TUTORIAL N° 1

Part 1

1) What is a database ?
2) What is a DBMS ? what do you use it for ?
3) What is redundancy?
4) Which user groups interact with a running DBMS?
5) For each of the following concepts give a brief description of what it means
   i- Key
   ii- Composed key
   iii- Total participation
   iv- Key constraint

Part 2

6) A student accommodation service looks after several residential halls, and wishes to integrate management of these into a single database. One small part of this concerns recording the allocation of students to rooms. You have the following information, arising from an initial requirements analysis.

- Each student has a universal username (UUN) that can be used to identify them in the database. This is a unique 8-character alphanumeric code issued by the University.
- Other than that, the database must record every student's name and their year of study.
- Students are allocated to rooms. Each room has a fixed capacity — one, two, three, or even more.
- No student can be allocated to more than one room; but some students in the system might not yet have any room assigned.
- There are several halls, each with its own name and unique Building ID.
- Each room belongs to one hall, and is identified within that hall by its number. There is no coordination in room numbering between different halls: in particular, two rooms in different halls might have the same number.

Draw an entity-relationship (ER) diagram that represents this information. Make sure that you capture the constraints described on the relationships involved, and designate appropriate primary keys for all entities.

7) The organisers of the EXAM 2011 international multi-conference need to keep track of a large collection of workshops associated with the event. Initial requirements analysis brings out the following information about what needs to be recorded.

- Each workshop has a name, and happens on a particular date — or dates, as some workshops last more than one day.
- There are several participants, each of which may sign up to one or more workshops.
- For each participant, it is important to record their name, email address, and the work-shops which they wish to attend.

11) Olympic games happen in a certain year at a certain place. Each year, there is at most one instance of Olympic games. In each discipline of an olympic game, there is exactly one gold medalist, one silver medalist, and one bronze medalist. All these medalists are athletes.
Give an ER model for this description. Identify the keys and give the functionalities of all relationships.

12) The following are the requirements for the Gym Fitness Database

- For each MEMBER we keep track of the unique MemdID, a well as Name, Zip, and the Date the membership was paid
- For each MEMBERSHIP type we keep track of the unique Mid, as well as MNameandPrice
- For each PASS CATEGORY we keep track of the unique PassCatID, as well as PCNameand Price
- For each ONE DAY PASS we keep track of the unique PassIDand Date
- For each MERCHANDISE item we keep track of the unique MrchID, as well as Name and Price
- For each sale TRANSACTION we keep track of the unique Tidand Date
- Each member pays for exactly one membership type; each membership type has at least one member but can have many members
- Each member can buy many day passes but does not have to buy any, each day pass was bought by exactly one member
- Each day pass belongs to exactly one pass category; a pass category can have many individual day passes issued for it but does not have to have any
- Each sale transaction involves exactly one member; each member can be involved in many sale transactions but does not have to be involved in any
- Each merchandise item is sold via at least one sale transaction but it can be sold via many sale transactions; each sale transaction involves at least one merchandise item but can involve many merchandise items
- Every time a merchandise item is sold via a sale transaction, we keep track of the quantity (how many instances of that particular merchandise item were sold via that particular sale transaction)

Your task is to create an ER Diagram based on these requirements and then map it into a Relational Schema

- There are a number of meeting rooms at the conference venue, each of a fixed capacity. Meetings rooms are identified by a floor and room number.
- Every workshop needs an allocated meeting room; where a workshop lasts for two days, it will use the same room on both days.

Draw an entity-relationship diagram suitable for representing this information, in particular the connections between participants, workshops, rooms, and dates.

8) A database is to be set up to record details of experts on different subjects. The database will be used to contact experts to be called as witnesses in court cases. The following information needs to be recorded.

- For each expert, their witness identity number, name, affiliation (e.g., "Edinburgh Uni- versity"), and email address.
- For each field of expertise, the name of the field (e.g., "DNA forensics").
- For each expert, all the fields of expertise that they are expert in.
- For each field of expertise, at most one identified leading expert.

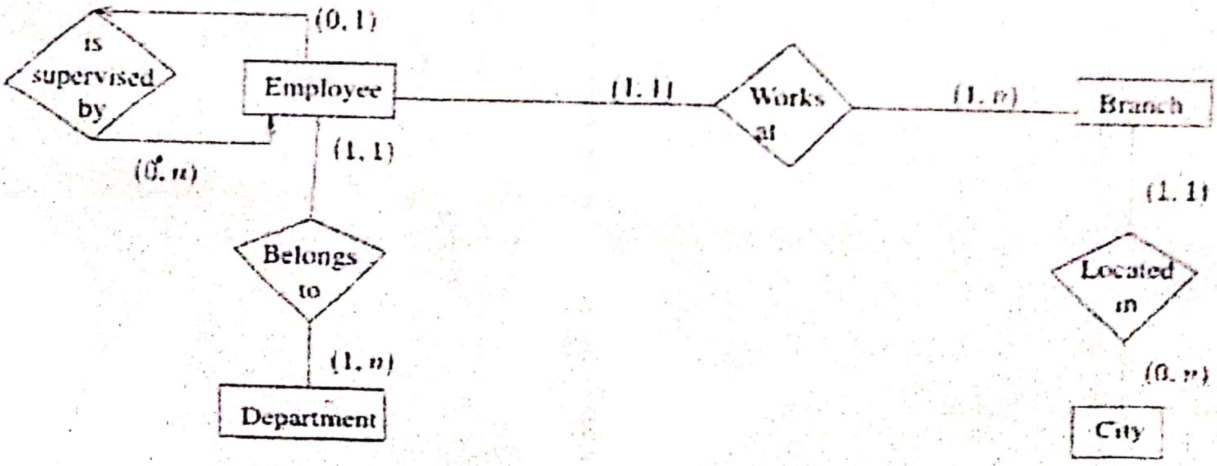
Draw an ER diagram that expresses the requirements for the database. Make sure that you capture all the constraints on the data mentioned above.

9) A university wants to set up a database to record details about its staff, and the departments they belong to. They intend to record the following information.

- For each member of staff, their staff identity number, name, job title, and salary.
- For each department, its name and address.
- For each member of staff, all departments that they belong to. It is required that every member of staff belongs to at least one department.
- For each department, the head of department. It is required that each department has exactly one head of department.

Draw an ER diagram that expresses the requirements for the database. Make sure that you capture all the constraints on the data mentioned above.

10) Give the business rules of the following ER and derive its relational model



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