Relational Algebra

Computing on Data

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Learning Objectives

By the end of this video, you will be able to:

- Define what relational algebra is.
- Identify the operands and operators for relational algebra.

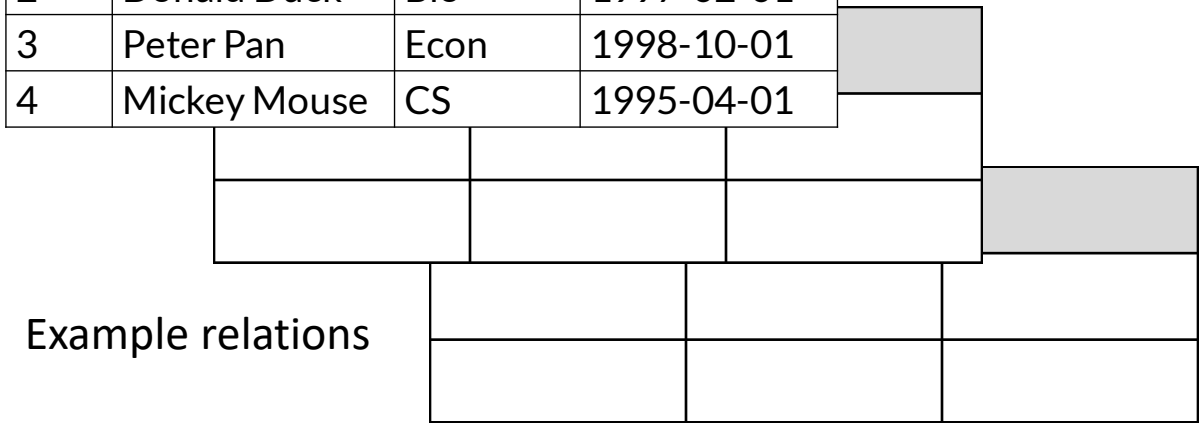
Algebra

- Mathematical system with:
  - **Operands**: Values to be operated upon (to generate new values)
  - **Operators***:* Symbols denoting operations that compute over operands and produce new values
- Examples
  - Arithmetic algebra
    - Operands: Numbers
    - Operators: Addition, subtraction, multiplication, division, etc.
  - Boolean algebra
    - Operands: Truth values false and true
    - Operators: And, or, not

Relational Algebra

- Operands: Relations, of course!

id	name	major	birthday
1	Bugs Bunny	CS	2004-11-06
2	Donald Duck	Bio	1997-02-01
3	Peter Pan	Econ	1998-10-01
4	Mickey Mouse	CS	1995-04-01



Example relations

- Operators
  - What do we want to compute over one or multiple relations?
  - Purpose: We want to compute on relations to “answer questions.”
    - What is the major of Bugs Bunny?
    - What majors do students have?
    - What courses are Bugs Bunny taking?

Relational Operators

- Operators: relations as input, new relation as output
- Basic operators
  - Reduction: Make one table smaller.
    - Selection
    - Projection
  - Combination: Combine two tables.
    - Set Operations
      - Union, difference
    - Cartesian Product
  - Renaming: Change attribute names.

- Derived operations
  - Intersection, complement
  - Joins (natural, equi-join, theta join, semi-join)