Warm-Up: Review

Create a table of remakes that have the same title

title	first	second
How to Train Your Dragon	2010	2025
The Girl with the Dragon Tattoo	2009	2011

1. Use self-join on the table **titles**

```
SELECT old.title, old.year AS first, new.year AS second
  FROM titles AS old JOIN titles AS new
    ON old.title=new.title AND old.year < new.year;
```

2. Use aggregation (don't use JOIN)

```
SELECT title, MIN(year) AS first, MAX(year) AS second
    FROM titles
    GROUP BY title
    HAVING COUNT(*) > 1;
```

SELECT: Values each output row contains (and column labels)

FROM: Source of input rows

GROUP BY: Form output rows

HAVING: Which output rows

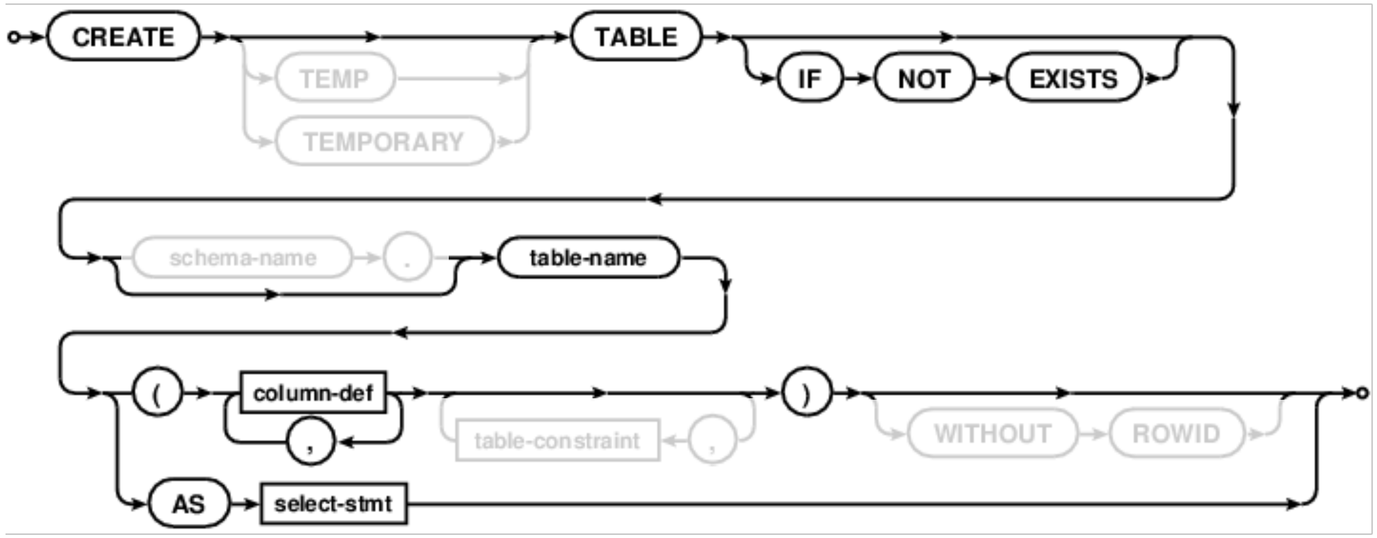
Databases

Announcements

Create Table and Drop Table

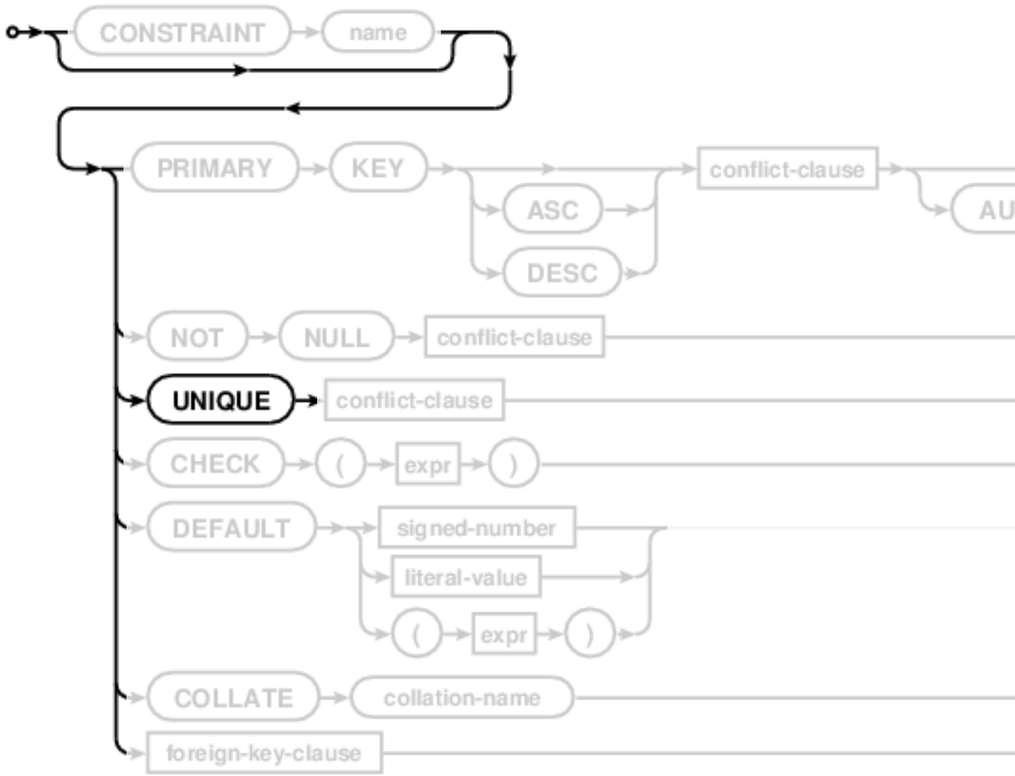
Create Table

CREATE TABLE expression syntax:



column-def:

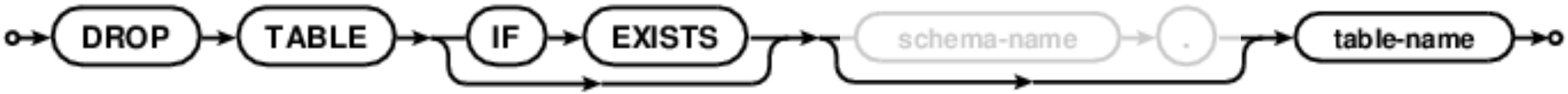
column-constraint:



Examples:

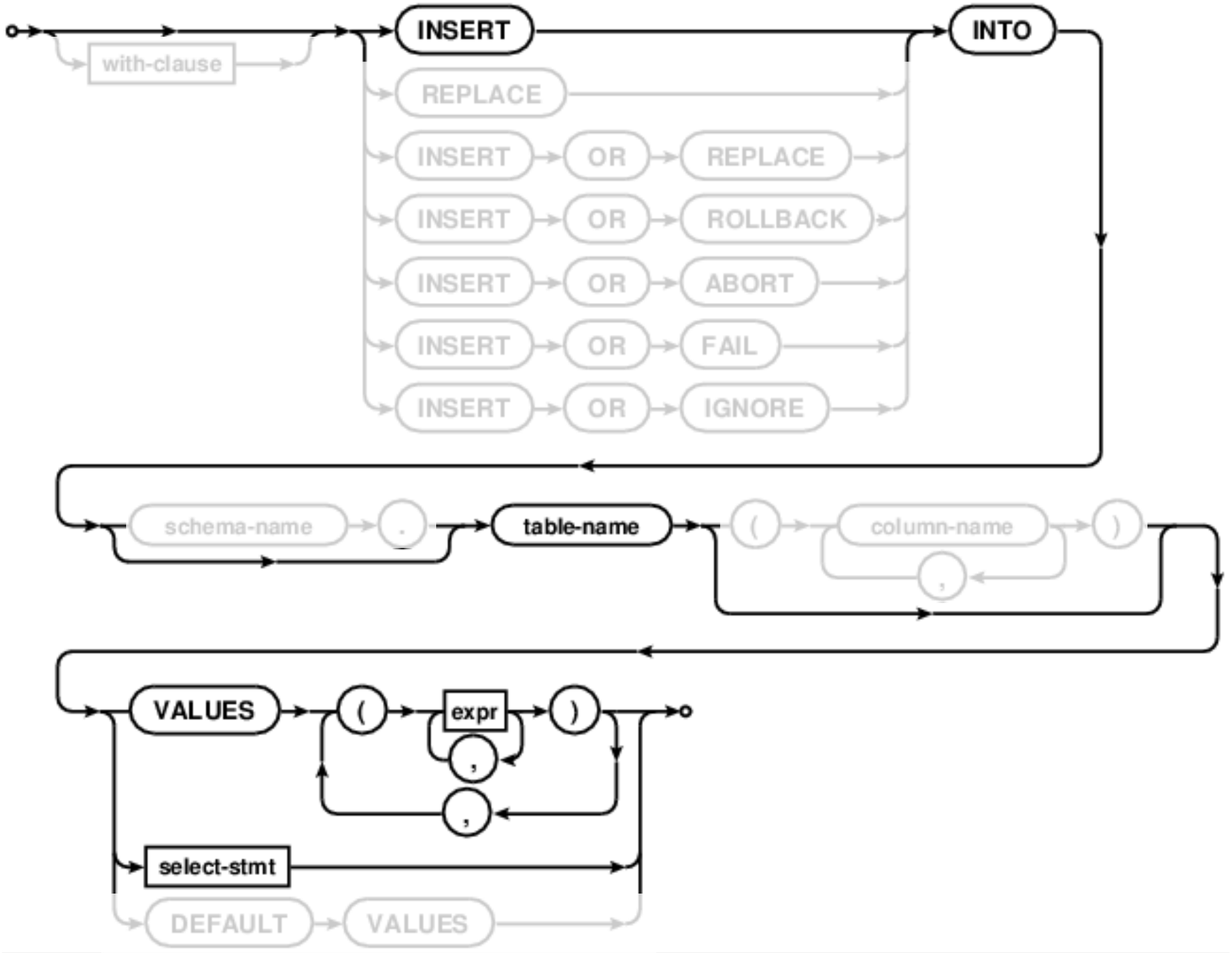
```
CREATE TABLE numbers (n, note);
CREATE TABLE numbers (n UNIQUE, note);
```

Drop Table



Modifying Tables

Insert

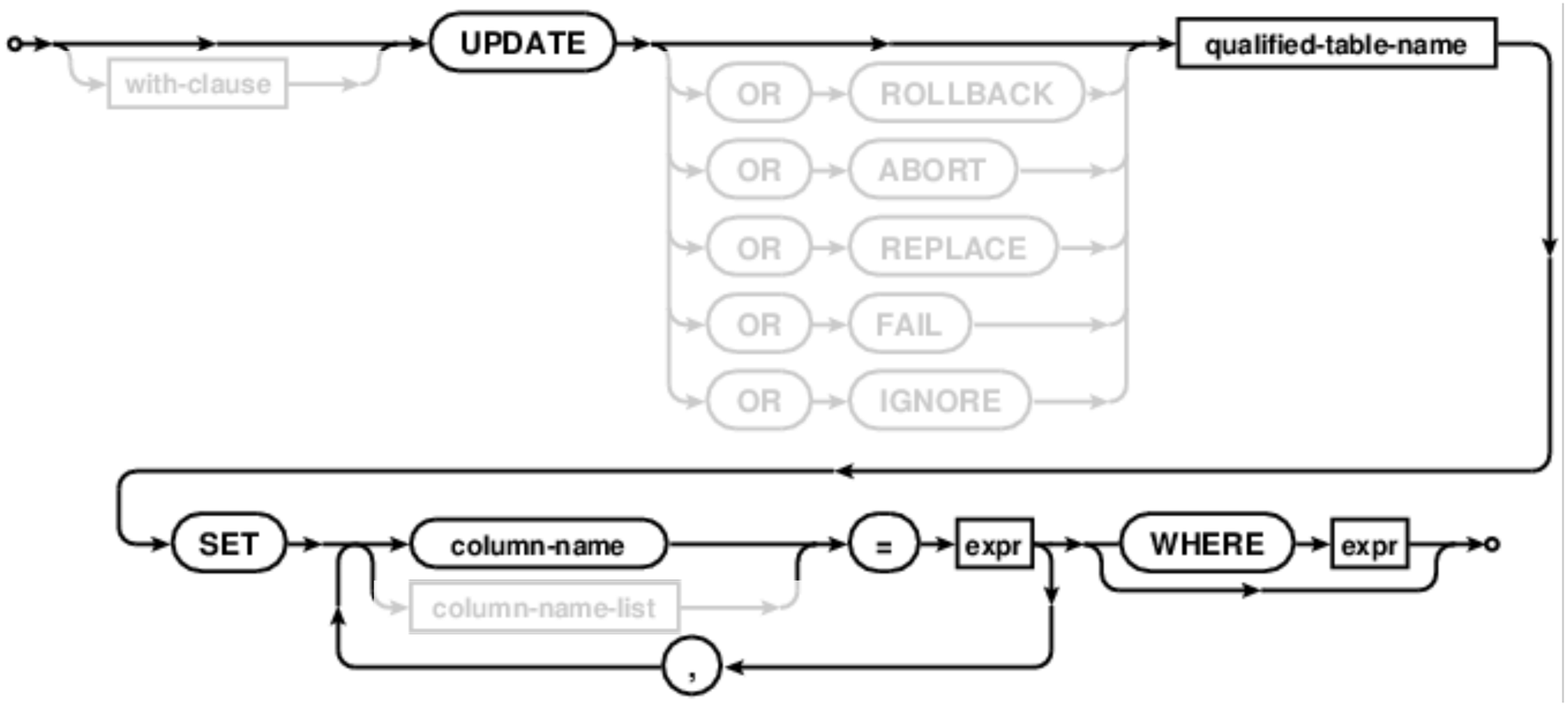


For a table t with two columns...

To insert a row:

```
INSERT INTO t VALUES (value0, value1);
```

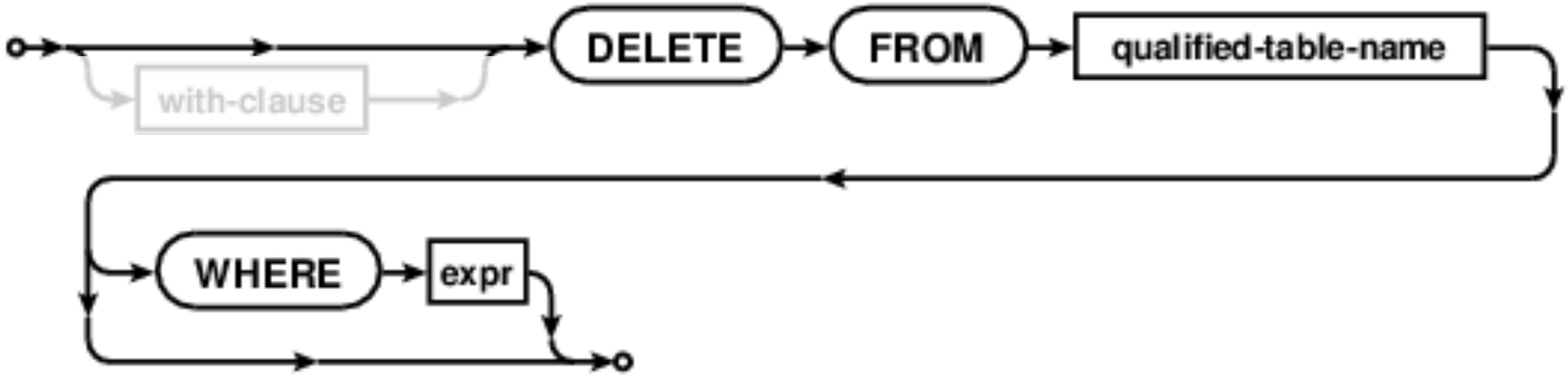
Update



Update sets all entries in certain columns to new values, just for some subset of rows.

(Demo)

Delete



Delete removes some or all rows from a table.

(Demo)

Python and SQL

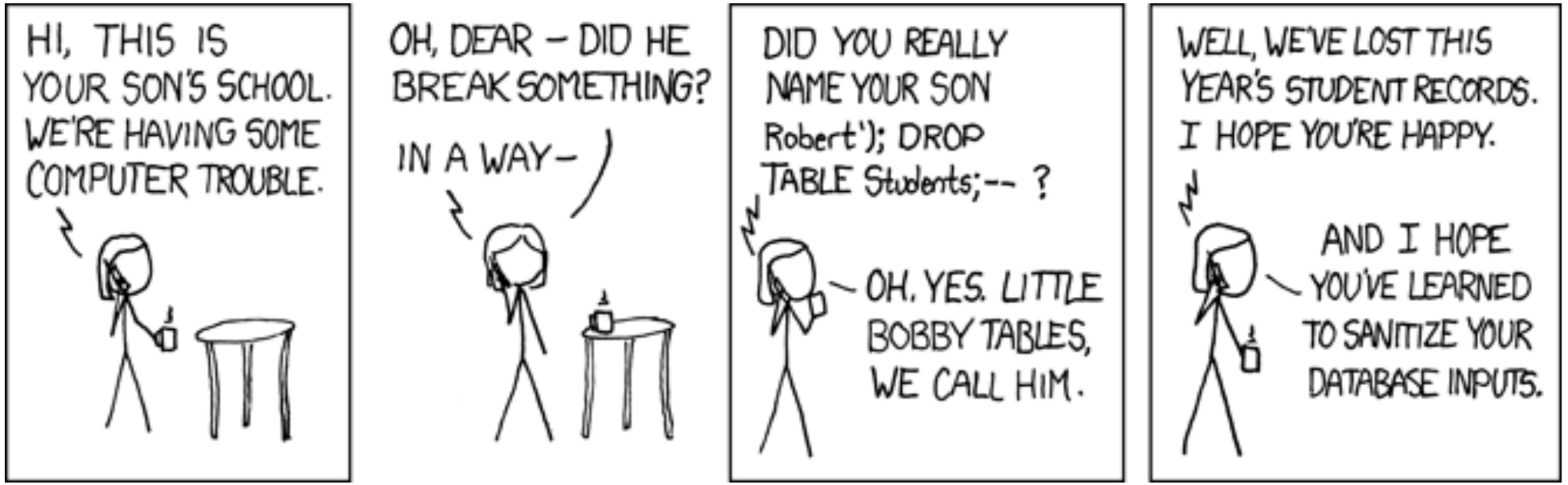
Python Can Access Sqlite Databases

```
import sqlite3


db = sqlite3.Connection('number.db')
db.execute('CREATE TABLE nums (first INT, second INT);’)
db.execute('INSERT INTO nums VALUES (?, ?), (?, ?);', range(6, 10))
print(db.execute('SELECT * FROM nums;').fetchall())
db.commit()
```

SQL Injection Attack

A Program Vulnerable to a SQL Injection Attack




```
name = "Robert'); DROP TABLE Students; --"
cmd = "INSERT INTO Students VALUES ('" + name + "');"
db.executescript(cmd)
```

```
db.execute("INSERT INTO Students VALUES (?)", [nam
```

SQLite makes a query plan before substitution happens

SQLite gets parameters separately

SQLite gets a string:

```
INSERT INTO Students VALUES ('Robert'); DROP TABLE Students; --');
```

https://xkcd.com/327/