

This is CS50



Untitled spreadsheet - Google



https://docs.google.com/spreadsheets/

Incognito



Untitled spreadsheet



Share



File Edit View Insert Format Data Tools Add-ons Help



100%



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123

Default (Ari...

10

B

I



A



fx

	A	B	C	D	E	F	G	
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								



Sheet1



Favorite TV Shows

x

+

←

→

↺

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

relational databases

sqlite3

```
.mode csv  
.import FILE TABLE  
.schema
```

C
R
U
D

CREATE

READ

UPDATE

DELETE

SQL

INSERT

SELECT

UPDATE

DELETE

...

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

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

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

```
SELECT columns FROM table;
```

AVG
COUNT
DISTINCT
MAX
MIN
...

WHERE

LIKE

LIMIT

GROUP BY

ORDER BY

JOIN

...

```
SELECT columns FROM table WHERE condition;
```

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

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

IMDb

[imdb.com/interfaces](https://www.imdb.com/interfaces)

title.basics.tsv

title.basics.tsv

tconst

titleType

primaryTitle

startYear

genres

...

title.basics.tsv

tconst	tt4786824
--------	-----------

titleType

primaryTitle

startYear

genres

...

title.basics.tsv

tconst	tt4786824
--------	-----------

titleType	tvSeries
-----------	----------

primaryTitle

startYear

genres

...

title.basics.tsv

tconst	tt4786824
--------	-----------

titleType	tvSeries
-----------	----------

primaryTitle	The Crown
--------------	-----------

startYear	
-----------	--

genres	
--------	--

...

title.basics.tsv

tconst	tt4786824
--------	-----------

titleType	tvSeries
-----------	----------

primaryTitle	The Crown
--------------	-----------

startYear	2016
-----------	------

genres	
--------	--

...

title.basics.tsv

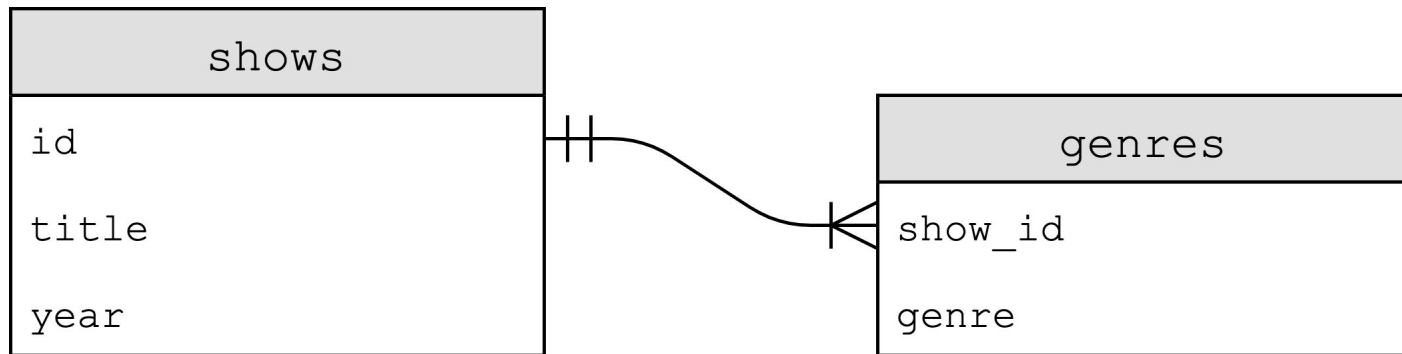
tconst	tt4786824
titleType	tvSeries
primaryTitle	The Crown
startYear	2016
genres	Drama,History
...	

Please don't eat candy in here btw :)



```
db = cs50.SQL("sqlite:///shows.db")
```

shows
id
title
year
genres



title.basics.tsv

tconst	tt4786824
titleType	tvSeries
primaryTitle	The Crown
startYear	2016
genres	Drama,History
...	

name.basics.tsv

nconst	nm2946516
primaryName	Claire Foy
birthYear	1984
...	

title.principals.tsv

tconst	tt4786824
--------	-----------

nconst	nm2946516
--------	-----------

category	actress
----------	---------

...

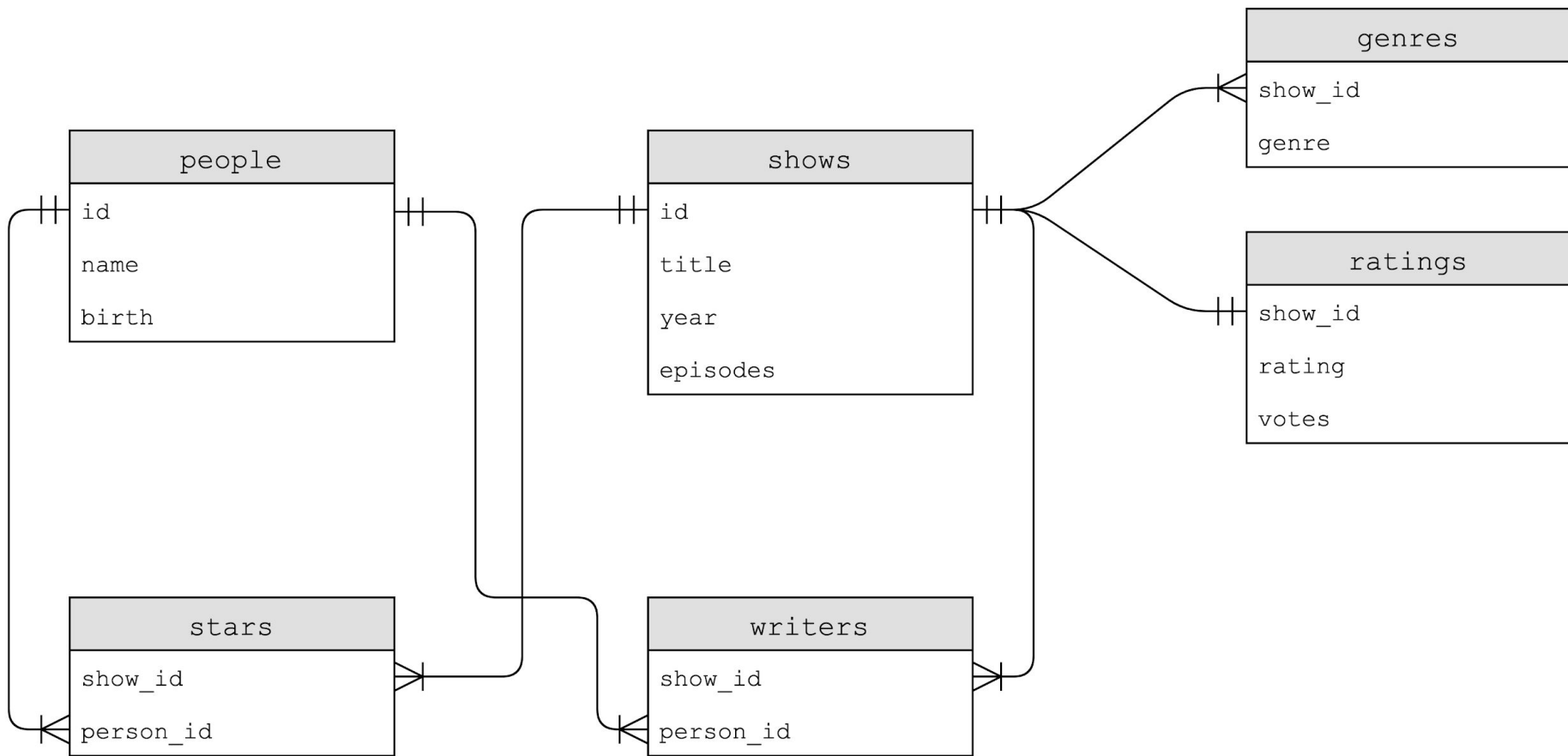
title.ratings.tsv

tconst	tt4786824
--------	-----------

averageRating	8.7
---------------	-----

numVotes	88529
----------	-------

...



PRIMARY KEY

FOREIGN KEY

UNIQUE

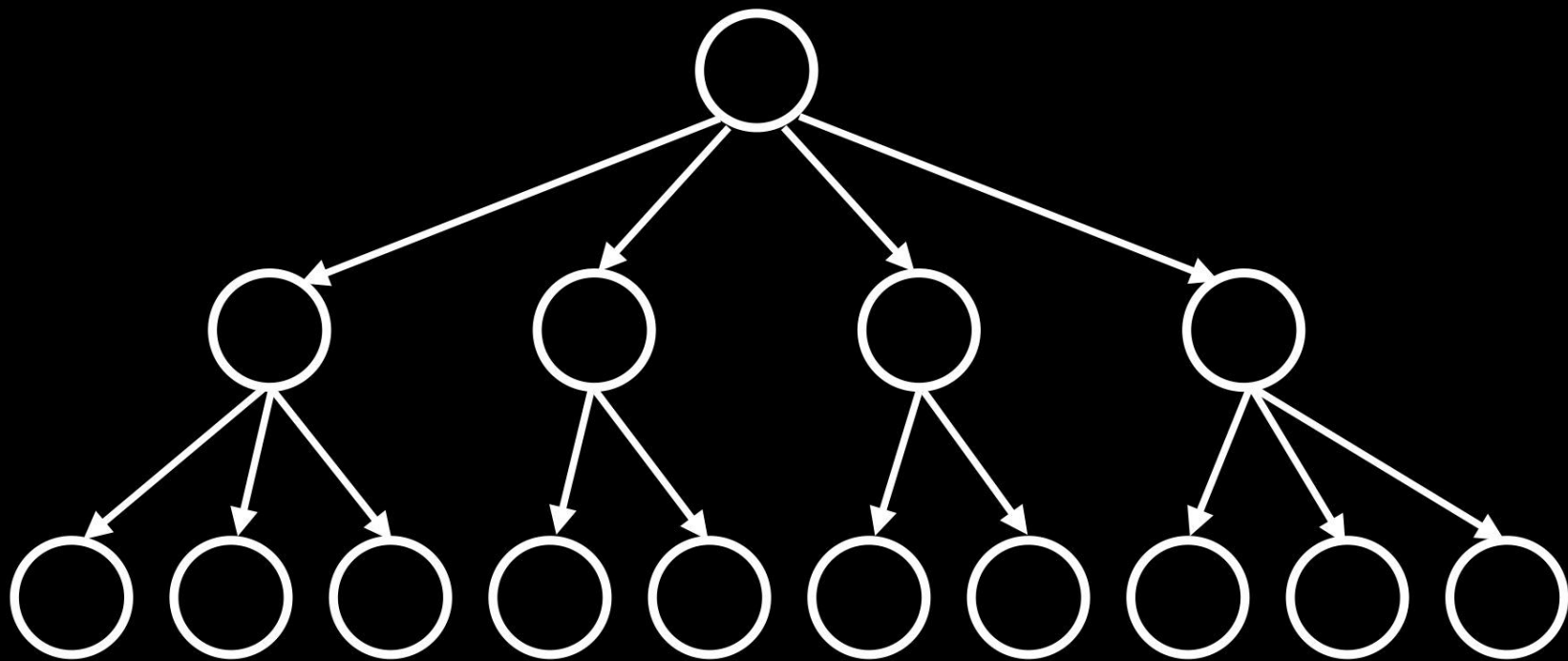
INDEX

AUTOINCREMENT

NOT NULL

indexes

B-trees



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

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

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

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

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

DB Browser for SQLite

sqlitebrowser.org

race conditions

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


BEGIN TRANSACTION

COMMIT

ROLLBACK

SQL injection attacks

Login required

You may establish Yale authentication now in order to access protected services later.

NetID:

Password:

☐

Warn me before logging me in to other sites.

Login

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):

Password:

Login

[Recover/Reset Your HarvardKey Password >](#)

[Recover Your HarvardKey Login Name >](#)

[Recover/Reset Passwords for Other Login Types >](#)

[Back to HarvardKey Home >](#)

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):

malan@harvard.edu'--

Password:

Login

[Recover/Reset Your HarvardKey Password >](#)

[Recover Your HarvardKey Login Name >](#)

[Recover/Reset Passwords for Other Login Types >](#)

[Back to HarvardKey Home >](#)

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

```
if len(rows) == 1:  
    # Logged in!
```

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

```
if len(rows) == 1:  
    # Logged in!
```

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

```
if len(rows) == 1:  
    # Logged in!
```

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

```
if len(rows) == 1:  
    # Logged in!
```

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

```
if len(rows) == 1:  
    # Logged in!
```

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

if len(rows) == 1:
    # Logged in!
```

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

if len(rows) == 1:
    # Logged in!
```

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

```
if len(rows) == 1:  
    # Logged in!
```

HI, THIS IS
YOUR SON'S SCHOOL.
WE'RE HAVING SOME
COMPUTER TROUBLE.



OH, DEAR - DID HE
BREAK SOMETHING?
IN A WAY--



DID YOU REALLY
NAME YOUR SON
Robert'); DROP
TABLE Students;-- ?



OH, YES. LITTLE
BOBBY TABLES,
WE CALL HIM.

WELL, WE'VE LOST THIS
YEAR'S STUDENT RECORDS.
I HOPE YOU'RE HAPPY.



AND I HOPE
YOU'VE LEARNED
TO SANITIZE YOUR
DATABASE INPUTS.

This is CS50