PROJECT 1 (42 points)

Keep in mind that the problems below are designed to simulate some real life systems analysis situation; hence some information might be unstructured and sometimes fuzzy. It is your responsibility, as an analyst/designer, to translate what you read into an ERM. If you need to make any additional assumption in your model present it as a comment to your solution. Make sure that you clearly indicate the constraints. For example, if there is/are IsA situation(s), indicate the overlapping and coverage constraints next to the ISA symbol(s) in English. You are not required to specify the domains of the attributes in this project.

Problem 1. (20 points)

You are supposed to design a database to keep track of information for an art museum. Assume that the following requirements were collected:

- The museum has a collection of art objects. Each art object has a unique identification (ArtId), an artist (if known), a year (when it was created, if known), a title, an epoch (Renaissance, Modern, Ancient, etc.), and a description.
- The art objects are classified in the museum based on their type. The main types are painting and sculpture, plus another type they called "other" to accommodate objects that do not fall into one of the two main types.
- A painting has a paint type (oil, watercolor, etc.), material on which it is draw on (paper, canvas, wood, etc.), and style (baroque, renaissance, modern, realism, abstract, impressionism, etc.).
- A sculpture has a material from which it was created (wood, stone, iron, etc.), height, weight, and style (baroque, renaissance, modern, realism, abstract, impressionism, etc.).
- An art object in the other category has a type (print, photo, clay, etc.) and a style (modern, abstract, etc.).
- The art objects displayed by the museum are also categorized as **permanent collection** that are owned by the museum (which has information on the date acquired, whether it is on display or stored, and cost) or **borrowed from another collection**. When an art object is borrowed, the museum must store the date when the art object is borrowed, and the date when it is returned. It is possible that the same art object is borrowed many distinct times by the museum from the same collection. We will store in the database information only about the collections from which the museum borrowed some art object.
- Information is kept on collections with which the museum interacts, including collection's id, name, type (museum, personal, etc.), description, address, phone, and current contact person's name.
- The museum keeps track of artist's information: artist's id (five digits), name, date of birth, date of death (if not living), country of birth, epoch, main style, and a short biography. We store in the database information about artists having their art objects owned by the museum.
- Different art exhibitions occur, each having an exhibition's id, name, a place, a start date, and an end date. The museum uses to display its art objects during such exhibitions, although not all art objects of the museum were exposed in such art exhibitions. For each art object displayed in an exhibition we need to keep track of its display start date and display end date which can be different from the start and end date of the exhibition. We store in the database only information concerning the exhibitions where the museum exposed its art objects.

Develop an entity-relationship model (ERM) for the art museum. Clearly identify the entity sets, relationship sets, cardinality constraints, participation constraints, attributes, and primary keys in your model, using the notations and diagramming rules presented in the course.

Problem 2 (18 points)**.**

WISE_CAR Enterprises runs a high quality car sales operation for which they provide a complete customer after sales service. We store in the database only information concerning the cars sold by WISE_CAR, but we store the information concerning all cars' models available in Canada: make, type, year, 4WD (yes, no), horsepower. Each model is identified by a model_id (Mod_ID) which is unique. A record is kept of the names, phone numbers, and addresses of car owners. Each car owner is identified by an owner id (O_Id) which is unique. It is possible that the same person owns more than one car. For each car that a customer owns, a record is kept of the VIN (Vehicle Identification Number) which is unique, the registration number of the car, the model of the car, the date it was sold to the customer, and the price. Each car has a unique owner. The enterprise has a set of possible services it can offer. Each service is identified by a code unique (Serv_Id), a short description of the service, and a maximum number of hours needed by a mechanic to do the service. The enterprise has a number of car mechanics ("mechanics"). They are identified by a mechanic id (M_Id). We store in the database their names, addresses, phone number, seniority in the company (number of years). A service is done on a car by a car mechanic at a specific date. We have to store how long it took to the mechanic to do it and a short report concerning the service done on the car.

A byer must insure the car he/she will buy with an insurance company. The request is to store in the database all insurance companies available in Canada. Each insurance company has a unique name and an address; an insurance policy is identified by a policy number (unique inside the same insurance company). Each car is insured by a unique insurance policy and an insurance policy concerns only one car. The WISE_CAR likes to store the date when the insurance policy was issued and the length in time of the coverage.

Develop an entity-relationship model (ERM) for the WISE_CAR company. Clearly identify the entity sets, relationship sets, cardinality constraints, participation constraints, attributes, and primary keys in your model, using the notations and diagramming rules presented in the course.

Problem 3 (using the DB2 documentation) (4 points)

1. Use DESCRIBE statement to display the columns/attributes of the view SYSCAT.COLUMNS (present your statement and the result of it).
2. Present the definition of "Database partition groups" and the example of a database with five database partitions given in DB2 documentation.

What to submit:

The Project_1.doc file that contains:

- for each ERM (problem 1 and 2):
    - the entity sets and their attributes list (PK identified)
    - the relationship sets list (cardinality constraints, participation constraints, descriptive attributes, etc.)
    - the ERM diagram (use the symbols presented in the course). Do not forget to indicate the cardinality constraints, participation constraints, and primary keys. A handmade diagram is not acceptable.
- the answers for problem 3