Relational Query Languages: Taxonomy

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When a query language is **relationally complete**

**Equivalence** of the relational algebra, the tuple calculus, and the domain calculus
Relational Queries and Solutions - Relational Algebra - I

students(sname, gpa, fname)
faculty(fname, office)

1. all advisors

\[ \pi_{\text{fname}} \text{students} \]

2. all student records with gpa’s over 3.0

\[ \sigma_{\text{gpa} > 3.0} \text{students} \]

3. all advisors of students with gpa’s over 3.0

\[ \pi_{\text{fname}} \sigma_{\text{gpa} > 3.0} \text{students} \]

4. offices of all advisors of students with gpa’s over 3.0

\[ \pi_{\text{office}} (\text{faculty} \ast \sigma_{\text{gpa} > 3.0} \text{students}) \]
Relational Queries and Solutions - Relational Algebra - II

students(sname, gpa, fname)
offerings(cno, sem, fname)
took(sname, cno, sem, grade)

1. students who took a course with their advisor

\[ \pi_{\text{sname}} (\text{students} \times \text{offerings} \times \text{took}) \]

2. students who never took a course with their advisor

\[ \pi_{\text{sname}} \text{students} - \pi_{\text{sname}} (\text{students} \times \text{offerings} \times \text{took}) \]

3. students who took a course their advisor never taught

\[ \pi_{\text{sname}} (\pi_{\text{sname}, \text{cno}} \text{took} - \pi_{\text{sname}, \text{cno}} (\text{students} \times \text{offerings})) \]

3.5) students who took a course with someone other than their advisor

\[ \pi_{\text{sname}}(\pi_{\text{sname}, \text{cno}, \text{sem}} \text{took} - \pi_{\text{sname}, \text{cno}, \text{sem}} (\text{students} \times \text{offerings})) \]

4. students who only took courses with their advisor

\[ \pi_{\text{sname}} \text{students} - \pi_{\text{sname}} (\pi_{\text{sname}, \text{cno}, \text{sem}} \text{took} - \pi_{\text{sname}, \text{cno}, \text{sem}} (\text{students} \times \text{offerings})) \]