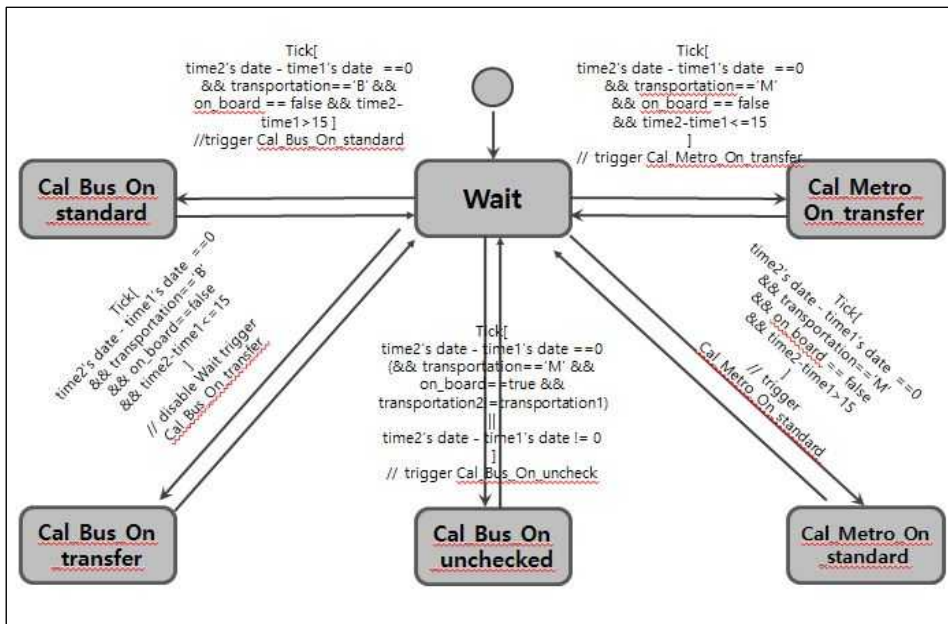
대중교통시스템(PTS : Public Transportation System)을 구성하는 최소 단위의 모듈들이 Unit

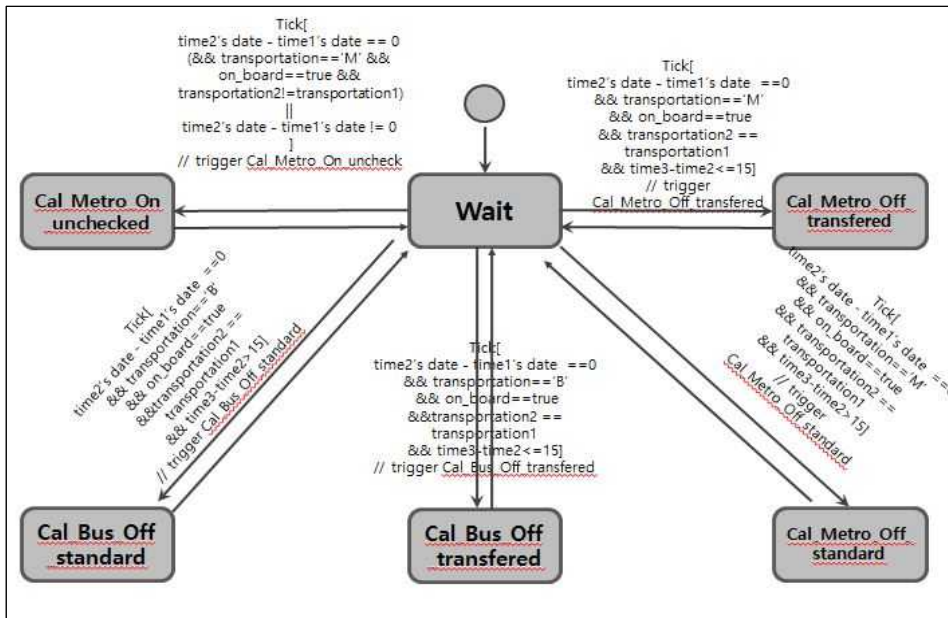
test의 대상이 된다. 각 모듈들이 요구사항을 만족하는 지를 test하며, test item은 다음 자료들로부터 작성되었다.

(1) Overall of Terminal System modules – T1_2014_SRA_3.0V 참조

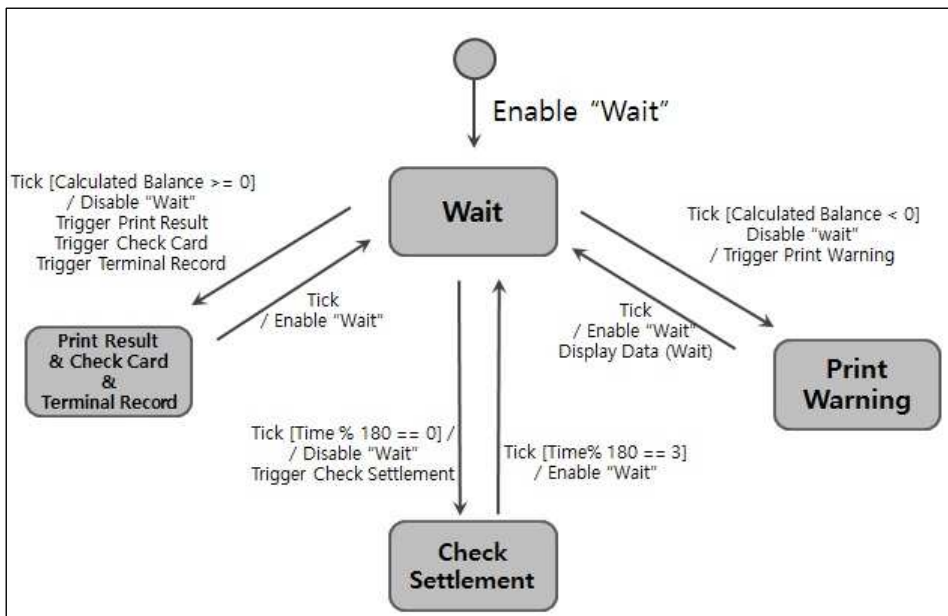


Calculator_Selector 2.1.1.1 State Diagram

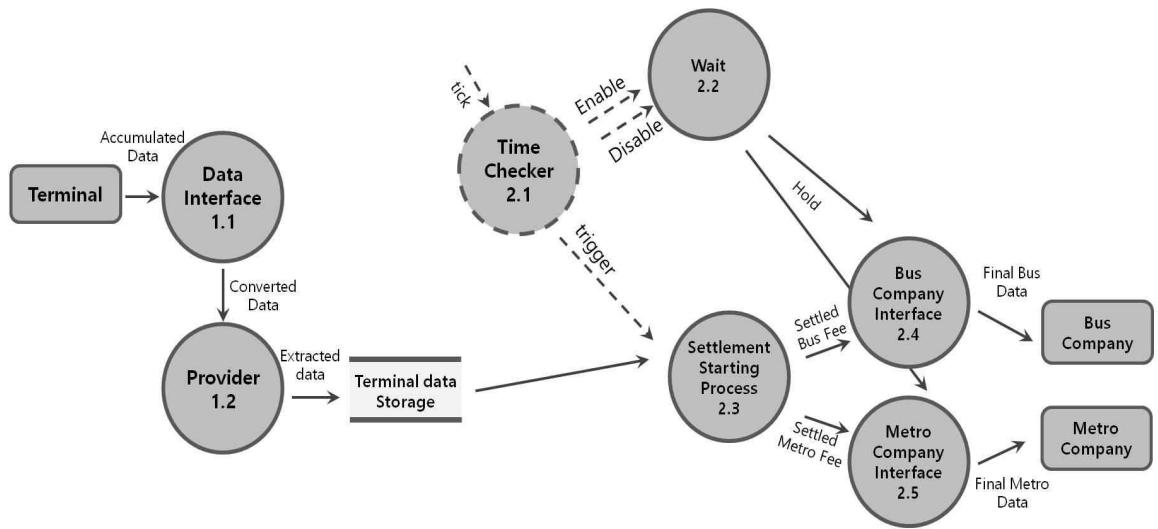




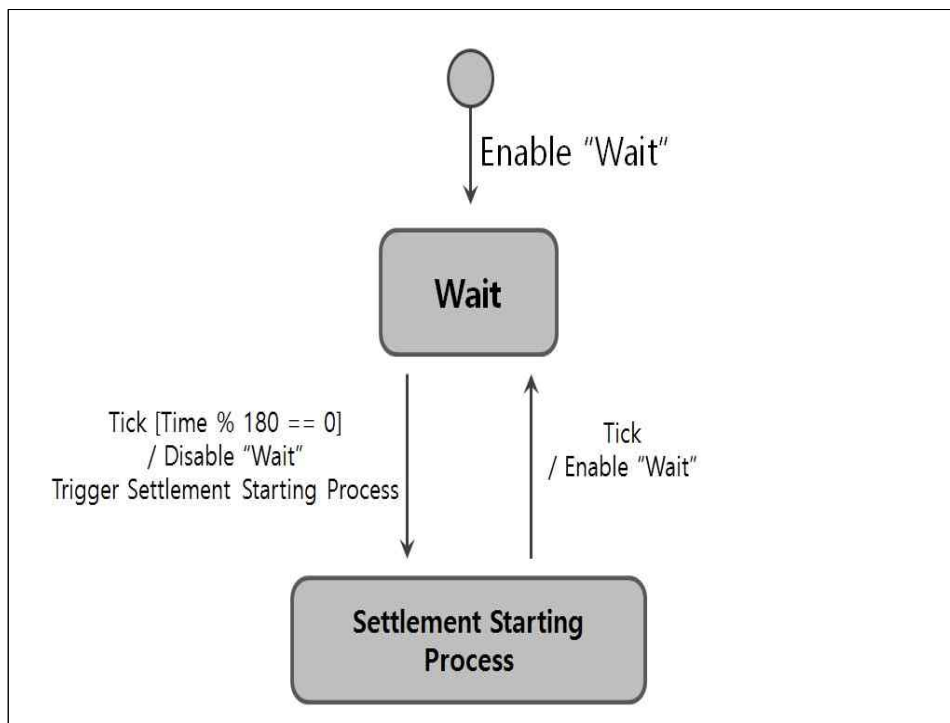
Controller 2.1.2 State Diagram



(2) Overall of Settlement System modules – T1_2014_SRA_3.0V 참조



Time Checker 2.1 State Diagram



3 Features to be tested

(1) Process in SRA : 각 프로세스가 가지고 있는 요구사항을 만족하는 지를 test한다.

1. Terminal System

2. Settlement System

(2) Modules in SDS : 각 모듈이 가지고 있는 데이터 인터페이스를 test한다.

1. Terminal System(<Table 1테스트할 Process(DFD) 리스트>의 Process name 참조)

2. Settlement System(<Table 2테스트할 Process(DFD) 리스트>의 Process name 참조)

<Table 1 테스트할 Process(DFD) 리스트>

ID	Name	Description
2.1.1.1	Calculator Selector	Card datd와 Terminal Data를 분석해서 작동한 Process를 선택한다.
2.1.1.2	Cal_Bus_On_Standard	버스에 탑승하는 경우 중 기본요금을 계산하는 Process로 Calculated Data를 출력한다.
2.1.1.3	Cal_Bus_On_Transfer	버스에 탑승하는 경우 중 환승하는 경우를 계산하는 Process로 Calculated Data를 출력한다.
2.1.1.4	Cal_Bus_On_Unchecked	버스에 탑승하는 경우 중 미정산 요금을 계산하는 Process로 Calculated Data를 출력한다.
2.1.1.5	Cal_Metro_On_Standard	지하철에 탑승하는 경우 중 기본요금을 계산하는 Process로 Calculated Data를 출력한다.
2.1.1.6	Cal_Metro_On_Transfer	지하철에 탑승하는 경우 중 환승하는 경우를 계산하는 Process로 Calculated Data를 출력한다.
2.1.1.7	Cal_Metro_On_Unchecked	지하철에 탑승하는 경우 중 미정산 요금을 계산하는 Process로 Calculated Data를 출력한다.
2.1.1.8	Cal_Bus_Off_Standard	버스에서 하차하는 경우 중 기본요금을 계산하는 Process로 Calculated Data를 출력한다.
2.1.1.9	Cal_Bus_Off_Transfer	버스에서 하차하는 경우 중 환승하는 경우를 계산하는 Process로 Calculated Data를 출력한다.
2.1.1.10	Cal_Metro_Off_Standard	지하철에서 하차하는 경우 중 기본요금을 계산하는 Process로 Calculated Data를 출력한다.
2.1.1.11	Cal_Metro_Off_Transfer	지하철에서 하차하는 경우 중 환승하는 경우를 계산하는 Process로 Calculated Data를 출력한다.
2.1.2	Controller	Calculated Data를 받아 종합하여 조건에 맞는 Process를 실행시킨다.
2.1.3	Check Settlement	하루가 끝나면 프로세스가 실행되며, Reset Accept Data를 전송하여

		Terminal 초기화 여부 데이터를 다룬다.
2.1.4	Terminal Record	Calculated Balance >= 0일 때 프로세스가 실행되며, Terminal에 Card의 결제 정보를 저장하는 데이터를 다룬다.
2.1.6	Print Result	Card Data의 Input이 들어왔을 경우와 Calculated Balance >= 0일 때 프로세스가 실행되며, 단말기에 요금과 잔액이 표시된다.
2.1.7	Print Warning	Card Data의 Input이 들어왔을 경우와 Calculated Balance < 0일 때 프로세스가 실행되며, 단말기에 탑승 불가 메시지를 표시한다.
2.1.8	Check Card	Card Data의 Input이 들어왔을 경우와 Calculated Balance >= 0일 때 프로세스가 실행되며 Card의 결제 정보를 저장하는 데이터를 다룬다.

<Table 2 테스트할 Process(DFD) 리스트>

ID	Name	Description
2.1	Time_Checker	하루가 끝나고 시, 분이 0000이 될 때 Wait을 Disable하고 Settlement_Starting_Process를 Trigger한다. Trigger한 후 다음 Tick에서 다시 Wait을 Enable한다.
2.2	Wait	Enable 상태 시 Hold 데이터(True)를 Bus Company Interface, Metro Company Interface로 전송한다.
2.3	Settlement_Starting_Process	시, 분이 0000이라는 조건이 만족되어 프로세스가 실행되면 Extracted Data를 이용해 Settled Bus Fee, Settled Metro Fee 데이터를 완성 후 각각 Bus Company Interface, Metro Company Interface로 전송한다.

4 Features not to be tested

(1) Process in SRA : 외부 장치 드라이버, 단순 데이터 전달 프로세스 등은 test에서 제외한다.

3. Terminal System

4. Settlement System

(2) Modules in SDS

1. Terminal System(<Table 3 테스트하지 않을 Process(DFD) 리스트>의 Process name 참조)

2. Settlement System(<Table 4 테스트하지 않을 Process(DFD) 리스트>의 Process name 참조)

<Table 3 테스트하지 않을 Process(DFD) 리스트>

ID	Name	Description
1.1	Card Data Interface	Terminal Sensor로부터 받은 아날로그 신호를 디지털 신호로 변환한다.
1.2	Card Data	입력받은 Data 중 필요한 데이터만을 추출하여 전송한다.

2.1.5	Wait	Card Data의 Input이 없을 경우 평소의 단말기 상태를 표시해 준다.
2.2	Settlement Interface	Reset Accept Data를 받아 Terminal에 보내어 Terminal Data를 초기화시킬 지 결정한다.
2.3	Terminal Data Interface	Terminal에 누적 결제 기록을 저장하기 위해 Recorded Data를 생성한다.
2.4	Card Data Interface	Updated Card Data를 받아 Card 정보를 Update 시키는 정보를 보낸다.
2.5	Hardware Interface	Display Data를 받아 LED 화면에 출력할 Display 정보를 보낸다.
2.6	Company Interface	Company Terminator에서 Settlement Data를 받아 Settlement Status를 F.M.S Process로 전송한다.
2.7	Terminal Interface	Terminal Information을 Data Storage로부터 받아 Terminal Data를 F.M.S Process로 전송한다.

<Table 4 테스트하지 않을 Process(DFD) 리스트>

ID	Name	Description
1.1	Data_Interface	Terminal에 관련된 모든 누적 기록을 받아서 Converted data리스트를 만든 후 Converted Data리스트를 Provider로 전달한다.
1.2	Provider	Converted Data리스트에서 정산에 필요한 데이터만 추출해서 Extracted Data리스트를 만들어 Settlement Starting Process로 전달한다.
2.4	Bus_Company_Interface	Hold데이터와 Settled_Fee데이터를 받아 Final Bus Data를 전송한다.
2.5	Metro_Company_Interface	Hold데이터와 Settled_Fee데이터를 받아 Final Metro Data를 전송한다.

5 Approach

대중교통시스템(PTS : Public Transportation System)의 Program source code 및 unit test를 위한 test code는 Cygwin환경에서 이루어지며, program source code/test code의 변경 및 수정 사항은 지속적으로 통합되고 test된다.

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

TEAM1_PTS_0_000_000

7.2 Features to be tested

<Table 1 : 테스트할 Process (DFD) 리스트> 참조

<Table 2 : 테스트할 Process (DFD) 리스트> 참조

7.3 Approach refinements

TEAM1의 각 모듈이 요구사항을 만족하는지를 확인하기 위하여, 요구사항에 정의된 내용에 기반하여 test code를 작성한다. 그 이외의 예외 상황에 대해서는 test code를 작성하지 않는다.

7.4 Test identification

<Table 5 : Test Design Identification>

Identifier	Feature(Process DFD)	Valid / Invalid value
TEAM1_PTS_0_000_000	2.1.1.1.1 Calculator Selector	Card_Data Input : 200001014211,B,1,966900,0_30 200001014311,B,0,966900,0_31 Terminal_Data Input : 200001014211,B,1,0,0_30 200001014311,B,0,0,0_31
TEAM1_PTS_0_000_001	2.1.1.1.1 Calculator Selector	Card_Data Input : 200001015011,B,1,963750,0_36 200001015111,B,0,963750,0_37 Terminal_Data Input : 200001015011,B,1,1050,0_36 200001015111,B,0,0,0_37
TEAM1_PTS_0_000_002	2.1.1.1.1 Calculator Selector	Card_Data Input : 200001011111,T,0,983200,0_8 200001011111,T,1,982150,0_9 Terminal_Data Input : 200001010411,B,0,0,0_46 200001010511,M,1,0,1_63
TEAM1_PTS_0_000_003	2.1.1.1.1 Calculator Selector	Card_Data Input : 200001014611,B,0,966900,0_31 200001014711,B,1,965850,0_32 Terminal_Data Input : 200001014611,B,0,0,0_31 200001014711,B,1,1050,0_32
TEAM1_PTS_0_000_004	2.1.1.1.1 Calculator Selector	Card_Data Input : 200001015111,B,0,963750,0_37 200001015211,B,1,962700,0_38

		Terminal_Data Input : 200001015111,B,0,0,0_37 200001015211,B,1,1050,0_38
TEAM1_PTS_0_000_005	2.1.1.1.1 Calculator Selector	Card_Data Input : 200001015211,B,1,962700,0_38 200001015311,B,0,962700,0_39 Terminal_Data Input : 200001015211,B,1,1050,0_38 200001015311,B,0,0,0_39
TEAM1_PTS_0_000_006	2.1.1.1.1 Calculator Selector	Card_Data Input : 200001010011,B,1,959300,0_43 200001010111,B,0,959300,0_44 Terminal_Data Input : 200001010011,B,1,0,0_43 200001010111,B,0,0,0_44
TEAM1_PTS_0_000_007	2.1.1.1.1 Calculator Selector	Card_Data Input : 200001015511,B,0,961400,0_42 200001015611,M,1,961400,1_56 Terminal_Data Input : 200001015611,B,0,0,0_42 200001015711,M,0,0,1_57
TEAM1_PTS_0_000_008	2.1.1.1.1 Calculator Selector	Card_Data Input : 200001010411,B,0,958600,0_46 200001010511,M,1,958600,1_63 Terminal_Data Input : 200001010411,B,0,0,0_46 200001010511,M,1,0,1_63
TEAM1_PTS_0_000_009	2.1.1.1.1 Calculator Selector	Card_Data Input : 200001010911,M,1,956850,1_66 200001011011,M,0,956850,1_67 Terminal_Data Input : 200001010911,M,1,0,1_66 200001011011,M,0,0,1_67
TEAM1_PTS_0_000_010	2.1.1.1.1 Calculator Selector	Card_Data Input : 200001011211,M,1,955800,1_68 200001011311,M,0,955200,3_1 Terminal_Data Input : 200001011211,M,1,0,1_68 200001011311,M,0,600,3_1
TEAM1_PTS_0_000_011	2.1.1.1.1 Calculator Selector	Card_Data Input : 200001011011,M,0,956850,1_67 200001011111,B,1,956850,0_53 Terminal_Data Input : 200001011011,M,0,0,1_67 200001011111,B,1,0,0_53
TEAM1_PTS_0_000_012	2.1.1.1.1 Calculator Selector	Card_Data Input : 200001011311,M,0,955200,3_1 200001011411,B,1,955200,0_57 Terminal_Data Input : 200001011311,M,0,600,3_1 200001011411,B,1,0,0_57
TEAM1_PTS_0_000_013	2.1.1.1.1 Calculator Selector	Card_Data Input : 200001011511,M,1,955200,1_69 200001011611,M,0,955200,1_70 Terminal_Data Input : 200001011511,M,1,0,1_69 200001011611,M,0,0,1_70
TEAM1_PTS_0_000_014	2.1.1.1.1 Calculator Selector	Card_Data Input : 200001011511,M,1,954150,1_71 200001011711,M,0,954149,2_2

		Terminal_Data Input : 200001011511,M,1,1050,1_71 200001011711,M,0,1,2_2
TEAM1_PTS_0_000_015	2.1.1.1.1 Calculator Selector	Card_Data Input : 200001012111,M,0,952500,4_2 200001013111,M,1,951450,1_74 Terminal_Data Input : 200001012111,M,0,600,4_2 200001013111,M,1,1050,1_74
TEAM1_PTS_0_000_016	2.1.1.1.1 Calculator Selector	Card_Data Input : 200001014111,M,0,950850,4_3 200001015111,M,1,949800,1_75 Terminal_Data Input : 200001014111,M,0,600,4_3 200001015111,M,1,1050,1_75
TEAM1_PTS_0_000_017	2.1.1.1.1 Calculator Selector	Card_Data Input : 200001012111,M,0,949600,2_2 200001012211,M,1,948550,2_3 Terminal_Data Input : 200001012111,M,0,200,2_2 200001012211,M,1,1050,2_3
TEAM1_PTS_0_000_018	2.1.1.1.1 Calculator Selector	Card_Data Input : 200001012111,B,1,947850,0_59 200001012211,M,1,947250,1_76 Terminal_Data Input : 200001012111,B,1,700,0_59 200001012211,M,1,600,1_76
TEAM1_PTS_0_000_019	2.1.1.1.1 Calculator Selector	Card_Data Input : 200001012111,M,1,948550,2_3 200001012111,B,1,947850,0_59 Terminal_Data Input : 200001012111,M,1,1050,2_3 200001012111,B,1,700,0_59
TEAM1_PTS_0_000_020	2.1.1.1.1 Calculator Selector	Card_Data Input : 200001012111,M,1,947250,1_76 200001015111,B,1,946550,0_60 Terminal_Data Input : 200001012111,M,1,600,1_76 200001015111,B,1,700,0_60
TEAM1_PTS_0_001_000	2.1.1.2 Cal_Bus_On_Standard	Data Input : ecd.on_board = 0, ecd.balance = 10000, ecd.Terminal_ID = 0, ecd.time1 = 200001011115, ecd.time2 = 200001011111, ecd.c_time = 200001011530, ecd.transportation = B, ecd.transportation1 = B, ecd.count = 5, etd.transportation = B, etd.Terminal_ID = 0, etd.count = 1
TEAM1_PTS_0_001_001	2.1.1.2 Cal_Bus_On_Standard	Data Input : ecd.on_board = 0, ecd.balance = 10000, ecd.Terminal_ID = 0, ecd.time1 = 200001011115, ecd.time2 = 200001011111, ecd.c_time = 201002011530, ecd.transportation = B, ecd.transportation1 = B, ecd.count = 5, etd.transportation = B, etd.Terminal_ID = 0, etd.count = 1
TEAM1_PTS_0_002_000	2.1.1.3 Cal_Bus_On_Transfer	Data Input : ecd.on_board = 0, ecd.balance = 8000, ecd.Terminal_ID = 3, ecd.time1 = 200001011115, ecd.time2 = 200001011111, ecd.c_time = 200001011530, ecd.transportation = M, ecd.transportation1 = M, ecd.count = 4,

		etd.transportation = B, etd.Terminal_ID = 0, etd.count = 1
TEAM1_PTS_0_003_000	2.1.1.4 Cal_Bus_On_Unchecked	Data Input : ecd.on_board = 0, ecd.balance = 10000, ecd.Terminal_ID = 3, ecd.time1 = 200001011115, ecd.time2 = 200001011111, ecd.c_time = 200001021530, ecd.transportation = B, ecd.transportation1 = M, ecd.count = 5, etd.transportation = B, etd.Terminal_ID = 0, etd.count = 1
TEAM1_PTS_0_003_001	2.1.1.4 Cal_Bus_On_Unchecked	Data Input : ecd.on_board = 0, ecd.balance = 10000, ecd.Terminal_ID = 3, ecd.time1 = 200001011115, ecd.time2 = 200001011111, ecd.c_time = 200001011530, ecd.transportation = M, ecd.transportation1 = M, ecd.count = 5, etd.transportation = B, etd.Terminal_ID = 0, etd.count = 1
TEAM1_PTS_0_004_000	2.1.1.5 Cal_Metro_On_Standard	Data Input : ecd.on_board = 0, ecd.balance = 10000, ecd.Terminal_ID = 3, ecd.time1 = 200001011115, ecd.time2 = 200001011111, ecd.c_time = 200001011530, ecd.transportation = M, ecd.transportation1 = M, ecd.count = 5, etd.transportation = M, etd.Terminal_ID = 1, etd.count = 1
TEAM1_PTS_0_005_000	2.1.1.6 Cal_Metro_On_Transfer	Data Input : ecd.on_board = 0, ecd.balance = 10000, ecd.Terminal_ID = 3, ecd.time1 = 200001011115, ecd.time2 = 200001011111, ecd.c_time = 200001011530, ecd.transportation = B, ecd.transportation1 = B, ecd.count = 5, etd.transportation = M, etd.Terminal_ID = 1, etd.count = 1
TEAM1_PTS_0_006_000	2.1.1.7 Cal_Metro_On_Unchecked	Data Input : ecd.on_board = 0, ecd.balance = 10000, ecd.Terminal_ID = 3, ecd.time1 = 200001011115, ecd.time2 = 200001011111, ecd.c_time = 200001021530, ecd.transportation = B, ecd.transportation1 = B, ecd.count = 5, etd.transportation = M, etd.Terminal_ID = 0, etd.count = 1
TEAM1_PTS_0_006_001	2.1.1.7 Cal_Metro_On_Unchecked	Data Input : ecd.on_board = 0, ecd.balance = 10000, ecd.Terminal_ID = 3, ecd.time1 = 200001011115, ecd.time2 = 200001011111, ecd.c_time = 200001011530, ecd.transportation = B, ecd.transportation1 = B, ecd.count = 5, etd.transportation = M, etd.Terminal_ID = 0, etd.count = 1
TEAM1_PTS_0_007_000	2.1.1.8 Cal_Bus_Off_Standard	Data Input : ecd.on_board = 1, ecd.balance = 10000, ecd.Terminal_ID = 0, ecd.time1 = 200001011115, ecd.time2 = 200001011111, ecd.c_time = 200001011530, ecd.transportation = B, ecd.transportation1 = M, ecd.count = 5, etd.transportation = B, etd.Terminal_ID = 0, etd.count = 1
TEAM1_PTS_0_008_000	2.1.1.9 Cal_Bus_Off_Transfer	Data Input : ecd.on_board = 1, ecd.balance = 10000, ecd.Terminal_ID = 3, ecd.time1 = 200001010100, ecd.time2 = 200001010000, ecd.c_time = 200001012359, ecd.transportation = B, ecd.transportation1 = M, ecd.count = 5, etd.transportation

		= B, etd.Terminal_ID = 0, etd.count = 1
TEAM1_PTS_0_008_001	2.1.1.9 Cal_Bus_Off_Transfer	Data Input : ecd.on_board = 1, ecd.balance = 10000, ecd.Terminal_ID = 3, ecd.time1 = 200001010400, ecd.time2 = 200001010000, ecd.c_time = 200001012359, ecd.transportation = B, ecd.transportation1 = M, ecd.count = 5, etd.transportation = B, etd.Terminal_ID = 0, etd.count = 1
TEAM1_PTS_0_008_002	2.1.1.9 Cal_Bus_Off_Transfer	Data Input : ecd.on_board = 1, ecd.balance = 10000, ecd.Terminal_ID = 3, ecd.time1 = 200001010800, ecd.time2 = 200001010000, ecd.c_time = 200001012359, ecd.transportation = B, ecd.transportation1 = M, ecd.count = 5, etd.transportation = B, etd.Terminal_ID = 0, etd.count = 1
TEAM1_PTS_0_008_003	2.1.1.9 Cal_Bus_Off_Transfer	Data Input : ecd.on_board = 1, ecd.balance = 10000, ecd.Terminal_ID = 3, ecd.time1 = 200001012300, ecd.time2 = 200001010000, ecd.c_time = 200001012359, ecd.transportation = B, ecd.transportation1 = M, ecd.count = 5, etd.transportation = B, etd.Terminal_ID = 0, etd.count = 1
TEAM1_PTS_0_009_000	2.1.1.10 Cal_Metro_Off_Standard	Data Input : ecd.on_board = 1, ecd.balance = 10000, ecd.Terminal_ID = 4, ecd.time1 = 200001011115, ecd.time2 = 200001011111, ecd.c_time = 200001011530, ecd.transportation = M, ecd.transportation1 = M, ecd.count = 5, etd.transportation = M, etd.Terminal_ID = 3, etd.count = 1
TEAM1_PTS_0_009_001	2.1.1.10 Cal_Metro_Off_Standard	Data Input : ecd.on_board = 1, ecd.balance = 10000, ecd.Terminal_ID = 4, ecd.time1 = 200001011115, ecd.time2 = 200001011111, ecd.c_time = 200001011530, ecd.transportation = M, ecd.transportation1 = M, ecd.count = 5, etd.transportation = M, etd.Terminal_ID = 2, etd.count = 1
TEAM1_PTS_0_009_002	2.1.1.10 Cal_Metro_Off_Standard	Data Input : ecd.on_board = 1, ecd.balance = 10000, ecd.Terminal_ID = 4, ecd.time1 = 200001011115, ecd.time2 = 200001011111, ecd.c_time = 200001011530, ecd.transportation = M, ecd.transportation1 = M, ecd.count = 5, etd.transportation = M, etd.Terminal_ID = 1, etd.count = 1
TEAM1_PTS_0_010_000	2.1.1.11 Cal_Metro_Off_Transfer	Data Input : ecd.on_board = 1, ecd.balance = 10000, ecd.Terminal_ID = 1, ecd.time1 = 200001010100, ecd.time2 = 200001010000, ecd.c_time = 200001012359, ecd.transportation = M, ecd.transportation1 = B, ecd.count = 5, etd.transportation = B, etd.Terminal_ID = 0, etd.count = 1
TEAM1_PTS_0_010_001	2.1.1.11 Cal_Metro_Off_Transfer	Data Input : ecd.on_board = 1, ecd.balance = 10000, ecd.Terminal_ID = 2, ecd.time1 = 200001010100, ecd.time2 = 200001010000, ecd.c_time = 200001012359, ecd.transportation = M, ecd.transportation1 = B, ecd.count = 5, etd.transportation = B, etd.Terminal_ID = 0, etd.count = 1

		= B, etd.Terminal_ID = 0, etd.count = 1
TEAM1_PTS_0_010_002	2.1.1.11 Cal_Metro_Off_Transfer	Data Input : ecd.on_board = 1, ecd.balance = 10000, ecd.Terminal_ID = 3, ecd.time1 = 200001010100, ecd.time2 = 200001010000, ecd.c_time = 200001012359, ecd.transportation = M, ecd.transportation1 = B, ecd.count = 5, etd.transportation = B, etd.Terminal_ID = 0, etd.count = 1
TEAM1_PTS_0_010_003	2.1.1.11 Cal_Metro_Off_Transfer	Data Input : ecd.on_board = 1, ecd.balance = 10000, ecd.Terminal_ID = 4, ecd.time1 = 200001010100, ecd.time2 = 200001010000, ecd.c_time = 200001012359, ecd.transportation = M, ecd.transportation1 = B, ecd.count = 5, etd.transportation = B, etd.Terminal_ID = 0, etd.count = 1
TEAM1_PTS_0_011_000	2.1.2 Controller	Data Input : hour == 0 && minute == 0
TEAM1_PTS_0_011_001	2.1.2 Controller	Data Input : hour == 0 && minute != 0
TEAM1_PTS_0_011_002	2.1.2 Controller	Data Input : hour != 0 && minute == 0
TEAM1_PTS_0_011_003	2.1.2 Controller	Data Input : hour != 0 && minute != 0
TEAM1_PTS_0_011_004	2.1.2 Controller	Data Input : cd.Calculated_Balance = 3000
TEAM1_PTS_0_011_005	2.1.2 Controller	Data Input : cd.Calculated_Balance = -1000
TEAM1_PTS_0_012_000	2.1.3 Check Settlement	Data Input : 정산 완료되었다는 파일 존재
TEAM1_PTS_0_012_001	2.1.3 Check Settlement	Data Input : 정산 완료되었다는 파일 존재하지 않음
TEAM1_PTS_0_013_000	2.1.4 Terminal Record	Data Input : cd.time = 201411210500, cd.transportation = B, cd.on_board = 1, cd.fee = 500, cd.Terminal_ID = 0, cd.count = 2
TEAM1_PTS_0_013_001	2.1.4 Terminal Record	Data Input : cd.time = 201411210530, cd.transportation = M, cd.on_board = 0, cd.fee = 500, cd.Terminal_ID = 3, cd.count = 1
TEAM1_PTS_0_014_000	2.1.6 Print Result	Data Input : cd.fee = 100, cd.Calculated_Balance = 500
TEAM1_PTS_0_014_001	2.1.6 Print Result	Data Input : cd.fee = 200, cd.Calculated_Balance = -100
TEAM1_PTS_0_015_000	2.1.7 Print Warning	Data Input : cd.fee = 250, cd.Calculated_Balance = 400
TEAM1_PTS_0_015_001	2.1.7 Print Warning	Data Input : cd.fee = 300, cd.Calculated_Balance = -200
TEAM1_PTS_0_016_000	2.1.8 Check Card	Data Input : cd.fee = 700, cd.Calculated_Balance = 0
TEAM1_PTS_0_016_001	2.1.8 Check Card	Data Input : cd.fee = 150, cd.Calculated_Balance = -50
TEAM1_PTS_1_000_000	2.1 Time_Checker	time = "201411200000" Input
TEAM1_PTS_1_000_001	2.1 Time_Checker	time = "201411200100" Input
TEAM1_PTS_1_000_002	2.1 Time_Checker	time = "201411200008" Input
TEAM1_PTS_1_000_003	2.1 Time_Checker	time = "201411200108" Input
TEAM1_PTS_1_001_000	2.2 Wait	Enable Input

TEAM1_PTS_1_001_001	2.2 Wait	Disable Input
TEAM1_PTS_1_002_000	2.3 Settlement_Starting_Process	trigger , Stack ED={ 201411200008, M, 1, 1050 201411200124, M, 0, 400 201411200400, B, 1, 1050 201411200440, B, 0, 0 201411200600, B, 1, 1050 201411200800, B, 0, 0 } Input
TEAM1_PTS_1_002_001	2.3 Settlement_Starting_Process	trigger , Stack ED={ 201411200008, M, 1, 1050 201411200124, M, 0, 400 201411200400, B, 1, 1050 201411200440, B, 0, 0 201411200504, M, 1, 0 201411200600, M, 0, 300} Input
TEAM1_PTS_1_002_002	2.3 Settlement_Starting_Process	trigger , Stack ED={ 201411200400, B, 1, 1050 201411200440, B, 0, 0 201411200504, M, 1, 0 201411200600, M, 0, 300 201411200640, B, 1, 0 201411201448, B, 0, 200} Input
TEAM1_PTS_1_002_003	2.3 Settlement_Starting_Process	trigger , Stack ED={ 201411200016, M, 1, 1050 201411200040, M, 0, 200 201411200232, B, 1, 0 201411201224, B, 0, 200 201411201400, M, 1, 0 201411201408, M, 0, 600 201411201416, B, 1, 0 201411201824, B, 0, 200} Input
TEAM1_PTS_1_002_004	2.3 Settlement_Starting_Process	trigger , Stack ED={ 201411200016, B, 1, 1050 201411200216, B, 0, 0 201411200616, B, 1, 1050 201411200624, B, 0, 0 201411200632, B, 1, 1050 201411200640, B, 0, 0} Input
TEAM1_PTS_1_002_005	2.3 Settlement_Starting_Process	trigger , Stack ED={ 201411200016, M, 1, 1050 201411200216, M, 0, 0 201411200616, M, 1, 1050 201411200624, M, 0, 0 201411200632, M, 1, 1050 201411200640, M, 0, 0} Input
TEAM1_PTS_1_002_006	2.3 Settlement_Starting_Process	trigger ,

		Stack ED={ 201411200008, M, 1, 1050 201411200124, M, 0, 400 201411200400, B, 1, 1050 201411200440, B, 0, 0 201411200504, M, 1, 0} Input
TEAM1_PTS_1_002_007	2.3 Settlement_Starting_Process	trigger , Stack ED={ 201411200400, B, 1, 1050 201411200440, B, 0, 0 201411200504, M, 1, 0 201411200600, M, 0, 300 201411200640, B, 1, 0} Input
TEAM1_PTS_1_002_008	2.3 Settlement_Starting_Process	trigger , Stack ED={ 201411200016, M, 1, 1050 201411200040, M, 0, 200 201411200232, B, 1, 0 201411201224, B, 0, 200 201411201400, M, 1, 0 201411201408, M, 0, 600 201411201416, B, 1, 0} Input
TEAM1_PTS_1_002_009	2.3 Settlement_Starting_Process	trigger , Stack ED={ 201411201010, M, 1, 1050 201411201020, B, 1, 1750 201411201030, B, 0, 0} Input
TEAM1_PTS_1_002_010	2.3 Settlement_Starting_Process	trigger , Stack ED={ 201411201010, M, 1, 1050 201411201020, B, 1, 1750 201411201030, M, 1, 1750 201411201040, M, 0, 0} Input
TEAM1_PTS_1_002_011	2.3 Settlement_Starting_Process	trigger , Stack ED={ 201411201010, M, 1, 1050 201411201020, B, 1, 1750 201411201030, M, 1, 1750 201411201040, B, 1, 1750 201411201050, B, 0, 0 } Input
TEAM1_PTS_1_002_012	2.3 Settlement_Starting_Process	trigger , Stack ED={ 201411201010, M, 1, 1050 201411201020, B, 1, 1750 201411201030, B, 0, 0 201411201050, M, 1, 0 201411201058, M, 0, 300} Input
TEAM1_PTS_1_002_013	2.3 Settlement_Starting_Process	trigger , Stack ED={ 201411201010, M, 1, 1050 201411201020, B, 1, 1750

		201411201030, M, 1, 1750 201411201040, M, 0, 300 201411201100, B, 1, 0 201411201130, B, 0, 0} Input
TEAM1_PTS_1_002_014	2.3 Settlement_Starting_Process	trigger , Stack ED={ 201411201000, M, 1, 1050 201411201030, M, 0, 400 201411201100, B, 1, 0 201411201200, M, 1, 1750} Input

7.5 Feature pass/fail criteria

최초 입력에 대해 범위 이상의 값과 범위 이하의 값을 한번씩 입력해보고, 그 뒤는 선행 프로세스의 구조상 이외의 값이 나올 수 없으므로 범위 이상의 값과 범위 이하의 값에 대해 테스트 하지 않음

8 Unit test case specification

8.1 Test case specification identifier

<Table 6 : Test Case Identification>

Test case Identifier	Input Specification	Output Specification
TEAM1_PTS_0_000_000	Card_Data Input : 200001014211,B,1,966900,0_30 200001014311,B,0,966900,0_31 Terminal_Data Input : 200001014211,B,1,0,0_30 200001014311,B,0,0,0_31	Cal_Bus_On_Standard() 실행
TEAM1_PTS_0_000_001	Card_Data Input : 200001015011,B,1,963750,0_36 200001015111,B,0,963750,0_37 Terminal_Data Input : 200001015011,B,1,1050,0_36 200001015111,B,0,0,0_37	Cal_Bus_On_Standard() 실행
TEAM1_PTS_0_000_002	Card_Data Input : 200001011111,T,0,983200,0_8 200001011111,T,1,982150,0_9 Terminal_Data Input : 200001010411,B,0,0,0_46 200001010511,M,1,0,1_63	어떠한 함수도 실행되지 않음
TEAM1_PTS_0_000_003	Card_Data Input : 200001014611,B,0,966900,0_31 200001014711,B,1,965850,0_32	Cal_Bus_Off_Standard() 실행

	Terminal_Data Input : 200001014611,B,0,0,0_31 200001014711,B,1,1050,0_32	
TEAM1_PTS_0_000_004	Card_Data Input : 200001015111,B,0,963750,0_37 200001015211,B,1,962700,0_38 Terminal_Data Input : 200001015111,B,0,0,0_37 200001015211,B,1,1050,0_38	Cal_Bus_Off_Standard() 실행
TEAM1_PTS_0_000_005	Card_Data Input : 200001015211,B,1,962700,0_38 200001015311,B,0,962700,0_39 Terminal_Data Input : 200001015211,B,1,1050,0_38 200001015311,B,0,0,0_39	Cal_Metro_On_transfer() 실행
TEAM1_PTS_0_000_006	Card_Data Input : 200001010011,B,1,959300,0_43 200001010111,B,0,959300,0_44 Terminal_Data Input : 200001010011,B,1,0,0_43 200001010111,B,0,0,0_44	Cal_Metro_On_transfer() 실행
TEAM1_PTS_0_000_007	Card_Data Input : 200001015511,B,0,961400,0_42 200001015611,M,1,961400,1_56 Terminal_Data Input : 200001015611,B,0,0,0_42 200001015711,M,0,0,1_57	Cal_Metro_Off_transfer() 실행
TEAM1_PTS_0_000_008	Card_Data Input : 200001010411,B,0,958600,0_46 200001010511,M,1,958600,1_63 Terminal_Data Input : 200001010411,B,0,0,0_46 200001010511,M,1,0,1_63	Cal_Metro_Off_transfer() 실행
TEAM1_PTS_0_000_009	Card_Data Input : 200001010911,M,1,956850,1_66 200001011011,M,0,956850,1_67 Terminal_Data Input : 200001010911,M,1,0,1_66 200001011011,M,0,0,1_67	Cal_Bus_On_transfer() 실행
TEAM1_PTS_0_000_010	Card_Data Input : 200001011211,M,1,955800,1_68 200001011311,M,0,955200,3_1 Terminal_Data Input : 200001011211,M,1,0,1_68 200001011311,M,0,600,3_1	Cal_Bus_On_transfer() 실행
TEAM1_PTS_0_000_011	Card_Data Input : 200001011011,M,0,956850,1_67	Cal_Bus_Off_transfer() 실행

	200001011111,B,1,956850,0_53 Terminal_Data Input : 200001011011,M,0,0,1_67 200001011111,B,1,0,0_53	
TEAM1_PTS_0_000_012	Card_Data Input : 200001011311,M,0,955200,3_1 200001011411,B,1,955200,0_57 Terminal_Data Input : 200001011311,M,0,600,3_1 200001011411,B,1,0,0_57	Cal_Bus_Off_transfer() 실행
TEAM1_PTS_0_000_013	Card_Data Input : 200001011511,M,1,955200,1_69 200001011611,M,0,955200,1_70 Terminal_Data Input : 200001011511,M,1,0,1_69 200001011611,M,0,0,1_70	Cal_Metro_On_Standard() 실행
TEAM1_PTS_0_000_014	Card_Data Input : 200001011511,M,1,954150,1_71 200001011711,M,0,954149,2_2 Terminal_Data Input : 200001011511,M,1,1050,1_71 200001011711,M,0,1,2_2	Cal_Metro_On_Standard() 실행
TEAM1_PTS_0_000_015	Card_Data Input : 200001012111,M,0,952500,4_2 200001013111,M,1,951450,1_74 Terminal_Data Input : 200001012111,M,0,600,4_2 200001013111,M,1,1050,1_74	Cal_Metro_Off_Standard() 실행
TEAM1_PTS_0_000_016	Card_Data Input : 200001014111,M,0,950850,4_3 200001015111,M,1,949800,1_75 Terminal_Data Input : 200001014111,M,0,600,4_3 200001015111,M,1,1050,1_75	Cal_Metro_Off_Standard() 실행
TEAM1_PTS_0_000_017	Card_Data Input : 200001012111,M,0,949600,2_2 200001012211,M,1,948550,2_3 Terminal_Data Input : 200001012111,M,0,200,2_2 200001012211,M,1,1050,2_3	Cal_Bus_On_Unchecked() 실행
TEAM1_PTS_0_000_018	Card_Data Input : 200001012111,B,1,947850,0_59	Cal_Bus_On_Unchecked() 실행

	200001012211,M,1,947250,1_76 Terminal_Data Input : 200001012111,B,1,700,0_59 200001012211,M,1,600,1_76	
TEAM1_PTS_0_000_019	Card_Data Input : 200001012111,M,1,948550,2_3 200001012111,B,1,947850,0_59 Terminal_Data Input : 200001012111,M,1,1050,2_3 200001012111,B,1,700,0_59	Cal_Metro_On_Unchecked() 실행
TEAM1_PTS_0_000_020	Card_Data Input : 200001012111,M,1,947250,1_76 200001015111,B,1,946550,0_60 Terminal_Data Input : 200001012111,M,1,600,1_76 200001015111,B,1,700,0_60	Cal_Metro_On_Unchecked() 실행
TEAM1_PTS_0_001_000	Data Input : ecd.on_board = 0, ecd.balance = 10000, ecd.Terminal_ID = 0, ecd.time1 = 200001011111, ecd.time2 = 200001011115, ecd.c_time = 200001011530, ecd.transportation = B, ecd.transportation1 = B, ecd.count = 5, etd.transportation = B, etd.Terminal_ID = 0, etd.count = 1	cd.time = 200001011530, cd.transportation = B, cd.on_board = 1, cd.balance = 10000, cd.fee = 1050, cd.Calculated_Balance = 8950, cd.Terminal_ID = 0, cd.count = 1
TEAM1_PTS_0_001_001	Data Input : ecd.on_board = 0, ecd.balance = 10000, ecd.Terminal_ID = 0, ecd.time1 = 200001011111, ecd.time2 = 200001011115, ecd.c_time = 201002011530, ecd.transportation = B, ecd.transportation1 = B, ecd.count = 5, etd.transportation = B, etd.Terminal_ID = 0, etd.count = 1	Calculated Data가 생성되지 않음
TEAM1_PTS_0_002_000	Data Input : ecd.on_board = 0, ecd.balance = 8000, ecd.Terminal_ID = 3, ecd.time1 = 200001011115, ecd.time2 = 200001011111, ecd.c_time = 200001011530, ecd.transportation = M, ecd.transportation1 = M, ecd.count = 4, etd.transportation = B, etd.Terminal_ID = 0, etd.count = 1	cd.time = 200001011530, cd.transportation = B, cd.on_board = 1, cd.balance = 8000, cd.fee = 0, cd.Calculated_Balance = 8000, cd.Terminal_ID = 0, cd.count = 1
TEAM1_PTS_0_003_000	Data Input : ecd.on_board = 0, ecd.balance = 10000, ecd.Terminal_ID = 3, ecd.time1 = 200001011115, ecd.time2 = 200001011111, ecd.c_time = 200001021530, ecd.transportation	cd.time = 200001021530, cd.transportation = B, cd.on_board = 1, cd.balance = 10000, cd.fee = 700, cd.Calculated_Balance = 9300, cd.Terminal_ID = 0, cd.count = 1

	= B, ecd.transportation1 = M, ecd.count = 5, etd.transportation = B, etd.Terminal_ID = 0, etd.count = 1	
TEAM1_PTS_0_003_001	Data Input : ecd.on_board = 0, ecd.balance = 10000, ecd.Terminal_ID = 3, ecd.time1 = 200001011115, ecd.time2 = 200001011111, ecd.c_time = 200001011530, ecd.transportation = M, ecd.transportation1 = M, ecd.count = 5, etd.transportation = B, etd.Terminal_ID = 0, etd.count = 1	cd.time = 200001011530, cd.transportation = B, cd.on_board = 1, cd.balance = 10000, cd.fee = 700, cd.Calculated_Balance = 9300, cd.Terminal_ID = 0, cd.count = 1
TEAM1_PTS_0_004_000	Data Input : ecd.on_board = 0, ecd.balance = 10000, ecd.Terminal_ID = 3, ecd.time1 = 200001011115, ecd.time2 = 200001011111, ecd.c_time = 200001011530, ecd.transportation = M, ecd.transportation1 = M, ecd.count = 5, etd.transportation = M, etd.Terminal_ID = 1, etd.count = 1	cd.time = 200001011530, cd.transportation = M, cd.on_board = 1, cd.balance = 10000, cd.fee = 1050, cd.Calculated_Balance = 8950, cd.Terminal_ID = 1, cd.count = 1
TEAM1_PTS_0_005_000	Data Input : ecd.on_board = 0, ecd.balance = 10000, ecd.Terminal_ID = 3, ecd.time1 = 200001011115, ecd.time2 = 200001011111, ecd.c_time = 200001011530, ecd.transportation = B, ecd.transportation1 = B, ecd.count = 5, etd.transportation = M, etd.Terminal_ID = 1, etd.count = 1	cd.time = 200001011530, cd.transportation = M, cd.on_board = 1, cd.balance = 10000, cd.fee = 0, cd.Calculated_Balance = 10000, cd.Terminal_ID = 1, cd.count = 1
TEAM1_PTS_0_006_000	Data Input : ecd.on_board = 0, ecd.balance = 10000, ecd.Terminal_ID = 3, ecd.time1 = 200001011115, ecd.time2 = 200001011111, ecd.c_time = 200001021530, ecd.transportation = B, ecd.transportation1 = B, ecd.count = 5, etd.transportation = M, etd.Terminal_ID = 0, etd.count = 1	cd.time = 200001021530, cd.transportation = M, cd.on_board = 1, cd.balance = 10000, cd.fee = 700, cd.Calculated_Balance = 9300, cd.Terminal_ID = 1, cd.count = 1
TEAM1_PTS_0_006_001	Data Input : ecd.on_board = 0, ecd.balance = 10000, ecd.Terminal_ID = 3, ecd.time1 = 200001011115, ecd.time2 = 200001011111, ecd.c_time = 200001011530, ecd.transportation = B, ecd.transportation1 = B, ecd.count = 5, etd.transportation = M, etd.Terminal_ID = 0, etd.count = 1	cd.time = 200001011530, cd.transportation = M, cd.on_board = 1, cd.balance = 10000, cd.fee = 700, cd.Calculated_Balance = 9300, cd.Terminal_ID = 1, cd.count = 1
TEAM1_PTS_0_007_000	Data Input : ecd.on_board = 1, ecd.balance = 10000, ecd.Terminal_ID = 0, ecd.time1 =	cd.time = 200001011530, cd.transportation = B, cd.on_board = 0, cd.balance = 10000, cd.fee

	200001011115, ecd.time2 = 200001011111, ecd.c_time = 200001011530, ecd.transportation = B, ecd.transportation1 = M, ecd.count = 5, etd.transportation = B, etd.Terminal_ID = 0, etd.count = 1	= 0, cd.Calculated_Balance = 10000, cd.Terminal_ID = 0, cd.count = 1
TEAM1_PTS_0_008_000	Data Input : ecd.on_board = 1, ecd.balance = 10000, ecd.Terminal_ID = 3, ecd.time1 = 200001010100, ecd.time2 = 200001010000, ecd.c_time = 200001012359, ecd.transportation = B, ecd.transportation1 = M, ecd.count = 5, etd.transportation = B, etd.Terminal_ID = 0, etd.count = 1	cd.time = 200001012359, cd.transportation = B, cd.on_board = 0, cd.balance = 10000, cd.fee = 0, cd.Calculated_Balance = 10000, cd.Terminal_ID = 0, cd.count = 1
TEAM1_PTS_0_008_001	Data Input : ecd.on_board = 1, ecd.balance = 10000, ecd.Terminal_ID = 3, ecd.time1 = 200001010400, ecd.time2 = 200001010000, ecd.c_time = 200001012359, ecd.transportation = B, ecd.transportation1 = M, ecd.count = 5, etd.transportation = B, etd.Terminal_ID = 0, etd.count = 1	cd.time = 200001012359, cd.transportation = B, cd.on_board = 0, cd.balance = 10000, cd.fee = 100, cd.Calculated_Balance = 9900, cd.Terminal_ID = 0, cd.count = 1
TEAM1_PTS_0_008_002	Data Input : ecd.on_board = 1, ecd.balance = 10000, ecd.Terminal_ID = 3, ecd.time1 = 200001010800, ecd.time2 = 200001010000, ecd.c_time = 200001012359, ecd.transportation = B, ecd.transportation1 = M, ecd.count = 5, etd.transportation = B, etd.Terminal_ID = 0, etd.count = 1	cd.time = 200001012359, cd.transportation = B, cd.on_board = 0, cd.balance = 10000, cd.fee = 200, cd.Calculated_Balance = 9800, cd.Terminal_ID = 0, cd.count = 1
TEAM1_PTS_0_008_003	Data Input : ecd.on_board = 1, ecd.balance = 10000, ecd.Terminal_ID = 3, ecd.time1 = 200001012300, ecd.time2 = 200001010000, ecd.c_time = 200001012359, ecd.transportation = B, ecd.transportation1 = M, ecd.count = 5, etd.transportation = B, etd.Terminal_ID = 0, etd.count = 1	cd.time = 200001012359, cd.transportation = B, cd.on_board = 0, cd.balance = 10000, cd.fee = 500, cd.Calculated_Balance = 9500, cd.Terminal_ID = 0, cd.count = 1
TEAM1_PTS_0_009_000	Data Input : ecd.on_board = 1, ecd.balance = 10000, ecd.Terminal_ID = 4, ecd.time1 = 200001011115, ecd.time2 = 200001011111, ecd.c_time = 200001011530, ecd.transportation = M, ecd.transportation1 = M, ecd.count = 5, etd.transportation = M, etd.Terminal_ID = 3, etd.count = 1	cd.time = 200001011530, cd.transportation = M, cd.on_board = 0, cd.balance = 10000, cd.fee = 0, cd.Calculated_Balance = 10000, cd.Terminal_ID = 3, cd.count = 1

TEAM1_PTS_0_009_001	Data Input : ecd.on_board = 1, ecd.balance = 10000, ecd.Terminal_ID = 4, ecd.time1 = 200001011115, ecd.time2 = 200001011111, ecd.c_time = 200001011530, ecd.transportation = M, ecd.transportation1 = M, ecd.count = 5, etd.transportation = M, etd.Terminal_ID = 2, etd.count = 1	cd.time = 200001011530, cd.transportation = M, cd.on_board = 0, cd.balance = 10000, cd.fee = 400, cd.Calculated_Balance = 9600, cd.Terminal_ID = 2, cd.count = 1
TEAM1_PTS_0_009_002	Data Input : ecd.on_board = 1, ecd.balance = 10000, ecd.Terminal_ID = 4, ecd.time1 = 200001011115, ecd.time2 = 200001011111, ecd.c_time = 200001011530, ecd.transportation = M, ecd.transportation1 = M, ecd.count = 5, etd.transportation = M, etd.Terminal_ID = 1, etd.count = 1	cd.time = 200001011530, cd.transportation = M, cd.on_board = 0, cd.balance = 10000, cd.fee = 600, cd.Calculated_Balance = 9400, cd.Terminal_ID = 1, cd.count = 1
TEAM1_PTS_0_010_000	Data Input : ecd.on_board = 1, ecd.balance = 10000, ecd.Terminal_ID = 1, ecd.time1 = 200001010100, ecd.time2 = 200001010000, ecd.c_time = 200001012359, ecd.transportation = M, ecd.transportation1 = B, ecd.count = 5, etd.transportation = B, etd.Terminal_ID = 0, etd.count = 1	cd.time = 200001012359, cd.transportation = M, cd.on_board = 0, cd.balance = 10000, cd.fee = 0, cd.Calculated_Balance = 10000, cd.Terminal_ID = 1, cd.count = 1
TEAM1_PTS_0_010_001	Data Input : ecd.on_board = 1, ecd.balance = 10000, ecd.Terminal_ID = 2, ecd.time1 = 200001010100, ecd.time2 = 200001010000, ecd.c_time = 200001012359, ecd.transportation = M, ecd.transportation1 = B, ecd.count = 5, etd.transportation = B, etd.Terminal_ID = 0, etd.count = 1	cd.time = 200001012359, cd.transportation = M, cd.on_board = 0, cd.balance = 10000, cd.fee = 300, cd.Calculated_Balance = 9700, cd.Terminal_ID = 2, cd.count = 1
TEAM1_PTS_0_010_002	Data Input : ecd.on_board = 1, ecd.balance = 10000, ecd.Terminal_ID = 3, ecd.time1 = 200001010100, ecd.time2 = 200001010000, ecd.c_time = 200001012359, ecd.transportation = M, ecd.transportation1 = B, ecd.count = 5, etd.transportation = B, etd.Terminal_ID = 0, etd.count = 1	cd.time = 200001012359, cd.transportation = M, cd.on_board = 0, cd.balance = 10000, cd.fee = 600, cd.Calculated_Balance = 9400, cd.Terminal_ID = 3, cd.count = 1
TEAM1_PTS_0_010_003	Data Input : ecd.on_board = 1, ecd.balance = 10000, ecd.Terminal_ID = 4, ecd.time1 = 200001010100, ecd.time2 = 200001010000, ecd.c_time = 200001012359, ecd.transportation = M, ecd.transportation1 = B, ecd.count = 5, etd.transportation = B, etd.Terminal_ID = 0,	cd.time = 200001012359, cd.transportation = M, cd.on_board = 0, cd.balance = 10000, cd.fee = 600, cd.Calculated_Balance = 9400, cd.Terminal_ID = 4, cd.count = 1

	etd.count = 1	
TEAM1_PTS_0_011_000	Data Input : hour == 0 && minute == 0	Check_Settlement() 실행
TEAM1_PTS_0_011_001	Data Input : hour == 0 && minute != 0	Wait() 실행
TEAM1_PTS_0_011_002	Data Input : hour != 0 && minute == 0	Wait() 실행
TEAM1_PTS_0_011_003	Data Input : hour != 0 && minute != 0	Wait() 실행
TEAM1_PTS_0_011_004	Data Input : cd.Calculated_Balance = 3000	Terminal_Record(), Print_Result(), Check_Card() 실행
TEAM1_PTS_0_011_005	Data Input : cd.Calculated_Balance = -1000	Print_Warning() 실행
TEAM1_PTS_0_012_000	Data Input : 정산 완료되었다는 파일 존재	rad.reset = 1
TEAM1_PTS_0_012_001	Data Input : 정산 완료되었다는 파일 존재하지 않음	rad.reset = 0
TEAM1_PTS_0_013_000	Data Input : cd.time = 201411210500, cd.transportation = B, cd.on_board = 1, cd.fee = 500, cd.Terminal_ID = 0, cd.count = 2	pd.time = 201411210500, pd.transportation = B, pd.on_board = 1, pd.fee = 500, pd.Terminal_ID = 0, pd.count = 2
TEAM1_PTS_0_013_001	Data Input : cd.time = 201411210530, cd.transportation = M, cd.on_board = 0, cd.fee = 500, cd.Terminal_ID = 3, cd.count = 1	pd.time = 201411210530, pd.transportation = M, pd.on_board = 0, pd.fee = 500, pd.Terminal_ID = 3, pd.count = 1
TEAM1_PTS_0_014_000	Data Input : cd.fee = 100, cd.Calculated_Balance = 500	fee = 100 Balance = 500
TEAM1_PTS_0_014_001	Data Input : cd.fee = 200, cd.Calculated_Balance = -100	Display Data 생성되지 않음
TEAM1_PTS_0_015_000	Data Input : cd.fee = 250, cd.Calculated_Balance = 400	Display Data 생성되지 않음
TEAM1_PTS_0_015_001	Data Input : cd.fee = 300, cd.Calculated_Balance = -200	"잔액이 부족합니다."
TEAM1_PTS_0_016_000	Data Input : cd.time = 201411210500, cd.transportation = B, cd.on_board = 1, cd.Calculated_Balance = 0, cd.Terminal_ID = 0, cd.count = 3;	ucd.time = 201411210500, ucd.transportation = B, ucd.on_board = 1, ucd.balance = 0, ucd.Terminal_ID = 0, ucd.count = 3;
TEAM1_PTS_0_016_001	Data Input : cd.time = 201411210500, cd.transportation = B, cd.on_board = 1, cd.Calculated_Balance = -1600, cd.Terminal_ID = 0, cd.count = 3;	Updated Card Data 생성되지 않음

TEAM1_PTS_1_000_000	time = "201411200000" Input	
TEAM1_PTS_1_000_001	time = "201411200100" Input	
TEAM1_PTS_1_000_002	time = "201411200008" Input	
TEAM1_PTS_1_000_003	time = "201411200108" Input	
TEAM1_PTS_1_001_000	Enable Input	Hold=true(1) Output
TEAM1_PTS_1_001_001	Disable Input	Hold=false(0) Output
TEAM1_PTS_1_002_000	trigger , Stack ED={ 201411200008, M, 1, 1050 201411200124, M, 0, 400 201411200400, B, 1, 1050 201411200440, B, 0, 0 201411200600, B, 1, 1050 201411200800, B, 0, 0 } Input	SF = { 201411200800, 201411200124, 2100, 1400 }Output
TEAM1_PTS_1_002_001	trigger , Stack ED={ 201411200008, M, 1, 1050 201411200124, M, 0, 400 201411200400, B, 1, 1050 201411200440, B, 0, 0 201411200504, M, 1, 0 201411200600, M, 0, 300} Input	SF = { 201411200440, 201411200600, 591, 2209 }Output
TEAM1_PTS_1_002_002	trigger , Stack ED={ 201411200400, B, 1, 1050 201411200440, B, 0, 0 201411200504, M, 1, 0 201411200600, M, 0, 300 201411200640, B, 1, 0 201411201448, B, 0, 200} Input	SF = { 201411201448, 201411200600, 976, 574 }Output
TEAM1_PTS_1_002_003	trigger , Stack ED={ 201411200016, M, 1, 1050 201411200040, M, 0, 200 201411200232, B, 1, 0 201411201224, B, 0, 200 201411201400, M, 1, 0 201411201408, M, 0, 600 201411201416, B, 1, 0 201411201824, B, 0, 200} Input	SF = { 201411201824, 201411201408, 1042, 1408 }Output
TEAM1_PTS_1_002_004	trigger , Stack ED={ 201411200016, B, 1, 1050 201411200216, B, 0, 0 201411200616, B, 1, 1050 201411200624, B, 0, 0 201411200632, B, 1, 1050 201411200640, B, 0, 0} Input	SF = { 201411200640, NULL, 3150, NULL }Output
TEAM1_PTS_1_002_005	trigger ,	SF = {

	Stack ED={ 201411200016, M, 1, 1050 201411200216, M, 0, 0 201411200616, M, 1, 1050 201411200624, M, 0, 0 201411200632, M, 1, 1050 201411200640, M, 0, 0} Input	NULL, 201411200640, NULL, 3150 }Output
TEAM1_PTS_1_002_006	trigger , Stack ED={ 201411200008, M, 1, 1050 201411200124, M, 0, 400 201411200400, B, 1, 1050 201411200440, B, 0, 0 201411200504, M, 1, 0} Input	SF = { 201411200440, 201411200504, 1050, 1450 }Output
TEAM1_PTS_1_002_007	trigger , Stack ED={ 201411200400, B, 1, 1050 201411200440, B, 0, 0 201411200504, M, 1, 0 201411200600, M, 0, 300 201411200640, B, 1, 0} Input	SF = { 201411200640, 201411200600, 591, 759 }Output
TEAM1_PTS_1_002_008	trigger , Stack ED={ 201411200016, M, 1, 1050 201411200040, M, 0, 200 201411200232, B, 1, 0 201411201224, B, 0, 200 201411201400, M, 1, 0 201411201408, M, 0, 600 201411201416, B, 1, 0} Input	SF = { 201411201416, 201411201408, 907, 1143 }Output
TEAM1_PTS_1_002_009	trigger , Stack ED={ 201411201010, M, 1, 1050 201411201020, B, 1, 1750 201411201030, B, 0, 0} Input	SF = { 201411201030, 201411201010, 1750, 1050 }Output
TEAM1_PTS_1_002_010	trigger , Stack ED={ 201411201010, M, 1, 1050 201411201020, B, 1, 1750 201411201030, M, 1, 1750 201411201040, M, 0, 0} Input	SF = { 201411201020, 201411201040, 1750, 2800 }Output
TEAM1_PTS_1_002_011	trigger , Stack ED={ 201411201010, M, 1, 1050 201411201020, B, 1, 1750 201411201030, M, 1, 1750 201411201040, B, 1, 1750 201411201050, B, 0, 0 } Input	SF = { 201411201050, 201411201030, 3500, 2800 }Output
TEAM1_PTS_1_002_012	trigger , Stack ED={ 201411201010, M, 1, 1050	SF = { 201411201030, 201411201058, 1157, 1943 }Output

	201411201020, B, 1, 1750 201411201030, B, 0, 0 201411201050, M, 1, 0 201411201058, M, 0, 300} Input	
TEAM1_PTS_1_002_013	trigger , Stack ED={ 201411201010, M, 1, 1050 201411201020, B, 1, 1750 201411201030, M, 1, 1750 201411201040, M, 0, 300 201411201100, B, 1, 0 201411201130, B, 0, 0} Input	SF = { 201411201130, 201411201040, 2444, 2406 }Output
TEAM1_PTS_1_002_014	trigger , Stack ED={ 201411201000, M, 1, 1050 201411201030, M, 0, 400 201411201100, B, 1, 0 201411201200, M, 1, 1750} Input	SF = { 201411201100, 201411201200, 609, 2591 }Output

8.2 Test items

<Table 5 : Test Design Identification> 참조

8.3 Input specifications

<Table 6 : Test Case Identification> 참조

8.4 Output specifications

<Table 6 : Test Case Identification> 참조

9 Testing tasks

<Table 7 : Testing tasks & Schedule>

10 Environmental needs

대중교통시스템(PTS : Public Transportation System)의 Unit Test를 위한 환경적 요구사항은 다음과 같다.

(1) Hardware & Platform, Cygwin

(2) CTIP(Continuous Testing & Integration Platform) Environment

11 Unit Test deliverables

12 Schedules

<Table 7 : Testing tasks & Schedule> 참조