

Assignment 3: Algebra and SQL

Course ISE 322: Database Systems

Due December 29, 2009; Extended to January 5, 2010

Answer the following exercises.

1 Relational Algebra Queries (50 points)

Consider the following schema:

Students (*sid*:integer, *sname*:string, *age*:integer, *average*:real)
Courses (*cid*:integer, *cname*:string, *points*:integer)
Enrolled (*sid*:integer, *cid*:integer, *grade*:real)
Lecturers (*lid*:integer, *lname*:string, *rank*:string)
Teaches (*lid*:integer, *cid*:integer, *room*:string)

Students are described by a *sid* identifier, their name, age, and average grade. Courses are identified by their id, their name, and the number of hours (*points*) they are for. The Enrolled relation lists which students are enrolled in which course and records their final grade for the course.

1. (5 points) Find the *cids* for each course which has at least one student enrolled:
2. (5 points) Find the *cids* for each course which has at least two students enrolled
3. (5 points) Find the *cids* for each course which has zero students enrolled
4. (5 points) Find the *sids* for each student who is enrolled in every course
5. (5 points) Find the *sids* for each student who is enrolled in zero courses
6. (8 points) Find the *cids* for every course which “Jon” took for which he received a grade **higher** than his average
7. (8 points) Find the names of students who take more than one course worth at least two points in the same room
8. (9 points) Find the names and ranks of all lecturers who teach every student

2 SQL Queries (68 points)

Consider the following schema:

Suppliers(*sid*:integer, *sname*:string, *address*: string)
Parts(*pid*:integer, *pname*:string, *color*:string)
Catalog(*sid*:integer, *pid*:integer, *cost*:real)

The Catalog relation lists the prices charged for parts by Suppliers. Write the following queries in SQL. To help guide you, I have provided a sample set of data for the above tables. The file can be found on the course web page. After each question I have put a table showing the results as they should be received based on the sample data set.

Hint: Queries where you may need to use GROUP BY are hinted with a † symbol.

1. (5 points) Find the pnames of parts for which there is at least one supplier.

	pname
Results	7 Segment Display
	Acme Widget Washer
	Anti-Gravity Turbine Generator
	Fire Hydrant Cap
	I Brake for Crop Circles Sticker
	Left Handed Bacon Stretcher Cover
	Smoke Shifter End
	Turkish Turkey

2. (5 points) Find the snames and addresses of suppliers who supply every part.

	sname	address
Results	Yuletide Tides	1 Grub St., Potemkin Village, IL 61801

3. (5 points) Find the snames of suppliers who supply every red part.

	sname
Results	Yuletide Tides
	Big Red Tool and Die

4. (5 points) Find the pnames of parts supplied by “Yuletide Tides” and no one else.

	pname
Results	Smoke Shifter End
	Acme Widget Washer

5. (8 points) Find the sids of suppliers who charge more for some part than the average cost of that part (averaged over all the suppliers who supply that part).†

	sid
Results	1
	2
	3
	4

6. (5 points) For each part, find the sname of the supplier who charges the most for that part (and print the part’s pid next to it)

sname	pid
Alien Aircraft Inc.	6
Alien Aircraft Inc.	7
Big Red Tool and Die	1
Big Red Tool and Die	3
Perfunctory Parts	8
Yuletide Tides	2
Yuletide Tides	4
Yuletide Tides	5
Yuletide Tides	9
Yuletide Tides	10

Results

7. (5 points) Find the sids of suppliers who supply only red parts.

Results

sid
2

8. (5 points) Find the sids of suppliers who supply at least one red part **and** at least one green part.

Results

sid
1
3

9. (5 points) Find the sids of suppliers who supply at least one red part **or** at least one green part.

Results

sid
1
2
3
5

10. (10 points) For every supplier that supplies **only** green parts, print the name of the supplier and the total number of parts that she supplies.†

Results

sname	count
Interfacing Outs	1

11. (10 points) For every supplier that supplies at least one green part **and** at least one red part, print the name and price of the **most expensive** part that she supplies.

Results

sname	pname	cost
Yuletide Tides	Anti-Gravity Turbine Generator	100.23
Perfunctory Parts	Fire Hydrant Cap	12.5