CS50 for JDs

cs50.harvard.edu/hls

DB Browser for SQLite

sqlitebrowser.org

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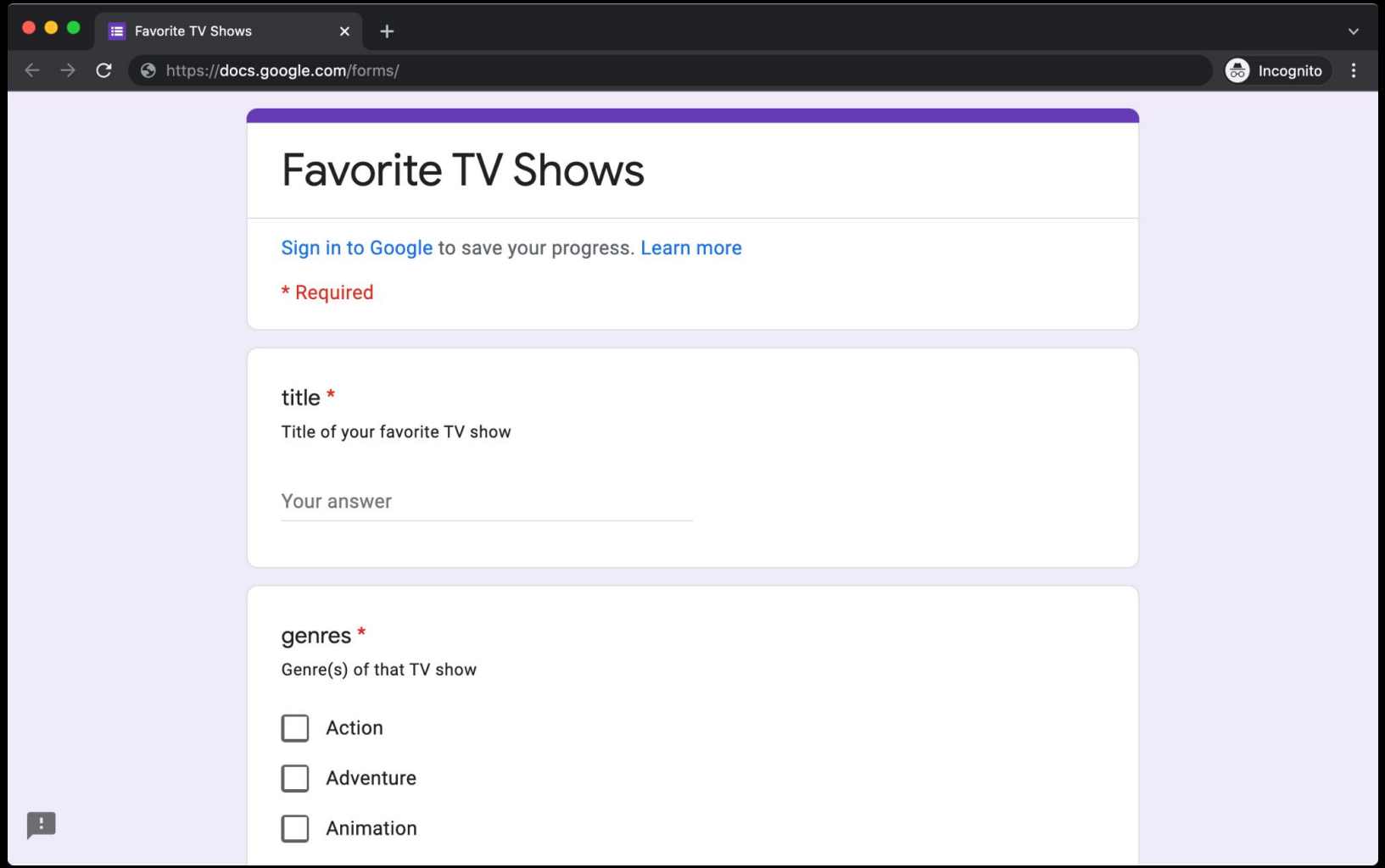
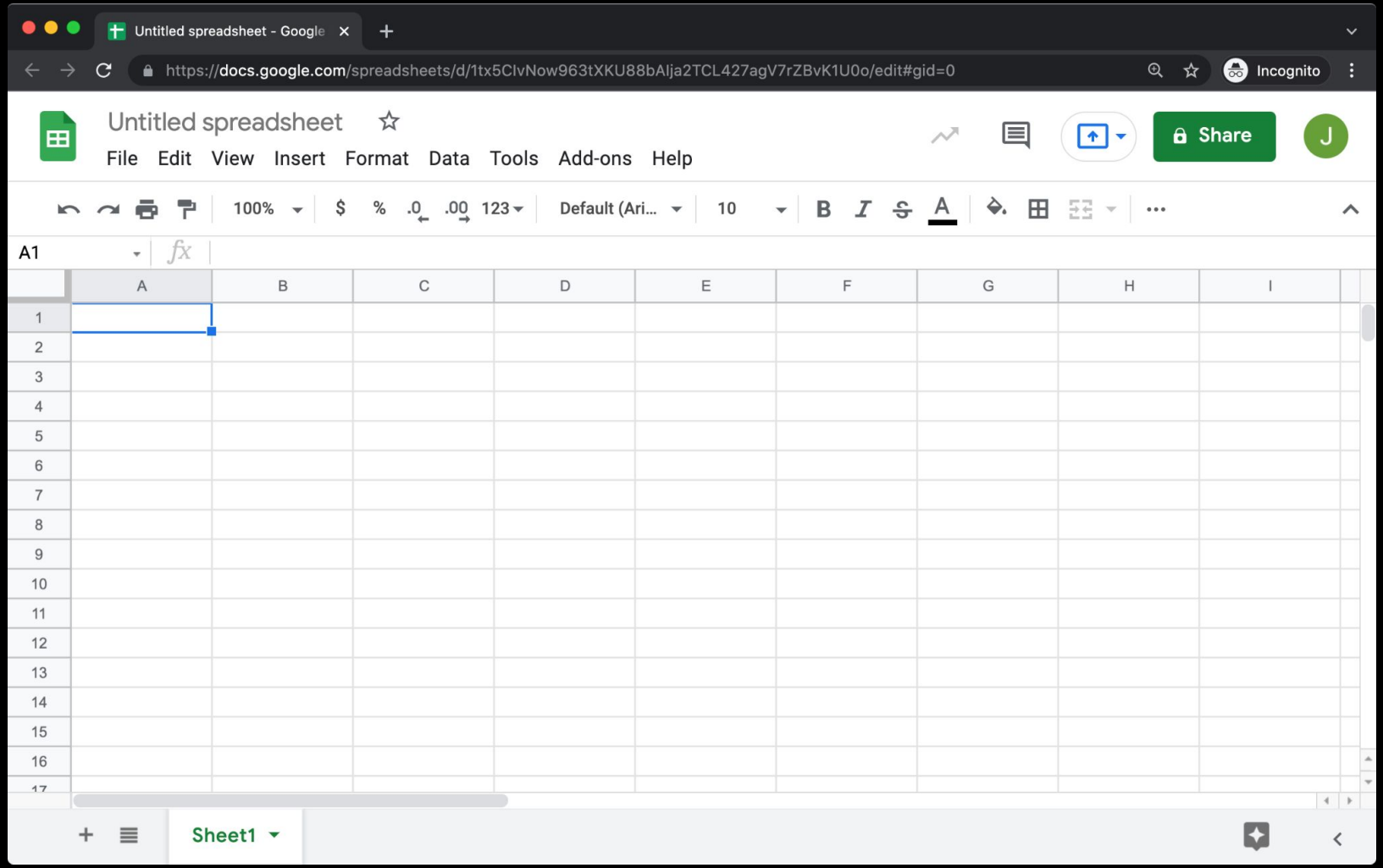
SQL

cs50.ly/favorites


Favorite TV Shows
https://docs.google.com/forms/
Incognito
Favorite TV Shows
Sign in to Google to save your progress. Learn more
* Required
title *
Title of your favorite TV show
Your answer
genres *
Genre(s) of that TV show
Action
Adventure
Animation


Untitled spreadsheet - Google
https://docs.google.com/spreadsheets/d/1tx5ClvNow963tXKU88bAlja2TCL427agV7rZBvK1U0o/edit#gid=0
Incognito
Untitled spreadsheet
File Edit View Insert Format Data Tools Add-ons Help
Share
J
100% $ % .0 .00 123 Default (Ari... 10
A1
A B C D E F G H I
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Sheet1

flat-file database

CSV

```
import csv

titles = set()

with open("favorites.csv") as file:

    reader = csv.DictReader(file)

    for row in reader:
        titles.add(row["title"])

for title in sorted(titles):
    print(title)
```

cs50.ly/youtunes

- attorneys
- clients
- cases
- fees

relational database

SQLite

DB Browser for SQLite

sqlitebrowser.org

SQL

C

R

U

D

CREATE

READ

UPDATE

DELETE

CREATE, INSERT
SELECT
UPDATE
DELETE
...

```
SELECT columns FROM table;
...
```

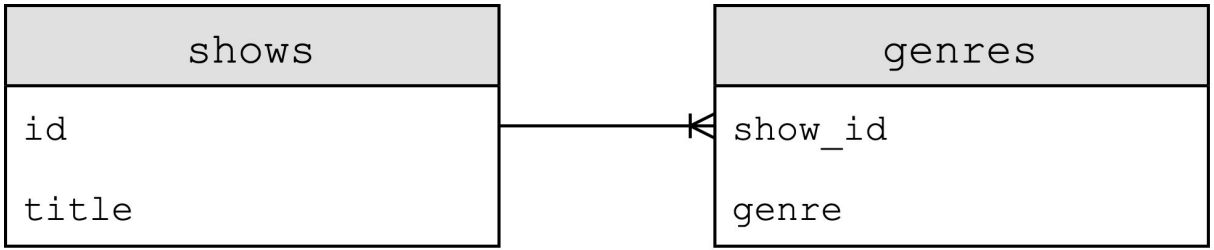
AVG
COUNT
DISTINCT
LOWER
MAX
MIN
UPPER
...

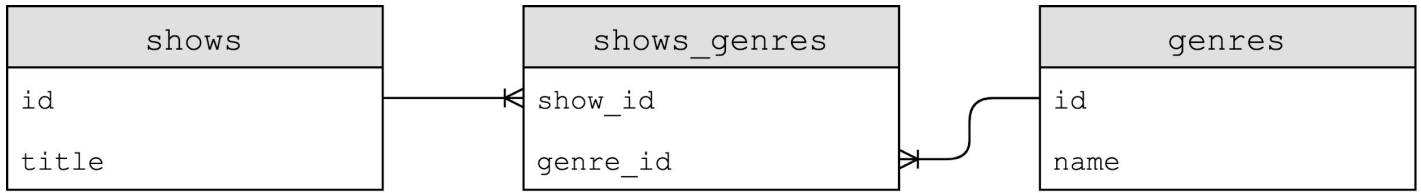
```
WHERE
LIKE
ORDER BY
LIMIT
GROUP BY
...
```

```
INSERT INTO table (column, ...) VALUES(value, ...);
```

```
UPDATE table SET column = value WHERE condition;
```

```
DELETE FROM table WHERE condition;
```


shows
id
title
genres
show_id
genre


shows
id
title
shows_genres
show_id
genre_id
genres
id
name

```
CREATE TABLE table (column type, ...);
```

BLOB

INTEGER

NUMERIC

REAL

TEXT

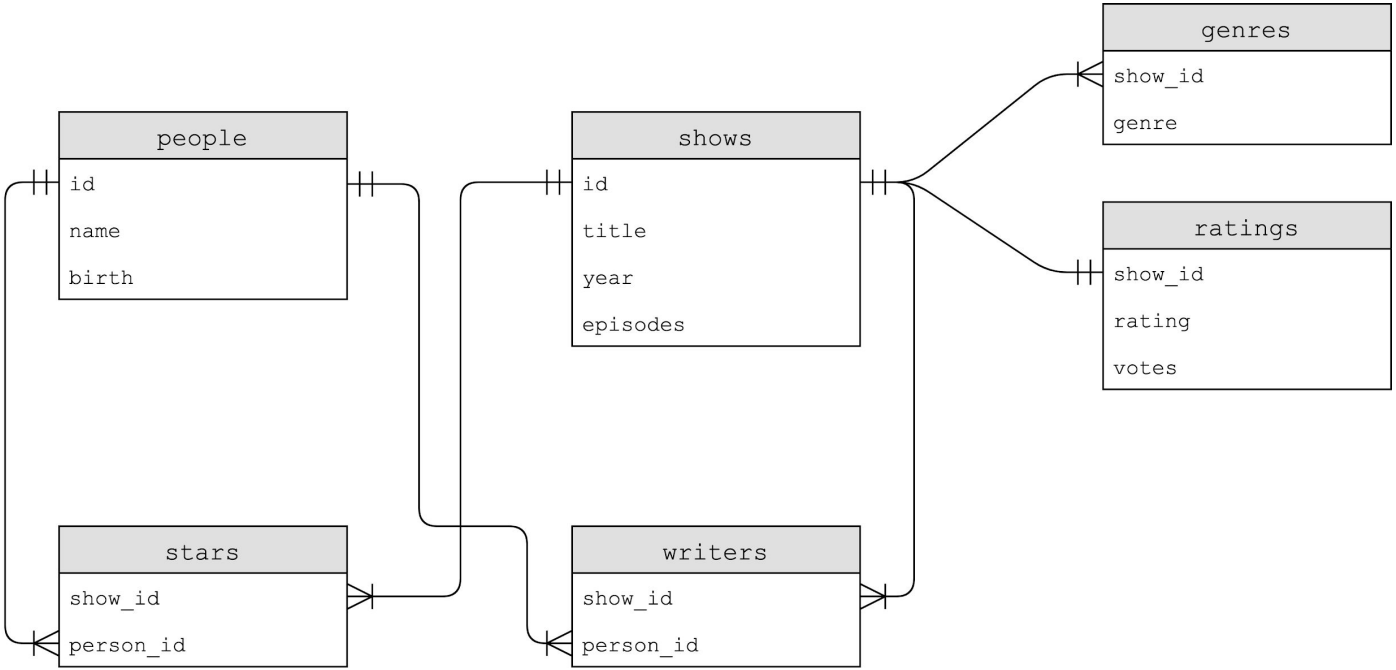
NOT NULL
UNIQUE

PRIMARY KEY

FOREIGN KEY

IMDb

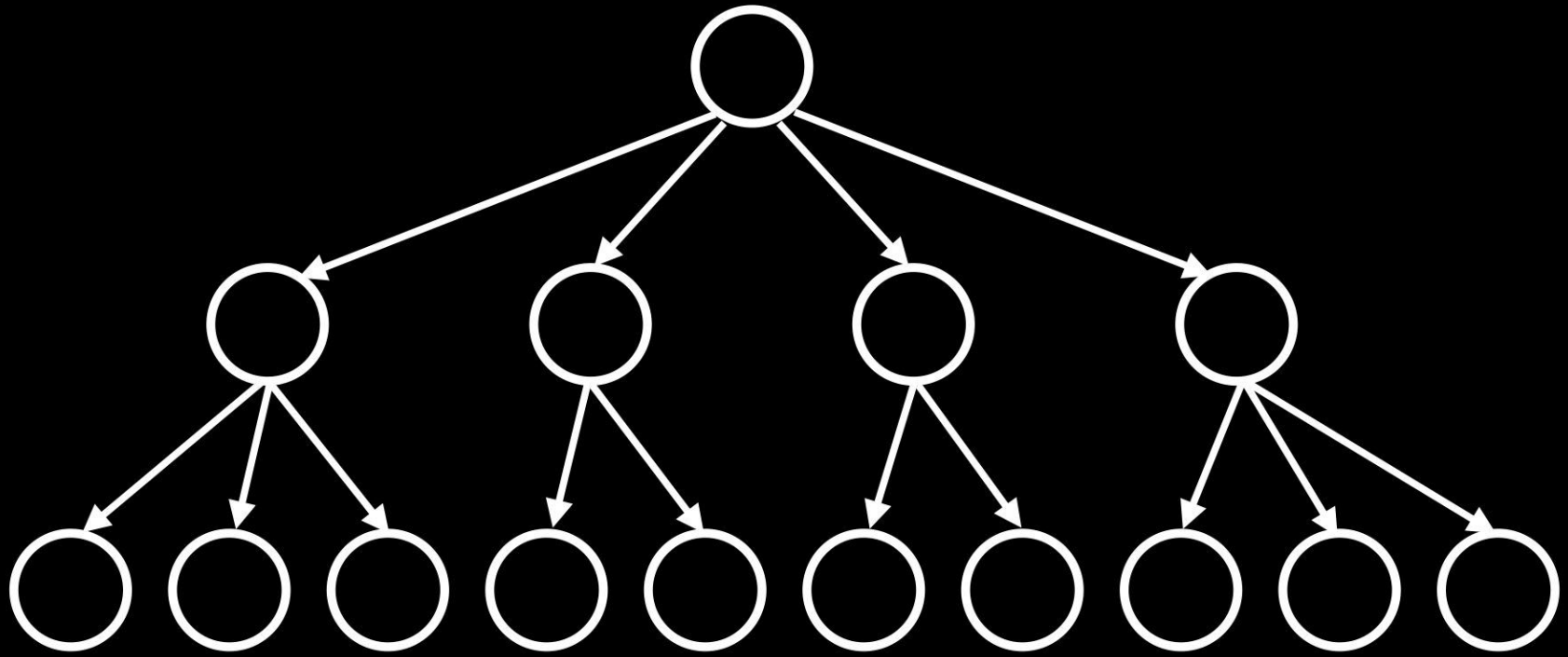
cs50.ly/shows


people
id
name
birth
shows
id
title
year
episodes
genres
show_id
genre
ratings
show_id
rating
votes
stars
show_id
person_id
writers
show_id
person_id

indexes

```
CREATE INDEX name ON table (column, ...);
```

B-trees



JOIN

...

JOIN

...

JOIN

...

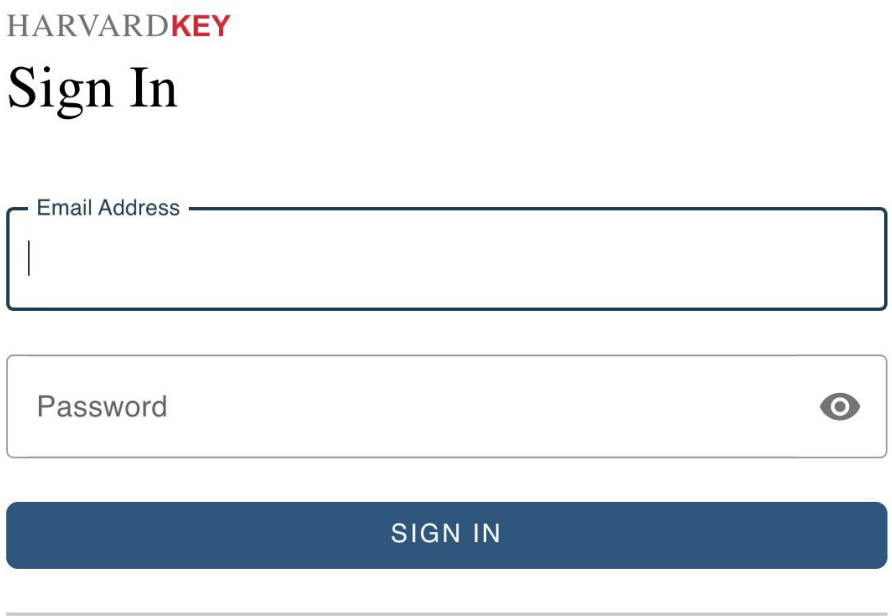
JOIN

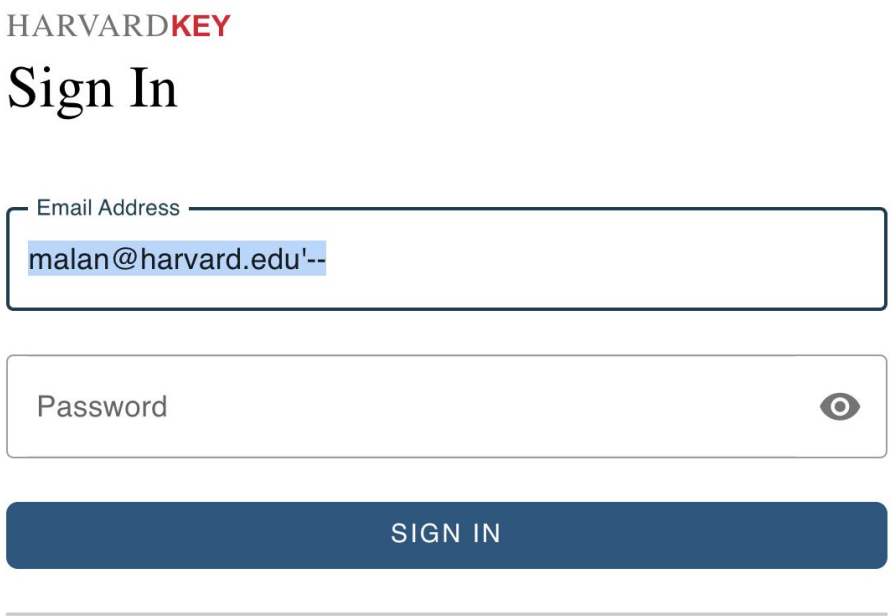
...

```
CREATE INDEX name ON table (column, ...);
```

replication

SQL injection attacks


HARVARDKEY
Sign In
Email Address
Password
SIGN IN
FORGOT YOUR PASSWORD?


HARVARDKEY
Sign In
Email Address
malan@harvard.edu'--
Password
SIGN IN
FORGOT YOUR PASSWORD?

```
rows = db.execute(f"SELECT * FROM users WHERE username = '{username}' AND password = '{password}'")

if len(rows) == 1:
    # Log user in
```

```
rows = db.execute(f"SELECT * FROM users WHERE username = '{username}' AND password = '{password}'")

if len(rows) == 1:
    # Log user in
```

```
rows = db.execute(f"SELECT * FROM users WHERE username = 'malan@harvard.edu'--' AND password = '{password}'")

if len(rows) == 1:
    # Log user in
```

```
rows = db.execute("SELECT * FROM users WHERE username = ? AND password = ?", username, password)

if len(rows) == 1:
    # Log user in
```

```
rows = db.execute("SELECT * FROM users WHERE username = ? AND password = ?", username, password)

if len(rows) == 1:
    # Log user in
```

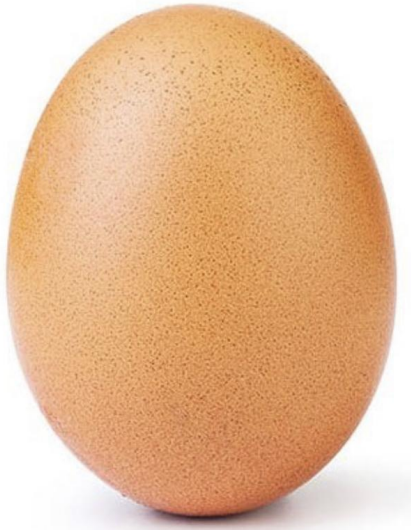
ZU 0666', 0, 0); DROP DATABASE TABLICE;

ZU 0666',0,0); DROP DATABASE TABLICE;

race conditions

Photo

world_record_egg



```
rows = db.execute("SELECT likes FROM posts WHERE id = ?", id);
likes = rows[0]["likes"]
db.execute("UPDATE posts SET likes = ? WHERE id = ?", likes + 1, id);
```

```
BEGIN TRANSACTION
COMMIT
ROLLBACK
```

```
db.execute("BEGIN TRANSACTION")
rows = db.execute("SELECT likes FROM posts WHERE id = ?", id);
likes = rows[0]["likes"]
db.execute("UPDATE posts SET likes = ? WHERE id = ?", likes + 1, id);
db.execute("COMMIT")
```

Lab

Seminars

- Data Visualization, for Good and for Evil
- Git: The Power of Version Control

Assignment 3

Office Hours

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