

CS586 PROJECT – General Description

CS 586; Fall 2025

Deadlines:

Part #1: MDA-EFSM (5 points): Friday, November 7, 2025

Late submissions: 50% off

After **November 11**, the MDA-EFSM will not be accepted.

This is an **individual** project, not a team project.

Submission: The MDA-EFSM assignment must be submitted on Canvas. Your submission should be a **single PDF file** (otherwise, a 10% penalty will be applied). The hardcopy submissions will not be accepted.

The detailed description of Part #2 of the project will be posted later.

Goal:

The goal of this project is to design two different gas pump components using the Model-Driven Architecture (MDA) and then implement these gas pump components based on this design using an object-oriented programming language.

Description of the Project:

There are two gas pump components: *GP-1* and *GP-2*.

The gas pump **GP-1** component supports the following operations:

Activate (float a)	// the gas pump is activated, where <i>a</i> is the price of the gas per liter
Start()	//start the transaction
Cancel()	// cancel the transaction
Approved()	// credit card is approved
StartPump()	// start pumping gas
PumpLiter()	// one liter of gas is dispensed
PayCredit()	// pay for gas by a credit card
Reject()	// credit card is rejected
PayCash(float c)	// pay for gas by cash, where <i>c</i> represents prepaid cash
StopPump()	// stop pumping gas

The gas pump **GP-2** component supports the following operations:

Activate (int a, int b)	// the gas pump is activated, where <i>a</i> is the price of the Regular gas // <i>b</i> is the price of Diesel gas per gallon
Start()	//start the transaction
PayCredit()	// pay for gas by a credit card
Reject()	// credit card is rejected
Approved()	// credit card is approved
Diesel()	// Diesel gas is selected
Regular()	// Regular gas is selected
StartPump()	// start pumping gas
PayDebit(int p)	// pay for gas by a debit card, where <i>p</i> is a pin #
Pin(int x)	// pin # is provided, where <i>x</i> represents the pin #
Cancel()	// cancel the transaction
PumpGallon()	// one gallon of gas is dispensed
StopPump()	// stop pumping gas
FullTank()	// Tank is full and the pump is stopped

Both gas pump components are state-based and are used to control simple gas pumps. Users can pay by cash, a credit card, or a debit card. The gas pump may dispense different types of gasoline. The price of the gasoline is provided when the gas pump is activated. The detailed behavior of gas pump components is specified using EFSM. The EFSM of Figure 1 shows the detailed behavior of gas pump *GP-1*, and the EFSM of Figure 2 shows the detailed behavior of gas pump *GP-2*. Notice that there are several differences between gas pump components.

Aspects that vary between two gas pump components:

- a. Types of gasoline pumped
- b. Types of payment
- c. Display menu(s)
- d. Messages
- e. Receipts
- f. Operation names and signatures
- g. Data types
- h. etc.

The goal of this project is to design two gas pump components using the Model-Driven Architecture (MDA) covered in the course. In the first part of the project, you should design an executable meta-model, referred to as MDA-EFSM, for gas pump components. This MDA-EFSM should capture the “generic behavior” of both gas pump components and should be decoupled from data and implementation details. Notice that in your design, there should be **ONLY** one MDA-EFSM for both gas pump components. The meta-model (MDA-EFSM) used in the Model-Driven architecture should be expressed as an EFSM (Extended Finite State Machine) model. Notice that the EFSMs shown in Figure 1 and Figure 2 are **not acceptable** as a meta-model (MDA-EFSM) for this model-driven architecture.

SUBMISSIONS & DEADLINES

Part I: MDA-EFSM

MDA-EFSM model report for the gas pump components should contain:

- A class diagram
- A list of meta events for the MDA-EFSM
- A list of meta actions for the MDA-EFSM, where the responsibility of each action must be described
- A state diagram/model of the MDA-EFSM
- Pseudo-code of all operations of the Input Processors of *GP-1* and *GP-2*

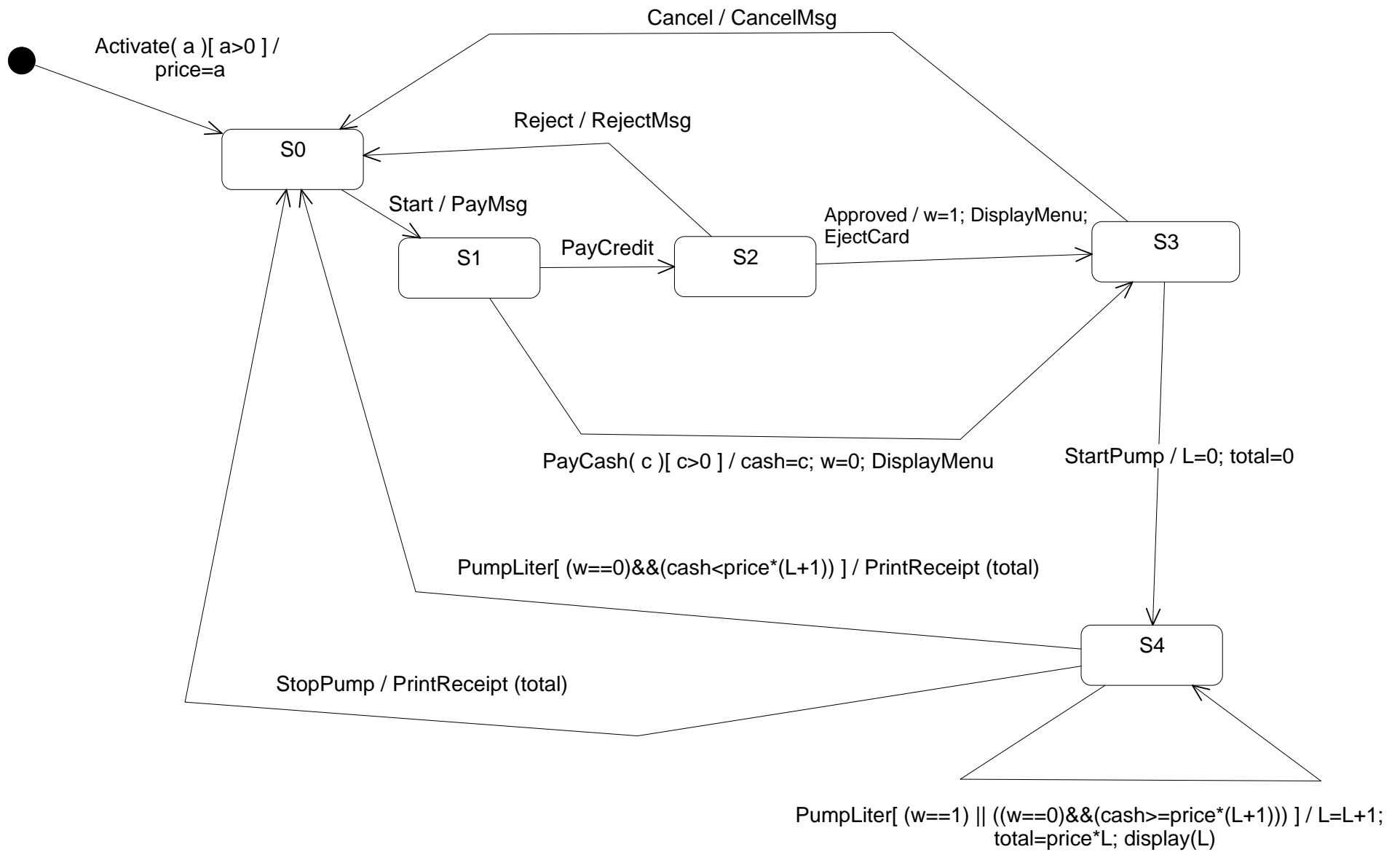


Figure 1: EFSM for gas pump GP-1

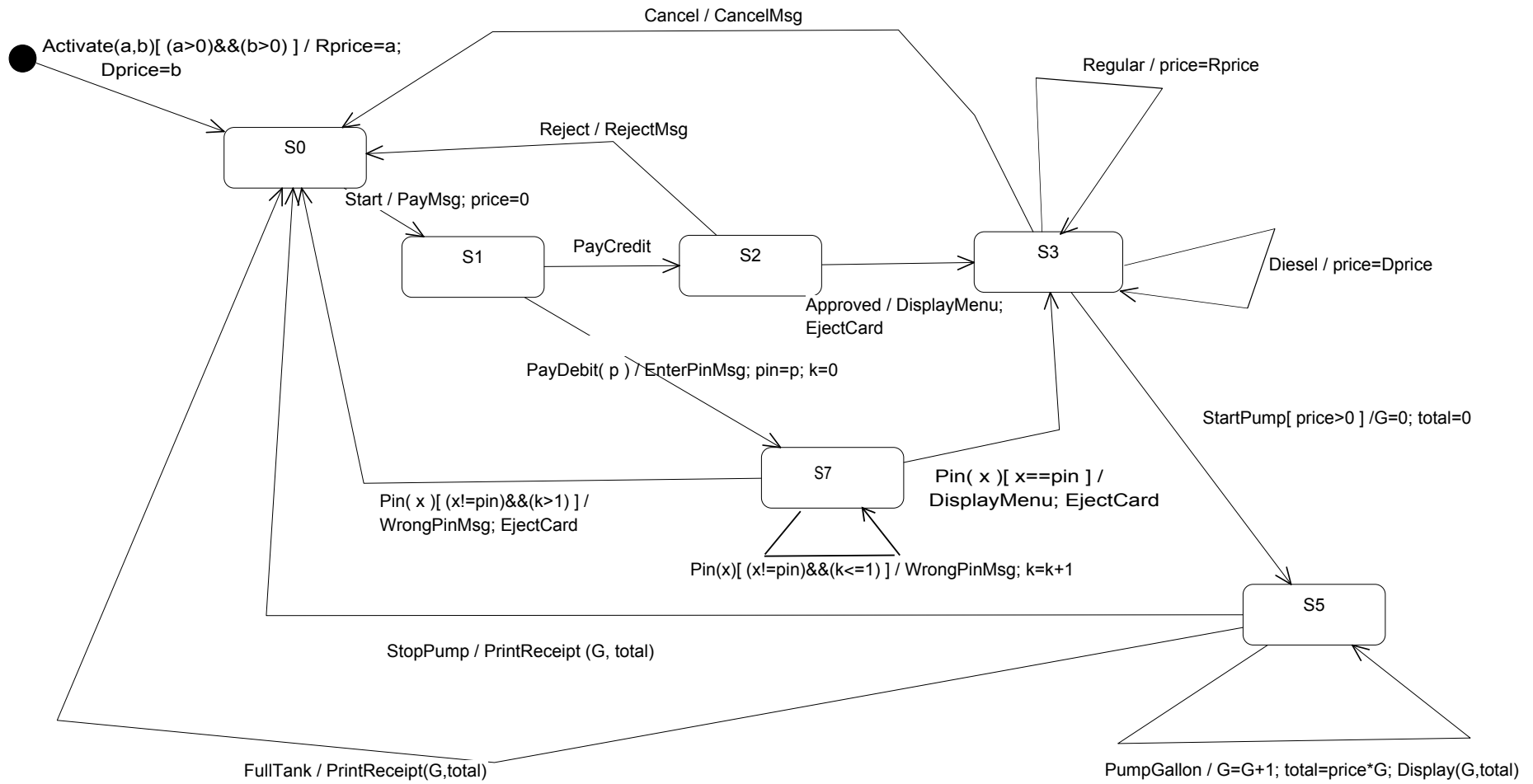


Figure 2: EFSM for gas pump GP-2