EXAMEN DE FIN D'ÉTUDES SECONDAIRES – Sessions 2024						
QUESTIONNAIRE						
Date :	07.06.24	*Horaire :*	08:15 - 11:15		*Durée :*	180 minutes
Discipline :	AMINF	*Type :*	écrit	*Section(s) :*	CI	
				Numéro du candidat :		

Documents provided

- `Answers.dotx:`   to be used to insert your answers in the predefined structure
- `Translation.drawio:`   contains the CDM to be translated
- `Database.sql:`   MySQL database with a sample data set
- `Functions.pdf:`   List of known SQL functions

Preparation and delivery

In your working directory (to be defined by each school), you will find a folder called **EXAMEN_AMINF**. Rename this folder by replacing the current name with your exam code (example notation: **LXY_CI_07**). All your files should be saved in this folder, which will be called **your folder** afterwards!

Then open the file **Answers.dotx** inside your folder, adapt the header by adding your candidate number and the date. Then save the document in **your folder** (example of notation: **LXY_CI_07_ Answers.docx**).

At the end of the exam, create a PDF version of your answers file (example of notation: **LXY_CI_07_ Answers.pdf**) and check:
- that the PDF file contains all your solutions,
- that the screenshots are readable.
- that all SQL queries are provided, one query per file.

Remember to save your file <u>regularly</u>!

You will be evaluated solely on the contents of the PDF file!

Question 1 – Creating a CDM   20p

You are tasked with designing a relational database to manage information on artificial intelligence (AI) research.

The database must provide a comprehensive structure for organizing and managing information related to AI research, researchers, projects, publications, conferences, technologies, and collaborations.

Created with DALL-E 3 on 15th February 2024

Specific projects on the topic of AI need to be listed in the database. Information such as the project number, project title, description, the start, and end of the project is required.

Many researchers work on projects. There is always a project lead among the researchers that are working on a project. Senior researchers may lead several projects. Researchers take on a specific role (eg. Team leader, team member, secretary, etc) on each project they are working. During each project the assignment of roles can vary over time. A history of roles must be available at all times. Projects can be defined before any researcher is associated with it. Researchers can work on different projects at the same time. Researchers that are not involved in any project may still figure in the database. Researchers are stored with their unique number, first and last name, affiliation, email address.

Researchers may publish papers. These are stored in the database with their title, abstract, the publication date, and some keywords. Each paper is written by at least one researcher.

Researchers attend scientific conferences. The conferences are saved with a unique sequential number. Each conference has a name, their location, planned duration (start and end date) and a host. Conferences are planned before any researcher can attend.

Possible conference hosts are stored in the database even if they have not yet organised a conference. Their names, headquarters, and a brief description of the organisation are recorded. Before a conference is added to the database, the host must be available.

Research conferences target multiple specific scientific or engineering fields. These fields exist independently of whether they are covered by a conference. Each field has a unique code, a name, and a description. Fields can be composed of multiple sub-fields.

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Question 2 – Translating a CDM into a LDM   12p

Translate the conceptual data model (CDM) below into a logical data model (LDM). Use draw.io software for your work and insert the screenshot (on a white background) of your translation in the answer document.

For the class Option, optionId denotes the running bullet for each question, e.g. a), b), c).
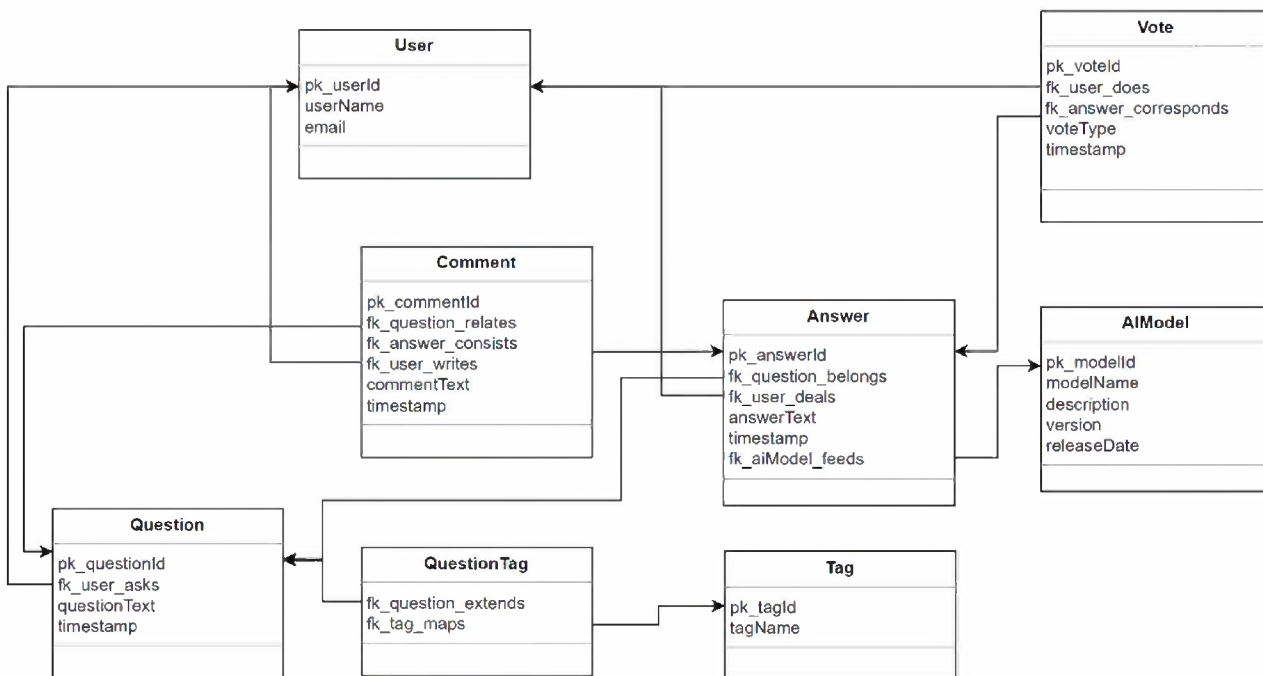
In your LDM, it must be possible to keep a history of answers a respondent gives for a specific question!
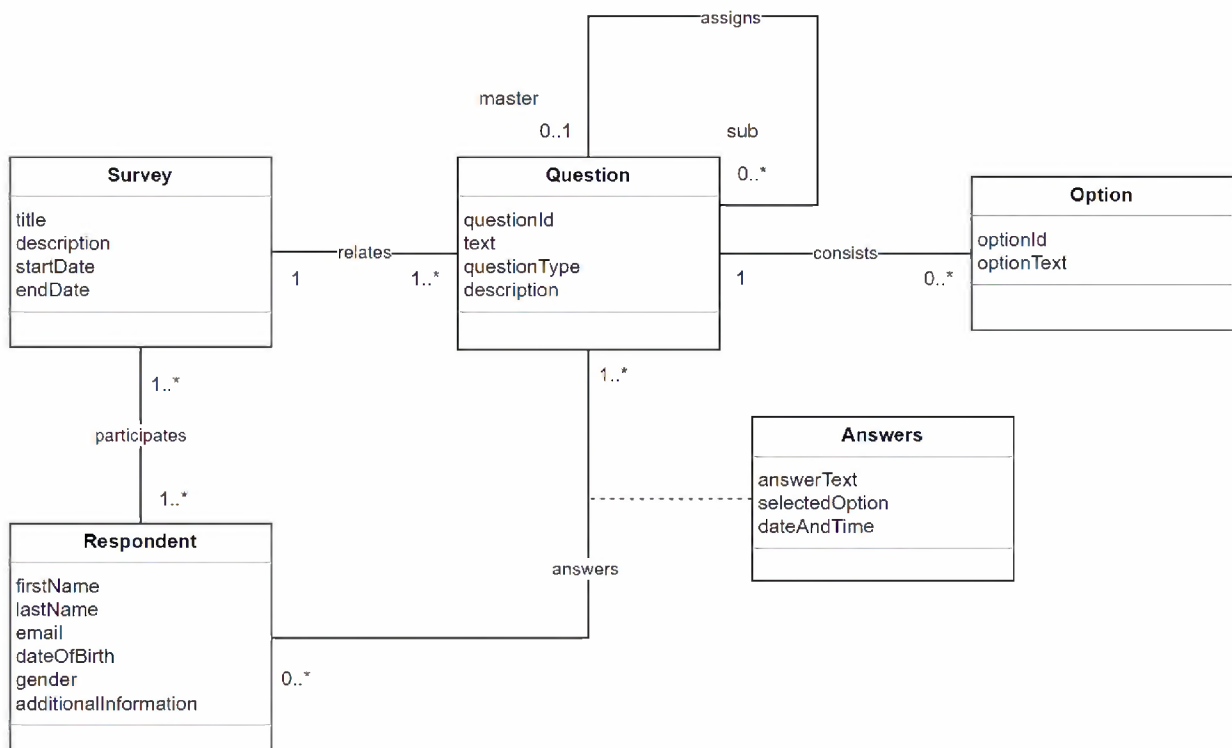
Question 3 – Writing SQL and Comprehension   28p

Execute the Database.sql file into Workbench. This creates a database corresponding to the LDM below. Use the dataset inserted in this database to run your SQL query tests.

Develop your answers **and** insert a screenshot of the SQL code for your queries and the result of execution into your answer document.

Note: The database contains a sample dataset which does not always provide good results. If you want to test your SQL queries, you may need to add additional test data.

1. Develop the SQL code to find the questions with a text of more than 100 characters. Retrieve the question ID, text, and the alias "**Question length**" of each question text.

    2p

2. Develop the SQL code to count the number of upvotes ("**Upvotes**") for each answer with its ID and text.   **4p**

3. Develop the SQL code to get the users who have actively engaged in the community by making at least two comments. Provide their user ID, username, and the count of comments ("**Comment count**") they have made.

    4p

4. Develop the SQL code to retrieve the 3 most recent questions along with their associated tags as follows. The latest question should be listed on top!

QuestionID	Question	Tags
6	What are the key principles of effective time management?	Productivity
5	How does the Internet work?	Health,Technology
4	What is the largest mammal on Earth?	Marine Life

5p

5. Develop the SQL code to retrieve all questions (id, text) with their answers (id, text) and associated user information of all users with either "John" or "Alice" in their name.

4p

6. Develop the SQL code to retrieve all comments made by user number 3 and 6, with the related question and answer text ("**UserID**", "**CommentID** ", "**Comment**", "**RelatedQuestion**", "**RelatedAnswer**"). Take only comments into account where an answer exists! Sort the list in alphanumerical order by user ID, starting with the smallest id. For each user comments are sorted by latest entry.

5p

7. Which problem do you encounter if you want to delete record number 6 of your "Answer" table on the **initial** data set without changing the table configuration? Explain the necessary steps and give a solution in SQL to delete "Answer" number 6 without any issues!

4p