Lab #2: More Relational Data Processing

Everything Data

CompSci 216 Spring 2015

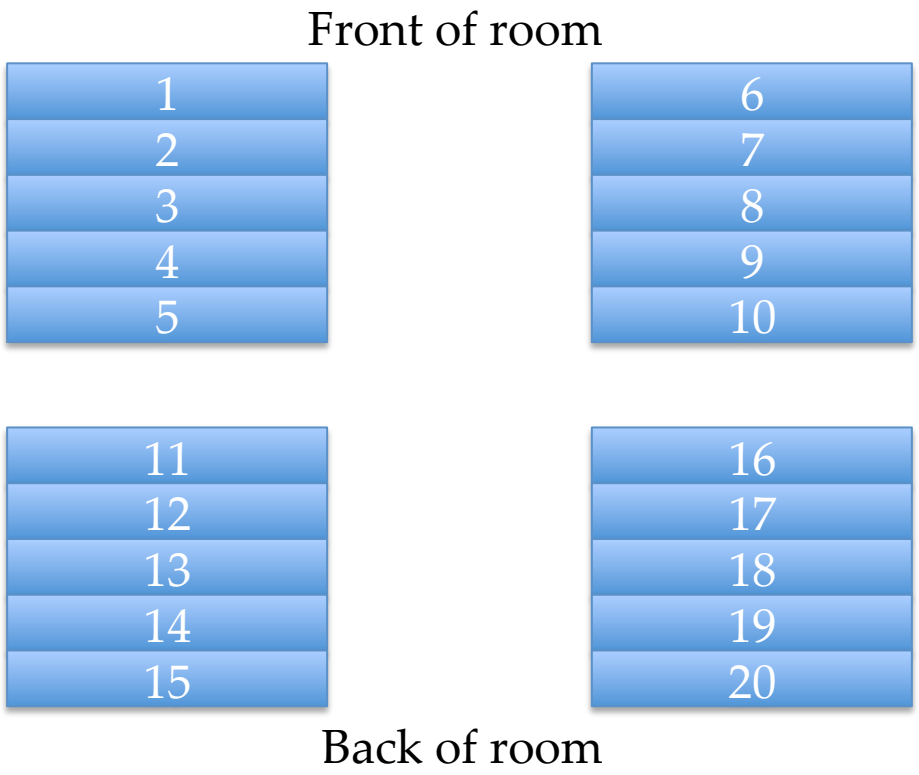
DUKE
COMPUTER SCIENCE

Announcements (Mon. Jan. 26)

- Team assignment slightly updated because of drop/add
  - If you didn't receive an email from me, your team assignment remains unchanged
- You should been very comfortable with your VM now
  - If not, come to our office hours to resolve any setup issues

Seat assignment

See course website (under "Schedule") for team assignment



Format of this lab

- Class discussion of Homework #2 + a few more SQL tricks (15 min.)
- Team discussion of Homework #2, Part 2 (10 min.)
  - Share your claims and counterarguments
- Lab #2, with team challenge! (40 min.)
  - Win prizes and extra credit!
- Summarize lessons learned (10 min.)

Homework #2, Part 2:

Price vs. Pelosi

- There is a Republican Representative whose last name is also Price
  - The filtering condition in the query shown in Lecture #2 wasn't precise enough
- Once we make the filtering condition precise, the result becomes expected:
  - David Price vs. Pelosi: 86%
  - Butterfield vs. Pelosi: 81%

Homework #2, Part 1 (A-D)

- Find females born in/after 1980: *filter*
- Find NC senators: *join*
- Count House votes by record value: *join, filter, group-by*
- Which Dems voted against funding the government in 2014?
  - A 4-way join: remember the connections (join conditions)!
  - Use `LIKE` or `~` for string pattern matching

Homework #2, Part 1 (E)

Breakdown of votes by party

- Key: given vote_id and person_id, find the person's party at the time of the vote

```
... (SELECT DISTINCT party
    FROM person_roles
    WHERE person_id = person_votes.person_id
    AND start_date <= votes.date AND votes.date <= end_date) ...
```

  - Govtrack data isn't clean: multiple roles may be active at the same time!
  - **DISTINCT** option for SELECT eliminates duplicates
    - **DISTINCT** is also available for aggregation functions
      - E.g., COUNT(DISTINCT party) = # distinct parties in a group

Some tips for writing SQL

Top-down

- First write the "outer" query
- Then fill in the blanks with subqueries

Bottom-up

- For each each output row, think about what evidence (rows from input tables) you need to prove it
  - That will give you the tables to join in `FROM`

Think logically, on whole sets

Queries too slow?

- *Indexing* may help
  - Index on a column speeds up looking up rows with a particular value (or within a range of values) for that column
  - E.g., **CREATE INDEX ON** persons_roles(person_id);

- *Note: if a column is PRIMARY KEY or UNIQUE, the database system will automatically create an index on it*

Image credit: http://2.bp.blogspot.com/-otmbPSD4G5k/T2C0dhJZUiI/AAAAAAAAAGQ/zbzKCD3fCCM/s1600/indexing.png

Team work (10 min.)

- Discuss Homework #2, Part 3 with your teammates
  - Share your claims and counterarguments
- At the end of this period, I will give the signal to start the challenge

Team claim-checking challenge

- 4 claims, some chosen from your submissions, some prepared by us
- For each claim
  - Is it technically "correct"?
  - Is it misleading? Why?
  - Show us your supporting queries for both

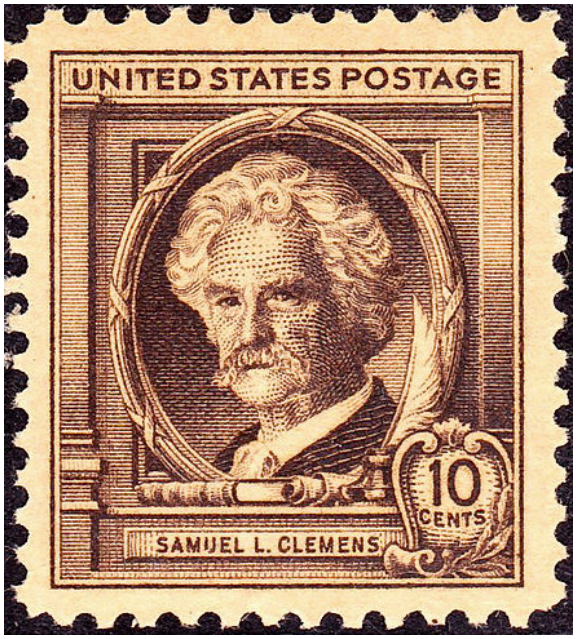
- Each claim successfully checked = extra credit worth 1% of a homework
- The first team to finish checking all claims gets a prize

Challenge

- On my mark, go to Lab #2 page
- Take just a little time to go over Part 1—it will help you!
- Once your team finishes checking a claim, raise your hands and yell "*CHECK ⟨claim #⟩!*"
  - One of the course staff will come and verify your answer
- If you finish early, try Part 3 for fun
  - To impress us; no extra credit though

Lessons learned

- With big data, it's easy to find something to support your agenda
- It's easy to make mistakes
- Knowing SQL doesn't mean you know how to query a dataset



… lies, d—ned lies, and statistics…
— Mark Twain

More lessons learned

- Behold the power of simple but flexible data model + "declarative" queries
  - Data = collection of tables
  - Queries = compositions of filter, group-by aggregation, join, sort, subqueries, …
- ***Physical data independence***

When to use a SQL database

- Pros and cons?
- Despite its age, SQL is still your best bet for querying your structured data

Finally

- Remember to **submit** `team.txt` **by midnight**
- Sample solutions to Lab #2 will be posted by tomorrow morning
  - Take some time on your own to go through the sample solutions