Task 2 (6 marks)
Conceptual modelling of a data warehouse

An objective of this task is to create a conceptual schema of a sample data warehouse domain described below. Read and analyse the following specification of a data warehouse domain.

A large international network of hotels would like to create a data warehouse to store information about their hotels located in the different cities of different countries, hotel guests visiting the rooms in hotels, and employees working at the hotels. The management of the network would like to store the following information in the data warehouse.

Each hotel is described by its location (country, city, building number), email address and link to a Web page. A hotel offers the rooms to its customers. A room has a unique number within a hotel. A room number consists of a floor number and a unique number at a floor. For example, room 25 at 5th floor has a number 0525.

Each hotel has a number of employees. An employee has a unique employee number, first name, last name, and date of birth. Staff members belong to either administration group or maintenance group. Among the other duties, administration staff members are allowed to perform check-in and check-out of hotel guests. Maintenance staff members perform the maintenance works in the rooms occupied by hotel guests.

Hotel guests stay in hotel rooms. On check-in day a start date of a visit is recorded and on check-out day an end date of a visit is recorded. The data warehouse must contain information about the total number days of each visit and amount of money paid by each hotel guest, total number of facilities used by hotel guests, and the total number of maintenances performed in a room during a visit.

A hotel guest is described by a number of identification document, first name, last name, date of birth and nationality. A hotel guest uses a credit card to pay for his/her stay in a hotel. A credit card number and a name of bank that issued a card is recorded.

A data warehouse must be designed such it should be possible to easily implement the following classes of applications.

A management of the hotel network would like to get from a data warehouse information about the total number of visits per hotel and per given period of time like day, month, and year, about total number of visits in hotels per city and per country, about total number of check-ins/outs per employee, and about the total number of visits paid per credit card used, total number of customers per hotel, per room, per month per year, total profits per hotel, per city where the hotels are located, average length of stay per year, per month, per hotel, average discount applied per hotel, per month per year.

To draw a conceptual schema, use a graphical notation explained to you in a presentation 11 Conceptual Data Warehouse Design.

To create a conceptual schema of a sample data warehouse domain, follow the steps listed below.

Step 1 Find a fact entity, find the measures describing a fact entity.
Step 2 Find the dimensions.
Step 3 Find the hierarchies over the dimensions.
Step 4 Find the descriptions (attributes) of all entity types.
Step 5 Draw a conceptual schema.

To draw a conceptual schema, you must use a graphical notation explained to you in a presentation 11 Conceptual Data Warehouse Design.

To draw your diagram, you can use UMLet diagram drawing tool and apply a "Conceptual modelling" notation, Selection of a drawing notation is available in the right upper corner of the main menu of UMLet diagram drawing tool. UMLet 14.3 software is can be downloaded from the subject's Moodle Web site in a section WEB LINKS. A neat hand drawing is still all right.

Deliverables
A file `solution2.pdf` with a drawing of a conceptual schema of a sample data warehouse domain.

Solution

A fact: `VISIT` (in a hotel)

Dimensions:
```
GUEST,
C-CARD,
ROOM,
TIME,
CHECK-IN-ADMIN,
CHECK-OUT-ADMIN,
```

Hierarchies:
```
COUNTRY Consists-of CITY Consists-of HOTEL
Consists-of FLOOR Consists-of ROOM,

YEAR Consists-if MONTH Consists-of DAY

ADMINISTRATION-STAFF ISA STAFF,
MAINTENANCE-STAFF ISA STAFF
```

Measures: `total-days-spent, amount-paid, discount-applied, total-facilities used, total-maintenances`

Attributes:

```
HOTEL(country,city,buildg#,email,Web-link)
ROOM(room#)
STAFF(emp#,first-name,last-name,date-of-birth)
ADMINISTRATION-STAFF(duties[1..*])
MAINTENANCE-STAFF()
GUEST(id-doc#, first-name, last-name,
     date-of-borth, nationality)
C-CARD(number, bank-name)
```