

CS 582 — Database Management System II— Spring 2007

Homework 1 — Solution for the second question

The homework has two parts.

1. Create your own web site on CS Web Server. Read how to do it from `intranet.cs.nmsu.edu`. Your website should provide the following information:

- Name
- Your highest degree, university
- List of classes that you have completed at NMSU
- List of your current classes

Answer: No answer for this.

2. Write *relational algebraic expressions* for the following queries (given the Student Registration System database as described in the hand-out, or page 43 from the textbook):

- List all courses that are taught by professors who belong to the EE or MGT departments.

Answer:

$$R = \pi_{CrsCode}(\sigma_{DeptId='EE' \text{ OR } DeptId='MGT'}(Teaching \bowtie_{ProfId=Id} Professor))$$
$$Answer = \pi_{CrsName, CrsCode, Descr}(Course \bowtie R)$$

R contains the course code satisfying the requirement of the query. The answer lists the name and description as well.

- List the names of all students who took courses both in spring 2007 and fall 2006.

Answer:

$$R_1 = \pi_{StudId}(\sigma_{Semester='F2006'}(Transcript))$$
$$R_2 = \pi_{StudId}(\sigma_{Semester='S2007'}(Transcript))$$
$$R_3 = R_1 \cap R_2$$
$$Answer = \pi_{Id, Name}(Student \bowtie_{Id=StudId} R_3)$$

Explanation: R_1 is the list of StudIds who takes at least one course in Fall 2006. R_2 is the list of StudIds who takes at least one course in Spring 2007. R_3 collects all students who took courses **both** in spring 2007 and fall 2006. The answer contains the name and id of those students.

- List the names of all students who took courses from at least two professors in different departments.

Answer:

$$R_1 = \pi_{StudId, ProfId, DeptId}((Transcript \bowtie Teaching) \bowtie_{ProfId=Id} Professor)$$
$$R_2 = R_1 \bowtie_{[StudId, Prof1, Dep1]}$$
$$R_3 = \pi_{StudId}(\sigma_{ProfId \neq Prof1 \text{ AND } DeptId \neq Dep1}(R_2))$$
$$Answer = \pi_{Id, Name}(Student \bowtie_{Id=StudId} R_3)$$

Explanation: R_1 is the list of StudIds with the ProfessorID, from whom the student takes at least one class, and the Department Id of the professor. R_3 collects all student IDs satisfying the request of the query. The answer contains the name and id of those students.

- List the names of all students who got at least one A.

Answer:

$$R_1 = \pi_{StudId}(\sigma_{Grade='A'}(Transcript))$$
$$Answer = \pi_{Id,Name}(Student \bowtie_{Id=StudId} R_1)$$

- List the names of all students who got at least one A and at least one F.

Answer:

$$R_1 = \pi_{StudId}(\sigma_{Grade='A'}(Transcript))$$
$$R_2 = \pi_{StudId}(\sigma_{Grade='F'}(Transcript))$$
$$R_3 = R_1 \cap R_2$$
$$Answer = \pi_{Id,Name}(Student \bowtie_{Id=StudId} R_3)$$