Exercise 2.1

Draw a UML class diagram representing exactly the following scenario:

A family consists of an arbitrary number of children and one or two parents. Every family member is a person with a name and an age. Children are able to play games, and parents can go to work and they can cook something in the kitchen. A family lives in a house which has an address and which consists of several rooms. An arbitrary number of families can live in a house. Each room has a size. It can either be a bedroom, a living room, or a kitchen. A house consists of at least one of each kind of rooms. An arbitrary number of persons sleep in a bedroom.

Exercise 2.2

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.

R6 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 completely entered, MyBonus generates a unique partner identification number (partner id) for the new partner.

R7 Partners can log in into MyBonus. The partner has to enter his/her partner id and the chosen password. If the combination of partner id and password is valid, the partner is logged-in, otherwise an error message is shown to him/her.

R8 A logged-in partner can edit his/her personal data. If no field is left empty, the edited values are stored, otherwise an error message is shown to him/her.

R9 A logged-in partner can request a list of his/her transactions. For the partner, a transaction consists of the date, and the MyBonus points calculated for this transactions.

R10 A logged-in partner can log out.

R13 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:

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

R14 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.

Identify for each of the above statements the **domains**, the **types** of the domains, and the **phenomena** that are mentioned in the statement.

Exercise 2.3

Using the statements in Exercise 2.2, draw a context diagram that shows the domains and phenomena mentioned in the statements, and how these are connected to the machine and each other.