Design - Part A

1. The following relations are given (primary keys are underlined):

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   ENGINEER(ECode, EName, Address, VAT_Number, City)
   COMPANY(CCode, CName, TypeOfCompany, City, WebSite)
   SECTOR(SCode, SectorName, Description)
   CONSULTING_WORK_CARRIED_OUT(ECode, CCode, Date, SCode, Amount)

   TypeOfCompany = {micro, small, medium, large}
   ```

   Write the following queries

   (a) *Mandatory* exercise in relational algebra (4 points):
   Show the code and the name of the engineers who carried out consulting works with at least two companies of type 'medium'.

   (b) *Mandatory* exercise in SQL language (5 points):
   For each engineer coming from Turin who has never carried out any consulting work in the 'Building' sector, show the name of the engineer and the total number of consulting works she/he has carried out.

   (c) *Optional* exercise in SQL language (5 points):
   For each company, show the name of the company and the name of the engineer who carried out the highest number of consulting works with the company in 2013.

Design - Part B

The NPO BabyTime manages different baby parkings in Torino and wishes to design a database to manage its activities.

- Each baby parking of the NPO BabyTime is identified by its name and it is characterized by the address, the list of available rooms and the indication if an outdoor area is available. Each baby parking contains some rooms. Each room is identified by a code unique within the corresponding baby parking, and it is characterized by name and size.
- For children entertainment different activities are organized within the baby parking. Each activity is characterized by a code unique within the baby parking in which it is organized. For each activity, the name of the activity and the age group (i.e., minimum age and maximum age) of the children allowed to participate are also known. Among the possible activities, there are the thematic workshops. For each thematic workshop, the workshop type (e.g., bodily expression, drama, or animated tale), the list of the objects used during the workshop (e.g., musical instruments, paper, and colors) and the location of workshop (i.e., whether inside or outside the baby parking) are known.
- The employees of the NPO BabyTime are identified by their social security number (SSN). For each employee, the name, the date of birth, the phone number, and the e-mail address (if available) are known. Employees are classified as educators, supporting staff, and administrative staff. For the administrative staff, the job is known. For educators, the qualification is recorded. The database stores the days of the week and the corresponding time slots (i.e., start hour and end hour) in which supporting staff lent service. Please consider that the same person can lend service on more days of the week, but at most on one single time slot per day.
- The children attending the baby parkings of the NPO BabyTime are characterized by their social security number (SSN), name, date of birth and the list of telephone numbers of the parents. The database stores the annual subscriptions made for the children in the different baby parkings. Each annual subscription is identified by the reference school year and a progressive code within the reference school year. For each annual subscription, the subscribed child and the corresponding baby barking are known. Each child can be associated with more annual subscriptions in different school years.
- The database keeps track of the program of the thematic workshops organized at the baby parkings. For each scheduled thematic workshop, the date, the start and end time, the educator who coordinates the workshop, and the list of children participating in the workshop are known. Please consider that the same thematic workshop can be done on different dates and more times in the same day. An educator can not coordinate two or more thematic workshops at the same time.

1. *Mandatory* exercise (9 points): Describe the conceptual schema of a database for the above application by means of an ER diagram.
2. *Mandatory* exercise (4 points): Derive a normalized relational logical schema for the same database.
3. *Optional* exercise (1 point): Define referential integrity constraints for 3 relations of your choice among those defined in the conceptual schema.