

# 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>**