




Section 2
SQL Queries

INTRODUCTION TO DATABASE SYSTEMS

CSE 444



Agenda

- Insert, Update, and Delete
 - Constraints
 - Group by: Group practice
 - Sub queries: Discussion
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Schema for today's queries

- AUTHOR(aid, name, age)
- WRITTEN_BY(bid, aid)
- BOOK (bid, title)
- BOOK_WORDS (bid, word)
- WORD(word) - we can do without this.

Insert, Update, and Delete

- **INSERT INTO** AUTHOR **VALUES**
(312, 'Michael Chabon', 45);
- **UPDATE** AUTHOR **SET** AGE=46 **WHERE**
aid=312;
- **DELETE FROM** AUTHOR **WHERE**
aid=312;

Note: for **DELETE** [be careful! don't forget the **WHERE** condition!]



Constraints

- What are examples of ICs constraints that we might want?
 - Keys, foreign keys
 - Attribute-level constraints
 - Tuple-level
 - Global constraints
- Policies
 - Reject
 - Cascade
 - Set NULL

Group Exercises 1

- Find names of authors who wrote more than 20 books.
- Without group-by

```
SELECT name
FROM AUTHOR a
WHERE (SELECT COUNT(*)
      FROM WRITTEN_BY wb
      WHERE wb.aid = a.aid) > 20
```

- With group-by:

```
SELECT name
FROM AUTHOR a, WRITTEN_BY wb
WHERE a.aid = wb.aid
GROUP BY a.aid, a.name --note that we must include
a.name
HAVING COUNT(*) > 20
```

Group by error

- Column '___' is invalid in the select list because it is not contained in either an aggregate function or the GROUP BY clause.

Group Exercise 2

- Find authors who have a vocabulary of more than 10k words.

Without group-by:

```
SELECT name
FROM AUTHOR A
WHERE (SELECT COUNT(DISTINCT word)
      FROM WRITTEN_BY wb, Book_Words bw
      WHERE A.aid = wb.aid AND wb.bid = bw.bid) > 10000
```

With group-by:

```
SELECT name
FROM AUTHOR a, WRITTEN_BY wb, BOOK_WORDS bw
WHERE a.aid = wb.aid AND wb.bid = bw.bid
GROUP BY a.aid, a.name
HAVING COUNT(DISTINCT word) > 10000
```


Group Exercise 3

- For each author, report average number of words per book.
- With group-by:

```
SELECT aid, AVG(num)
FROM (SELECT aid, bid, COUNT(*) num
      FROM AUTHOR a, WRITTEN_BY wb, BOOK_WORDS bw
      WHERE ...
      GROUP BY aid, bid) t
GROUP BY aid
```

Group Exercise 4

- Find most frequently used word.
- With group-by:

```
SELECT    word
FROM      BOOK_WORDS
GROUP BY  word
HAVING    count(*) >= ALL (SELECT count(*)
                           FROM    BOOK_WORDS bw1
                           GROUP BY bw1.word)
```

Subqueries: Discussion

- Where can sub-queries occur?
 - SELECT / FROM / WHERE / HAVING
- If I make a subquery S in the _____ (one of the above) clause,
 - Where can I access S?
 - What properties must S have?