Assignment 3

Write the relational algebra query for all the questions. Consult the manual to understand how to test your queries locally and run your queries on Gradescope. You only need to upload the file “relational_algebra_expressions.py” to Gradescope as a zip file. The schema for the relational algebra queries in this assignment are based on the solutions to Assignment 2 which are accessible to you on the class website. Note that some of the bonus questions are evaluated but do not carry any weightage towards the assignment and are only for practice, (so you are allowed to leave them empty/fail the tests).

1. Retrieve the names and genders of all people associated with ARC (i.e., members, employees, etc.) (15 marks)

2. List the names and departments of all faculty members who are also members of ARC. (15 marks)

Projection(non_student natural joint person Equals(“member_type”, “faculty”), [name])

3. Find the names of the people who were present in **either the weight room or the cardio room** on 2023-04-01.(20 marks)

   space, location_reading, person -> natural join
   minus
   space,location_reading, person -> where space_description = ‘weight room’ || cardio_room.

4. Find the names of the people who have attended all events. (15 marks)

person - person natural join attends

5. List the events whose capacity have reached the maximum capacity of their associated space. (15 marks) **(Just project the event ids)**

   Projection(Selection(event natural join space, Equals(“events.capacity”, “space.maximum_capacity”)), [event_description]);

6. Find the names of students who have used all the equipment located in the cardio room. (20 marks)

Bonus Questions

7. List the equipment ids and descriptions for equipment that is currently in use.
8. Find names of all employees in ARC.
9. Retrieve the names of all members who have attended an event in the yoga studio.
10. Find all family members who have attended ‘Summer Splash Fest’.

11. Find members who visit only those spaces in ARC that houses all the types of equipment that they have used (at some stage). As an example, say the location_reading table contains tuples for John showing that he has visited two rooms -- weight room and cardio room. Also, assume that there is an usage_reading showing that John has used a treadmill and an elliptical. John will be in the answer if each of the cardio and weight room contain machines of both the types -- treadmill and elliptical, and John does not visit any other location in ARC. If, for instance, cardio room did not include a treadmill, John would not be in the answer. Likewise, if John visited another space --e.g. swimming pool or yoga studio that does not contain both treadmill and elliptical then, again, John will not be in the answer.