

Exercise 1.1

Developing a software: *MyBonus*

In the tutorial sessions, we make use of a loyalty system called *MyBonus* as running example. With this software, customers are able to collect MyBonus points for shopping activities at web shops of partners of MyBonus. Based on the number of collected MyBonus points, voucher codes are generated for the customers that offer a discount of 10 Euro if the voucher code is entered during an order at a partner with a total greater than or equal to 50 Euro.

Customers can request a customer identification number (customer id) for the service by entering their personal data. Name, address, and e-mail are required fields. Birthday and phone number are optional information, but if customers enter this information, then the number of MyBonus points they get for an order will be doubled. The customer id will be a unique number for each customer. For reasons of simplicity, we do not consider the validation of the personal data entered by customers. Customers can log in into MyBonus with their customer id and the postal code to get access to two functionalities. First, they are able to edit their personal data. Second, they can have a look at the list of their MyBonus transactions. A MyBonus transaction for customers consists of the date of the order, the name and web address of the partner where they performed the order, and the number of MyBonus points they achieved for the order.

Companies that run a web shop can request to become a partner of My Bonus. To do so, they have to provide the company name, address, web shop address, contact e-mail, a password, and a point quotient between 1 and 500 that represents how many Euro Cents shall be recorded as one MyBonus point if a customer makes an order at the partner. E.g., if the point quotient is 100 and a customer makes an order of 1337 Euro Cent, then 13 MyBonus points are recorded. If the data is complete, MyBonus generates a unique partner identification number (partner id) for the new partner. For reasons of simplicity, we do not consider the validation of the data entered by partners. Partners can log in into MyBonus with their partner id and password to get access to two functionalities. First, they are able to edit their data. Second, they can have a look at the list of their MyBonus transactions. A MyBonus transaction for partners consists of the date of the order, and the number of MyBonus points that the corresponding customer achieved for the order.

In addition to the personal data of customers, the current number of MyBonus points

of them is stored in their account data. These points can be collected by using a web shop of one of the partners of MyBonus. Customers are able to enter their customer id during the order process in a partner's web shop. The partner has to trigger the validation of the provided customer id and has to accept all validated customer ids and only them. The validation itself is performed by MyBonus. After that, customers can optionally enter one of their voucher codes if the total of the order is greater than or equal to 50 Euro. Again the partner has to trigger the validation of the provided voucher code and has to accept all validated voucher codes and only them. The validation itself is performed by MyBonus. If the voucher code was successfully validated, the partner has to grant a discount of 10 Euros on the total of the order. If the order process is completed, the partner sends the total of the ordering and the customer information to MyBonus. If a voucher code was used for the order, this code is invalidated. Based on the point quotient, the total of the order, and whether the customer filled out the optional fields of personal data, the achieved MyBonus points are computed as follows and added to the customer's account:

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

There shall be an automatic process that will be called regularly. The process requests all account information of customers with a MyBonus point balance greater than or equal to 1000 MyBonus points. For every 1000 MyBonus points a customer has, a voucher code with a value of 10 Euro is generated and sent to him/her via e-mail, and the balance will be reduced accordingly. E.g., if a customer has a MyBonus point balance of 4242, then 4 voucher codes are sent to him/her and the new MyBonus point balance is 242.

Customers and partners are able to access the services of MyBonus using a provided web interface. For the integration of the validation of customer ids and voucher codes, and the report of transactions into the partner's web shops, MyBonus provides an API that allows to access the needed functionality.

Now look at the following statements. State for each statement if it is a requirement (R), an assumption (A), or a fact (F) and give a reason for your choice.

- (1) A logged-in partner can log out.
- (2) Partners only allow to enter voucher codes if the total of the order is greater than or equal to 50 Euro.
- (3) If a valid voucher code is entered by a customer, then the partner reduces the total of the order by 10 Euro.
- (4) 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.
- (5) Using the postal code of customers for authentication is a good trade-off between security and usability.

- (6) If partners send the total of an order in Euro Cent, their partner id and password, a customer id, and optionally a voucher code, then the MyBonus points for this transaction are calculated, the transaction is stored, the MyBonus points are recorded for the customer id, and the optionally provided voucher code is invalidated. The MyBonus points are calculated as follows:

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

- (7) With a web browser and an internet connection, it is possible to access a web page.
- (8) In regular intervals, for every 1000 MyBonus points a customer achieved, a voucher code is generated for the respective customer and sent to his/her known e-mail address. Additionally, the number of MyBonus points stored for these customers is accordingly reduced.
- (9) 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.
- (10) 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.
- (11) A logged-in customer can request a list of his/her transactions. For the customer, a transaction consists of the date, the name and web address of the partner, and the MyBonus points achieved for this transactions.
- (12) Companies that run a web shop can request to become a partner of MyBonus. To do so, they have to provide the company name, address, web shop address, contact e-mail, a password, and a point quotient between 1 and 500 that represents how many Euro Cents shall be recorded as one MyBonus point if a customer makes an order at the partner. E.g., if the point quotient is 100 and a customer makes an order of 1337 Euro Cent, then 13 MyBonus points are recorded. If the data is completely entered, MyBonus generates a unique partner identification number (partner id) for the new partner.
- (13) Customers and partners are able to use a web browser and have access to the internet.
- (14) Customers only enter valid information to MyBonus.
- (15) Partners can validate the correctness of a customer id provided by a customer during the order process. The partner has additionally to provide his/her partner id and password. If the combination of partner id and password is valid, the partner gets the result of the validation of the customer id.