

TP Genie Logiciel - Diagramme de sequences

Exercise 1. Sequence diagrams for modelling an ATM system

Build a model of a scenario of the *withdraw money* use case of a Bank ATM system. In such scenario a bank customer (the User) is able to make withdrawal of money operations on an ATM by using her bank card. The system employs a standard procedure of validating the card and account holders password. You are asked to develop first a model of a simplified, 2-components version of the ATM withdrawal scenario, then a second one, which consider a more complex 5-components version of the system.

Q1) Develop a UML sequence diagram for a two actors ATM system described as follows

Actors: the ATM systems consists of the following two kind of objects

- Cardholder (or Customer)
- ATM System

Events: Describe the main flow of events in this scenario by completing the list of events listed below:

- Customer arrives at the ATM machine and inserts a bank card.
- The system requests for user authentication (password).
- Customer insert PIN number
- ...

Once you have identified all relevant events translate them into corresponding system events (input and response) by completing the input/response table given below:

Actor	System response
User inserts card	
	System prompts user to enter PIN
User types PIN	
...	...
...	...
...	...

Q2) Develop a UML sequence diagram for a six actors version of the ATM system described as follows. Now model the scenario of the Withdraw Money use case in more detail. The SD is elaborated in more detail by including new internal objects of the withdraw money use case such as Card Controller (to control card management) and Bank (the issuing bank).

Actors: identify the objects of such system based on the few given below (do you need more?)

- User / Customer / Cardholder
- ATM System
- Card Controller
- Cash Dispenser
- Bank
- Account

Events: Extends/Modify the main flow of events you identified for the first scenario by including interactions with the 4 added actors Card Controller and Bank. The first 2 events are listed below:

- Customer arrives at the ATM machine and inserts a bank card.
- The card is verified by the Card Controller.

Once you have identified all relevant events translate them into corresponding system events (input and response) by filling in the corresponding input/response table given below.

Actor	System response
...	...
...	...
...	...

Exercise 2. Implementation of ATM system

Based on the use case and sequence diagrams scenarios identified in the previous exercise build a Java implementation of the ATM system starting from the Scenario 1 and then extending it to the Scenario 2. To this aim you should:

Q1) Develop a UML class diagram identifying the classes involved in your implementation, their relationships (generic adirectional association? generic directional association?) as well as the most relevant attributes and methods of each class. To design your system, hence while conceiving the UML class diagram, try to account for the *Responsibility Driven Design* criteria captured by the GRASP patterns, specifically try to obtain *high-cohesion*, *low coupling* and assign object creation responsibility correctly (i.e. to keep coupling low).

Q2) Based on the class diagram you have developed in the previous question give a Java implementation of the ATM systems. Test the implementation through a `main()` method which simulates the second scenario (that corresponding to the 6 components version of the system (Q2 of Exercise 1)).