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CS-UY 3083: Introduction to Databases

HW #4

--1.1

**SELECT DISTINCT** id, name **FROM** student **NATURAL** **JOIN** takes **WHERE** takes.grade = "A" **AND** (takes.course\_id = "CS-101" **OR** takes.course\_id = "CS-319");

--1.2

**SELECT DISTINCT** id, name **FROM** student **NATURAL JOIN** takes **WHERE** (takes.grade = "A" **AND** takes.course\_id = "CS-319") **OR** (takes.grade != "A" **AND** takes.course\_id = "CS-101");

--1.3

**SELECT** id **FROM** takes **GROUP BY** course\_id, id **HAVING** COUNT(\*) > 1;

--1.4

**CREATE TABLE** gradepoint (

letter **varchar(2)**,

points **numeric(2, 1)**,

PRIMARY KEY (letter, points)

);

**INSERT INTO** gradepoint **VALUES** ("A", 4.0), ("A-", 3.7), ("B+", 3.3), ("B", 3.0), ("B-", 2.7), ("C+", 2.3), ("C", 2.0), ("C-", 1.7), ("D+", 1.3), ("D", 1.0), ("F", 0);

**CREATE VIEW** StudentGPA **AS**

**SELECT** t1.id, (**SUM**(weighted\_points) / total\_credits) **AS** gpa

**FROM** (**SELECT** takes.id,

(course.credits \* gradepoint.points) **AS** weighted\_points

**FROM** takes

**NATURAL JOIN** course

**JOIN** gradepoint **ON** gradepoint.letter = takes.grade) **AS** t1

**NATURAL JOIN** (**SELECT** takes.id, **SUM**(course.credits) **AS** total\_credits

**FROM** takes **NATURAL JOIN** course **GROUP BY** takes.id) **AS** t2

**GROUP BY** id;

--1.5

--The foreign constraint belongs on the takes table to make sure that the grade column corresponds to an actual letter grade

**ALTER TABLE** takes

**ADD CONSTRAINT FOREIGN KEY** (grade) **REFERENCES** gradepoint.letter;

--1.6

**SELECT DISTINCT** takes.id

**FROM** takes

**JOIN** gradepoint **ON** letter=grade

**JOIN** (**SELECT** id, **MAX**(gradepoint.points) **AS** maxgrade, course\_id **FROM** takes **JOIN** gradepoint **ON** letter=grade **WHERE** course\_id="CS-101" **OR** course\_id="CS-347" **GROUP BY** id **HAVING** course\_id="CS-347") **AS** t1 **ON** t1.id = takes.id **AND** maxgrade = gradepoint.points

**WHERE** takes.course\_id="CS-101" **OR** takes.course\_id="CS-347"

--1.7

**SELECT DISTINCT** id

**FROM** takes

**WHERE** (grade = "A" **OR** grade = "A-") **AND** id **NOT IN** (**SELECT DISTINCT** id **FROM** takes **WHERE** grade != "A" **AND** grade != "A-" **GROUP BY** id);

--1.8

**SELECT** section.course\_id

**FROM** section

**INNER JOIN** (**SELECT** course\_id, year **FROM** section) **AS** t1

**ON** t1.year = section.year + 1 **AND** section.course\_id = t1.course\_id

--1.9

Set of all Comp Sci courses

Set of all classes instructor I taught

-- Write a query to find the number of Comp Sci courses that instructor 12345 taught.

**SELECT COUNT**(**DISTINCT** course\_id) **FROM** teaches **WHERE** ID=12345 **AND** course\_id **LIKE** "CS%"

-- Write a query to find the total number of Comp Sci courses

**SELECT COUNT**(course\_id) **FROM** course **WHERE** dept\_name="Comp. Sci."

-- Write a predicate that uses the above two counting queries and that is true if and only if instructor 12345 taught all Comp Sci courses.

**(SELECT COUNT**(**DISTINCT** course\_id) **FROM** teaches **WHERE** ID=12345 **AND** course\_id **LIKE** "CS%") = (**SELECT COUNT**(course\_id) **FROM** course **WHERE** dept\_name="Comp. Sci.")

-- Now, instead of focusing on instructor 12345, enclose the predicate you just wrote in a query that will check whether an arbitrary instructor i taught all Comp Sci courses.

**SELECT** ID **FROM** instructor **NATURAL JOIN** teaches **WHERE** teaches.course\_id **LIKE** "CS%" **GROUP BY** ID **HAVING COUNT**(\*) = (**SELECT COUNT**(\*) **FROM** course **WHERE** dept\_name="Comp. Sci.");

--1.10

Set of all TV series that a person p watches

Set of all TV series that Gene Guo watches

--Number of shows that Gene Guo watches

**SELECT** **COUNT**(\*) **FROM** watches **WHERE** first\_name = "Gene" **AND** last\_name = "Guo"

--Number of shows a person watches

**SELECT COUNT**(\*) **FROM** watches **GROUP BY** first\_name, last\_name

--Predicate

**SELECT COUNT**(\*) **FROM** watches **GROUP BY** first\_name, last\_name **HAVING COUNT(**\*) = (**SELECT** **COUNT**(\*) **FROM** watches **WHERE** first\_name = "Gene" **AND** last\_name = "Guo")

--Final Query

**SELECT** first\_name, last\_name

**FROM** watches

**JOIN** (**SELECT DISTINCT** title, year **FROM** watches **WHERE** first\_name = "Gene" **AND** last\_name = "Guo") **AS** t1 **ON** t1.title=watches.title

**GROUP BY** first\_name, last\_name

**HAVING** first\_name != "Gene"

**AND** last\_name != "Guo"

**AND COUNT(**\*) = (**SELECT** **COUNT**(\*) **FROM** watches **WHERE** first\_name = "Gene" **AND** last\_name = "Guo");

--1.11

**SELECT** tvseries.title

**FROM** tvseries

**LEFT JOIN** watches **ON** watches.title= tvseries.title

**WHERE** watches.first\_name **IS NULL**

--1.12

**SELECT** course.course\_id, ID

**FROM** course

**LEFT JOIN** teaches **ON** course.course\_id = teaches.course\_id

--2.1

If an instructor is changed, then all tables that rely on the instructor table as a foreign key will also be altered. These tables are: **teaches** and **advisor**.

The table teaches will have rows whose columns refer to the deleted row in instructor **deleted** as the foreign key constraint on that table has set "ON DELETE CASCADE" specified.

The table advisor will have the value of i\_ID set to NULL when the corresponding row in instructor is deleted.

--2.2

If the ON DELETE SET NULL was replaced with ON DELETE CASCADE, then the foreign key constraint on the advisor table would change. Now, if an instructor is deleted, then the corresponding row of the advisor table would also be deleted.

--2.3

**CREATE FUNCTION** untaught\_section(id **int,** cid **varchar(8),** s **varchar(6),** y **decimal(4, 0)**)

**RETURNS integer**

**BEGIN**

**DECLARE** s\_count **INTEGER;**

**SELECT COUNT**(\*) **INTO** s\_count

**FROM** section

**LEFT JOIN** teaches **ON** teaches.sec\_id = section.sec\_id **AND** teaches.course\_id = section.course\_id

**WHERE** section.sec\_id = id

**AND** teaches.ID **IS NOT NULL**

**AND** section.course\_id = cid

**AND** section.semester = s

**AND** section.year = y;

**RETURN** s\_count;

**END;**

**ALTER TABLE** takes

**ADD CONSTRAINT** untaught\_constraint **CHECK** (untaught\_section(sec\_id, course\_id, semester, year) > 0);