Day 10: Relational Data

Erin Rossiter

03 April, 2023

Announcements

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- project update feedback in Slack
  - » if you want additional feedback, come to office hours
- PS08 due tomorrow
- No class on Monday because of university holiday
  - » No office hours either!
  - » **Make up office hours Wednesday 4/12 10:30am-12:30pm**

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- A database in which information is stored in a number of database tables
- Each database table has its own rows and columns
- **The different tables in a database can be related**
- Having data in separate but related tables is:
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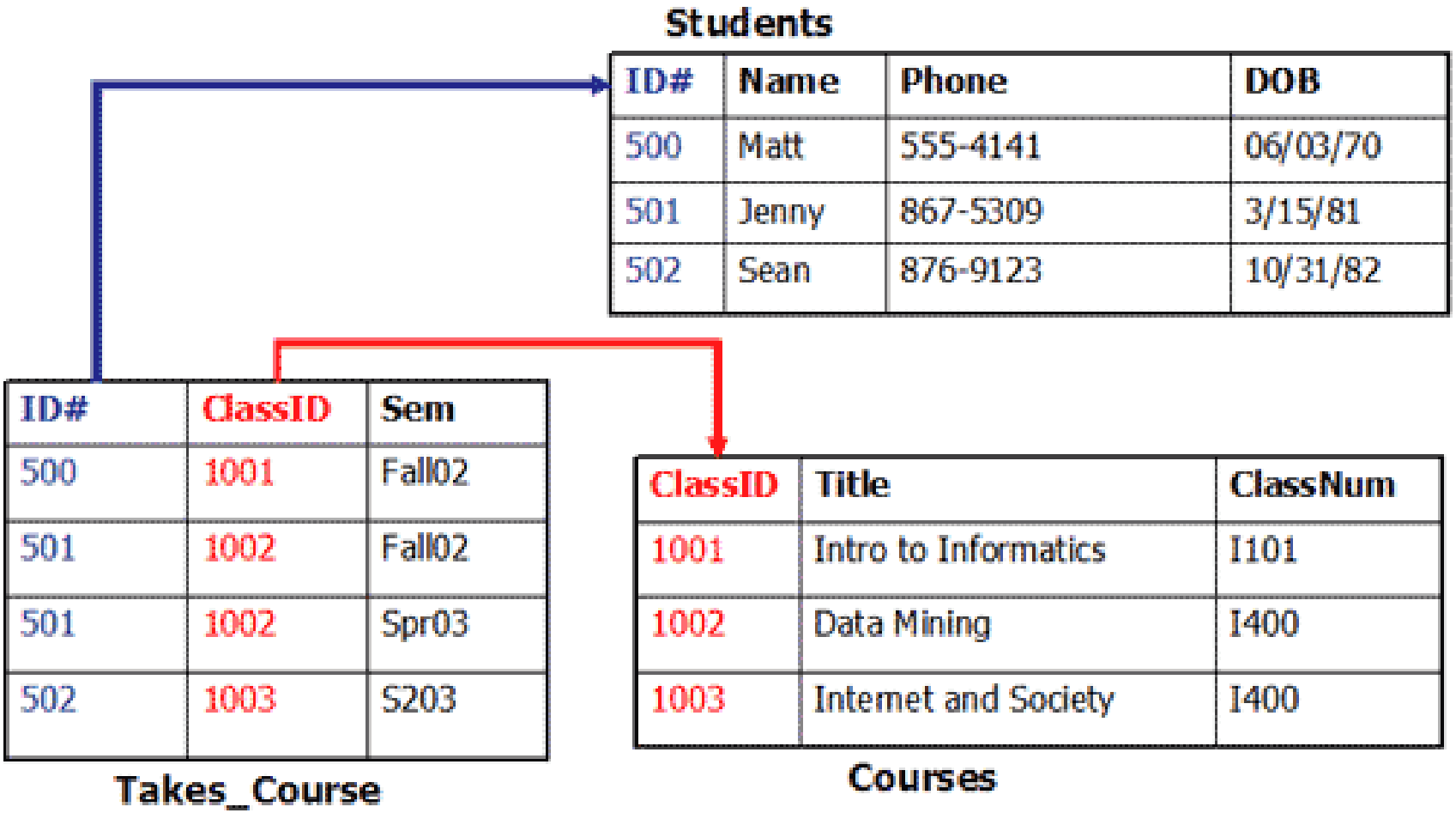

Students

ID#	Name	Phone	DOB
500	Matt	555-4141	06/03/70
501	Jenny	867-5309	3/15/81
502	Sean	876-9123	10/31/82

ID#	ClassID	Sem
500	1001	Fall02
501	1002	Fall02
501	1002	Spr03
502	1003	S203

Takes_Course

ClassID	Title	ClassNum
1001	Intro to Informatics	I101
1002	Data Mining	I400
1003	Internet and Society	I400

Courses

Why are we learning this?

- You might want to store a database you collect relationally
  - » space reasons
  - » sharing reasons (maybe you make a GUI someday. . .)
  - » network data is inherently like this (nodes and edges)
- Or, you might need to access data stored this way
  - » Simple example: Supreme Court Database
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Running example

- Mayor-level information
- Tweet-level information

Two topics today

There are various ways we might want to work across levels

- *Joins*, where you make a new variables constructed form matched observations in the other
  - » Ex: We have mayor info and want to add Twitter info to that dataset
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Kinds of joins and dplyr syntax

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- 4 most common types of joins:
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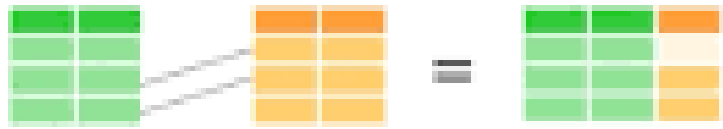

`right_join()`

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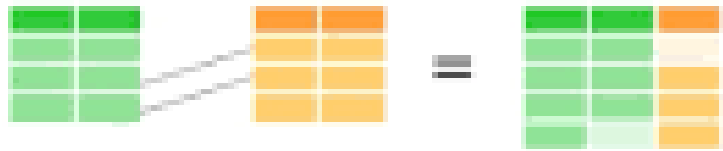

Working with remote data

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- We've only ever worked with local in-memory data
- We might want to work with remote on-disk data stored in databases
- Why?
  - » Your data is already stored this way
  - » You have so much data that it does not all fit into memory simultaneously and you need to use some external storage engine.
- If your data fits in memory there is no advantage to putting it in a database
  - » It will be slower in all ways

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- You need to understand relational data
- It writes the SQL for you!
- . . . but it doesn't do everything
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Lingo

- **database backend** underlying software that manages the storage and retrieval of data in a database
  - » We'll use `RSQLite::SQLite()`
- **SQL** another, old programming language for managing relational data
- **SQL queries** our requests for subsets and organizations of the data to bring into local memory