

Introduction to Databases

SQL assessed coursework

Dr Paolo Guagliardo

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Database schema. The schema we use in this assignment models a simplified university scenario consisting of the tables below.

COURSES have a unique code (string), a name (string), and a credits value (non-negative integer).

DEGREES have a unique code (string), a name (string), and a type attribute (string) that is either “UG” (for *undergraduate*) or “PG” (for *postgraduate*).

STUDENTS have a unique UUN identifier (string), a name (string), and a reference to the code of the degree they are enrolled in.

EXAMS have a reference to the code of a course, a reference to a student’s UUN, a date, and a grade (integer between 0 and 100). Each row is uniquely identified by the course code and the student’s UUN.

PROGRAMMES have a reference to the code of a degree, and a reference to the code of a course. The values of these two references (together as a pair) uniquely identify each row. This table indicates the mandatory courses that must be taken in order to obtain each degree.

The detailed SQL schema can be found at:

<https://ifile.inf.ed.ac.uk/?path=/afs/inf.ed.ac.uk/group/teaching/dbs/2020/coursework/sql-assignment/schema.sql>

Assignment. Write the following queries in SQL.

(01) **Students who have not taken any exams**

Return the UUN of each student that satisfies this requirement, without repetitions.

The output table will have a single column, which consists of distinct UUNs.

(02) **Total number of postgraduate students**

The output table will have a single column, consisting of non-negative integers, and precisely one row, independently of the instance. If there are no postgraduate students, the only answer will be the value 0 (zero).

(03) **Students whose average grade is greater than or equal to 75**

For each student that satisfies this requirement, return their UUN, their minimum grade, their maximum grade, and the total number of exams the student took (in this order). The same UUN cannot appear more than once in the output. Students without exams do not appear in the output.

The output table will have four columns: the first one consists of distinct UUNs, the second and third consist of marks (non-negative integers up to 100), and the fourth is the number of exams (a positive integer).

(04) **Students who failed more than 30% of their exams**

Return the UUN of each student that satisfies this requirement, without repetitions. An exam is failed when the grade is below 40.

The output table will have a single column, which consists of distinct UUNs.

(05) **Total number of credits in the programme of each degree**

For each degree, calculate the total number of credits of the courses listed in its programme. Return the code of the degree and the corresponding total (in this order). Degrees with no mandatory courses will be in the output with a total of 0.

The output table will have two columns: the first one consists of degree codes, the second consists of non-negative integers. The number of rows is always the same as the number of rows in the DEGREES table.

(06) **Number of A, B, C and D exam grades of each student**

Return the student's UUN, followed by columns A, B, C, D (in this order) with the total number of exam grades in each of the following categories:

- A is a grade of 80 or above,
- B is a grade between 60 and 79,
- C is a grade between 40 and 59,
- D is a grade below 40.

For each row, $A + B + C + D$ = total number of exams taken by the student. Students without exams do not appear in the output.

The number of rows will always be the same as the number of distinct UUNs in the first column of the EXAMS table.

(07) **Courses that are part of an undergraduate and a postgraduate degree programme**

That is, courses that are in the programme of some undergraduate degree and also in the programme of some postgraduate degree. Return the code of each course that satisfies these requirements, without repetitions.

The output table will have one column, which consists of distinct course codes.

(08) **Courses included in one and only one postgraduate degree programme**

That is, courses that are in the programme of some postgraduate degree and not in the programme of any other postgraduate degree. Return the code of each course that satisfies this requirement, without repetitions.

The output table will have one column, which consists of distinct course codes.

(09) **Students who took more than one exam on the date of their most recent exam**

For each student, return their UUN and the date of their most recent exam, if on that same date they have taken at least another (different) exam.

The output table will have two columns: the first consists of distinct UUNs, the second of dates.

(10) **Students who have taken the exam for every course in their degree programme**

For each student that satisfies this requirement, return their UUN and their name (in this order). Students in degrees without mandatory courses (listed in the PROGRAMMES table) satisfy the requirement and must appear in the output.

The output table will have two columns: the first one consists of UUNs, the second consists of student names. There are no duplicate rows.