

# Databases

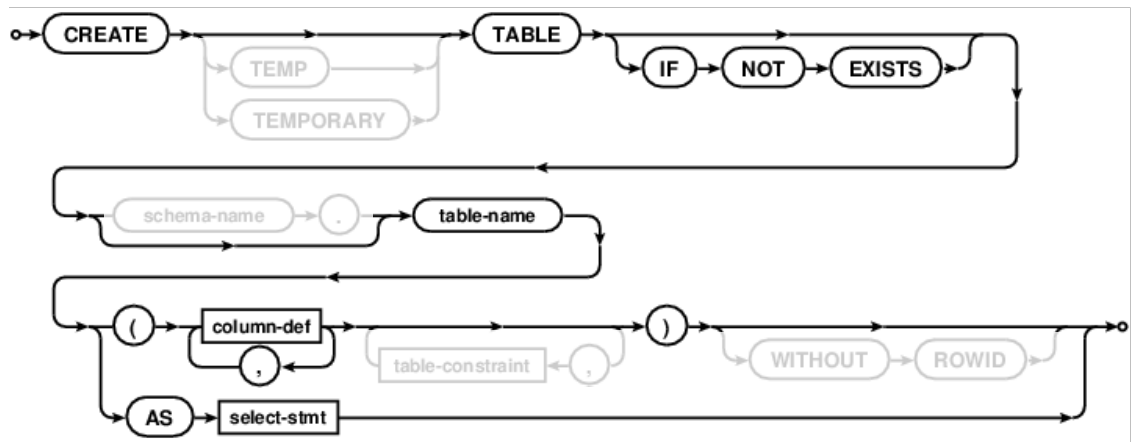
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# Announcements

Create Table and Drop Table

# Create Table

CREATE TABLE expression syntax:



Examples:

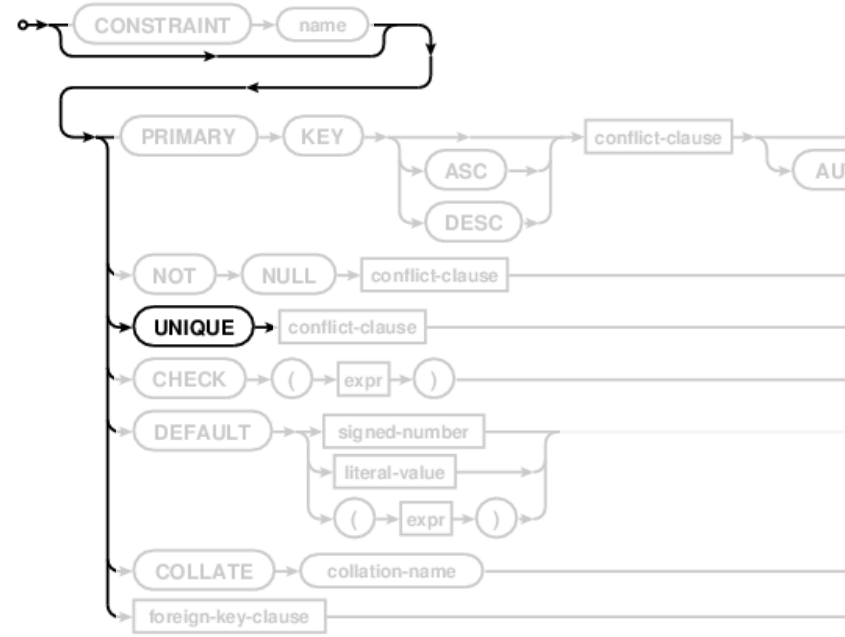
**CREATE TABLE** numbers (n, note);

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

column-def:

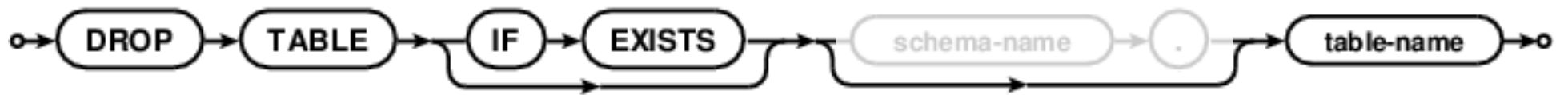


column-constraint:



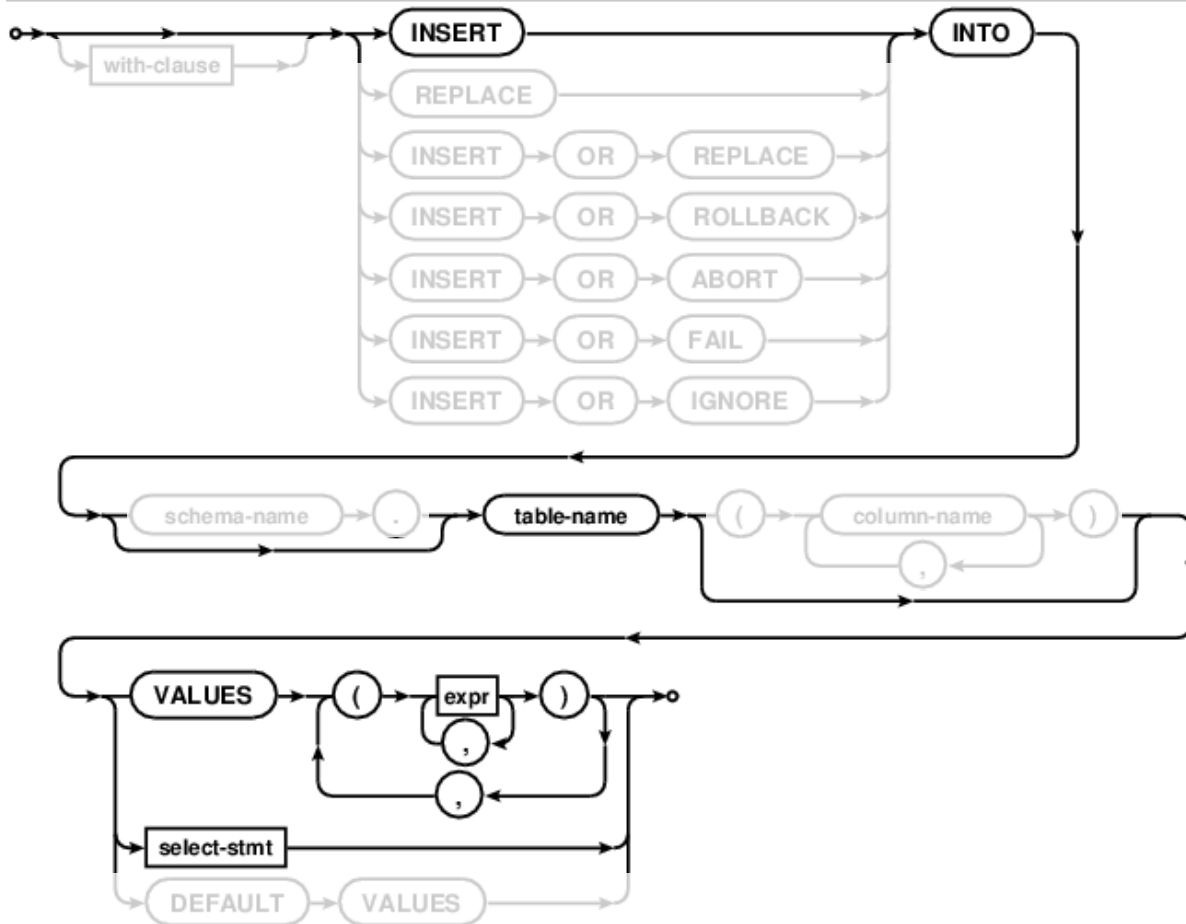
## Drop Table

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## Modifying Tables

## Insert

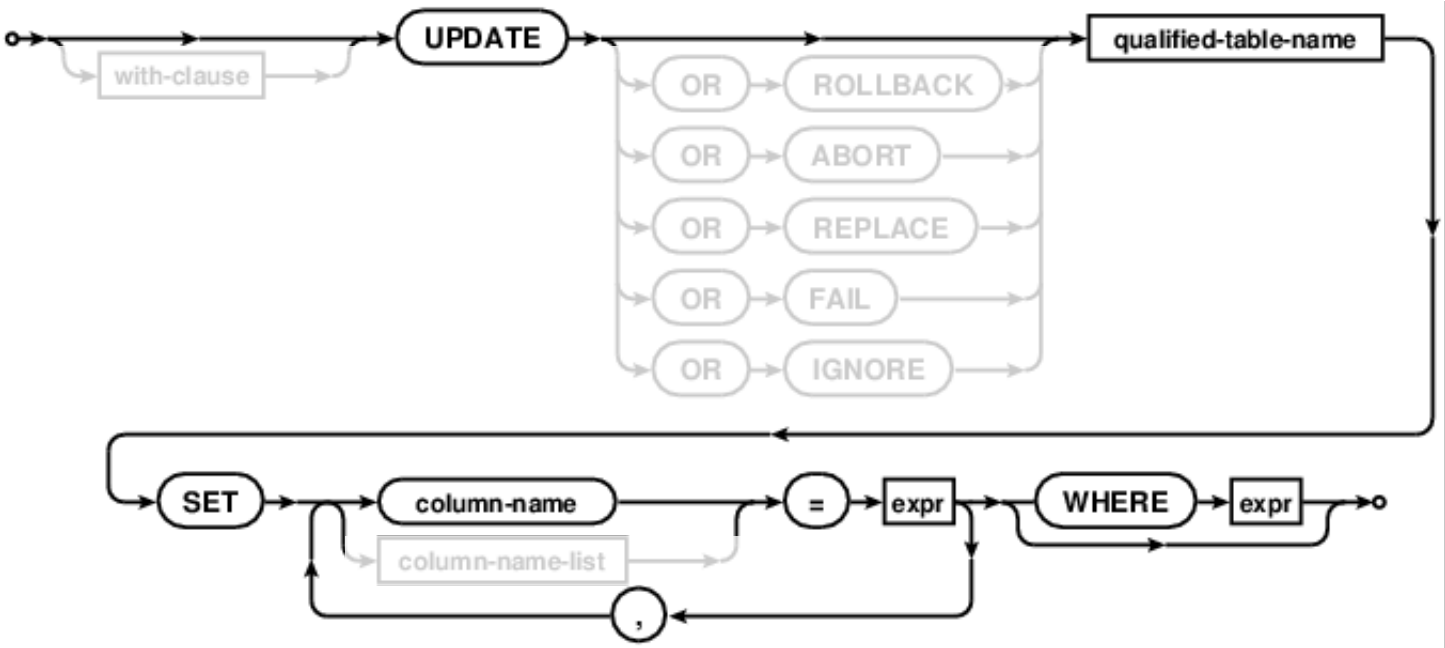


For a table t with two columns...

To insert a row:

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

# Update



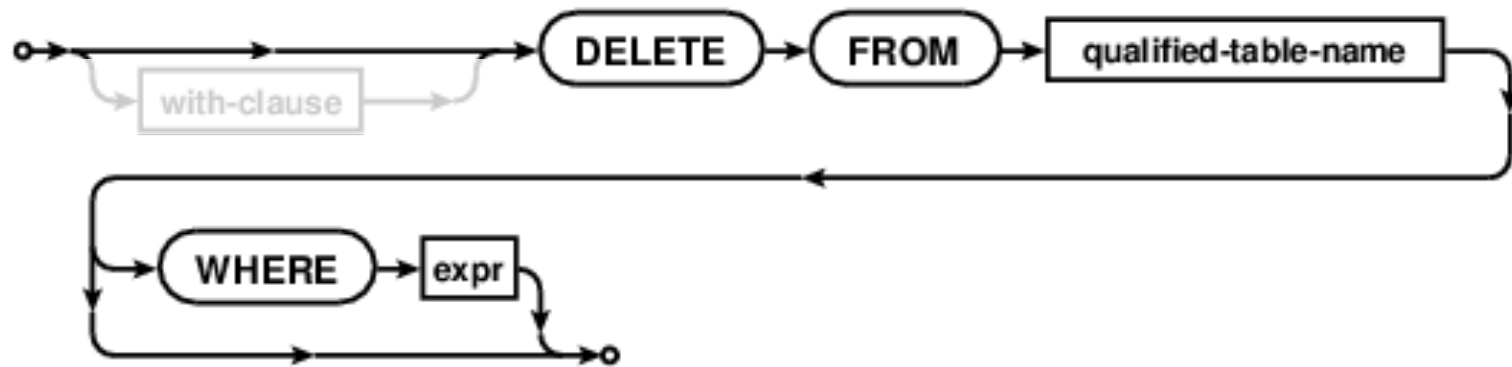
Update sets all entries in certain columns to new values, just for some subset of rows.

(Demo)



## Delete

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Delete removes some or all rows from a table.

(Demo)

# Python and SQL

## Python Can Access Sqlite Databases

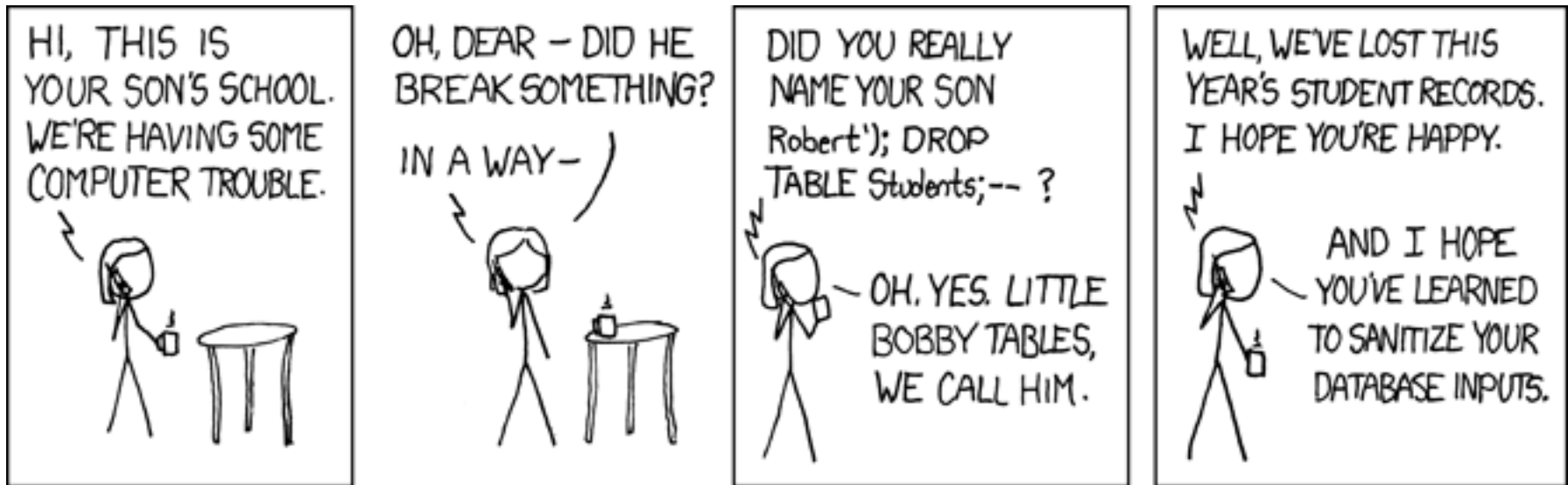
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```
import sqlite3

db = sqlite3.Connection('number.db')
db.execute('CREATE TABLE nums AS SELECT 2, 3 UNION SELECT 4, 5;')
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 (?)", [name])
```

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

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

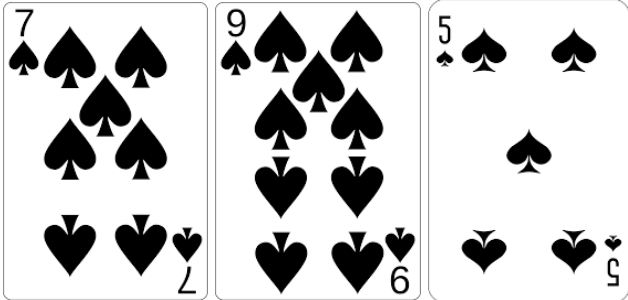
<https://xkcd.com/327/>

## Database Connections

# Casino Blackjack

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Player:



(Demo)

Dealer:

