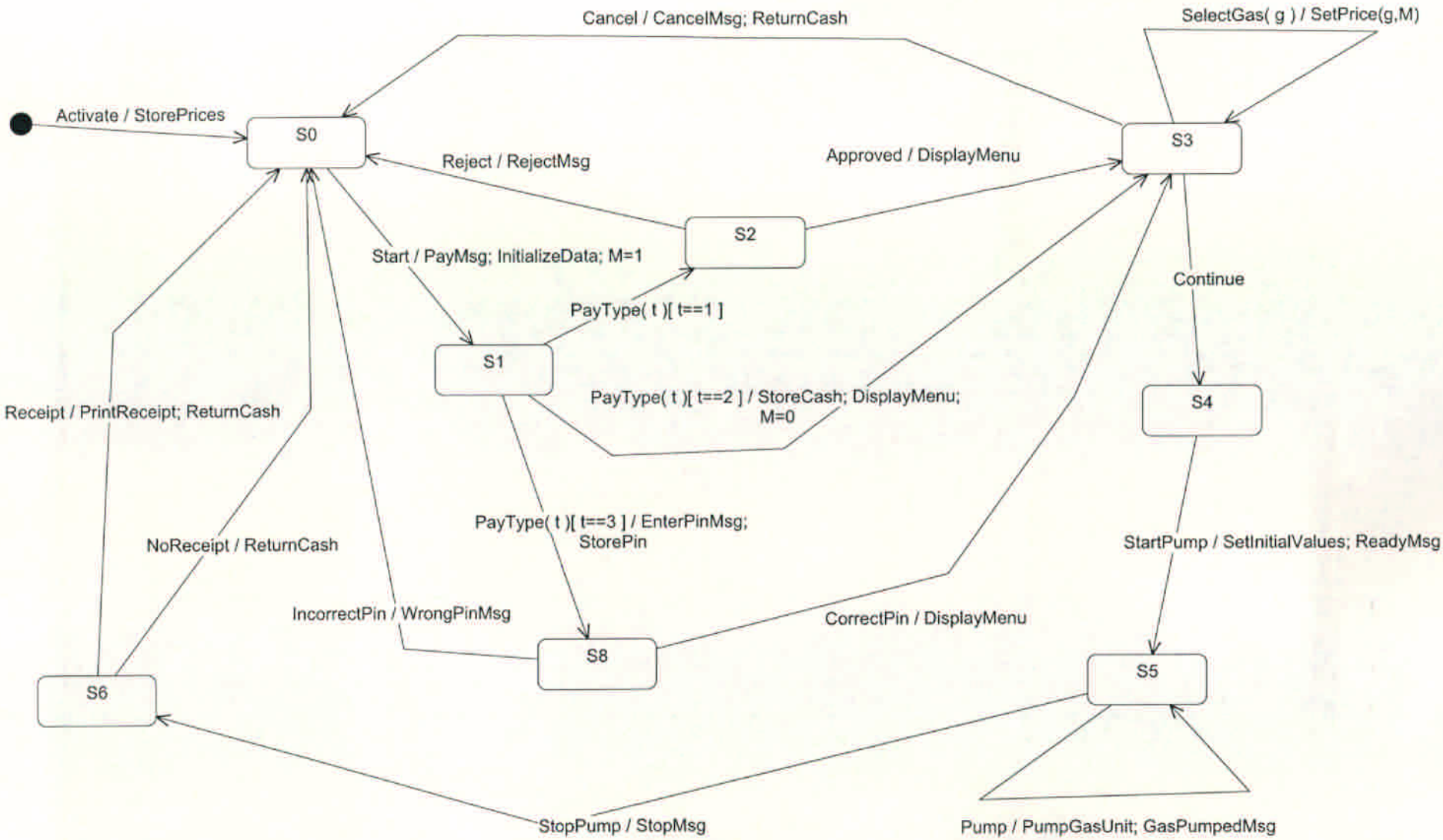
MDA-EFSM Events:

Activate()
Start()
PayType(int t) //credit: t=1; cash: t=2; debit: t=3
Reject()
Cancel()
Approved()
StartPump()
Pump()
StopPump()
SelectGas(int g) // Regular: g=1; Super: g=2; Premium: g=3; Diesel: g=4
Receipt()
NoReceipt()
CorrectPin()
IncorrectPin()
Continue()

MDA-EFSM Actions:

StorePrices	// stores price(s) for the gas from the temporary data store
PayMsg	// displays a type of payment method
StoreCash	// stores cash from the temporary data store
DisplayMenu	// display a menu with a list of selections
RejectMsg	// displays credit card not approved message
SetPrice(int g, int M)	// set the price for the gas identified by *g* identifier as in SelectGas(int g); if M=1, the price may be increased
ReadyMsg	// displays the ready for pumping message
SetInitialValues	// set *G* (or *L*) and *total* to 0;
PumpGasUnit	// disposes unit of gas and counts # of units disposed
GasPumpedMsg	// displays the amount of disposed gas
StopMsg	// stop pump message and receipt? msg (optionally)
PrintReceipt	// print a receipt
CancelMsg	// displays a cancellation message
ReturnCash	// returns the remaining cash
WrongPinMsg	// displays incorrect pin message
StorePin	// stores the pin from the temporary data store
EnterPinMsg	// displays a message to enter pin
InitializeData	// set the value of price and cash to 0



MDA-EFSM for Gas Pumps

Operations of the Input Processor (GasPump-1)

```
Activate(float a, float b) {
        if ((a>0)&&(b>0)) {
            d->temp_a=a;
            d->temp_b=b;
            m->Activate()
        }
}

Start() {
        m->Start();
}

PayCredit() {
        m->PayType(1);
}

Reject() {
        m->Reject();
}

PayDebit(string p) {
        d->temp_p=p;
        m->PayType(3);
}

Pin(string x) {
        if (d->pin==x) m->CorrectPin()
        else m->InCorrectPin();
}

Cancel() {
        m->Cancel();
}

Approved() {
        m->Approved();
}

Diesel() {
        m->SelectGas(4)
}

Regular() {
        m->SelectGas(1)
}

StartPump() {
        if (d->price>0) {
            m->Continue();
            m->StartPump();
        }
}

PumpGallon() {
        m->Pump();

StopPump() {
        m->StopPump();
        m->Receipt();
}

FullTank() {
        m->StopPump();
        m->Receipt();
}
```

Notice:
m: is a pointer to the MDA-EFSM object
d: is a pointer to the Data Store object

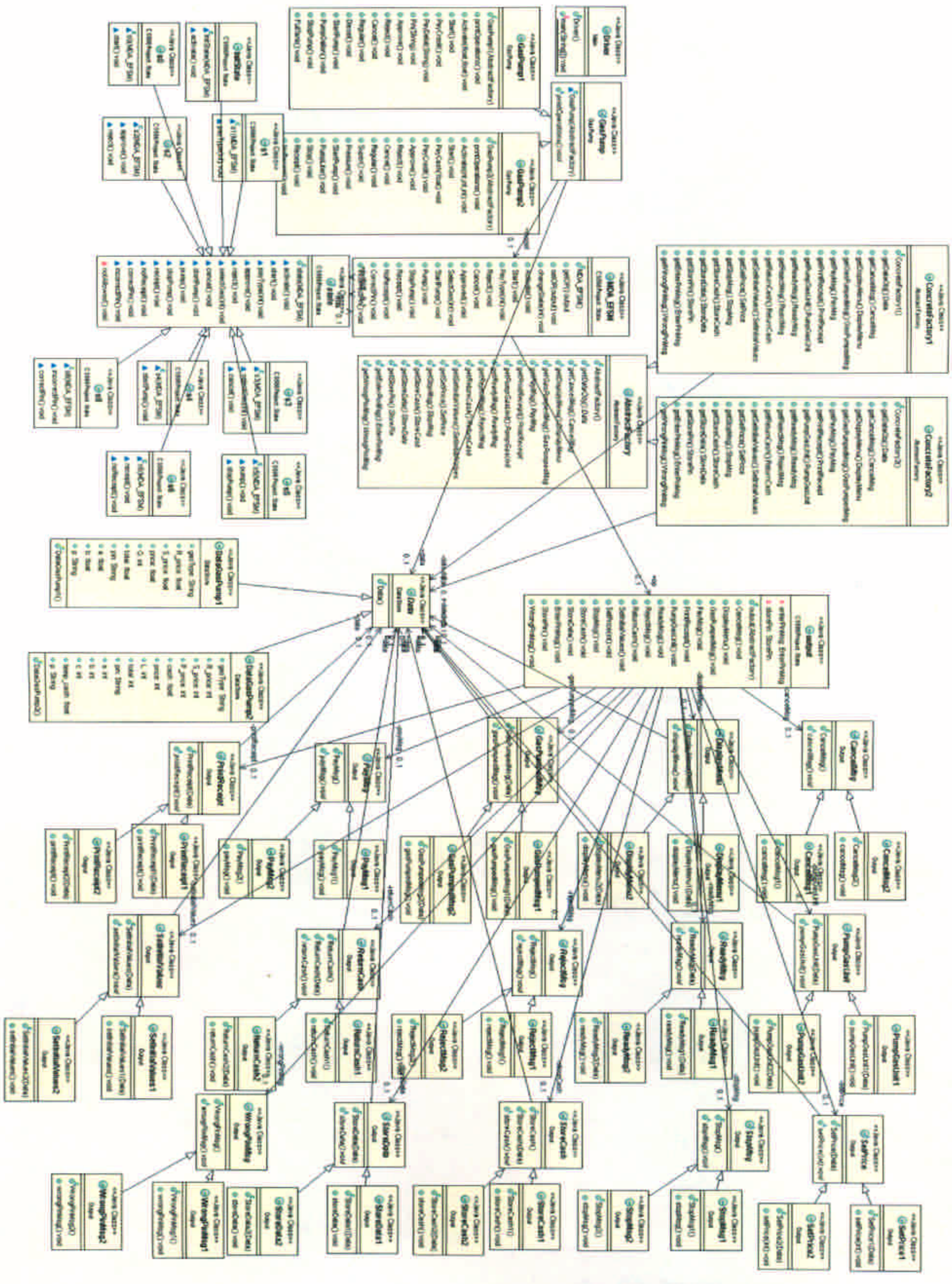
Operations of the Input Processor (GasPump-2)

```
Activate(int a, int b, int c) {
        if ((a>0)&&(b>0)&&(c>0)) {
            d->temp_a=a;
            d->temp_b=b;
            d->temp_c=c
            m->Activate()
        }
}

PayCash(float c) {
        if (c>0) {
            d->temp_cash=c;
            m->start();
            m->PayType(2)
        }
}

PayCredit() {
        m->start();
        m->PayType(1);
}

Reject() {
        m->Reject();
}

Approved() {
        m-> Approved();
}
Cancel() {
        m->Cancel();
}

Super() {
        m->SelectGas(2);
        m->Continue();
}

Premium() {
        m->SelectGas(3);
        m->Continue();
}

Regular() {
        m->SelectGas(1);
        m->Continue();
}

StartPump() {
        m->StartPump();
}

PumpLiter() {
if (d->cash>0)&&(d->cash < d->price*(d->L+1))
            m->StopPump();
else m->Pump()
}

Stop() {
        m->StopPump();
}

Receipt() {
        m->Receipt();
}

NoReceipt() {
        m->NoReceipt();
}
```

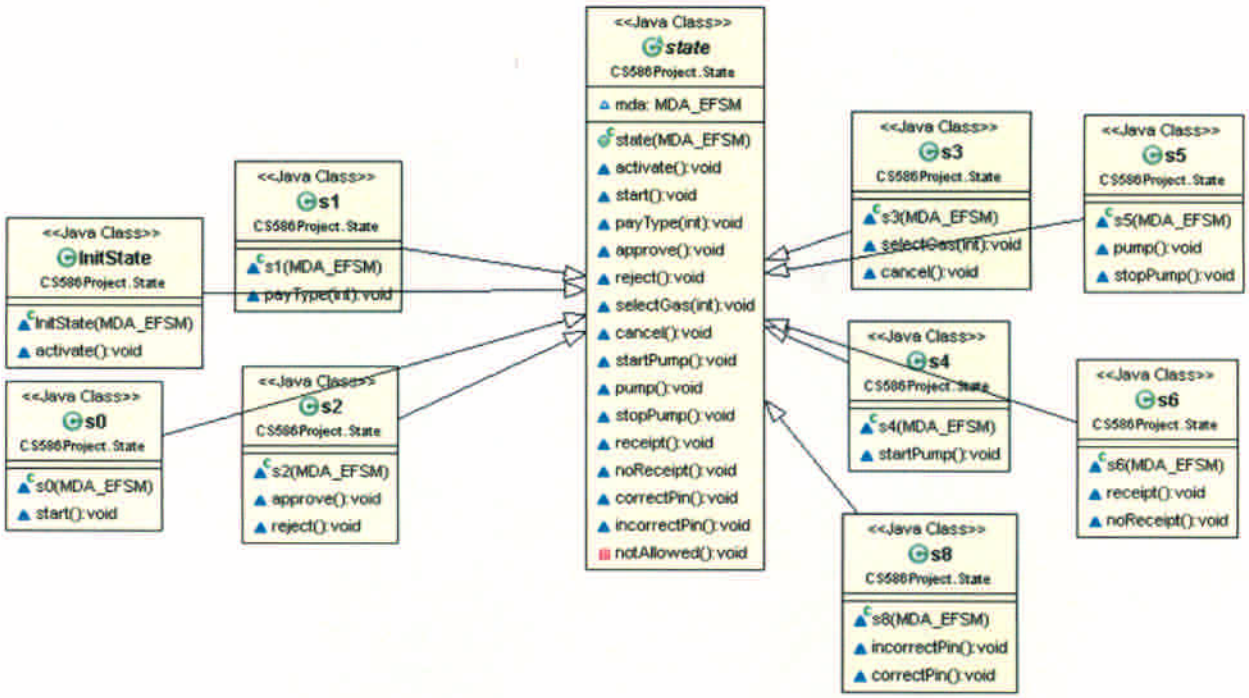
Notice:
cash: contains the value of cash deposited
price: contains the price of the selected gas
L: contains the number of liters already pumped

cash , *L*, *price* are in the data store
m: is a pointer to the MDA-EFSM object
d: is a pointer to the Data Store object

Class Diagram



State Pattern



De-centralized state pattern

State is an abstract state superclass

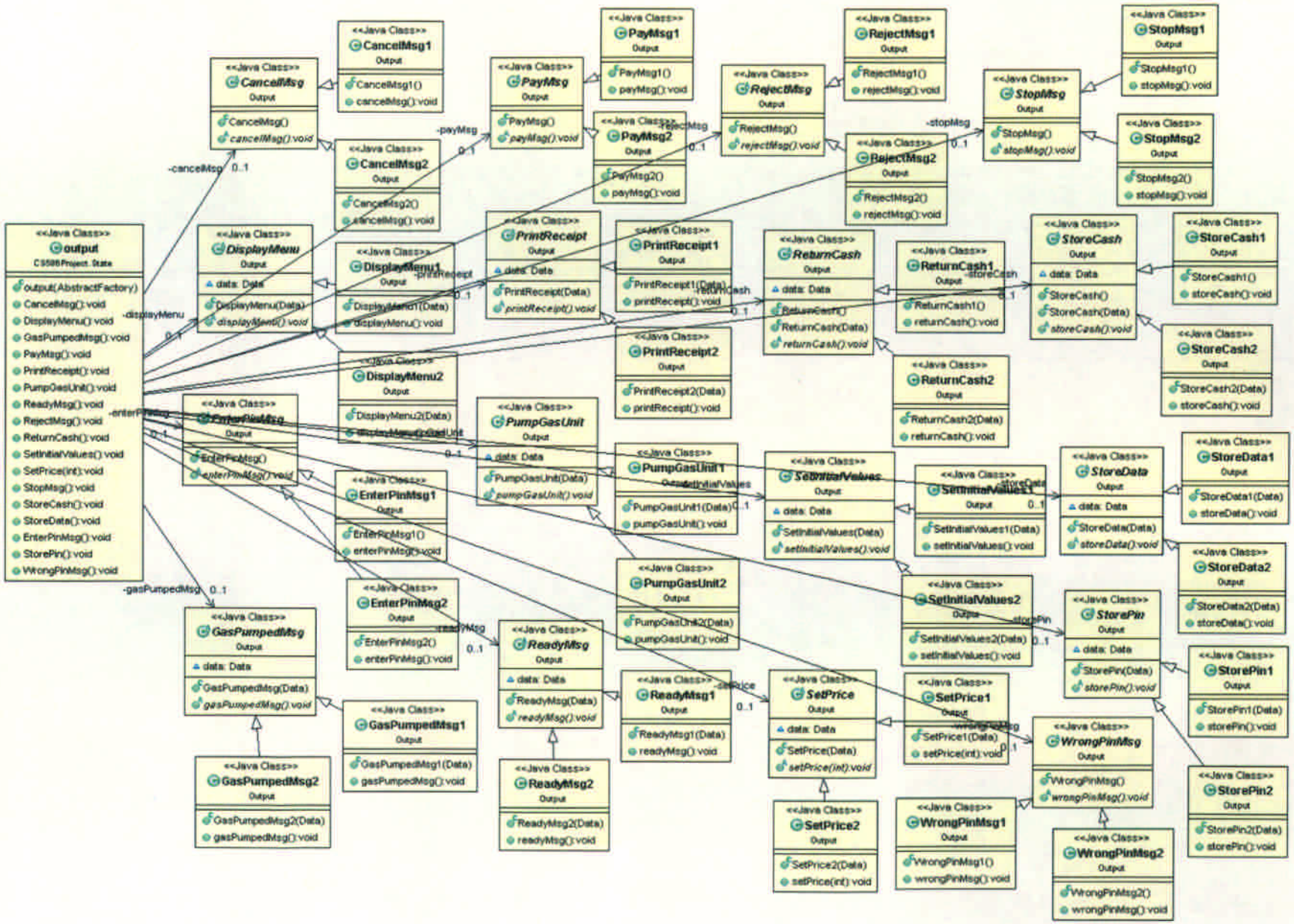
InitState, s0, s1, s2, s3, s4, s5, s6, s8 are the state subclasses

State classes are responsible for performing both actions and state transitions

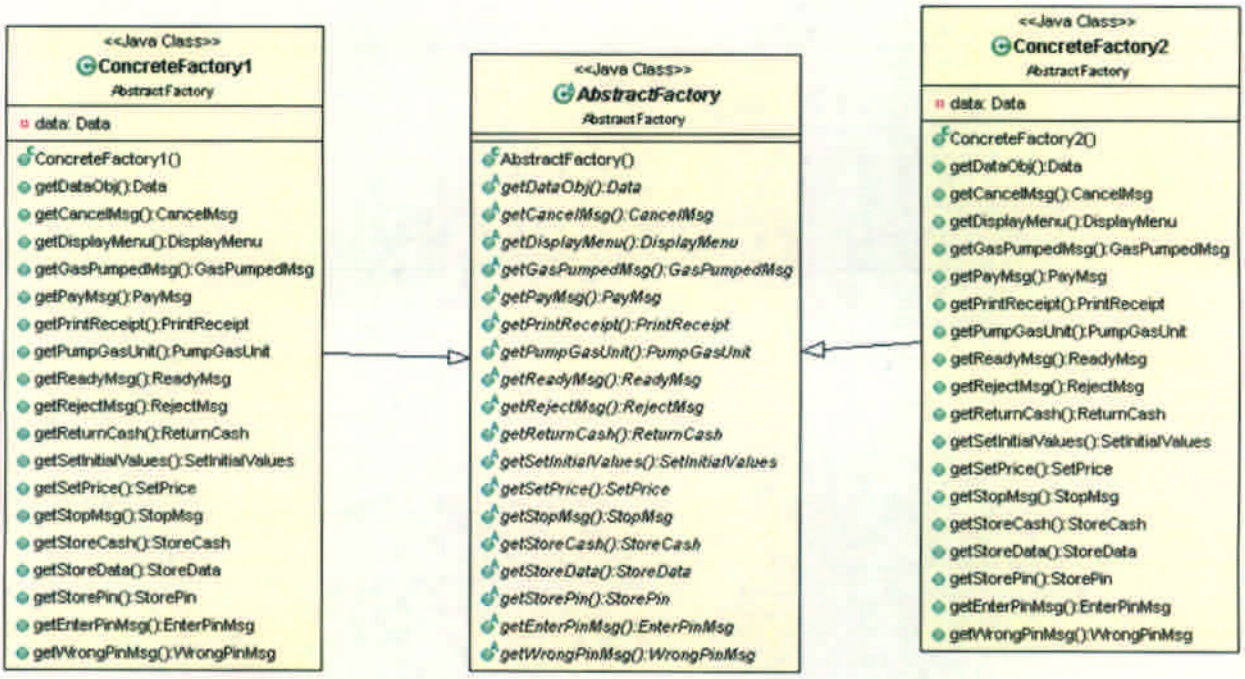
Strategy Pattern

Output is the client class that needs to be initialized with proper action strategies

One class is the abstract strategy that groups different implementations of a specific strategy


output
CancelMsg
CancelMsg1
CancelMsg2
PayMsg
PayMsg1
PayMsg2
RejectMsg
RejectMsg1
RejectMsg2
StopMsg
StopMsg1
StopMsg2
DisplayMenu
DisplayMenu1
DisplayMenu2
PrintReceipt
PrintReceipt1
PrintReceipt2
ReturnCash
ReturnCash1
ReturnCash2
StoreCash
StoreCash1
StoreCash2
EnterPinMsg
EnterPinMsg1
EnterPinMsg2
PumpGasUnit
PumpGasUnit1
PumpGasUnit2
SetInitialValues
SetInitialValues1
SetInitialValues2
StoreData
StoreData1
StoreData2
GasPumpedMsg
GasPumpedMsg1
GasPumpedMsg2
ReadyMsg
ReadyMsg1
ReadyMsg2
SetPrice
SetPrice1
SetPrice2
WrongPinMsg
WrongPinMsg1
WrongPinMsg2
StorePin
StorePin1
StorePin2

Abstract Factory Pattern



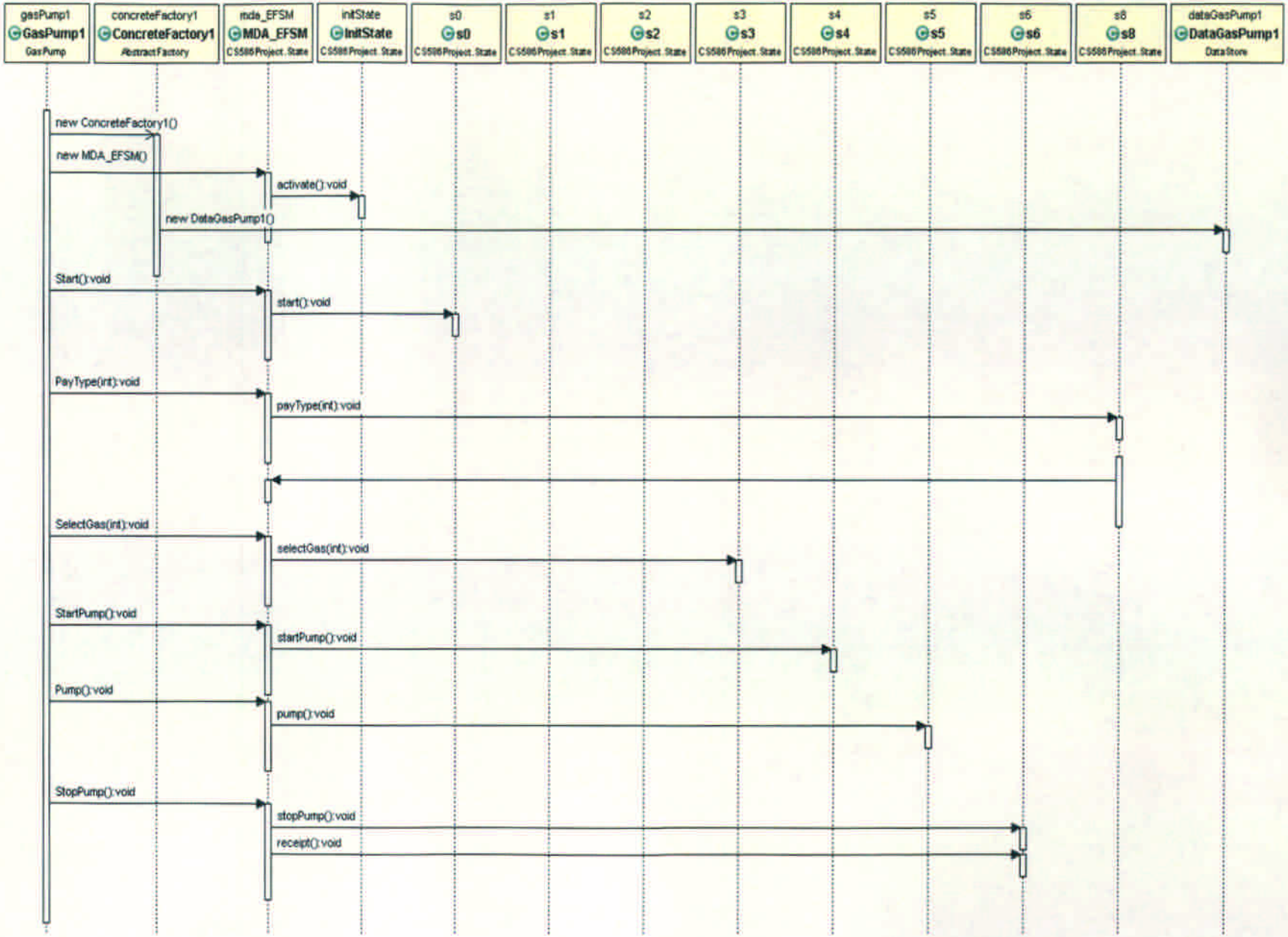
AbstractFactory is the abstract superclass

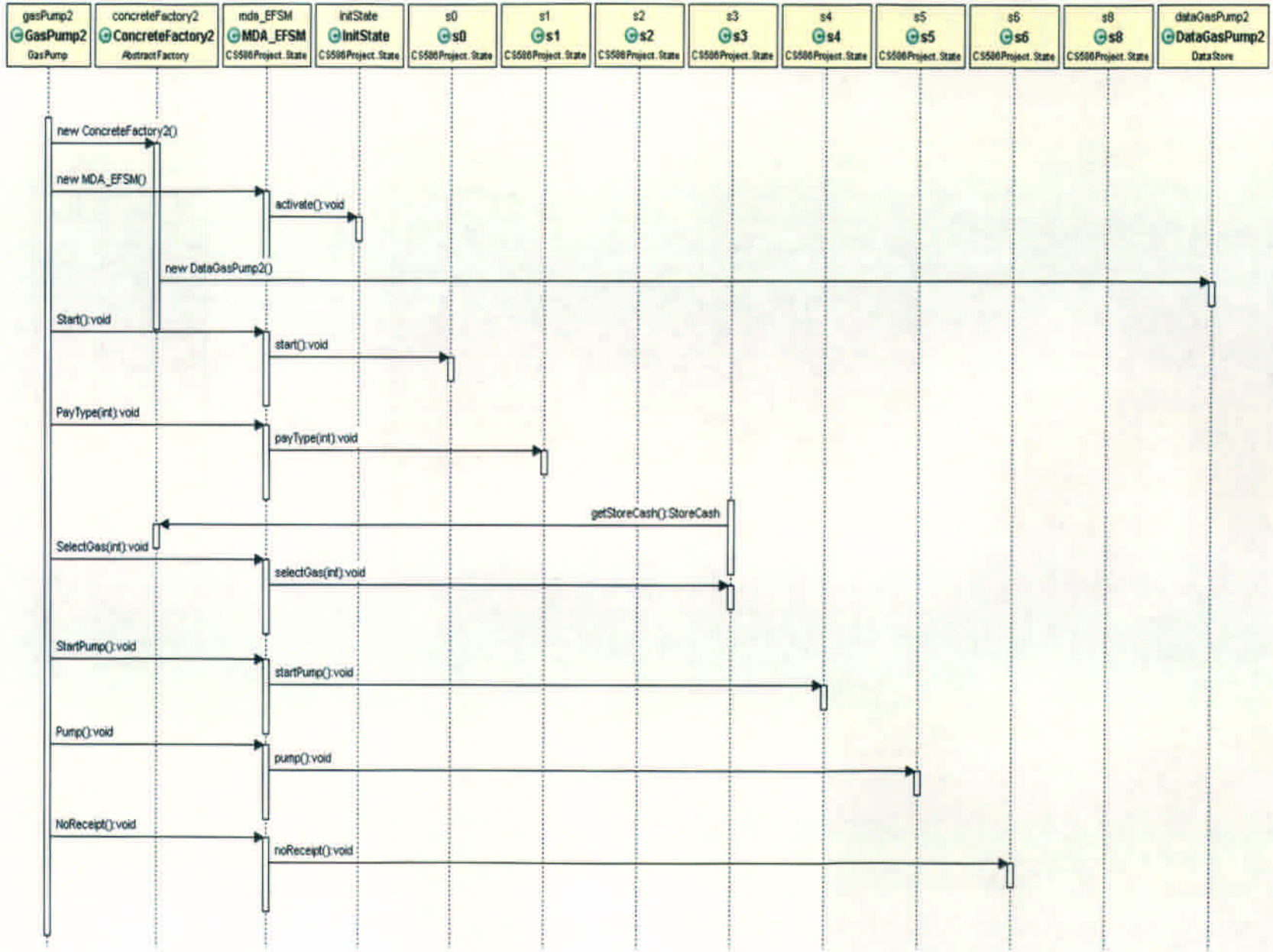
ConcreteFactory1 is the factory that returns the necessary driver objects for GasPump1

ConcreteFactory2 is the factory that returns the necessary driver objects for GasPump2

Sequence diagrams

Scenario 1


gasPump1
GasPump1
GasPump
concreteFactory1
ConcreteFactory1
AbstractFactory
mda_EFSM
MDA_EFSM
CS586Project.State
initState
InitState
CS586Project.State
s0
s0
CS586Project.State
s1
s1
CS586Project.State
s2
s2
CS586Project.State
s3
s3
CS586Project.State
s4
s4
CS586Project.State
s5
s5
CS586Project.State
s6
s6
CS586Project.State
s8
s8
CS586Project.State
dataGasPump1
DataGasPump1
DataStore
new ConcreteFactory1()
new MDA_EFSM()
activate():void
new DataGasPump1()
Start():void
start():void
PayType(int):void
payType(int):void
SelectGas(int):void
selectGas(int):void
StartPump():void
startPump():void
Pump():void
pump():void
StopPump():void
stopPump():void
receipt():void


gasPump2
GasPump2
GasPump
concreteFactory2
ConcreteFactory2
AbstractFactory
mda_EFSM
MDA_EFSM
CS586Project.State
initState
InitState
CS586Project.State
s0
s0
CS586Project.State
s1
s1
CS586Project.State
s2
s2
CS586Project.State
s3
s3
CS586Project.State
s4
s4
CS586Project.State
s5
s5
CS586Project.State
s6
s6
CS586Project.State
s8
s8
CS586Project.State
dataGasPump2
DataGasPump2
DataStore
new ConcreteFactory2()
new MDA_EFSM()
activate():void
new DataGasPump2()
Start():void
start():void
PayType(int):void
payType(int):void
getStoreCash():StoreCash
SelectGas(int):void
selectGas(int):void
StartPump():void
startPump():void
Pump():void
pump():void
NoReceipt():void
noReceipt():void

Scenario 2