

Discussion 12

SQL

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Announcements

- Homework 9 due Thursday 4/20.
- Midterm 2 regrade requests due Friday 4/21.
- Optional Scheme Recursive Art Contest entries due Tuesday 4/25.
- Scheme project due Friday, 4/28.
 - Checkpoint 1 due Friday, 4/21.
 - Checkpoint 2 due Tuesday, 4/25.
 - Early submission point for submitting by Thursday, 4/27.

SQL

SQL

- What is SQL?
 - A declarative programming language
 - Database management
 - Do not describe computations, but rather the desired result of computations
- Resources
 - <https://sql.cs61a.org>

SELECT

- Create a table with two rows, columns as `first` and `last`

```
sqlite> SELECT "Ben" AS first, "Bitdiddle" AS last UNION  
...> SELECT "Louis", "Reasoner";
```

| first | last |
|-------|-----------|
| Ben | Bitdiddle |
| Louis | Reasoner |

```
SELECT [columns]
```

FROM

- SELECT specific values from an existing table with a FROM clause

```
sqlite> SELECT name, division FROM records;
```

| name | division |
|-----------------|------------|
| Alyssa P Hacker | Computer |
| ... | ... |
| Robert Cratchet | Accounting |

```
SELECT [columns] FROM [tables]
```

WHERE

- filter out rows using a WHERE clause

```
sqlite> SELECT * FROM records WHERE title = "Programmer";
```

| name | division | title | salary | supervisor |
|-----------------|----------|------------|--------|---------------|
| Alyssa P Hacker | Computer | Programmer | 40000 | Ben Bitdiddle |
| Cy D Fect | Computer | Programmer | 35000 | Ben Bitdiddle |

```
SELECT [columns] FROM [tables] WHERE [condition]
```

ORDER BY

- Order rows with the ORDER BY clause

```
sqlite> SELECT name, salary FROM records  
...> WHERE division = "Accounting" ORDER BY salary desc;
```

| name | salary |
|-----------------|--------|
| Eben Scrooge | 75000 |
| Robert Cratchet | 18000 |

```
SELECT [columns] FROM [tables] WHERE [condition]  
ORDER BY [criteria]
```


Q4 , Q5 , Q6

JOIN

- What to do when you want to combine data from multiple tables
 - JOIN them!
- What happens when you use the JOIN clause?
 - Have a new row for each combination of the input table
 - If two tables are joined and the left table has m rows and the right table has n rows, then the joined table will have $m*n$ rows

JOIN (Example)

- Let's say we have a `meetings` table that displays what `Day` each `Division` has a meeting
- Our goal is to determine what `Day` each employee has a meeting
- First step
 - Combine table `records` and `meetings`
- Second step
 - Only include the rows where the `records.division = meetings.division`

JOIN (Example) (Combining)

```
SELECT name, day FROM records, meetings;
```

| name | day |
|-----------------|-----------|
| Alyssa P Hacker | Monday |
| Alyssa P Hacker | Monday |
| Alyssa P Hacker | Wednesday |
| Alyssa P Hacker | Wednesday |
| ... | ... |
| Robert Cratchet | Wednesday |

JOIN (Example) (Filtering)

Ambiguous Joins

```
SELECT a.name, b.day FROM records AS a, meetings AS b
WHERE a.division = b.division;
```

| name | day |
|-----------------|-----------|
| Alyssa P Hacker | Wednesday |
| Ben Bitdiddle | Wednesday |
| ... | ... |
| Robert Cratchet | Monday |

STEP BY STEP

Slides by Aditya Balasubramanian

Q6 , Q7 , Q8

Aggregation

- What if we want to obtain data from our table (i.e. `max`, `min`)
 - `MAX`, `MIN`, `COUNT`, and `SUM`

```
SELECT name, MAX(salary) FROM records;
```

| name | MAX(salary) |
|-----------------|-------------|
| Oliver Warbucks | 150000 |

```
sqlite> SELECT COUNT(*) from RECORDS;  
9
```

GROUP BY

- group rows in a column to be aggregated with the GROUP BY clause

```
sqlite> SELECT division, MIN(salary) FROM records  
GROUP BY division;
```

| division | MIN(salary) |
|----------------|-------------|
| Accounting | 18000 |
| Administration | 150000 |
| Computer | 25000 |

STEP BY STEP

HAVING

- Filter GROUPS with the HAVING clause

```
sqlite> SELECT title FROM records GROUP BY title  
HAVING COUNT(*) > 1;
```

title

Programmer

STEP BY STEP

Q9 , Q10 , Q11

Thank you!!!

Anon Feedback -> <https://tinyurl.com/adit-anon>