Section 3

Week of February 18

Outline

- A few notes
- SQL
- Heroku

A few notes:

- Project 1 was released Monday
- Due on March 4th: there are suggested milestones

SQL

- Structured Query Language
- Database: place to store long term information
  - Simplest form is like an excel spreadsheet: rows, columns, and tables (tabs)
- Query: to perform an operation on a database
- PostgreSQL: A variant of SQL

Keywords: database, table, query

- After you create a database, you create one or more **tables**.
- For each table, you specify all of the **columns** in the table.
- When new information is added to the database, the new information (typically) goes into a new **row**.
- There are many data types that can be stored in a SQL database. This is just a small sample.

INT	SMALLINT	SERIAL	MEDIUMINT	BIGINT
DECIMAL	FLOAT	BIT	DATE	TIME
DATETIME	TIMESTAMP	CHAR	VARCHAR	BINARY
BLOB	TEXT	ENUM	GEOMETRY	LINESTRING

CREATE

- A CREATE query makes a new table, using constraints.

```
CREATE TABLE <name> (
   <col-name> <type> <opt-constraint>,
   <col-name> <type> <opt-constraint>,
   …
   <col-name> <type> <opt-constraint>
);
```

Constraints:

```
NOT NULL
PRIMARY KEY
UNIQUE
DEFAULT
CHECK
...
```

Primary Key: A primary key is guaranteed to be unique. By convention, it is a SERIAL named ID

INSERT

- An INSERT query adds information to a table.

```
INSERT INTO
<table>
(<columns>)
VALUES
(<values>)
```

SELECT

- A SELECT query extracts information from a table.

```
SELECT
<columns>
FROM
<table>
WHERE
<predicate>
```

You can also select:

```
*
COUNT(*)
AVG(<column>
MIN(<column>)
MAX(<column>)
```

Possible predicates:

```
<condition> AND <condition>
<condition> OR <condition>
<column> IN (<list>, <of>, <items)
<column> LIKE '%pattern%'
```

SELECT

- A SELECT query extracts information from a table.

```
SELECT <columns> FROM <table>
WHERE <predicate>
ORDER BY <column> [ASC or DESC]
LIMIT [#]

SELECT <columns> FROM <table>
WHERE <predicate>
GROUP BY <column>
HAVING <predicate>
```

UPDATE

- An UPDATE query changes information in a table.
  - You can also update multiple columns at once

```
UPDATE <table>
SET <column>=<value>
WHERE
<predicate>
```

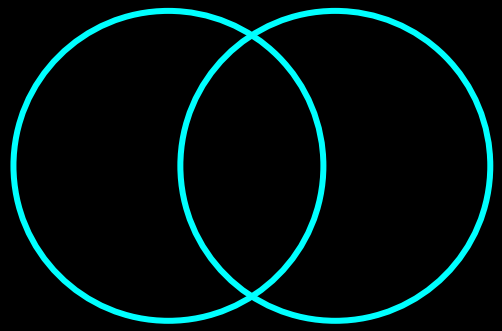
JOIN

- A SELECT (JOIN) query extracts information from multiple tables.

```
SELECT
<columns>
FROM
<table1>
JOIN
<table2>
ON
<predicate>
```

You can also do:

```
LEFT JOIN
RIGHT JOIN
```



DELETE

- A DELETE query removes information from a table.

```
DELETE FROM
<table>
WHERE
<predicate>
```

Some Concerns with SQL

- SQL Injection
- Race conditions

Any remaining questions?