

## PART #2: PROJECT DESIGN, IMPLEMENTATION and REPORT

CS 586; Spring 2019

Final Project Deadline: **Thursday, May 2, 2019** ~~May 1, 2019~~

Late submissions: 50% off

After **May 5** the final project will not be accepted.

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

The hardcopy of the project must be submitted. Electronic submissions are not acceptable. Notice that the Blackboard project submissions are only considered as a proof of submission on time (before the deadline). If the hardcopy of the project is different than the electronic version submitted on the Blackboard, then **50%** penalty will be applied. If the project assignment is submitted on the Blackboard on time, we must receive the hardcopy of the project by **3:00pm** on **Friday, May 3** ~~Thursday, May 2~~. If the hardcopy is received after this deadline, **20%** penalty will be applied.

### DESIGN and IMPLEMENTATION

The goal of the second part of the project is to design two *Vending Machine* components using the Model-Driven Architecture (MDA) and then implement these *Vending Machine* components based on this design using the OO programming language. This OO-oriented design should be based on the MDA-EFSM for both *Vending Machine* components that was identified in the first part of the project. You may use your own MDA-EFSM (assuming that it was correct) or you can use the posted sample MDA-EFSM. In your design, you **MUST** use the following OO design patterns:

- state pattern
- strategy pattern
- abstract factory pattern

In the design, you need to provide the class diagram, in which the coupling between components should be minimized and the cohesion of components should be maximized (components with high cohesion and low coupling between components). In addition, two sequence diagrams should be provided as described on the next page (Section 4 of the report).

After the design is completed, you need to implement the *Vending Machine* components based on your design using the OO programming language. In addition, the driver for the project to execute and test the correctness of the design and its implementation for the *Vending Machine* components must be implemented.

## Outline of the Report & Deliverables

1. MDA-EFSM model for the *Vending Machine* components
  - a. A list of meta events for the MDA-EFSM
  - b. A list of meta actions for the MDA-EFSM with their descriptions
  - c. A state diagram of the MDA-EFSM
  - d. Pseudo-code of all operations of Input Processors of Vending Machines: *VM-1* and *VM-2*
2. Class diagram(s) of the MDA of the *Vending Machine* components. In your design, you **MUST** use the following OO design patterns:
  - a. State pattern
  - b. Strategy pattern
  - c. Abstract factory pattern
3. For each class in the class diagram(s) you should:
  - a. Describe the purpose of the class, i.e., responsibilities.
  - b. Describe the responsibility of each operation supported by each class.
4. Dynamics. Provide two sequence diagrams for two Scenarios:
  - a. Scenario-I should show as to how the cup of tea is disposed in the Vending Machine *VM-1* component, i.e., the following sequence of operations is issued:  
*create(2), insert\_cups(20), card(7.2), sugar(), tea()*
  - b. Scenario-II should show as to how a cup of coffee is disposed in the Vending Machine *VM-2* component, i.e., the following sequence of operations is issued:  
*CREATE(0.5), InsertCups(1), COIN(0.25), COIN(0.25), CREAM(), COFFEE()*
5. Well documented (commented) source code.

In the source-code you should clearly indicate/highlight which parts of the source code are responsible for the implementation of the three required design patterns (**if this is not clearly indicated in the source code, 20 points will be deducted**):

  - state pattern
  - strategy pattern
  - abstract factory pattern.

**NOTE:** Because of the significant size of the source-code, the printed version of the source-code is not required in the report. However, the source-code must be submitted on the Blackboard or on the flash drive. Note that the source code may be compiled during the grading and then executed. If the source-code is not provided, **15 POINTS** will be deducted.

**IMPORTANT:** The project executable(s) of the *Vending Machine* components with detailed instructions explaining the execution of the program must be prepared by students and made available for grading. The best way is to submit the project executable on the Blackboard. However, you may provide the project executable on a flash drive. If the executable is not provided (or not easily available), **20 POINTS** will be automatically deducted from the project grade.