Tutorial 4 - Nested SQL

CSC343 - Introduction to Databases Fall 2008

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Nested Query

Question

Student (snum: integer, sname: string, major: string, level: string, age: integer) Class (<u>name</u>: <u>string</u>, meets_at: string, room: string, fid: integer) Enrolled (<u>snum</u>: <u>integer</u>, <u>cname</u>: <u>string</u>)

Faculty (fid: integer, fname: string, deptid: integer)

- (E5.1.2) Q8: Find the **age** of the oldest student who is enrolled in a course taught by I. Teach.
- The way of thinking
 - Divide and Conquer
 - Find the set S1 of students who are enrolled in a course taught by I. Teach
 - Find the age of the oldest student in a set S1 of students

Answer 08: SELECT MAX(S.age) FROM Student S WHERE S.snum IN (SELECT E.snum FROM Class C, Enrolled E, Faculty F WHERE E.cname = C.name AND C.fid = F.fid AND F.fname = 'I.Teach'

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Without nested query

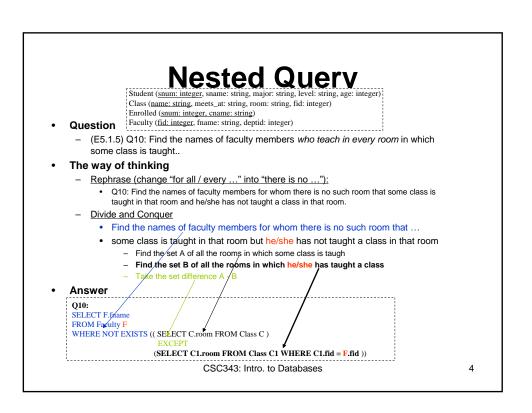
SELECT MAX(S.age) FROM Student S, Class C, Enrolled E, Faculty F WHERE S.snum = E.snum AND E.cname = C.name AND C.fid = F.fid AND F.fname = 'I.Teach'

Nested Query Student (<u>snum: integer</u>, sname: string, major: string, level: string, age: integer) Class (<u>name: string</u>, meets_at: string, room: string, fid: integer) Enrolled (<u>snum: integer</u>, <u>cname: string</u>) **Question** Faculty (fid: integer, fname: string, deptid: integer) (E5.1.3) Q9: Find the names of all classes that either meet in room BA1180 or have 2 or more students enrolled. The way of thinking Divide and Conquer Find the set A of classes that meet in room BA1180 Find the set B of classes that have 2 or more students enrolled Answer Without Nested Query SELECT C.name SELECT C.name FROM Class C FROM Class C WHERE C.room = 'BA1180' OR C.name IN (SELECT E.cname WHERE C.room = 'BA1180' UNION FROM Enrolled E SELECT E.cname **GROUP BY E.cname** FROM Enrolled E **HAVING COUNT** (*) >= 2)

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GROUP BY E.cname HAVING COUNT (*) >= 2)



Nested Query

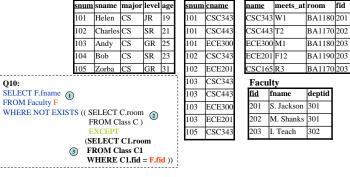
Enrolled

Class

Question

- Given following database instance, answer Q10.

Student



Answer

I. Teach

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Nested Query

Question

Student (snum: integer, sname: string, major: string, level: string, age: integer)
Class (name: string, meets_at: string, room: string, fid: integer)
Enrolled (snum: integer, cname: string)
Faculty (fid: integer, fname: string, deptid: integer)

 (E5.1.6) Q11: Find the names of faculty members for whom the combined enrollment of the courses that they teach is less than five.

• The way of thinking

- Divide and Conquer
 - For each faculty member, find the combined enrolment r of the courses he/she teaches

Print the name of that faculty member if r is less than 5.

PAnswer

Q11:
SELECT F.fname
FROM Faculty F
WHERE 5 > (SELECT COUNT(E.snum)
FROM Class C, Enrolled E
WHERE C.name = E.cname
AND C.fid = F.fid)

Each student may appear in the
Enrolled table many time. Why
do not we add the keyword
'DISTINCT' when we count
student numbers here?

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Nested Query

Question

Student (<u>snum: integer</u>, sname: string, major: string, level: string, age: integer)
Class (<u>name: string</u>, meets_at: string, room: string, fid: integer)
Enrolled (<u>snum: integer, cname: string</u>)
Faculty (<u>fid: integer</u>, fname: string, deptid: integer)

- (E5.1.10) Q12: Find the names of students enrolled in the maximum number of classes.
- · The way of thinking
 - Rephrase (change "maximum ..." into "greater than or equal to all others ...")
 - Find the names of students who enrolled the number of classes greater than or equal to all other students did.
 - Divide and Conquer
 - Find the names of students who is ...
 - enrolled the number of classes greater than or equal to ...
 - the number of classes all other students enrolled.

Answer

Q12:
SELECT DISTINCT S.sname
FROM Student S
WHERE S.snum IN (SELECT E.snum
FROM Enrolled E
GROUP BY E.snum
HAVING COUNT (*) >= ALL (SELECT COUNT (*)
FROM Enrolled E2
GROUP BY E2.snum))

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Nested Query

Question

Student (snum: integer, sname: string, major: string, level: string, age: integer)
Class (name: string, meets_at: string, room: string, fid: integer)
Enrolled (snum: integer, cname: string)
Faculty (fid: integer, fname: string, deptid: integer)

- (E5.1.11) Q13: Find the names of students not enrolled in any class.
- The way of thinking
 - Divide and Conquer
 - Find the set A of students who have enrolled in some class
 - · Print the names of students who is not in A

Answer

Q13:
SELECT DISTINCT S.sname
FROM Student S
WHERE S.snum NOT IN (SELECT E.snum
FROM Enrolled E)

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• Tutorial notes are also available at: http://www.cs.utoronto.ca/~leijiang/ta/343/08f/index.html

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