

Relational Query Languages: Relational Algebra

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Relational query languages

- 1) Relational Algebra
- 2) Relational Calculus
- 3) SQL

Tables:

teach(sin, cid)

courses(cid, title)

emp(sin, name, phone, age, salary)

E.g. Find names and phones of employees who make more than 50k.

- 3) SQL

- 2) Relational Calculus

- 1) Relational Algebra

Relational calculus: declarative

SQL: based on rel. calculus and declarative (sometimes with procedural components)

Relational Algebra:

- a procedural or operational query language
- It is an algebra: much similar to elementary algebra and linear algebra

- domain:
- operators:
 - basic:
 - derived:
- Some features

Operations:

1) σ : select some rows

2) π : project some columns

3) \times : cartesian product

4) ρ : rename result columns (and table)

5) \cup : Set union

6) $-$: Set difference

7) \cap : set intersection is a derived operator (how?)

8) \bowtie : join

9) / : division

Another set of tables:

courses(cid, title)
students (sid, name)
taken(sid, cid, sem, year, grade)

Queries:

Q1. Find the names of students who have taken a course in 2021.

Q2. Find the sid and names of students who have not taken a course in 2021.

Q3. Find the sid of students who have taken at least two different courses in 2021.

Q4. Find students who have taken all courses.

courses(cid, title)
students (sid, name)
taken(sid, cid, sem, year, grade)