

Relational Algebra & Calculus Expressions

Consider the relational schema below:

Students(sid: integer, sname: string, major: string)

Courses(cid: integer, cname: string, hours: integer)

Enrollment(sid: integer, cid: integer, grade: real)

Q1) Write a relational algebra expression that satisfies this query?

Find the distinct names of all students that take more than three courses and do not major in "Philosophy".

A1)

$\pi_{\text{distinct}(\text{sname})}(\sigma_{\text{sid} \text{ Gcount}(\text{cid}) > 3 \wedge \text{major} \neq \text{'Philosophy'}}(\text{Students} \bowtie \text{Courses} \bowtie \text{Enrollment}))$

Consider the relational schema below:

Students(sid: integer, sname: string, major: string)

Courses(cid: string, cname: string)

Enrollment(sid: integer, cid: string, grade: real)

Q2) Write a tuple relational calculus expression that satisfies this query?

Find the distinct names of all students who major in either "Math" or "Economics" who score less than 60% in either course 91.574 or in course 14.501 (using cid).

A2)

$\{\text{Students.sname} \mid \text{Students} \wedge \text{Enrollment} \wedge (\text{Enrollment.sid} = \text{Students.sid}) \wedge (\text{Students.major} = \text{'Math'} \vee \text{Students.major} = \text{'Economics'}) \wedge ((\text{Enrollment.grade} < 60\% \wedge \text{Enrollment.cid} = \text{'91.574'}) \vee (\text{Enrollment.grade} < 60\% \wedge \text{Enrollment.cid} = \text{'14.501'}))\}$

Consider the relational schema below:

Students(sid: integer, sname: string, degree: string, gpa: real)

College(cid: integer, cname: string)

Enrollment(sid: integer, cid: integer, onCoop: boolean)

Q3) Write a relational algebra expression that satisfies this query?

Find the total number of all students in the college "Khoury" who have a GPA below 3.0 and are not on coop.

A3)

$\text{Gcount}(\text{sid})(\sigma_{\text{cname} = \text{'Khoury'} \wedge \text{gpa} < 3.0 \wedge \text{onCoop} = \text{False}}(\text{Students} \bowtie \text{College} \bowtie \text{Enrollment}))$