MTAT.03.083 – Systems Modelling

Homework 2 (HW2) - Interaction Modelling (10 points)

Due on 14.10.2014 at 10 am
complete the homework in groups of 2 students.

Modelling a computer game: "The Restaurant Owner"

Read carefully the parts of chapters 11, 12 and 13 selected from the book.

Following the methodology defined in these chapters model the computer game described in the following through (1) a use-case diagram; (2) mainstream and exceptional scenarios for each use case; (3) a sequence diagram for each use case; (4) an application class model.

Each player in the game has a name. When a game starts, the player becomes owner of a restaurant. The restaurant has a name, an address, and a city.

The initial budget of the restaurant is 10.000 euros. In the restaurant there are 3 waiters, 1 chef, and 1 barman.

Each waiter, the chef, and the barman have a salary and a level of experience. There are 3 levels of experience: low, medium, and high. If the level of experience is low, the salary per week for a waiter is 200 euros and for the chef and the barman is 300 euros. If the level of experience is medium the salary for a waiter is 300 euros and for the chef and the barman is 400 euros. If the level of experience is high the salary for a waiter is 400 euros and for the chef and the barman is 500 euros. The salaries are taken from the budget at the end of every week. Each waiter, the chef and the barman have a name and a surname. The chef has also a tax code.

At any point in time during the game, the owner can increase the level of experience of a waiter with a training course that costs in total 800 euros (if the budget is sufficient for this). It is also possible to increase the level of experience of the chef and the barman with a training course that costs in total 1200 euros (if the budget is sufficient for this). At the beginning, every member of the staff has a low level of experience.

In the restaurant there are 9 tables. Each table has a number and we assume that at a table there are always seated exactly 2 persons. Each waiter can serve 3 tables at most, and each table is assigned to only 1 waiter. The owner decides the number of tables to be assigned every day to each waiter.

In the menu there are 5 main dishes and 5 different beverages. Every dish has a name and a calorie count. Every beverage has a name and a volume. Each dish and each beverage has a quality level: low or high. The ingredients for preparing a high quality dish is 10 euros and for preparing a low quality dish is 3 euros. The ingredients for preparing a high quality beverage cost 3 euros and for preparing a low quality beverage it costs 1 euro. The owner can decide the number of dishes/beverages of high

quality and the number of dishes/beverages of low quality in the menu. The owner also decides the cost of high and low quality dishes and of high and low quality beverages for the clients (all the high quality dishes have the same price and all the low quality dishes have the same price). The suppliers of the restaurant are paid at the end of every week for the ingredient needed to prepare food and beverages (the assumption is that there is no waste of ingredients). From every table, we assume that 2 dishes and 2 beverages are chosen randomly by the two clients.

The restaurant has a reputation. The reputation can be high. This ensures that all the tables are occupied. If the reputation is medium, only 5 tables are occupied. Finally the reputation can be low. In this case only 2 tables are occupied. The high reputation corresponds to at least 30 reputation points, the medium reputation corresponds to at least 15 reputation points. Below 15 reputation points the reputation of the restaurant is low (the initial reputation score is 15).

Every time a client is not satisfied for the service 1 reputation points is removed (otherwise 1 point is added). The same happens if a client is not satisfied by the food or if a client is not satisfied by the beverages (again if the client is satisfied 1 point is added).

A client is satisfied with the service 90% of times if the level of experience of the waiter is high, 80% if it is medium, 60% if it is low.

A client is satisfied with the food 80% of times if the level of experience of the chef is high, 60% if it is medium, 40% if it is low. If the dish chosen is of high quality these percentages increase by 20 percentage points.

A client is satisfied with the beverages 80% of times if the level of experience of the barman is high, 60% if it is medium, 40% if it is low. If the beverage chosen is of high quality these percentages increase by 20 percentage points.

For every 3 euros of difference between the cost of the ingredients and the cost of a dish or of a beverage, these percentages decrease by 10 percentage points (for example if the ingredients to prepare a dish cost 5 euros and the client pays 7 euros the percentage does not decrease, but if the client has to pay 8 euros the percentage decreases by 10 percentage points. If the client pays 9 or 10 euros the percentage decreases by 10 percentage points as well. If the client pays 11 euros the percentage decreases by 20 percentage points, and so on). Client satisfaction cannot drop below zero, and it cannot raise above 100.

If the budget becomes less than zero the restaurant closes and the game ends. Otherwise, after 30 days of work, the final budget represents the final score of the game that is recorded in a “ranking list”. The goal for a player is to reach the top score in the list. Consider that there are additional costs for the entire month (rent, cleaning service, taxes, etc.) of 4.000 euros to be deducted from the budget at the end of the month.

Clients are chosen from a population of 18 people. Each client has a name, a surname, a telephone number, and a tax code. At the end of the game some statistics are provided for each client including the number of times each dish and the beverage has been consumed, the average calorie count of the dishes, the average volume of the beverages, and the total amount of money spent in the restaurant in the entire month.

Notes:

1. Use MagicDraw to create the models;
2. For the sake of simplicity, make the assumption that each table can be occupied only once in a day;
3. Submissions: one of the members of the group has to login and submit the assignment using the link “submit” on the course webpage. Please specify in a comment the other member of the group. The submission should consist of one single pdf file.