CSCC43 UTSC

Tutorial Week 5 – Introduction to SQL

Part 1:

Schema

Student (<u>sID</u>, surName, firstName, campus, email, cgpa)

Course (<u>dept</u>, <u>cNum</u>, name, breadth)

Offering (<u>oID</u>, dept, cNum, term, instructor)

Took (<u>sID</u>, <u>oID</u>, grade)

Offering [dept, cNum] ⊆ Course [dept, cNum]

Took [sID] ⊆ Student [sID]

Took [oID] ⊆ Offering [oID]

Questions

Write a query for each of the following:

1. Answer each of the following questions with an arithmetic expression.
   Suppose a row occurs n times in table R and m times in table S.
   (a) Using bag semantics, how many times will it occur in table $R \cup S$?
   (b) Using bag semantics, how many times will it occur in table $R \cap S$?
   (c) Using bag semantics, how many times will it occur in table $R - S$?

2. Use a set operation to find all terms when Jepson and Suzuki were both teaching. Include every occurrence of a term from the result of both operands.

   Output:

   ```
   term
   -------
   20089
   20081
   20081

   (3 rows)
   ```

3. Find the sID of students who have earned a grade of 85 or more in some course, or who have passed a course taught by Atwood.

Ensure that no sID occurs twice in the result.

Output:

```
  sid
-------
   157
 98000
 99132
 99999
(4 rows)
```

4. Find all terms when csc369 was not offered.

   Output:

   ```
   term
   -------
    20081
    20089
   (2 rows)
   ```

5. Make a table with two columns: oID and results.
   In the results column, report either “high” (if that offering had an average grade of 80 or higher), or “low” (if that offering had an average under 60). Offerings with an average in between will not be included.
   Hints:
   Surprise surprise, use a set operation.
   You can use the SELECT clause to put a literal value into a column.
   For example:

   ```
   SELECT 'high' as results ....
   ```

   Output:

   ```
   oid  | results
   -----+---------
     38 | high
     14 | low
      8 | high
      7 | high
      3 | high
     28 | high
     13 | high
     39 | high
     15 | low
      1 | high
   (10 rows)
   ```

Part 2:

1. Write a query to find the average grade, minimum grade, and maximum grade for each offering.

Output:

```
 oid |          avg          | min | max
-----+-----------------------+-----+-----
  31 | 78.0000000000000000 |  70 |  82
  34 | 60.6666666666666667 |  45 |  75
            . . . rows omitted
   8 | 92.0000000000000000 |  91 |  93
  11 | 79.0000000000000000 |  39 |  99
(23 rows)
```

2. Which of these queries is legal?

```
SELECT surname, sid
FROM Student, Took
WHERE Student.sid = Took.sid
GROUP BY sid;
```

```
SELECT surname, Student.sid
FROM Student, Took
WHERE Student.sid = Took.sid
GROUP BY campus;
```

```
SELECT instructor, max(grade),
count(Took.oid)
FROM Took, Offering
WHERE Took.oid = Offering.oid
GROUP BY instructor;
```

```
SELECT Course.dept, Course.cnum,
       count(oid), count(instructor)
FROM Course, Offering
WHERE Course.dept = Offering.dept and
      Course.cnum = Offering.cnum
GROUP BY Course.dept, Course.cnum
ORDER BY count(oid);
```

3. Find the sid and minimum grade of each student with an average over 80.

Output:

```
  sid  | min
-------+-----
 98000 |  54
 99999 |  52
(2 rows)
```

4. Find the sid, surname, and average grade of each student, but keep the data only for those students who have taken at least 10 courses.

Output:

```
  sid  |  surname   |         avg
-------+------------+---------------------
   157 | Lakemeyer  | 75.9333333333333333
 99999 | Ali        | 84.5833333333333333
 98000 | Fairgrieve | 83.2000000000000000
(3 rows)
```

5. For each student who has passed at least 10 courses, report their sid and average grade on the courses that they passed.

Output:

```
  sid  |         avg
-------+---------------------
 98000 | 83.2000000000000000
 99999 | 84.5833333333333333
   157 | 78.5714285714285714
(3 rows)
```

6. For each student who has passed at least 10 courses, report their sid and average grade on all of their courses.

   Output:

```
  sid  |         avg
-------+---------------------
 98000 | 83.2000000000000000
 99999 | 84.5833333333333333
   157 | 75.9333333333333333
(3 rows)
```

7. Which of these queries is legal?

```
SELECT dept
FROM Took, Offering
WHERE Took.oID = Offering.oID
GROUP BY dept
HAVING avg(grade) > 75;
```

```
SELECT Took.oID, avg(grade)
FROM Took, Offering
WHERE Took.oID = Offering.oID
GROUP BY Took.oID
HAVING avg(grade) > 75;
```

```
SELECT Took.oID, dept, cNum,
       avg(grade)
FROM Took, Offering
WHERE Took.oID = Offering.oID
GROUP BY Took.oID
HAVING avg(grade) > 75;
```

```
SELECT oID, avg(grade)
FROM Took
GROUP BY sID
HAVING avg(grade) > 75;
```