

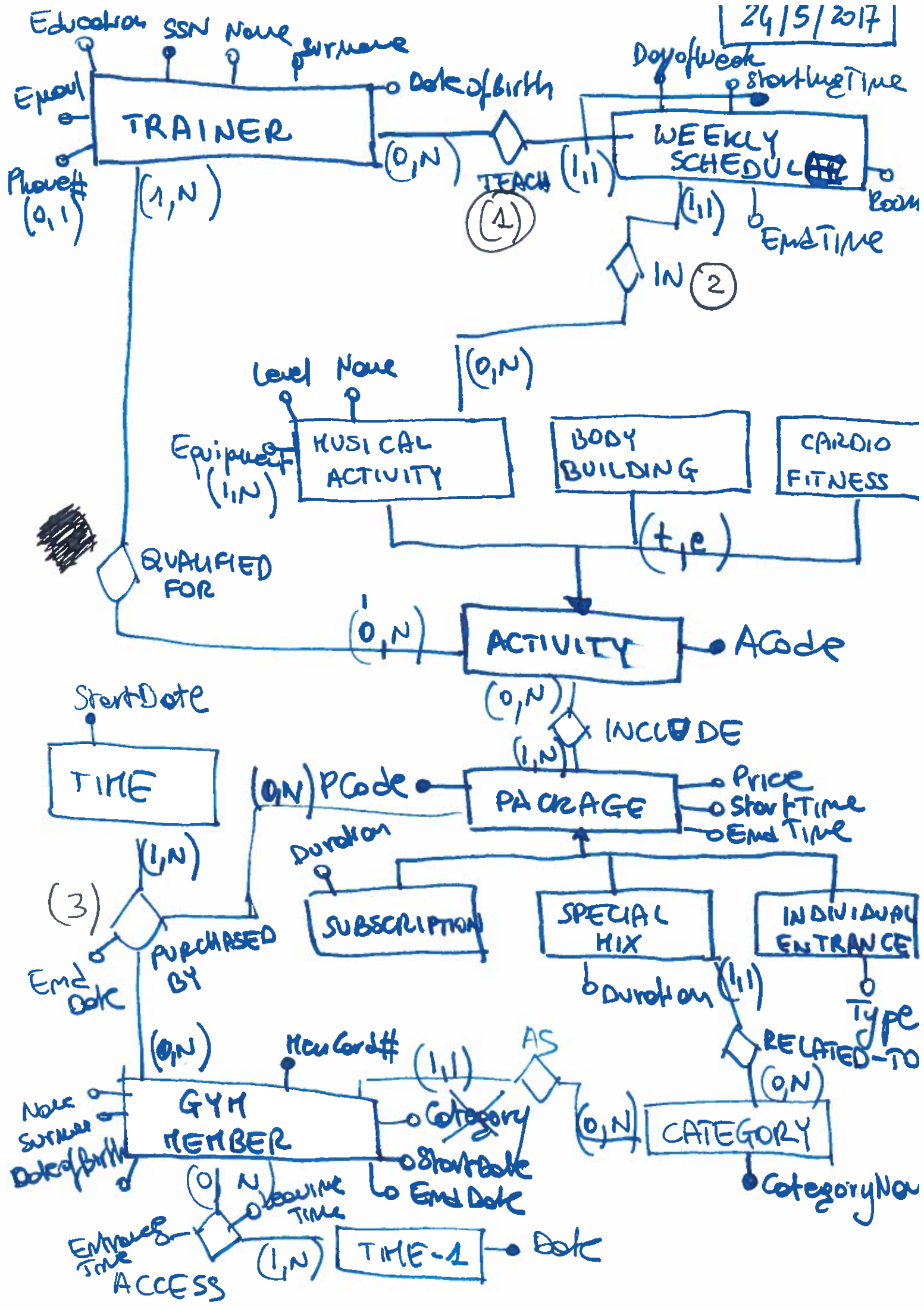
Introduction to Databases

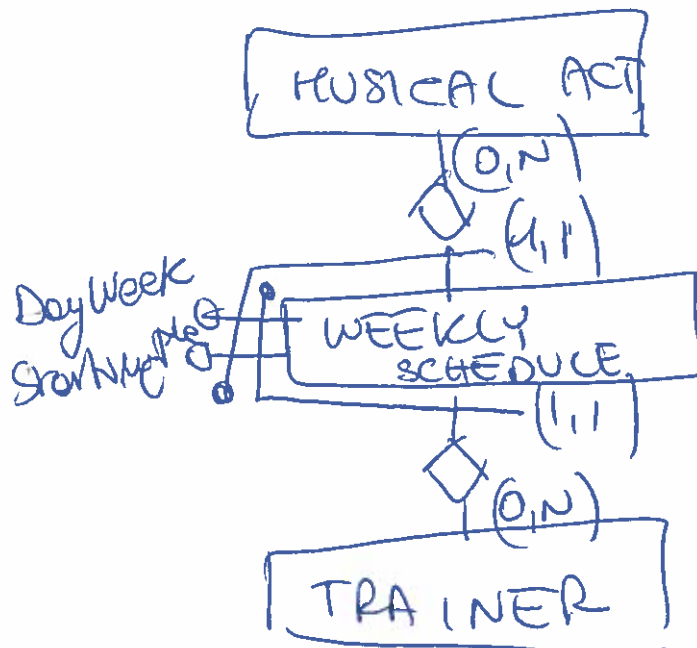
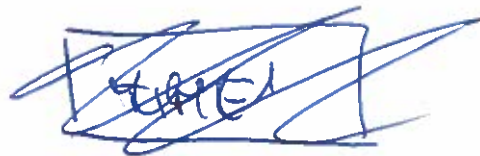
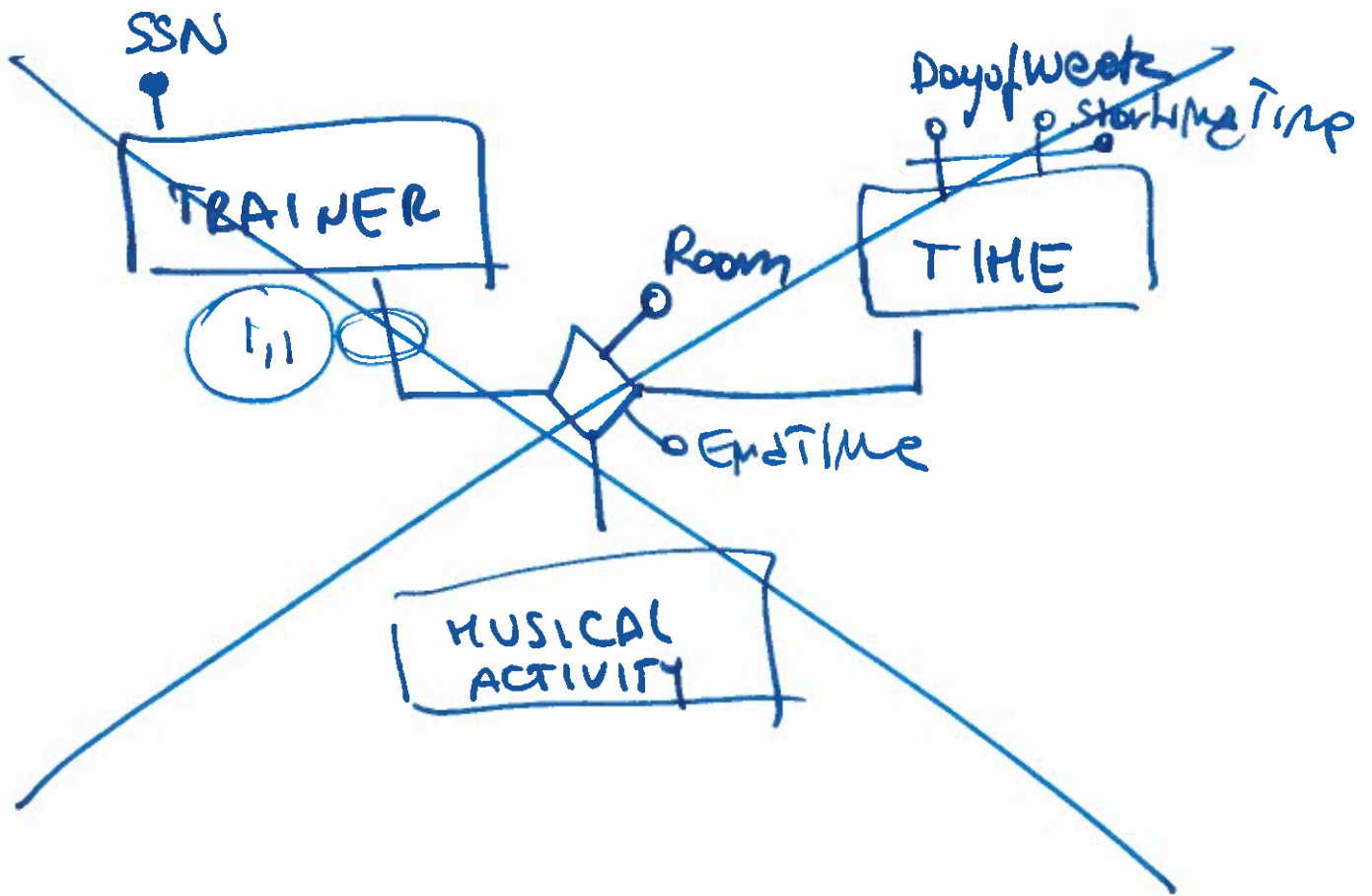
Management of gym activities

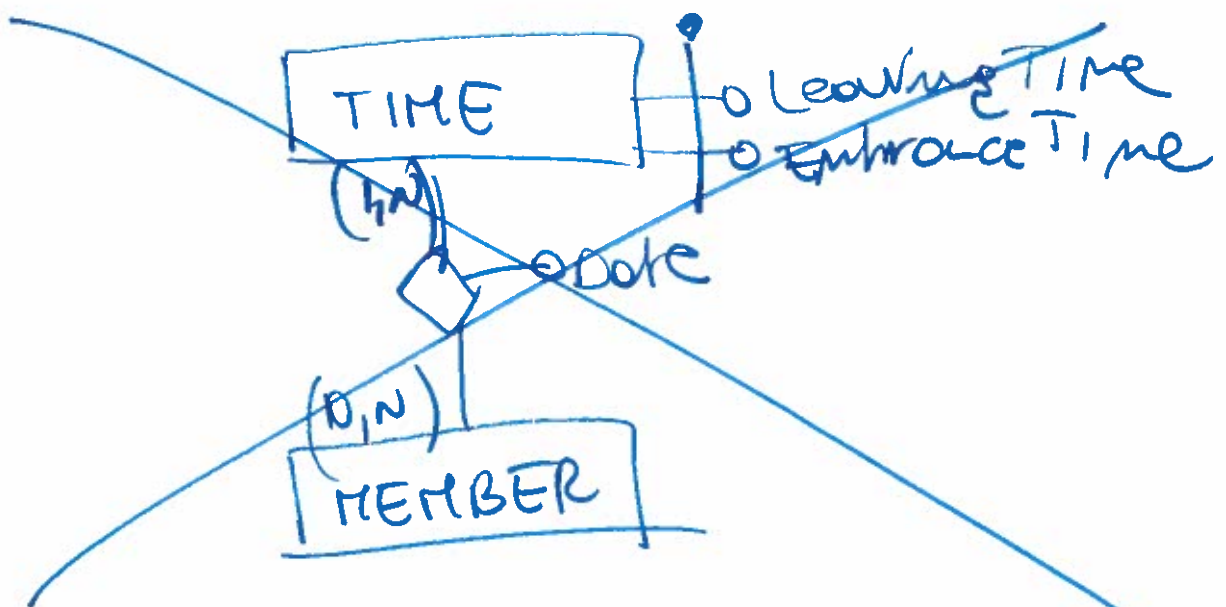
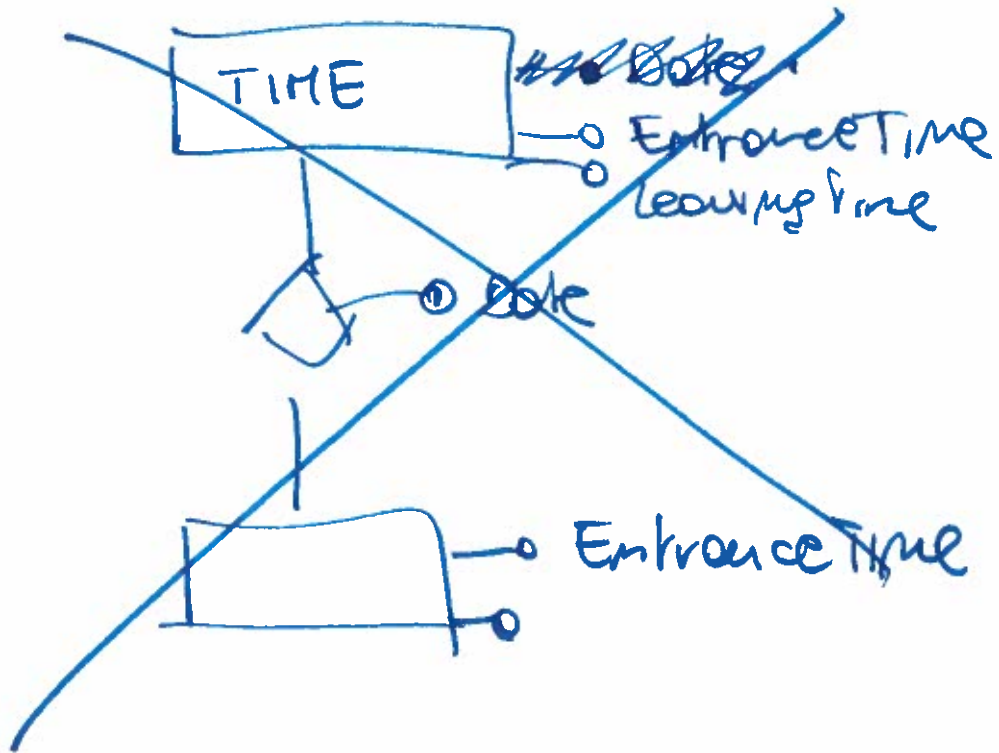
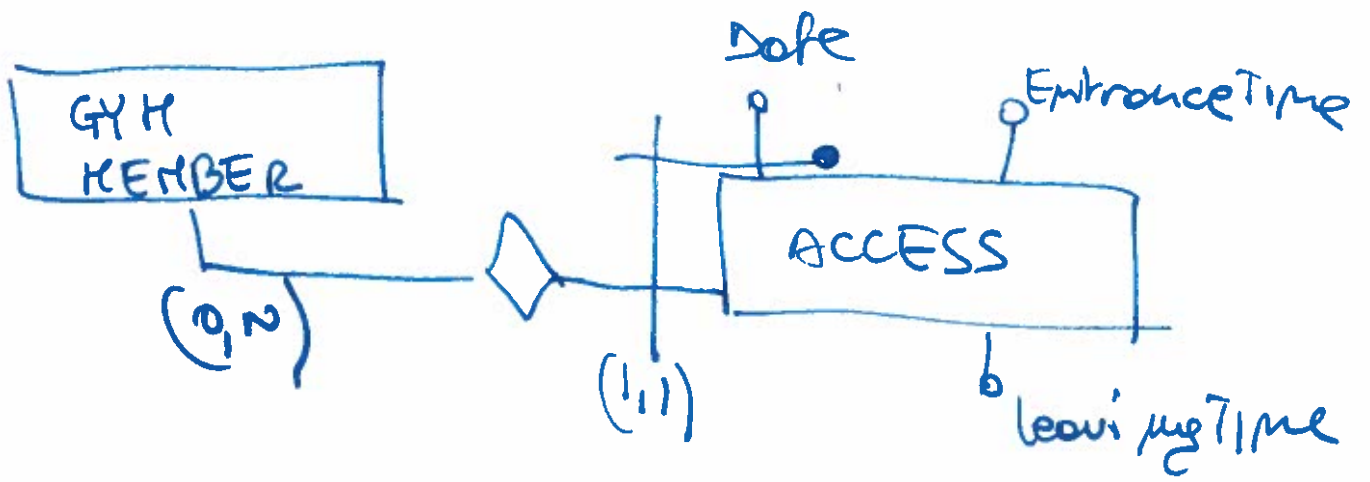
A gym would like to design a database to manage some of its activities.

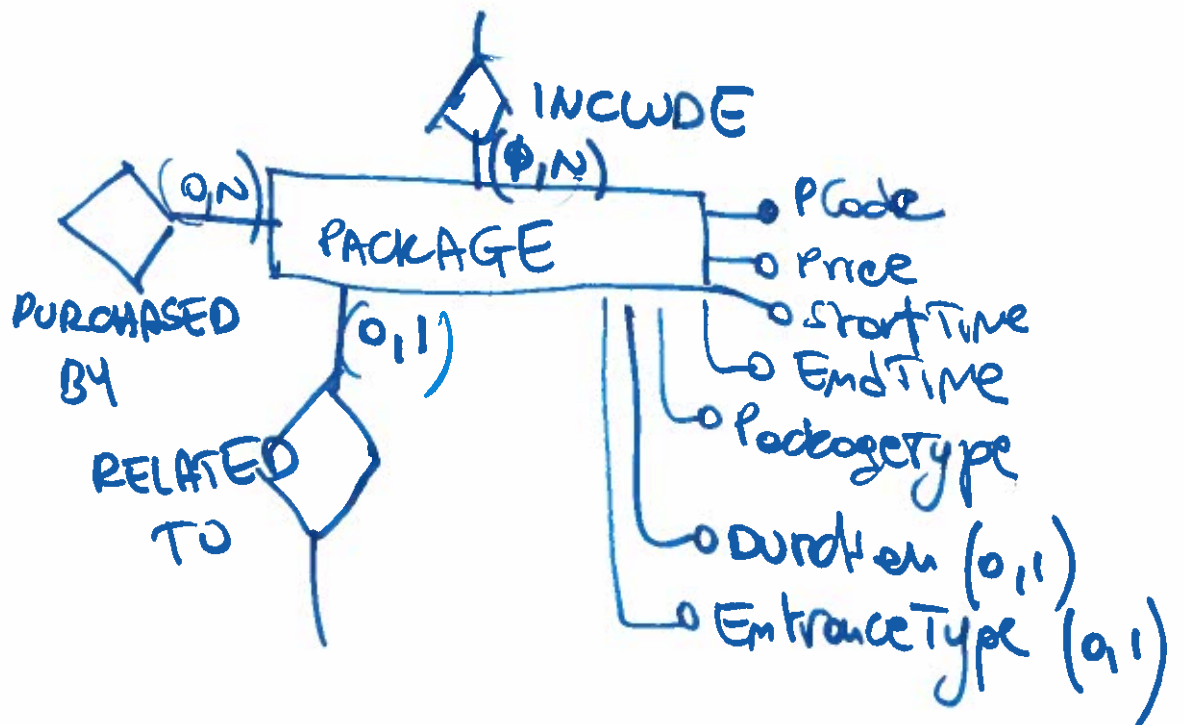
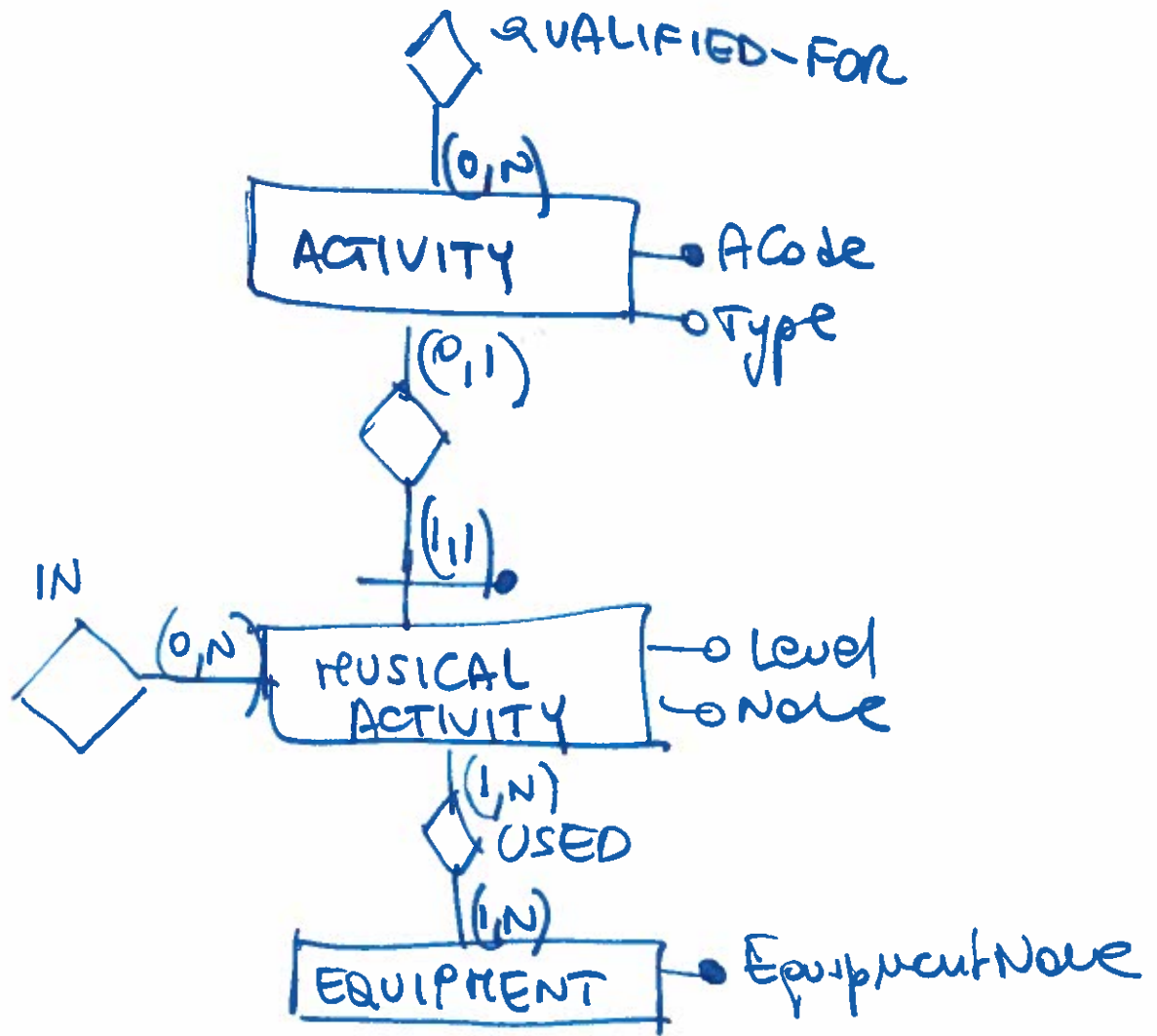
- Several trainers work at the gym. Each trainer is identified by her/his Social Security Number (SSN) and is characterized by name and surname, date of birth, education, e-mail, phone number (if available) and the list of sport activities the trainer is qualified to teach.
 - Several sport activities can be carried out at the gym. Activities are identified by a unique code and classified as musical activities, body building, or cardiofitness. For each musical activity the name, level (basic, intermediate, advanced) and the list of equipments used (e.g., weights, rope, step) are known. Keep track of the days of the week and of the room where each musical activity takes place, the starting and ending times, and the corresponding trainer. Please note that a trainer can not teach two different musical activities at the same day and time. However, the same musical activity may be carried out at the same time and day in different rooms. Furthermore, the same musical activity can be carried out on different days and many times on the same days in different time periods.
 - Gym members are identified by the number of their membership card. Each member is characterized by name, surname, date of birth, category (e.g., students, under 16, over 60) and validity time period. Members access the gym. For each access keep track of the corresponding member, date, entrance and leaving times (e.g., from 10am to 2pm). Assume that each member may access the gym only once per date.
 - The gym offers different packages of activities. Packages are characterized by the list of sport activities that can be carried out. Packages can be purchased by members as subscription, individual entrance, and special mix. For all types of packages the price and the time slots at which members are allowed to access the gym are known. For subscriptions and special mix the package duration (in months) is also known. Special mix packages are also characterized by the category of member to whom packages are addressed, while individual entrances are characterized by the type of entrance (e.g., simple, power).
 - The database stores all the activity packages purchased by gym members during the year. Members purchase packages and then associate a time period of usage (starting and ending date) in which the activities of the packages can be carried out at the gym. Assume that a member can associate different packages to the same time period, and the same package can be associated by different members to the same period.
1. Design an E-R conceptual schema of the database for the above application.
 2. Design a normalized relational schema for the above database.
 3. Define the referential integrity constraints for 3 relations (of your own choice) among those defined in the conceptual schema.

24/5/2017









LOGICAL SCHEMA

ACTIVITY (A Code, Type)

MUSICAL-ACTIVITY (A Code, Level, Name)

~~EQUIPMENT (EquipmentName)~~

USED (EquipmentName, A Code)

TRAINER (SSN, Name, Surname, Date of Birth, Education, e-mail, Phone#*)

QUALIFIED-FOR (SSN of Trainer, A Code)

WEEKLY-SCHEDULE (SSN of Trainer, Day of week, Starting Time, Room, End Time, A Code)

PACKAGE (P Code, Price, Start Time, End Time, Package Type, Duration*, Entrance Type*, Category Name*)

CATEGORY (Category Name)

INCLUDE (A Code, P Code)

GYM-MEMBER (Mem Card#, Start Date, End Date, Name, Surname, Date of Birth, Category Name)

~~TIME-1 (Date)~~ ACCESS (Mem Card#, Date, Entrance, leaving Time)

TIME (Start Date)

PURCHASED-BY (MemCard#, PCode, Start Date,
End Date)

REFERENTIAL INTEGRITY CONSTRAINT

(1) IN THE CREATE TABLE

WEEKLY-SCHEDULE

FOREIGN KEY (SSN of Trainer)

REFERENCES TRAINER (SSN)

(2) FOREIGN KEY (A Code)

REFERENCES MUSICAL-ACTIVITY (A Code)

(3) IN THE CREATE TABLE

PURCHASED-BY

FOREIGN KEY (MemCard#)

REFERENCES GYM-MEMBER (MemCard#)

FOREIGN KEY (PCode)

REFERENCES PACKAGE (PCode)