Exercise 5.1

In this task, we have a closer look at the ordering process from the point of view of a MyBonus partner's web shop.

The web shop is realized as a web application. On the main page, customers can either select a category of products or they search for products by entering a keyword. In both cases, a list of respective products is shown to the customer. Customers can add an arbitrary number of the products shown in the provided list to their shopping cart. Then customers can select a new category or start a new search to add further products to their shopping cart, or they proceed with the ordering process.

To provide the data needed for payment and delivery, the web shop offers two alternatives: customers can submit the order as a guest by entering all needed data for payment and delivery, or they can log in to the web shop if they are already registered. If the log in is not successful, the customer can again try to log in.

After providing the data needed for payment and delivery, customers can optionally enter their MyBonus customer id to gain MyBonus points for the order. The web shop then directly requests the validation of the customer id from MyBonus. If the validation is not successful, the customer can again try to enter an id. If the customer id was successfully validated and the total of the order is greater or equal to 50 Euro, customers can optionally enter a voucher code. Also the voucher code is directly validated using MyBonus. If the validation is not successful, the customer can try to enter another voucher code. If the voucher code was successfully validated, the web shop reduces the total of the order by 10 Euro and MyBonus invalidates the used voucher code.

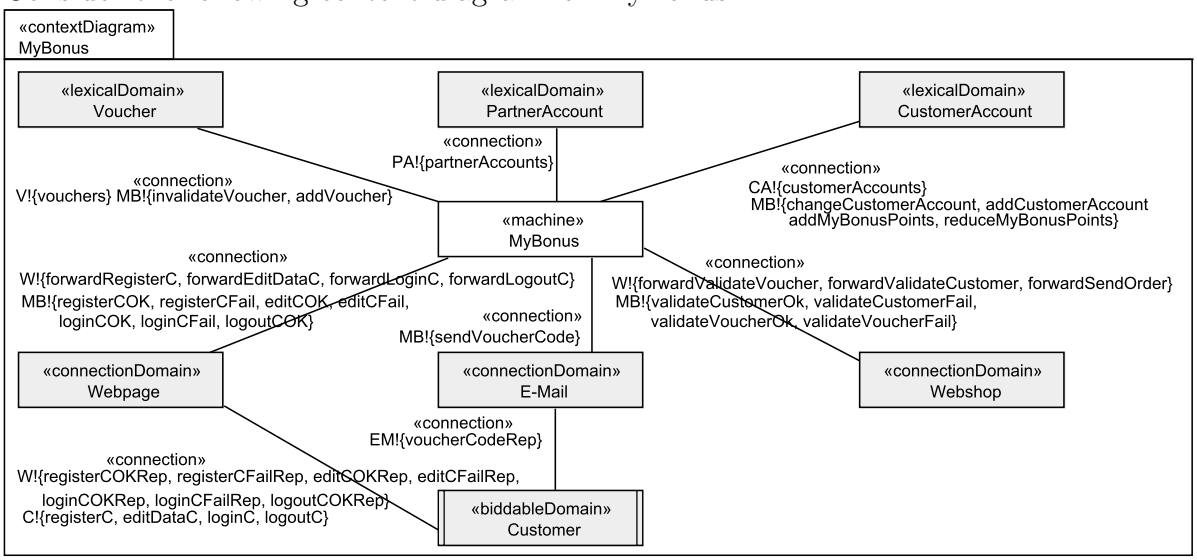
Finally, the total of the order is shown to the customer and he/she can submit the order. Then the web shop shows the customer a message with the delivery date and forwards the order to the warehouse. If a valid MyBonus customer id was provided, then the value of the order is sent to MyBonus and MyBonus calculates the gained MyBonus points for the order and creates a respective transactions.

When the warehouse receives the order, it overhands the goods to the post office which transports the goods to the customers address. When the delivery date is reached the goods are delivered to the customer.

Task: Model the described scenario as UML sequence diagram. It suffices to consider the five lifelines Customer, Web Shop, MyBonus, Warehouse, and Post Office.

Exercise 5.2

Consider the following context diagram for MyBonus.



Also consider the following statements (requirements R, facts F, assumptions A):

R1 Customers can register at MyBonus by providing their name, address (street, house number, postal code, and city), and e-mail. Optionally, they can provide their birthday and phone number. If the mandatory fields are filled out, MyBonus generates a unique customer identification number (customer id) for the customer.

R2 Customers can log in into MyBonus. The customer has to enter his/her customer id and the postal code (which is a part of the address). If the combination of customer id and postal code is valid, the customer is logged-in, otherwise an error message is shown to him/her.

R3 A logged-in customer can edit his/her personal data. The edited values are stored if at least the mandatory fields (name, address (street, house number, postal code, and city)) are not empty, otherwise an error message is shown to him/her.

R5 A logged-in customer can log out.

R14 In regular intervals, for every 1000 MyBonus points a customer achieved, a voucher code is generated for the respective customer and sent to the customer. Additionally, the number of MyBonus points stored for these customers is accordingly reduced.

R15 Customers of MyBonus receive MyBonus points when they performed an order at a MyBonus partner's web shop. The MyBonus points are calculated as follows:

$$\frac{\textit{total in Euro Cent}}{\textit{point quotient of partner}} \times \begin{cases} 2 & \text{if customer entered birthday and phone number} \\ 1 & \text{else} \end{cases}$$

R16 Customers of MyBonus can enter one of their voucher codes during the order process at a partner's web shop if the total of the order is greater or equal to 50 Euro. The total of the order is then reduced by 10 Euro.

A1 Customers only enter valid information to MyBonus.

A3 Using the postal code of customers for authentication is a good trade-off between security and usability.

A4 If a customer enters his/her customer id during the order process of a partner, the partner validates the customer id.

A5 Partners accept all validated customer ids and only these.

A6 Partners only allow to enter voucher codes if the total of the order is greater than or equal to 50 Euro.

A7 If a customer enters a voucher code during the order process of a partner, the partner validates the voucher code.

A8 Partners accept all validated voucher codes and only these.

A9 If and only if a customer who entered a valid MyBonus customer id completes his/her order at the partner's web shop, the partner sends the total of the order in Euro Cent, the partner id and password, the customer id, and if entered by the customer and validated by MyBonus the voucher code to MyBonus.

A10 If a valid voucher code is entered by a customer, then the partner reduces the total of the order by 10 Euro.

A11 Customers and partners are able to use a web browser and have access to the internet.

A12 Partners are able to modify their web shops in order to use the API functions provided by MyBonus.

A13 Customers check regularly their e-mails.

Task: Derive specifications that are implementable by the machine and provide a reasoning why these specifications together with the given domain knowledge suffice to satisfy the requirements.