

VANCOUVER ISLAND UNIVERSITY
CSCI 370 — MIDTERM EXAMINATION
20 February 2019, 11:30 — 12:50

TO BE ANSWERED IN BOOKLETS

DURATION: 80 Minutes

INSTRUCTOR: H. Liu

Instructions

- Students must count the number of pages in this examination paper before beginning to write, and report any discrepancy immediately to the invigilator.
- This examination paper consists of 4 pages.
- This is a CLOSED BOOK examination. You are allowed to have one piece of letter-sized and double-sided notes.
- Calculators are NOT permitted.
- Remember to state any assumptions and show rough work.
- Note carefully the weight of each question, and answer appropriately.
- Attempt all questions. All questions relate to material covered in the lectures, labs and assignments.

The following schema is used in all the questions in this exam. There are four relations in the database. The primary key of each relation is underlined.

Members(mid, name, title, email)
Committees(cid, name, description)
Composition(cid, mid, position, hours)
Proposals(pid, cid, topic, description, submitDeadline)

This schema describes a relational database used by an organization to manage its committees and working proposals by these committees.

- Each record in relation **Members** describes a member of the organization that potentially can work in the committees. Each member is given a unique id (mid), has a name, a title and an email address. You can safely assume that each member has a unique name too.
- Each record in relation **Committees** describes a committee with a unique id (cid), a unique name and a description that describes its responsibilities.
- Relation **Composition** stores the information about the committee's participating members. Each record in this relation tells us that a member (identified by mid) spends a certain number of hours each week in a position (such as Chair, regular member, etc) in a committee (identified by cid).
- A committee can have several open proposals. Each proposal belongs to exactly one committee. All the participating members of the committee work on the proposals belong to this committee.
Each record in relation **Proposals** describes a working proposal. Each proposal is given a unique id (pid), belongs to a committee (identified by cid), has a topic, a description and a date as its submit deadline.

1. (5 Marks) Describe succinctly the logical meaning of the following SQL query.

```
SELECT M.name, M.title
FROM Members M
WHERE NOT EXISTS (SELECT *
                  FROM Committees C
                  WHERE C.cid NOT IN (SELECT cid
                                     FROM Composition T
                                     WHERE T.mid = M.mid
                                     AND T.hours >= 5));
```

2. (25 Marks) Express each of the following queries in SQL against the relational schema defined before. Each query should be expressed using a *single* SQL statement.

- (a) List the name of each committee that has either “Anna Salim” or “Beth Pike” (or both) as its participating member(s).
- (b) List the name and description of each committee that doesn’t have any participating members yet.
- (c) For each committee with “Standards” in its name, list its name and the names and titles of all its participating members.
- (d) For each member, list his/her name, title, and the total number of hours he/she working in the committees. If a member doesn’t work in any committee, his/her name and title should still be included in the result and his/her total working hours should be listed as 0 (zero).
- (e) List the name and description of each committee with 10 (ten) or more participating members. Order the result by the numbers of participating members descending.

3. (10 Marks) Express the following query in Relational Algebra and Datalog respectively against the relational schema defined before.

For each proposal “Anna Salim” works on, list the proposal’s topic, submit deadline, and the names of all the members that also work on it.

4. (5 Marks) Anna Salim (with mid “HR012”) wants to reduce her workload and decides to spend only half of the time on each committee she currently participates.
Write a single SQL query to record such a change for Anna.
5. (5 Marks) Using the relational schema given for this exam, draw the corresponding ER diagram. (I.e., draw the ER diagram that can be translated into the relational schema used in this exam.) Clearly show the identifiers, discriminators if there are any, and cardinality types (many to 1 or many to many) of the relationship sets.

===== END OF EXAM QUESTIONS =====