CS589 Project

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1. Introduction

This project provided an EFSM model with an implementation GasPump class. The goal of this project is to test this GasPump class that exhibits state behavior specified by the EFSM model. We need to test the class in three model:

1. Model Based Testing
2. Default Transitions Testing
3. Multiple Condition Testing

In model based testing, we should use the provided EFSM model to test the GasPump class. What we should do is to design test cases for the GasPump class so that all 2-transition sequences testing criterion is satisfied based on the provided EFSM.

Then we should design a set of additional test cases so each default transition in the EFSM is tested.

The third part we should use multiple-condition testing to test predicates of conditional-statements in operations.

2. Model-Based Testing

According to the EFSM model, there are 7 different states. First, we identify the transition pairs.

State S0:

Incoming edge:T0,T3,T5,T13,T14

Outgoing edge:T1,T15

T0	T1	Test 2
T3	T1	Test 3
T5	T1	Test 4
T13	T1	Test 3
T14	T1	Test 4
T0	T15	Test 1
T3	T15	Test 4
T5	T15	Test 3
T13	T15	Test 5
T14	T15	Test 2

State S1:

Incoming edge:T1

Outgoing edge:T2,T6

T1	T2	Test 2
T1	T6	Test 3

State S2:

Incoming edge:T2

Outgoing edge:T3,T4

T2	T3	Test 3
T2	T4	Test 2

State S3:

Incoming edge:T4,T6

Outgoing edge:T5,T7,T8

T4	T5	Test 4
T4	T7	Test 2
T4	T8	Test 5
T6	T5	Test 3
T6	T7	Test 3
T6	T8	Test 4

State S4:

Incoming edge:T7,T8

Outgoing edge:T9

T7	T9	Test 2
T8	T9	Test 4

State S5:

Incoming edge:T9,T10

Outgoing edge:T10,T11,T12

T9	T10	Test 2
T9	T11	Test 5
T9	T12	Test 6
T10	T10	Test 3
T10	T11	Test 2
T10	T12	Test 3

State S6:

Incoming edge:T11,T12

Outgoing edge:T13,T14

T11	T13	Test 5
T11	T14	Test 3
T12	T13	Test 4
T12	T14	Test 3

Test case:

Test1:Activate(3,4),TurnOff

Transitions:T0,T15

Pairs: (T0,T15)

Test2:Activate(3,4),Start,PayCredit,Approved,Regular,StartPump,PumpGallon,
StopPump,NoReceipt,TurnOff

Transitions:T0,T1,T2,T4,T7,T9,T10,T11,T14,T15

Pairs:(T0,T1),(T1,T2),(T2,T4),(T4,T7),(T7,T9),(T9,T10),(T10,T11),(T11,T14),(T14,T15)

Test3:Activate(3,4),Start,PayCredit,Reject,Start,PayCash(6),Regular,StartPump,PumpGallon,PumpGallon,PumpGallon,NoReceipt,Start,PayCash,Cancel,TurnOff

Transitions:T0,T1,T2,T3,T1,T6,T7,T9,T10,T10,T10,T14,T1,T6,T5,T15

Pairs:(T0,T1),(T1,T2),(T2,T3),(T3,T1),(T1,T6),(T6,T7),(T7,T9),(T9,T10),(T10,T10),(T10,T10),(T10,T14),(T14,T1),(T6,T5),(T5,T15)

Test4:Activate(3,4),Start,PayCredit,Approved,Cancel,Start,PayCash(10),Super,StartPump,PumpGallon,PumpGallon,PumpGallon,Receipt,Start,PayCredit,Reject,TurnOff

Transitions:T0,T1,T2,T4,T5,T1,T6,T8,T9,T10,T10,T12,T13,T1,T2,T3,T15

Pairs:(T0,T1),(T1,T2),(T2,T4),(T4,T5),(T5,T1),(T1,T6),(T6,T8),(T8,T9),(T9,T10),

(T10,T10),(T10,T12),(T12,T13),(T13,T1),(T1,T2),(T2,T3),(T3,T15)

Test5:Activate(3,4),Start,PayCredit,Approved,Super,StartPump,StopPump,Receipt,
TurnOff
Transitions:T0,T1,T2,T4,T8,T9,T11,T13,T15
Pairs:(T0,T1),(T1,T2),(T2,T4),(T4,T8),(T8,T9),(T9,T11),(T11,T13),(T13,T15)

Test6:Activate(3,4),Start,PayCash(2),Super,StartPump,PumpGallon,
Receipt,TurnOff
Transitions:T0,T1,T2,T8,T9,T12,T13,T15
Pairs:(T0,T1),(T1,T2),(T2,T8),(T8,T9),(T9,T12),(T12,T13),(T13,T15)

3. Default Testing

Ghost/Default transitions are those transitions that nothing should or will
happen after executing them. The state of the GasPump class should not
change, nor attributes of the GasPump class should not change.

State S0 (13 ghost-transitions):
Ghost-transitions:
Activate,PayCredit,Reject,Approved,Cancel,PayCash,Regular,Super,StartPump,
PumpGallon,StopPump,NoReceipt,Receipt.

Test7: Activate(3,4),Activate(3,4),PayCredit(),Reject()
Coverage: Activate,PayCredit,Reject

Test8:Activate(3,4),PayCredit(),Approved(),Cancel()
Coverage:PayCredit,Approved,Cancel,

Test9:Activate(3,4),PayCash(2),Regular(),StartPump(),PumpGallon(),NoReceipt()
Coverage: PayCash,Regular,StartPump,PumpGallon,StopPump,NoReceipt

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Test10:Activate(3,4),PayCredit(),Approved(),Super(),StartPump(),PumpGallon(),
StopPump(),Receipt()
Coverage:Super

State S1(14 ghost-transitions):
Ghost-transitions:Activate,Start,Reject,Approved,Cancel,PayCash,Regular,
Super,StartPump,PumpGallon,StopPump,NoReceipt,Receipt,TurnOff.

Test11:Activate(3,4), Start, Activate(3,4), Start, Reject, Approved, Cancel,
PayCash(0), Regular, StartPump,PumpGallon, StopPump, Receipt, TurnOff
Coverage:Activate,Start,Reject,Approved,Cancel,PayCash,Regular,
StartPump,PumpGallon,StopPump,Receipt,TurnOff.

Test12:Activate(3,4), Start, Activate(3,4),Start,PayCash(0),Super,
StartPump,StopPump,Receipt
Coverage:Super,Receipt.

State S2(13 ghost-transitions):
Ghost-transitions:Activate,Start,PayCredit,Cancel,PayCash,Regular,
Super,StartPump,PumpGallon,StopPump,NoReceipt,Receipt,TurnOff

Test13:Activate(3,4),Start,PayCredit,Activate(3,4),Start,PayCredit,Cancel,Pay
Cash(4),Regular,StartPump,PumpGallon,StopPump,NoReceipt
Coverage:Activate,Start,PayCredit,Cancel,PayCash,Regular,
StartPump,PumpGallon,StopPump,NoReceipt.

Test14:Activate(3,4),Start,PayCredit,Activate(3,4),Start,PayCredit,Super,Start
Pump,StopPump,Receipt,TurnOff

Coverage:Super,Receipt,TurnOff.

State S3(12 ghost-transitions):
Ghost-transitions:Activate,Start,PayCredit,Reject,Approved,PayCash,
StartPump,PumpGallon,StopPump,NoReceipt,Receipt,TurnOff.

Test15:Activate(3,4),Start,PayCredit,Approved,Activate(3,4),Start,PayCredit,
Reject,Approved,PayCash(3),StartPump,PumpGallon,StopPump,NoReceipt,
Receipt,TurnOff
Coverage:Activate,Start,PayCredit,Reject,Approved,PayCash,
StartPump,PumpGallon,StopPump,NoReceipt,Receipt,TurnOff

State S4(14 ghost-transitions):
Ghost-transitions:Activate,Start,PayCredit,Reject,Approved,Cancel,
PayCash,Regular,Super,PumpGallon,StopPump,NoReceipt,Receipt,
TurnOff

Test16:Activate(3,4), Start, PayCredit, Approved, Regular, Activate(3,4), Start,
PayCredit, Reject, Approved, Cancel, PayCash(3), Regular, Super,
PumpGallon, StopPump, Receipt, NoReceipt, TurnOff
Coverage:Activate,Start,PayCredit,Reject,Approved,Cancel,
PayCash,Regular,Super,PumpGallon,StopPump,NoReceipt,Receipt,
TurnOff

State S5(13 ghost-transitions):
Ghost-transitions:Activate,Start,PayCredit,Reject,Approved,Cancel,
PayCash,Regular,Super,StartPump,NoReceipt,Receipt,TurnOff

Test17:Activate(3,4), Start, PayCredit, Approved, Regular,StartPump,
Activate(3,4), Start, PayCredit, Reject,Approved,Cancel, PayCash(10),
Regular, Super,StartPump, Receipt, NoReceipt, TurnOff
Coverage:Activate,Start,PayCredit,Reject,Approved,Cancel,
PayCash,Regular,Super,StartPump,NoReceipt,Receipt,TurnOff

State S6(13 ghost-transitions):
Ghost-transitions:Activate,Start,PayCredit,Reject,Approved,Cancel,
PayCash,Regular,Super,StartPump,PumpGallon,StopPump,TurnOff

Test18:Activate(3,4), Start, PayCredit, Approved, Regular, StartPump,
PumpGallon, StopPump, Activate(3,4), Start,PayCredit, Reject, Approved,
Cancel, PayCash(10),Regular, Super, StartPump, PumpGallon,
StopPump,TurnOff
Coverage:Activate,Start,PayCredit,Reject,Approved,Cancel,
PayCash,Regular,Super,StartPump,PumpGallon,StopPump,TurnOff

4. Multiple-condition
Activate(a,b)

s==-1	a>0	b>0	Test
T	T	T	Test1
T	T	F	Test19
T	F	T	Test20
T	F	F	Test21
F	T	T	Test22
F	T	F	Test23
F	F	T	Test24
F	F	F	Test25

Start()

s=0	Test
T	Test2
F	Test26

PayCredit()

s=1	Test
T	Test2
F	Test27

Reject()

s=2	Test
T	Test3
F	Test28

Approved()

s=2	Test
T	Test2
F	Test29

Cancel()

s=3	Test
T	Test3
F	Test30

w=0	Test
T	Test3
F	Test4

PayCash(c)

s=1	c>0	Test
T	T	Test3
T	F	Test31
F	T	Test32
F	F	Test33

Regular()

s=3	Test
T	Test2
F	Test34

Super()

s=3	Test
T	Test4
F	Test35

StartPump()

s=4	Test
T	Test2
F	Test36

PumpGallon()

s=5	Test
T	Test2
F	Test37

w=1	cash>price*(G+1)	w=0	Test
T	T	T	No test
T	T	F	No test
T	F	T	No test
T	F	F	Test2
F	T	T	Test3
F	T	F	No test
F	F	T	Test4
F	F	F	No test

w=0	cash<price*(G+1)	Test
T	T	Test3
T	F	No test
F	T	No test
F	F	No test

w=0	total<cash	Test
T	T	Test4
T	F	Test3
F	T	No test
F	F	No test

StopPump()

s=5	Test
T	Test2
F	Test38

w=0	total<cash	Test
T	T	Test39
T	F	Test40
F	T	No test
F	F	Test5

NoReceipt()

s=6	Test
T	Test2
F	Test41

Receipt()

s=6	Test
T	Test4
F	Test42

TurnOff()

s=0	Test
T	Test1
F	Test43

Test19: Activate(3,-4)

Test20: Activate(-3,4)

Test21: Activate(-3,-4)

Test22:Activate(3,4),Start(),Activate(3,4)

Test23:Activate(3,4),Start(),Activate(3,-4)

Test24:Activate(3,4),Start(),Activate(-3,4)

Test25:Activate(3,4),Start(),Activate(-3,-4)

Test26:Start()

Test27:Activate(3,4),PayCredit()

Test28:Activate(3,4),Reject()

Test29:Activate(3,4),Approved()

Test30:Activate(3,4),Cancel()

Test31:Activate(3,4),Start(),PayCash(0)

Test32:Activate(3,4),PayCash(5)

Test33:Activate(3,4),PayCash(0)

Test34:Activate(3,4),Regular()

Test35:Activate(3,4),Super()

Test36:Activate(3,4),StartPump()

Test37:Activate(3,4),PumpGallon()

Test38:Activate(3,4),StopPump()

Test39:Activate(3,4),Start(),PayCash(6),Super(),StartPump(),PumpGallon(),
StopPump(),Receipt(),TurnOff()

Test40:Activate(3,4),Start(),PayCash(8),Super(),StartPump(),PumpGallon(),
PumpGallon()StopPump(),Receipt(),TurnOff()

Test41:Activate(3,4),NoReceipt()

Test42:Activate(3,4),Receipt()

Test43:Activate(3,4),Start(),TurnOff()

5. Test Case and Test Result

Test1:Activate(3,4),TurnOff

    Activate(3,4)

        Expect: state = 0,   return = 1

        Output: state = 0,   return = 1

    TurnOff

        Expect: state = -2,   return = 1

        Output: state = -2,   return = 1

    Result:Success.

Test2:Activate(3,4),Start,PayCredit,Approved,Regular,StartPump,PumpGallon,stop
Pump,NoReceipt,TurnOff

Activate(3,4)

Expect: state = 0,   return = 1
Output: state = 0,   return = 1

Start

Expect: state = 1,   return = 1
Output: state = 1,   return = 1

PayCredit:

Expect: state = 2,   return = 1
Output: state = 2,   return = 1

Approved:

Expect: state = 3,   return = 1
Output: state = 3,   return = 1

Regular:

Expect: state = 4,   price=3,   return = 1
Output: state = 4,   price=3,   return = 1

StartPump:

Expect: state = 5,   G=0,   total=0,   return = 1
Output: state = 5,   G=0,   total=0,   return = 1

PumpGallon:

Expect: state = 5,   G=1,   total=3,   return = 1
Output: state = 5,   G=1,   total=3,   return = 1

StopPump:

Expect: state = 6,   G=1,   total=3,   return = 1
Output: state = 6,   G=1,   total=3,   return = 1

NoReceipt:

Expect: state = 0,   return = 1
Output: state = 0,   return = 1

TurnOff:

      Expect: state = -2,   return = 1

      Output: state = -2,   return = 1

Result:Success

Test3:Activate(3,4),Start,PayCredit,Reject,Start,PayCash(6),Regular,StartPump,PumpGallon,PumpGallon,PumpGallon,NoReceipt,Start,PayCash,Cancel,TurnOff

    Activate(3,4):

      Expect: state = 0,   return = 1

      Output: state = 0,   return = 1

    Start:

      Expect: state = 1,   return = 1

      Output: state = 1,   return = 1

    PayCredit:

      Expect: state = 2,   return = 1

      Output: state = 2,   return = 1

    Reject:

      Expect: state = 0,   return = 1

      Output: state = 0,   return = 1

    Start:

      Expect: state = 1,   return = 1

      Output: state = 1,   return = 1

    PayCash(6):

      Expect: state = 3,   cash=6,   return = 1

      Output: state = 3,   cash=6,   return = 1

    Regular:

      Expect: state = 4,   price=3,   return = 1

      Output: state = 4,   price=3,   return = 1

    StartPump:

Expect: state = 5,   G=0,   total=0,   return = 1

Output: state = 5,   G=0,   total=0,   return = 1

PumpGallon:

Expect: state = 5,   G=1,   total=3,   return = 1

Output: state = 5,   G=1,   total=3,   return = 1

PumpGallon:

Expect: state = 5,   G=2,   total=6,   return = 1

Output: state = 5,   G=2,   total=6,   return = 1

PumpGallon:

Expect: state = 6,   G=2,   total=6,   return = 1

Output: state = 6,   G=2,   total=6,   return = 1

NoReceipt:

Expect: state = 0,   return = 1

Output: state = 0,   return = 1

Start:

Expect: state = 1,   return = 1

Output: state = 1,   return = 1

PayCash(6):

Expect: state = 3,   cash=6,   return = 1

Output: state = 3,   cash=6,   return = 1

Cancel:

Expect: state = 0,   return = 1

Output: state = 0,   return = 1

TurnOff:

Expect: state = -2,   return = 1

Output: state = -2,   return = 1

Result:Success.

Test4:Activate(3,4),Start,PayCredit,Approved,Cancel,Start,PayCash(10),Super,Start Pump,PumpGallon,PumpGallon,PumpGallon,Receipt,Start,PayCredit,Reject,TurnOff

Activate(3,4):

      Expect: state = 0,   return = 1

      Output: state = 0,   return = 1

Start:

      Expect: state = 1,   return = 1

      Output: state = 1,   return = 1

PayCredit:

      Expect: state = 2,   return = 1

      Output: state = 2,   return = 1

Approved:

      Expect: state = 3,   return = 1

      Output: state = 3,   return = 1

Cancel:

      Expect: state = 0,   return = 1

      Output: state = 0,   return = 1

Start:

      Expect: state = 1,   return = 1

      Output: state = 1,   return = 1

PayCash(10):

      Expect: state = 3,   cash=10,   return = 1

      Output: state = 3,   cash=10,   return = 1

Super:

      Expect: state = 4,   price=4,   return = 1

      Output: state = 4,   price=4,   return = 1

StartPump:

      Expect: state = 5,   G=0,   total=0,   return = 1

Output: state = 5,   G=0,   total=0,   return = 1
PumpGallon:
    Expect: state = 5,   G=1,   total=4,   return = 1
    Output: state = 5,   G=1,   total=4,   return = 1
PumpGallon:
    Expect: state = 5,   G=2,   total=8,   return = 1
    Output: state = 5,   G=2,   total=8,   return = 1
PumpGallon:
    Expect: state = 6,   G=2,   total=8,   return = 1
    Output: state = 6,   G=2,   total=8,   return = 1
Receipt:
    Expect: state = 0,   return = 1
    Output: state = 0,   return = 1
Start:
    Expect: state = 1,   return = 1
    Output: state = 1,   return = 1
PayCredit:
    Expect: state = 2,   return = 1
    Output: state = 2,   return = 1
Reject:
    Expect: state = 0,   return = 1
    Output: state = 0,   return = 1
TurnOff:
    Expect: state = -2,   return = 1
    Output: state = -2,   return = 1
Result:Success.

Test5:Activate(3,4),Start,PayCredit,Approved,Super,StartPump,StopPump,Receipt,
TurnOff

Activate(3,4):

      Expect: state = 0,   return = 1

      Output: state = 0,   return = 1

Start:

      Expect: state = 1,   return = 1

      Output: state = 1,   return = 1

PayCredit:

      Expect: state = 2,   return = 1

      Output: state = 2,   return = 1

Approved:

      Expect: state = 3,   return = 1

      Output: state = 3,   return = 1

Super:

      Expect: state = 4,   price=4,   return = 1

      Output: state = 4,   price=4,   return = 1

StartPump:

      Expect: state = 5,   G=0,   total=0,   return = 1

      Output: state = 5,   G=0,   total=0,   return = 1

StopPump:

      Expect: state = 6,   G=0,   total=0,   return = 1

      Output: state = 6,   G=0,   total=0,   return = 1

Receipt:

      Expect: state = 0,   return = 1

      Output: state = 0,   return = 1

TurnOff

      Expect: state = -2,   return = 1

      Output: state = -2,   return = 1

Result:Success.

Test6:Activate(3,4),Start,PayCash(2),Super,StartPump,PumpGallon,Receipt,
TurnOff

Activate(3,4):

    Expect: state = 0,   return = 1

    Output: state = 0,   return = 1

Start:

    Expect: state = 1,   return = 1

    Output: state = 1,   return = 1

PayCash(2):

    Expect: state = 3,   cash=2,   return = 1

    Output: state = 3,   cash=2,   return = 1

Super:

    Expect: state = 4,   price=4,   return = 1

    Output: state = 4,   price=4,   return = 1

StartPump:

    Expect: state = 5,   G=0,   total=0,   return = 1

    Output: state = 5,   G=0,   total=0,   return = 1

PumpGallon:

    Expect: state = 6,   G=0,   total=0,   return = 1

    Output: state = 6,   G=0,   total=0,   return = 1

Receipt:

    Expect: state = 0,   return = 1

    Output: state = 0,   return = 1

TurnOff:

    Expect: state = -2,   return = 1

    Output: state = -2,   return = 1

Result:Success.

Test7: Activate(3,4),Activate(3,4),PayCredit(),Reject()

Activate(3,4):

      Expect: state = 0,   return = 1

      Output: state = 0,   return = 1

Activate(3,4):

      Expect: state = 0,   return = 0

      Output: state = 0,   return = 0

PayCredit:

      Expect: state = 0,   return = 0

      Output: state = 0,   return = 0

Reject:

      Expect: state = 0,   return = 0

      Output: state = 0,   return = 0

Result:Success.

Test8:Activate(3,4),PayCredit(),Approved(),Cancel()

Activate(3,4):

      Expect: state = 0,   return = 1

      Output: state = 0,   return = 1

PayCredit:

      Expect: state = 0,   return = 0

      Output: state = 0,   return = 0

Approved:

      Expect: state = 0,   return = 0

      Output: state = 0,   return = 0

Cancel:

      Expect: state = 0,   return = 0

      Output: state = 0,   return = 0

Result:Success.

Test9:Activate(3,4),PayCash(2),Regular(),StartPump(),PumpGallon(),NoReceipt()

Activate(3,4):

Expect: state = 0,   return = 1

Output: state = 0,   return = 1

PayCash(2):

Expect: state = 0,   cash=0,   return = 0

Output: state = 0,   cash=0,   return = 0

Regular:

Expect: state = 0,   price=0,   return = 0

Output: state = 0,   price=0,   return = 0

StartPump:

Expect: state = 0,   G=0,   total=0,   return = 0

Output: state = 0,   G=0,   total=0,   return = 0

PumpGallon:

Expect: state = 0,   G=0,   total=0,   return = 0

Output: state = 0,   G=0,   total=0,   return = 0

NoReceipt:

Expect: state = 0,   return = 0

Output: state = 0,   return = 0

Result:Success.

Test10:Activate(3,4),PayCredit(),Approved(),Super(),StartPump(),PumpGallon(),
StopPump(),Receipt()

Activate(3,4):

Expect: state = 0,   return = 1

Output: state = 0,   return = 1

PayCredit:

Expect: state = 0,   return = 0

Output: state = 0,   return = 0

Approved:

    Expect: state = 0,   return = 0

    Output: state = 0,   return = 0

Super:

    Expect: state = 0,   price=0,   return = 0

    Output: state = 0,   price=0,   return = 0

StartPump:

    Expect: state = 0,   G=0,   total=0,   return = 0

    Output: state = 0,   G=0,   total=0,   return = 0

PumpGallon:

    Expect: state = 0,   G=0,   total=0,   return = 0

    Output: state = 0,   G=0,   total=0,   return = 0

StopPump:

    Expect: state = 0,   G=0,   total=0,   return = 0

    Output: state = 0,   G=0,   total=0,   return = 0

Receipt:

    Expect: state = 0,   return = 0

    Output: state = 0,   return = 0

Result:Success.

Test11:Activate(3,4), Start, Activate(3,4), Start, Reject, Approved, Cancel, PayCash(0), Regular, StartPump,PumpGallon, StopPump, Receipt, TurnOff

    Activate(3,4):

        Expect: state = 0,   return = 1

        Output: state = 0,   return = 1

    Start:

        Expect: state = 1,   return = 1

        Output: state = 1,   return = 1

    Activate(3,4):

| | Expect: | state = 1, | return = 0 |
| Output: | state = 1, | return = 0 |

Start:

| | Expect: | state = 1, | return = 0 |
| Output: | state = 1, | return = 0 |

Reject:

| | Expect: | state = 1, | return = 0 |
| Output: | state = 1, | return = 0 |

Approved:

| | Expect: | state = 1, | return = 0 |
| Output: | state = 1, | return = 0 |

Cancel:

| | Expect: | state = 1, | return = 0 |
| Output: | state = 1, | return = 0 |

PayCash(0):

| | Expect: | state = 1, | cash=0, | return = 0 |
| Output: | state = 1, | cash=0, | return = 0 |

Regular:

| | Expect: | state = 1, | price=0, | return = 0 |
| Output: | state = 1, | price=0, | return = 0 |

StartPump:

| | Expect: | state = 1, | G=0, | total=0, | return = 0 |
| Output: | state = 1, | G=0, | total=0, | return = 0 |

PumpGallon:

| | Expect: | state = 1, | G=0, | total=0, | return = 0 |
| Output: | state = 1, | G=0, | total=0, | return = 0 |

StopPump:

| | Expect: | state = 1, | G=0, | total=0, | return = 0 |
| Output: | state = 1, | G=0, | total=0, | return = 0 |

Receipt:

       Expect: state = 1,   return = 0

       Output: state = 1,   return = 0

TurnOff:

       Expect: state = 1,   return = 0

       Output: state = 1,   return = 0

Result:Success.

Test12:Activate(3,4), Start, Activate(3,4),Start,PayCash(0),Super, StartPump,StopPump,Receipt

    Activate(3,4):

       Expect: state = 0,   return = 1

       Output: state = 0,   return = 1

    Start:

       Expect: state = 1,   return = 1

       Output: state = 1,   return = 1

    Activate(3,4):

       Expect: state = 1,   return = 0

       Output: state = 1,   return = 0

    Start:

       Expect: state = 1,   return = 0

       Output: state = 1,   return = 0

    PayCash(0):

       Expect: state = 1,   cash=0,   return = 0

       Output: state = 1,   cash=0,   return = 0

    Super:

       Expect: state = 1,   price=0,   return = 0

       Output: state = 1,   price=0,   return = 0

    StartPump:

	Expect:	state = 1,	G=0,	total=0,	return = 0
	Output:	state = 1,	G=0,	total=0,	return = 0

Receipt:

	Expect:	state = 1,	return = 0
	Output:	state = 1,	return = 0

Result:Success.

Test13:Activate(3,4),Start,PayCredit,Activate(3,4),Start,PayCredit,Cancel,Pay
Cash(4),Regular,StartPump,PumpGallon,StopPump,NoReceipt

Activate(3,4):

	Expect:	state = 0,	return = 1
	Output:	state = 0,	return = 1

Start:

	Expect:	state = 1,	return = 1
	Output:	state = 1,	return = 1

PayCredit:

	Expect:	state = 2,	return = 1
	Output:	state = 2,	return = 1

Activate(3,4):

	Expect:	state = 2,	return = 0
	Output:	state = 2,	return = 0

Start:

	Expect:	state = 2,	return = 0
	Output:	state = 2,	return = 0

PayCredit:

	Expect:	state = 2,	return = 0
	Output:	state = 2,	return = 0

Cancel:

	Expect:	state = 2,	return = 0

Output: state = 2,   return = 0

PayCash(4):

  Expect: state = 2, cash=0, return = 0

  Output: state = 2, cash=0, return = 0

Regular:

  Expect: state = 2, price=0, return = 0

  Output: state = 2, price=0, return = 0

StartPump:

  Expect: state = 2, G=0, total=0, return = 0

  Output: state = 2, G=0, total=0, return = 0

PumpGallon:

  Expect: state = 2, G=0, total=0, return = 0

  Output: state = 2, G=0, total=0, return = 0

StopPump:

  Expect: state = 2, G=0, total=0, return = 0

  Output: state = 2, G=0, total=0, return = 0

NoReceipt:

  Expect: state = 2, return = 0

  Output: state = 2, return = 0

Result:Success.

Test14:Activate(3,4),Start,PayCredit,Activate(3,4),Start,PayCredit,Super,StartPump
,StopPump,Receipt,TurnOff

 Activate(3,4):

  Expect: state = 0, return = 1

  Output: state = 0, return = 1

 Start:

  Expect: state = 1, return = 1

  Output: state = 1, return = 1

PayCredit:

  Expect: state = 2, return = 1

  Output: state = 2, return = 1

Activate(3,4):

  Expect: state = 2, return = 0

  Output: state = 2, return = 0

Start:

  Expect: state = 2, return = 0

  Output: state = 2, return = 0

PayCredit:

  Expect: state = 2, return = 0

  Output: state = 2, return = 0

Super:

  Expect: state = 2, return = 0

  Output: state = 2, return = 0

StartPump:

  Expect: state = 2, G=0, total=0, return = 0

  Output: state = 2, G=0, total=0, return = 0

StopPump:

  Expect: state = 2, G=0, total=0, return = 0

  Output: state = 2, G=0, total=0, return = 0

Receipt:

  Expect: state = 2, return = 0

  Output: state = 2, return = 0

TurnOff:

  Expect: state = 2, return = 0

  Output: state = 2, return = 0

Result:Success.

Test15:Activate(3,4),Start,PayCredit,Approved,Activate(3,4),Start,PayCredit,
Reject,Approved,PayCash(3),StartPump,PumpGallon,StopPump,NoReceipt,
Receipt,TurnOff

    Activate(3,4):

        Expect: state = 0,   return = 1

        Output: state = 0,   return = 1

    Start:

        Expect: state = 1,   return = 1

        Output: state = 1,   return = 1

    PayCredit:

        Expect: state = 2,   return = 1

        Output: state = 2,   return = 1

    Approved:

        Expect: state = 3,   return = 1

        Output: state = 3,   return = 1

    Activate(3,4):

        Expect: state = 3,   return = 0

        Output: state = 3,   return = 0

    Start:

        Expect: state = 3,   return = 0

        Output: state = 3,   return = 0

    PayCredit:

        Expect: state = 3,   return = 0

        Output: state = 3,   return = 0

    Reject:

        Expect: state = 3,   return = 0

        Output: state = 3,   return = 0

    Approved:

Expect: state = 3,   return = 0

Output: state = 3,   return = 0

PayCash(3):

Expect: state = 3,   cash=0,   return = 0

Output: state = 3,   cash=0,   return = 0

StartPump:

Expect: state = 3,   G=0,   total=0,   return = 0

Output: state = 3,   G=0,   total=0,   return = 0

PumpGallon:

Expect: state = 3,   G=0,   total=0,   return = 0

Output: state = 3,   G=0,   total=0,   return = 0

StopPump:

Expect: state = 3,   G=0,   total=0,   return = 0

Output: state = 3,   G=0,   total=0,   return = 0

NoReceipt:

Expect: state = 3,   return = 0

Output: state = 3,   return = 0

Receipt:

Expect: state = 3,   return = 0

Output: state = 3,   return = 0

TurnOff:

Expect: state = 3,   return = 0

Output: state = 3,   return = 0

Result:Success.

Test16:Activate(3,4), Start, PayCredit, Approved, Regular, Activate(3,4), Start, PayCredit, Reject, Approved, Cancel, PayCash(3), Regular, Super, PumpGallon, StopPump, Receipt, NoReceipt, TurnOff

Activate(3,4):

Expect:	state = 0,	return = 1	
Output:	state = 0,	return = 1	

Start:

Expect:	state = 1,	return = 1
Output:	state = 1,	return = 1

PayCredit:

Expect:	state = 2,	return = 1
Output:	state = 2,	return = 1

Approved:

Expect:	state = 3,	return = 1
Output:	state = 3,	return = 1

Regular:

Expect:	state = 4,	price=3,	return = 1
Output:	state = 4,	price=3,	return = 1

Activate(3,4):

Expect:	state = 4,	return = 0
Output:	state = 4,	return = 0

Start:

Expect:	state = 4,	return = 0
Output:	state = 4,	return = 0

PayCredit:

Expect:	state = 4,	return = 0
Output:	state = 4,	return = 0

Reject:

Expect:	state = 4,	return = 0
Output:	state = 4,	return = 0

Approved:

Expect:	state = 4,	return = 0
Output:	state = 4,	return = 0

Cancel:

      Expect: state = 4,   return = 0

      Output: state = 4,   return = 0

PayCash(3):

      Expect: state = 4,   cash=0,   return = 0

      Output: state = 4,   cash=0,   return = 0

Regular:

      Expect: state = 4,   price=3,   return = 1

      Output: state = 4,   price=3,   return = 1

Super:

      Expect: state = 4,   price=3,   return = 0

      Output: state = 4,   price=3,   return = 0

PumpGallon:

      Expect: state = 4,   G=0,   total=0,   return = 0

      Output: state = 4,   G=0,   total=0,   return = 0

StopPump:

      Expect: state = 4,   G=0,   total=0,   return = 0

      Output: state = 4,   G=0,   total=0,   return = 0

Receipt:

      Expect: state = 4,   return = 0

      Output: state = 4,   return = 0

NoReceipt:

      Expect: state = 4,   return = 0

      Output: state = 4,   return = 0

TurnOff:

      Expect: state = 4,   return = 0

      Output: state = 4,   return = 0

Result:Success.

Test17:Activate(3,4), Start, PayCredit, Approved, Regular,StartPump, Activate(3,4),
Start, PayCredit, Reject,Approved,Cancel, PayCash(10), Regular,
Super,StartPump, Receipt, NoReceipt, TurnOff

    Activate(3,4):

        Expect: state = 0,   return = 1

        Output: state = 0,   return = 1

    Start:

        Expect: state = 1,   return = 1

        Output: state = 1,   return = 1

    PayCredit:

        Expect: state = 2,   return = 1

        Output: state = 2,   return = 1

    Approved:

        Expect: state = 3,   return = 1

        Output: state = 3,   return = 1

    Regular:

        Expect: state = 4,   price=3,   return = 1

        Output: state = 4,   price=3,   return = 1

    StartPump:

        Expect: state = 5,   G=0,   total=0,   return = 1

        Output: state = 5,   G=0,   total=0,   return = 1

    Activate(3,4):

        Expect: state = 5,   return = 0

        Output: state = 5,   return = 0

    Start:

        Expect: state = 5,   return = 0

        Output: state = 5,   return = 0

    PayCredit:

        Expect: state = 5,   return = 0

Output: state = 5,   return = 0

Reject:

Expect: state = 5,   return = 0

Output: state = 5,   return = 0

Approved:

Expect: state = 5,   return = 0

Output: state = 5,   return = 0

Cancel:

Expect: state = 5,   return = 0

Output: state = 5,   return = 0

PayCash(3):

Expect: state = 5,   cash=0,   return = 0

Output: state = 5,   cash=0,   return = 0

Regular:

Expect: state = 5,   price=3,   return = 1

Output: state = 5,   price=3,   return = 1

Super:

Expect: state = 5,   price=3,   return = 0

Output: state = 5,   price=3,   return = 0

StartPump:

Expect: state = 5,   G=0,   total=0,   return = 0

Output: state = 5,   G=0,   total=0,   return = 0

Receipt:

Expect: state = 5,   return = 0

Output: state = 5,   return = 0

NoReceipt:

Expect: state = 5,   return = 0

Output: state = 5,   return = 0

TurnOff:

Expect: state = 5,   return = 0

Output: state = 5,   return = 0

Result:Success.

Test18:Activate(3,4), Start, PayCredit, Approved, Regular, StartPump, PumpGallon, StopPump, Activate(3,4), Start,PayCredit, Reject, Approved, Cancel, PayCash(10),Regular, Super, StartPump, PumpGallon, StopPump,TurnOff

    Activate(3,4):

        Expect: state = 0,   return = 1

        Output: state = 0,   return = 1

    Start:

        Expect: state = 1,   return = 1

        Output: state = 1,   return = 1

    PayCredit:

        Expect: state = 2,   return = 1

        Output: state = 2,   return = 1

    Approved:

        Expect: state = 3,   return = 1

        Output: state = 3,   return = 1

    Regular:

        Expect: state = 4,   price=3,   return = 1

        Output: state = 4,   price=3,   return = 1

    StartPump:

        Expect: state = 5,   G=0,   total=0,   return = 1

        Output: state = 5,   G=0,   total=0,   return = 1

    PumpGallon:

        Expect: state = 5,   G=1,   total=3,   return = 1

        Output: state = 5,   G=1,   total=3,   return = 1

    StopPump:

Expect: state = 6,   G=1,   total=3,   return = 1

Output: state = 6,   G=1,   total=3,   return = 1

Activate(3,4):

     Expect: state = 6,   return = 0

     Output: state = 6,   return = 0

Start:

     Expect: state = 6,   return = 0

     Output: state = 6,   return = 0

PayCredit:

     Expect: state = 6,   return = 0

     Output: state = 6,   return = 0

Reject:

     Expect: state = 6,   return = 0

     Output: state = 6,   return = 0

Approved:

     Expect: state = 6,   return = 0

     Output: state = 6,   return = 0

Cancel:

     Expect: state = 6,   return = 0

     Output: state = 6,   return = 0

PayCash(10):

     Expect: state = 6,   cash=0,   return = 0

     Output: state = 6,   cash=0,   return = 0

Regular:

     Expect: state = 6,   price=3,   return = 0

     Output: state = 6,   price=3,   return = 0

Super:

     Expect: state = 6,   price=3,   return = 0

     Output: state = 6,   price=3,   return = 0

StartPump:

        Expect: state = 6,   G=1,   total=3,   return = 0

        Output: state = 6,   G=1,   total=3,   return = 0

PumpGallon:

        Expect: state = 6,   G=1,   total=3,   return = 0

        Output: state = 6,   G=1,   total=3,   return = 0

StopPump:

        Expect: state = 6,   G=1,   total=3,   return = 0

        Output: state = 6,   G=1,   total=3,   return = 0

TurnOff:

        Expect: state = 6,   return = 0

        Output: state = 6,   return = 0

Result:Success.

Test19: Activate(3,-4)

    Activate(3,-4):

        Expect: state = -1, return = 0

        Output: state = -1, return = 0

    Result:Success.

Test20: Activate(-3,4)

    Activate(-3,4):

        Expect: state = -1, return = 0

        Output: state = -1, return = 0

    Result:Success.

Test21: Activate(-3,-4)

    Activate(-3,-4):

        Expect: state = -1, return = 0

Output: state = -1,   return = 0

Result:Success.

Test22:Activate(3,4),Start(),Activate(3,4)

    Activate(3,4):

        Expect: state = 0,   return = 1

        Output: state = 0,   return = 1

    Start:

        Expect: state = 1,   return = 1

        Output: state = 1,   return = 1

    Activate(3,4):

        Expect: state = 1,   return = 0

        Output: state = 1,   return = 0

    Result:Success.

Test23:Activate(3,4),Start(),Activate(3,-4)

    Activate(3,4):

        Expect: state = 0,   return = 1

        Output: state = 0,   return = 1

    Start:

        Expect: state = 1,   return = 1

        Output: state = 1,   return = 1

    Activate(3,-4):

        Expect: state = 1,   return = 0

        Output: state = 1,   return = 0

    Result:Success.

Test24:Activate(3,4),Start(),Activate(-3,4)

    Activate(3,4):

Expect: state = 0,   return = 1

Output: state = 0,   return = 1

Start:

Expect: state = 1,   return = 1

Output: state = 1,   return = 1

Activate(-3,4):

Expect: state = 1,   return = 0

Output: state = 1,   return = 0

Result:Success.

Test25:Activate(3,4),Start(),Activate(-3,-4)

Activate(3,4):

Expect: state = 0,   return = 1

Output: state = 0,   return = 1

Start:

Expect: state = 1,   return = 1

Output: state = 1,   return = 1

Activate(-3,-4):

Expect: state = 1,   return = 0

Output: state = 1,   return = 0

Result:Success.

Test26:Start()

Start:

Expect: state = -1,   return = 0

Output: state = -1,   return = 0

Result:Success.

Test27:Activate(3,4),PayCredit()

Activate(3,4):

      Expect: state = 0,   return = 1

      Output: state = 0,   return = 1

PayCredit:

      Expect: state = 0,   return = 0

      Output: state = 0,   return = 0

Result:Success.

Test28:Activate(3,4),Reject()

    Activate(3,4):

      Expect: state = 0,   return = 1

      Output: state = 0,   return = 1

    Reject:

      Expect: state = 0,   return = 0

      Output: state = 0,   return = 0

    Result:Success.

Test29:Activate(3,4),Approved()

    Activate(3,4):

      Expect: state = 0,   return = 1

      Output: state = 0,   return = 1

    Approved:

      Expect: state = 0,   return = 0

      Output: state = 0,   return = 0

    Result:Success.

Test30:Activate(3,4),Cancel()

    Activate(3,4):

      Expect: state = 0,   return = 1

Output: state = 0,   return = 1

Cancel:

    Expect: state = 0,   return = 0

    Output: state = 0,   return = 0

Result:Success.

Test31:Activate(3,4),Start(),PayCash(0)

Activate(3,4):

    Expect: state = 0,   return = 1

    Output: state = 0,   return = 1

Start:

    Expect: state = 1,   return = 1

    Output: state = 1,   return = 1

PayCash(0):

    Expect: state = 1,   cash=0,   return = 0

    Output: state = 1,   cash=0,   return = 0

Result:Success.

Test32:Activate(3,4),PayCash(5)

Activate(3,4):

    Expect: state = 0,   return = 1

    Output: state = 0,   return = 1

PayCash(5):

    Expect: state = 0,   cash=0,   return = 0

    Output: state = 0,   cash=0,   return = 0

Result:Success.

Test33:Activate(3,4),PayCash(0)

Activate(3,4):

Expect: state = 0,   return = 1

Output: state = 0,   return = 1

PayCash(5):

Expect: state = 0,   cash=0,   return = 0

Output: state = 0,   cash=0,   return = 0

Result:Success.

Test34:Activate(3,4),Regular()

Activate(3,4):

Expect: state = 0,   return = 1

Output: state = 0,   return = 1

Regular:

Expect: state = 0,   price=0,   return = 0

Output: state = 0,   price=0,   return = 0

Result:Success.

Test35:Activate(3,4),Super()

Activate(3,4):

Expect: state = 0,   return = 1

Output: state = 0,   return = 1

Super:

Expect: state = 0,   price=0,   return = 0

Output: state = 0,   price=0,   return = 0

Result:Success.

Test36:Activate(3,4),StartPump()

Activate(3,4):

Expect: state = 0,   return = 1

Output: state = 0,   return = 1

StartPump:

      Expect: state = 0,   G=0,   total=0,   return = 0

      Output: state = 0,   G=0,   total=0,   return = 0

Result:Success.

Test37:Activate(3,4),PumpGallon()

    Activate(3,4):

      Expect: state = 0,   return = 1

      Output: state = 0,   return = 1

    PumpGallon:

      Expect: state = 0,   G=0,   total=0,   return = 0

      Output: state = 0,   G=0,   total=0,   return = 0

Result:Success.

Test38:Activate(3,4),StopPump()

    Activate(3,4):

      Expect: state = 0,   return = 1

      Output: state = 0,   return = 1

    StopPump:

      Expect: state = 0,   G=0,   total=0,   return = 0

      Output: state = 0,   G=0,   total=0,   return = 0

Result:Success.

Test39:Activate(3,4),Start(),PayCash(6),Super(),StartPump(),PumpGallon(),
StopPump(),Receipt(),TurnOff()

    Activate(3,4):

      Expect: state = 0,   return = 1

      Output: state = 0,   return = 1

    Start:

Expect: state = 1, return = 1

Output: state = 1, return = 1

PayCash(6):

Expect: state = 3, cash=6, return = 1

Output: state = 3, cash=6, return = 1

Super:

Expect: state = 4, price=4, return = 1

Output: state = 4, price=4, return = 1

StartPump:

Expect: state = 5, G=0, total=0, return = 1

Output: state = 5, G=0, total=0, return = 1

PumpGallon:

Expect: state = 5, G=1, total=4, return = 1

Output: state = 5, G=1, total=4, return = 1

StopPump:

Expect: state = 6, G=1, total=4, return = 1

Output: state = 6, G=1, total=4, return = 1

Receipt:

Expect: state = 0, return = 1

Output: state = 0, return = 1

TurnOff:

Expect: state = -2, return = 1

Output: state = -2, return = 1

Result:Success.

Test40:Activate(3,4),Start(),PayCash(8),Super(),StartPump(),PumpGallon(),
PumpGallon(),StopPump(),Receipt(),TurnOff()

Activate(3,4):

Expect: state = 0, return = 1

Output: state = 0,   return = 1

Start:

     Expect: state = 1,   return = 1

     Output: state = 1,   return = 1

PayCash(8):

     Expect: state = 3,   cash=8,   return = 1

     Output: state = 3,   cash=8,   return = 1

Super:

     Expect: state = 4,   price=4,   return = 1

     Output: state = 4,   price=4,   return = 1

StartPump:

     Expect: state = 5,   G=0,   total=0,   return = 1

     Output: state = 5,   G=0,   total=0,   return = 1

PumpGallon:

     Expect: state = 5,   G=1,   total=4,   return = 1

     Output: state = 5,   G=1,   total=4,   return = 1

PumpGallon:

     Expect: state = 5,   G=2,   total=8,   return = 1

     Output: state = 5,   G=2,   total=8,   return = 1

StopPump:

     Expect: state = 6,   G=2,   total=8,   return = 1

     Output: state = 6,   G=2,   total=8,   return = 1

Receipt:

     Expect: state = 0,   return = 1

     Output: state = 0,   return = 1

TurnOff:

     Expect: state = -2,   return = 1

     Output: state = -2,   return = 1

Result:Success.

Test41:Activate(3,4),NoReceipt()

    Activate(3,4):

        Expect: state = 0,   return = 1

        Output: state = 0,   return = 1

    NoReceipt:

        Expect: state = 0,   return = 0

        Output: state = 0,   return = 0

    Result:Success.

Test42:Activate(3,4),Receipt()

    Activate(3,4):

        Expect: state = 0,   return = 1

        Output: state = 0,   return = 1

    Receipt:

        Expect: state = 0,   return = 0

        Output: state = 0,   return = 0

    Result:Success.

Test43:Activate(3,4),Start(),TurnOff()

    Activate(3,4):

        Expect: state = 0,   return = 1

        Output: state = 0,   return = 1

    Start:

        Expect: state = 1,   return = 1

        Output: state = 1,   return = 1

    TurnOff:

        Expect: state = 1,   return = 0

        Output: state = 1,   return = 0

Result:Success.

6. Conclusion

In this project, I have well practiced by combining the knowledge I studied in class and actual problems. In real problem, we may take more time to analysis the problem and find out the optimum test cases. There may be some status or paths that we cannot test, which is non-executable.

In this project, we should find some defects by myself. But for some reason, one may not able to find out all defects. And I also find that by providing test case, we should build a test driver that we can use test driver to execute our test code and cases. There will be a defect if we find the output and status are different from what we expected.

In all, this project gives me a lot of practice and I have learned a lot by finishing this project.