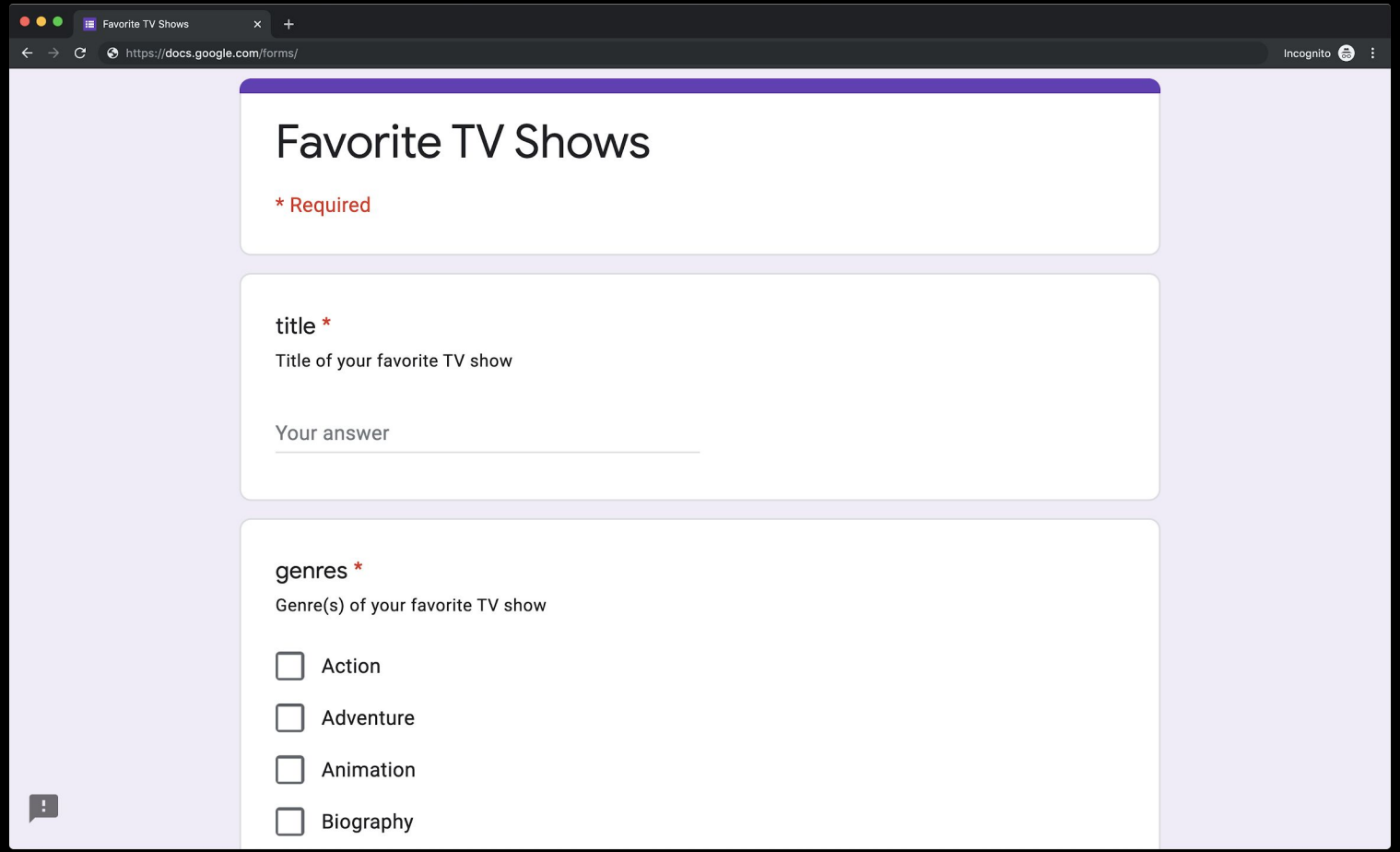
# CS50 for JDs

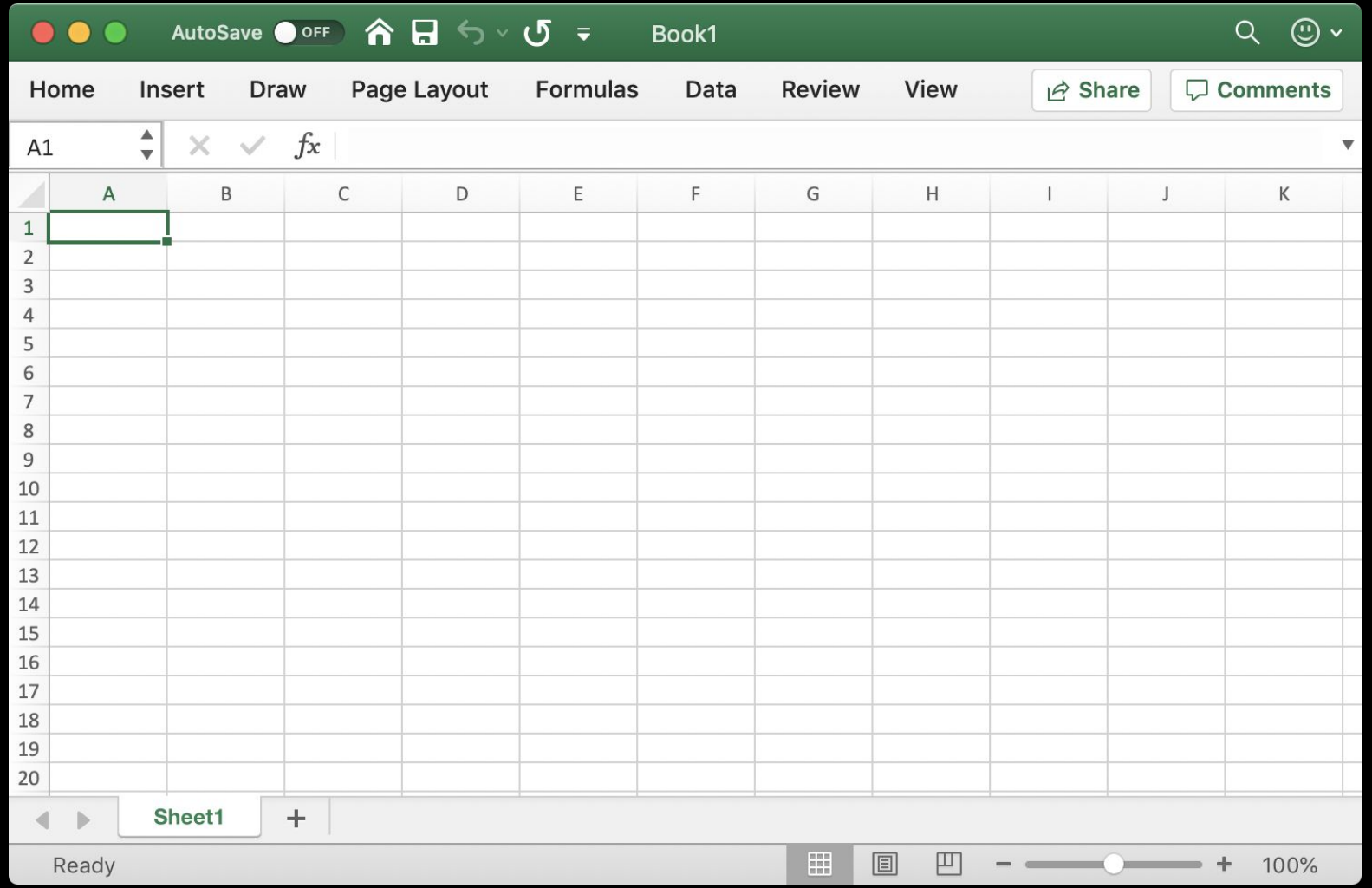
cs50.harvard.edu/hls

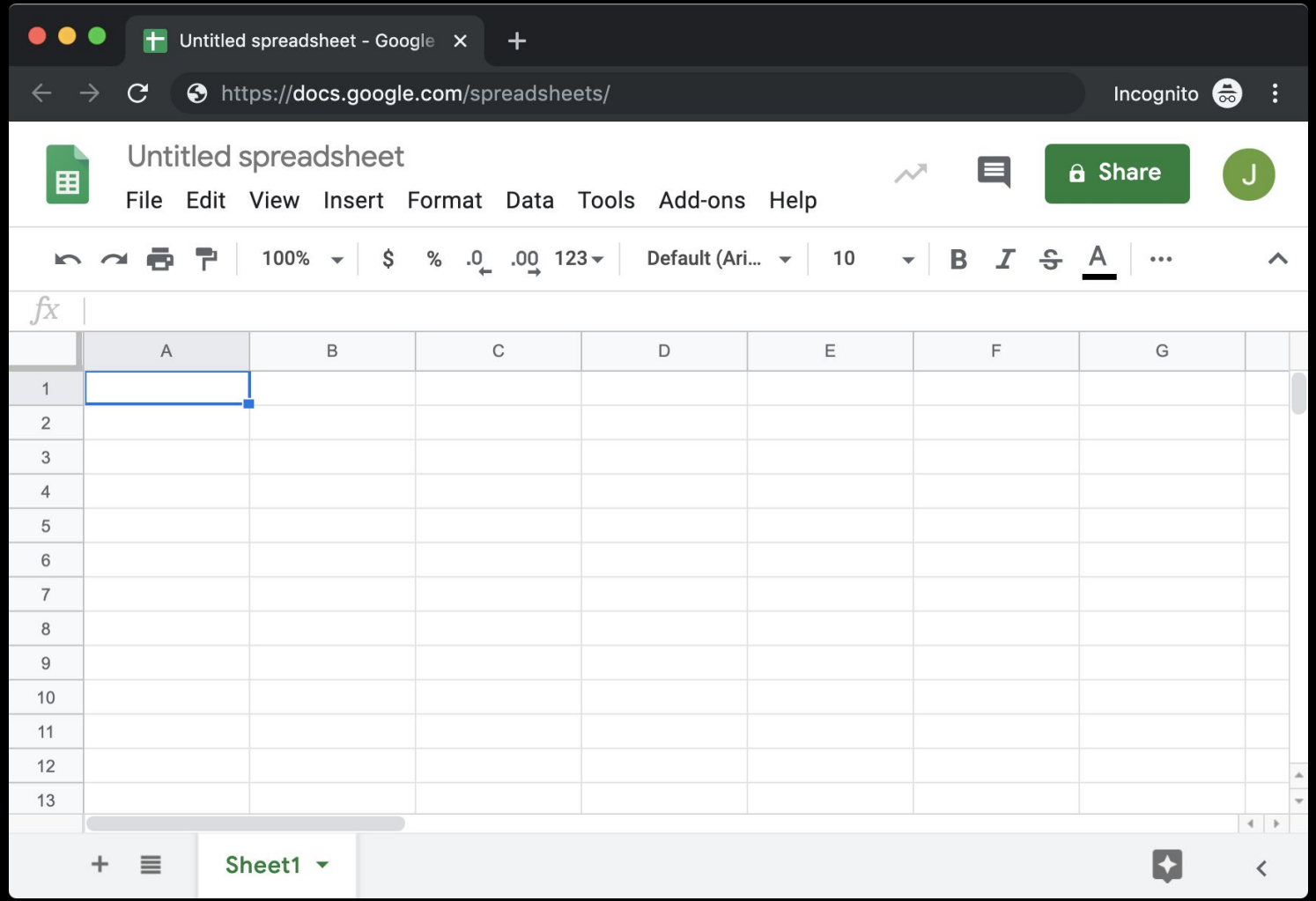
cs50.ly/youtunes

# SQL

cs50.ly/favorites


Favorite TV Shows
https://docs.google.com/forms/
Incognito
Favorite TV Shows
* Required
title *
Title of your favorite TV show
Your answer
genres *
Genre(s) of your favorite TV show
Action
Adventure
Animation
Biography


AutoSave
OFF
Book1
Home
Insert
Draw
Page Layout
Formulas
Data
Review
View
Share
Comments
A1
fx
A
B
C
D
E
F
G
H
I
J
K
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
Sheet1
Ready
100%


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

flat-file database

```
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)
```

CSV

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;
...
```

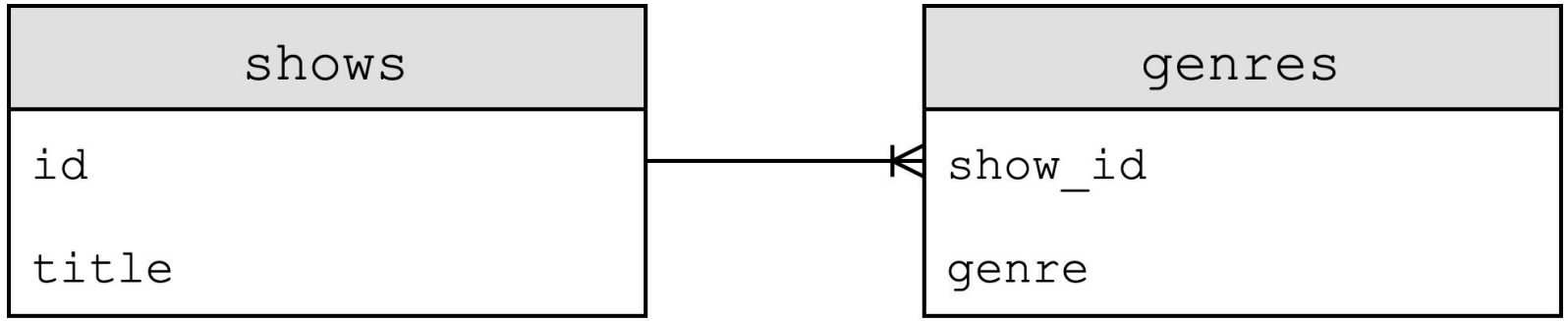
```
AVG
COUNT
DISTINCT
LOWER
MAX
MIN
UPPER
...
```

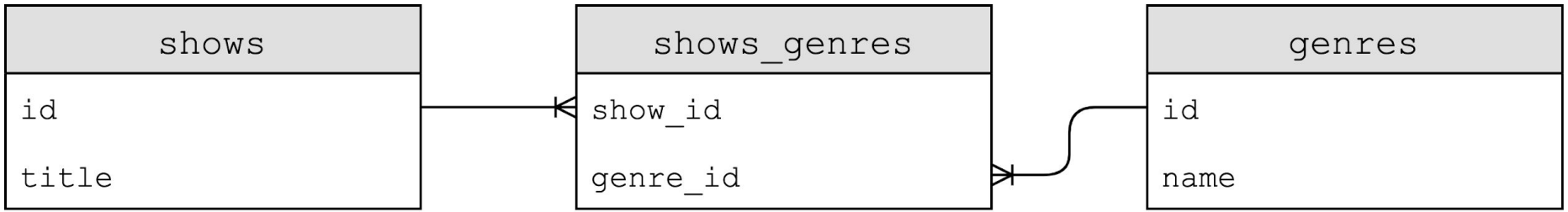
```
WHERE
LIKE
ORDER BY
LIMIT
GROUP BY
...
```

```
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, ...);
```

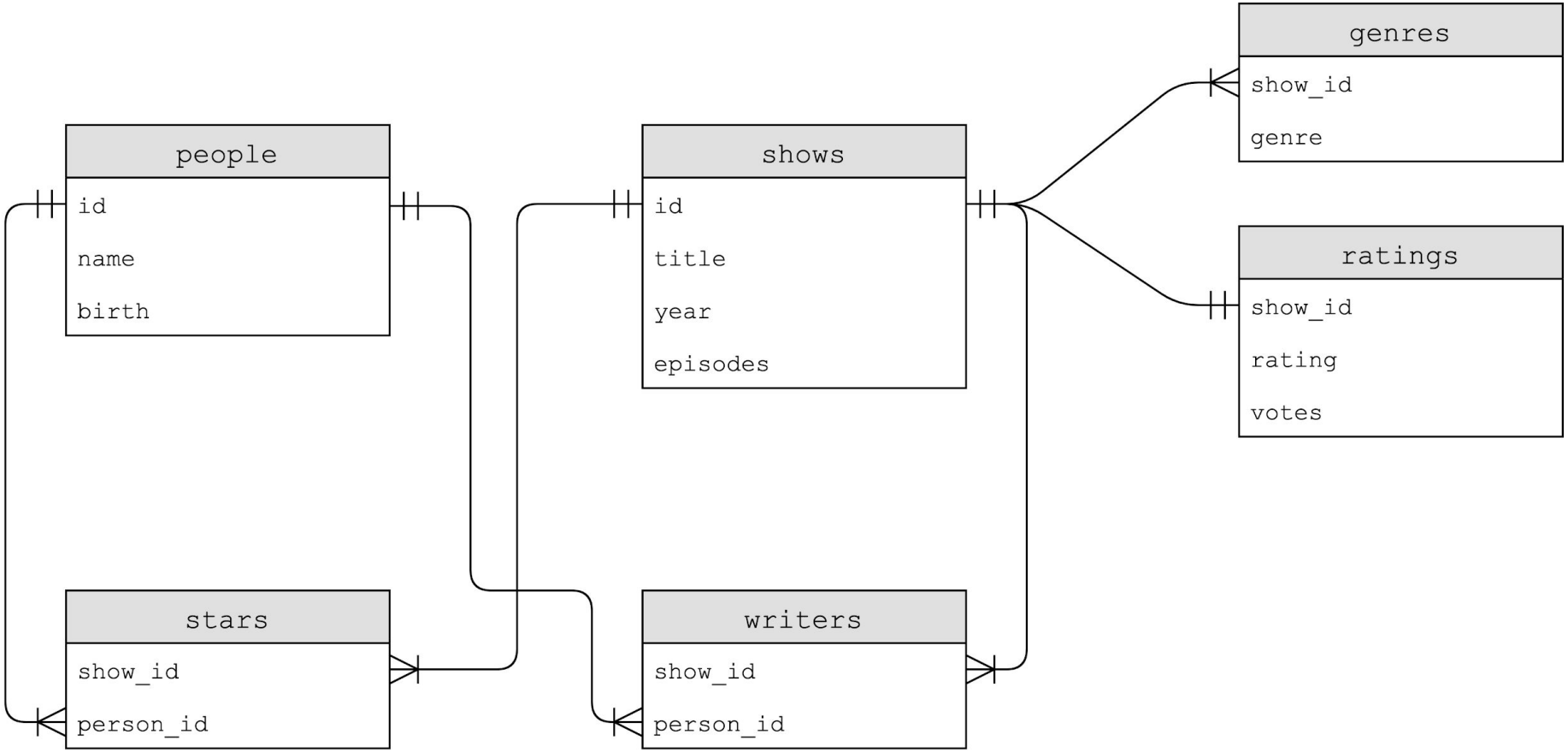
BLOB
INTEGER
NUMERIC
REAL
TEXT

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

BLOB
INTEGER
NUMERIC
REAL
TEXT

BLOB
INTEGER
  smallint
  integer
  bigint
NUMERIC
REAL
TEXT

```
BLOB
INTEGER
NUMERIC
REAL
  real
  double precision
TEXT
```

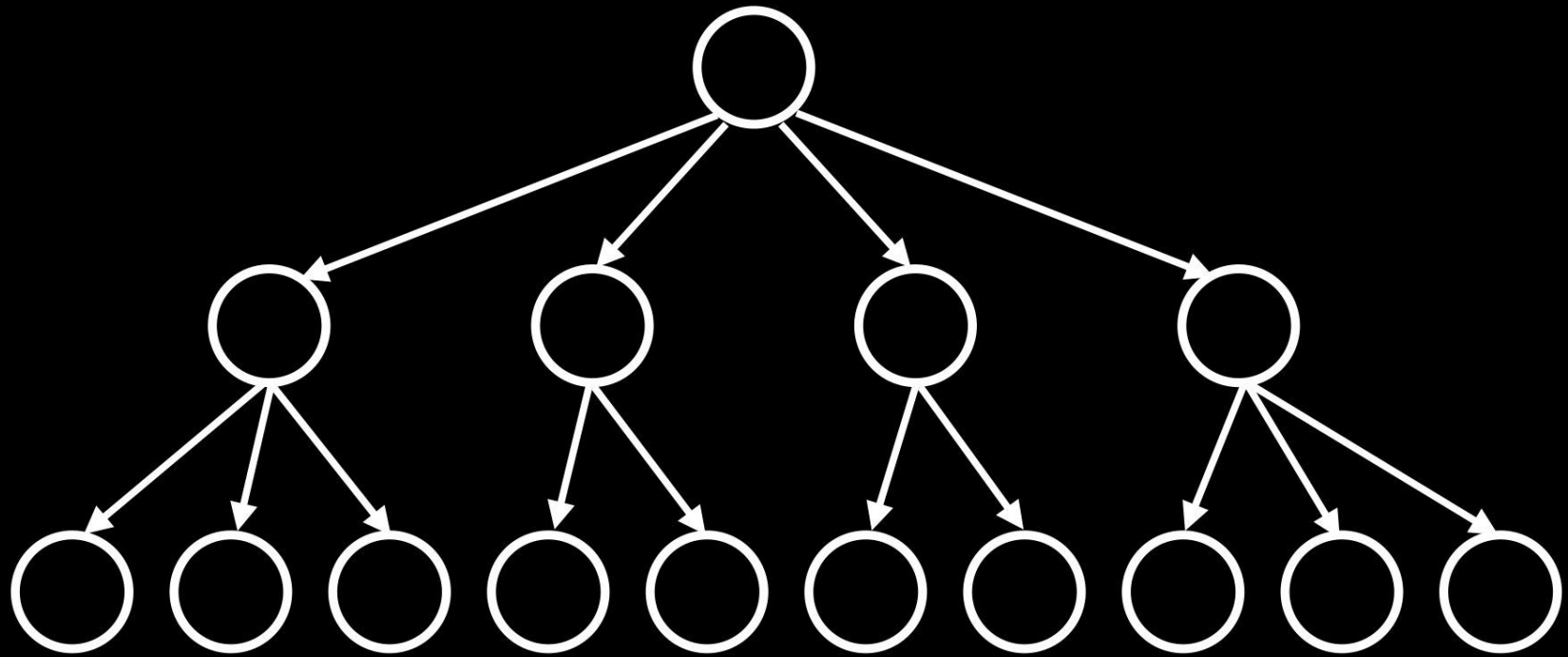
```
BLOB
INTEGER
NUMERIC
  boolean
  date
  datetime
  numeric(scale,precision)
  time
  timestamp
REAL
TEXT
```

BLOB
INTEGER
NUMERIC
REAL
TEXT
  char(n)
  varchar(n)
  text

indexes

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

# B-trees



JOIN
...

JOIN
...

JOIN
...

JOIN
...

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

replication

# SQL injection attacks

Please Log In

To log in, please select your login type from the tabs below and enter your credentials. If you're not sure what login type to use, **look here for how you login with HarvardKey.**

HarvardKey

Login Name (in the form of an email address):

me@examplemailprovider.com

Password:

Login

**Recover/Reset Your HarvardKey Password >**

**Recover Your HarvardKey Login Name >**

**Recover/Reset Passwords for Other Login Types >**

**Back to HarvardKey Home >**

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

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

# race conditions

Photo
world_record_egg

```
likes = SELECT likes FROM posts WHERE id = 123
UPDATE posts SET likes = likes + 1 WHERE id = 123
```

```
BEGIN TRANSACTION
COMMIT
ROLLBACK
```

```
BEGIN TRANSACTION
likes = SELECT likes FROM posts WHERE id = 123
UPDATE posts SET likes = likes + 1 WHERE id = 123
COMMIT
```

# Data Visualization with Matplotlib and Jupyter Notebooks

cs50.harvard.edu/hls/2021/winter/seminars

# Lab

SQL

# Assignment 3

cs50.harvard.edu/hls/2021/winter/assignments/3

# Office Hours

cs50.harvard.edu/hls/2021/winter/hours

# CS50 for JDs

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