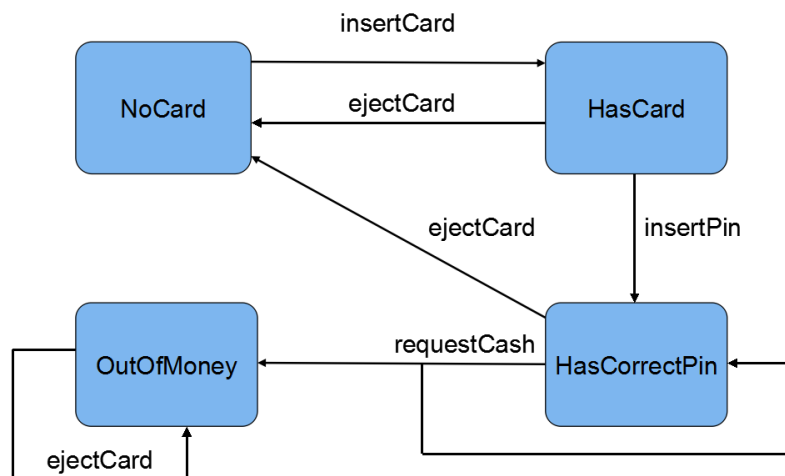


# CENG 4501 2020 Fall Final Exam

Download and extract the given zip file.

1. The package “finalexam.iterator” contains a class ItemRepository. Implement the inner Iterator class for the ItemRepository class. The iterator will enable iterating items in the 2 dimensional array. **(25 pts.)** (Objective 3)
2. Apply the factory method design pattern to the implementation given in the package “finalexam.factorymethod”. **(25 pts.)** (Objective 3)
3. Suppose you are developing an application for an ATM machine. Following diagram shows the states and the actions that can be performed on the ATM. **(25 pts.)** (Objective 3)



Apply the state pattern to the above problem. Provide the implementation in the “finalexam.state” package. A sample test is given in the package. You can assume pin is always entered correct for the given card.

4. Make the ATM Machine class in Question 3 double-checked locking Singleton class. **(25 pts.)** (Objective 3)

**Note:** Upload your source code in a zip or rar file.