The City College of New York
Department of Computer Science
Spring 2021 Semester

CSc 33600 Introduction to Database Systems

Assignment 2

A printed report showing [1] *the problem,* [2] *solution methods,* [3] *codes developed, and* [4] *outputs produced for the queries indicated is due at or before* 5:00 *pm on Thursday*, 25 March 2021. ***The deadline is strictly observed***.

A demonstration of your application is required.

Family Relations - II

Consider the Family Entity-Relationship (E-R) diagram[s] discussed in the class.

A. The definition of a brother-in-law in the Cambridge English Dictionary[1] is:

a. The husband of a person's sister,
b. The brother of a person's wife or husband, or
c. The husband of the sister of a person's wife or husband

Given the relation **Brothers** that has tuples of the form (*c*, *d*), where *c* is the brother of *d*, the relation **Sisters** that consists of tuples of the form (*g, h*), where *g* is the sister of *h*, the relation **Brother-Sister** which has tuples of the form (*e*, *f*), where *e* is the brother and *f* is the sister, and the relation **Husband-Wife** that has tuples of the form (*a*, *b*), where *a* is the husband and *b* is the wife.

a. Describe how you would define the relation **Brother-in-Law** whose tuples have the form (*x*, *y*) with *x* being the brother-in-law of *y*.
b. Give appropriate relational algebra and SQL expressions that return the relation **brother-in-Law**.

Amend your implementation in **Assignment 1** by including an implementation of part A above. The data utilized, whether your own personal data or available elsewhere, must be representative and sufficient to demonstrate the validity of your queries. The amendment also includes the implementation of the extended definition of nephew in the Merriam Webster Dictionary: A son of one's brother or sister or of one's brother-in-law or sister-in-law.[2]

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[1] https://dictionary.cambridge.org/us/dictionary/english/brother-in-law.
[2] [https://www.merriam-webster.com/dictionary/nephew.

B. Design and implement a Java application that connects to the database. The application employs a the following class inheritance hierarchy:

Person;
Child *is_a* **Person**;
GrandParent *is_a* **Person**;
BrotherInLaw *is_a* **Person**;
Nephew *is_a* **Child**.

class Person:

Class **Person** is the hierarchy's superclass and extends the Java class **Object.** Class **Person** implements an **interface SQLFamily**. A **Person** object is defined by the attributes of the Persons entity set in the Family E-R diagram. The class includes appropriate constructors and methods, including methods that perform the following operations:

a. *setPerson* – inserts a **Person** object in the database;
b. *get*[*X*]*Person* – returns attribute [*X*] of a **Person** object; and
c. *toString* – returns a **Person** object description as a String. The method overrides the method *toString* in **Object**.

class Child, **GrandParent**, **BrotherInLaw***;* **class Nephew**:

Classes **Child**, **GrandParent**, and **BrotherInLaw** extend class **Person**; class **Nephew** extends class **Child**. The classes include appropriate constructors and methods, including methods that perform the following operations:

a. *executeQuery* – executes the queries and return a list of the persons who are the children, grandparents, or brothers-in-law of a given person; and
b. *print* – prints the list of children, grandparents, or prothers-in-law of a given person.

interface SQLFamily:

Interface **SQLFamily** is implemented by the superclass **Person**, and includes method signatures, static methods, and/or default methods appropriate for the execution of the DML statements and SQL queries associated with the database.

Clarify in the report how **Brothers**, **Sisters**, **Brother-Sister** and **Husband-Wife** relations are accounted for in your java application.

Best wishes

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11 March 2021