

Databases

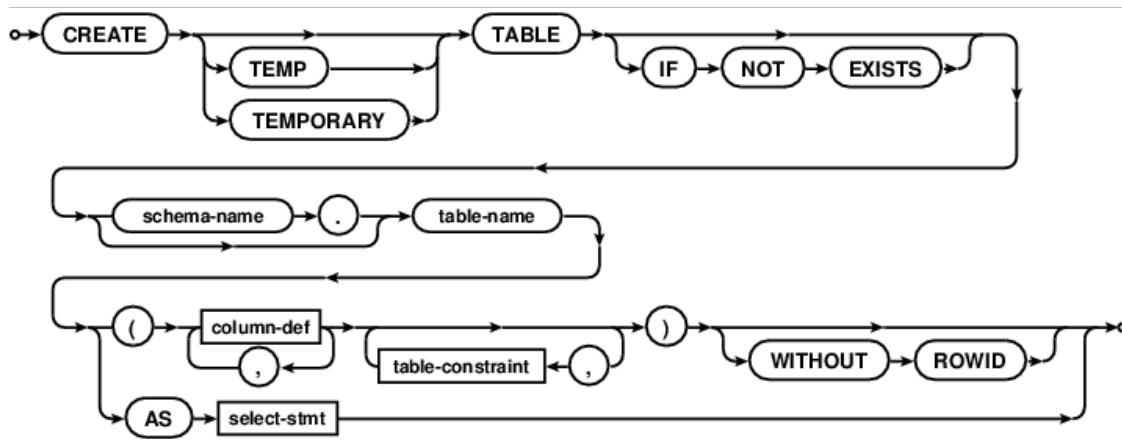
Announcements

Create Table and Drop Table

Create Table

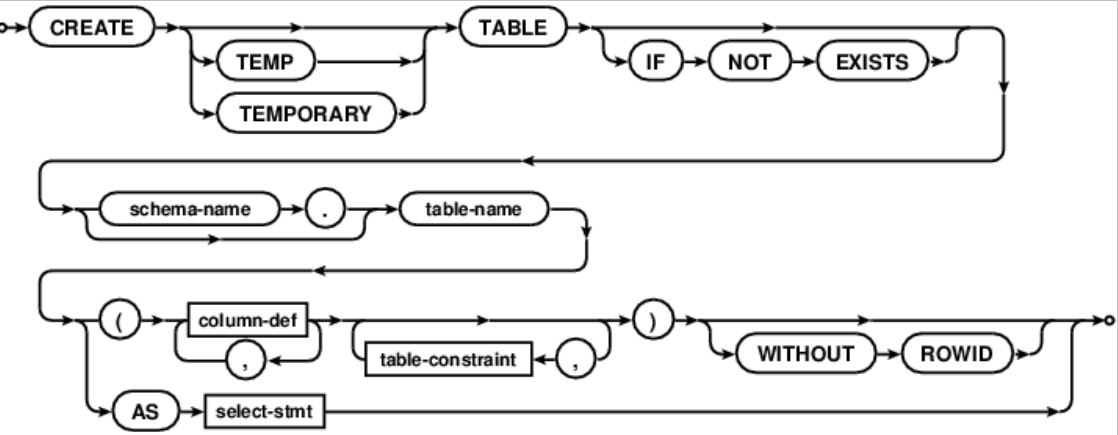
Create Table

CREATE TABLE expression syntax:



Create Table

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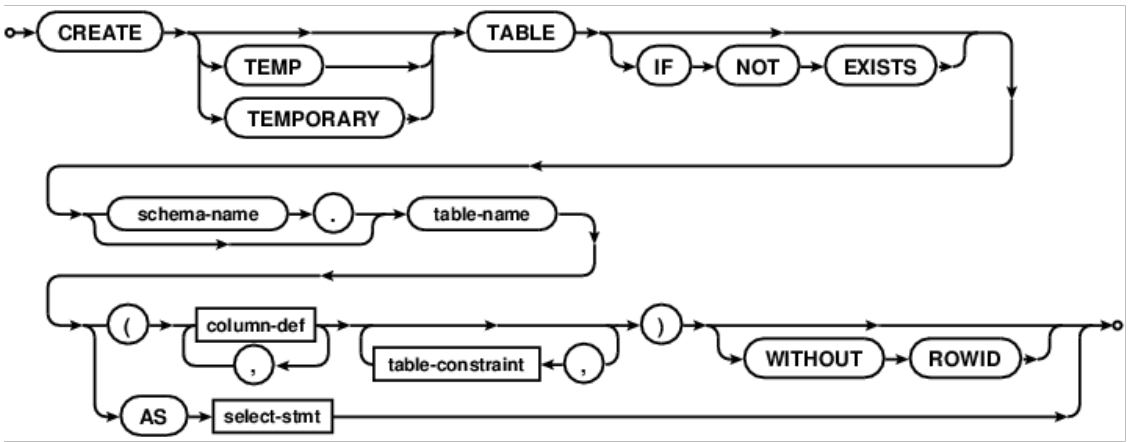


column-def:



Create Table

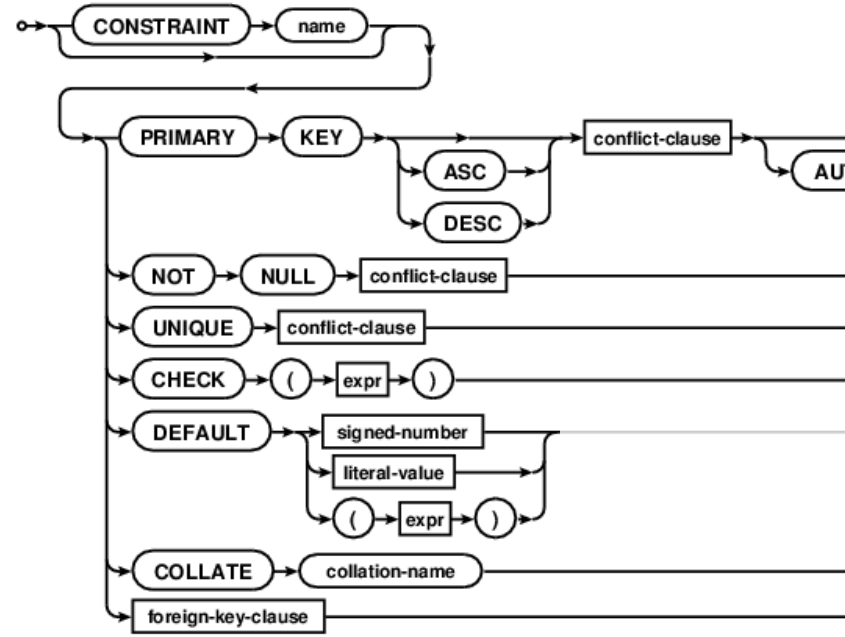
CREATE TABLE expression syntax:



column-def:

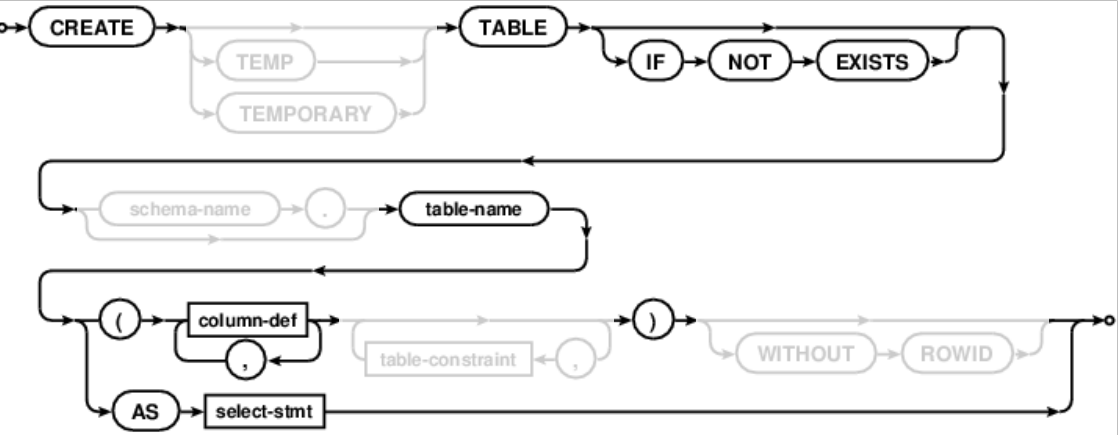


column-constraint:



Create Table

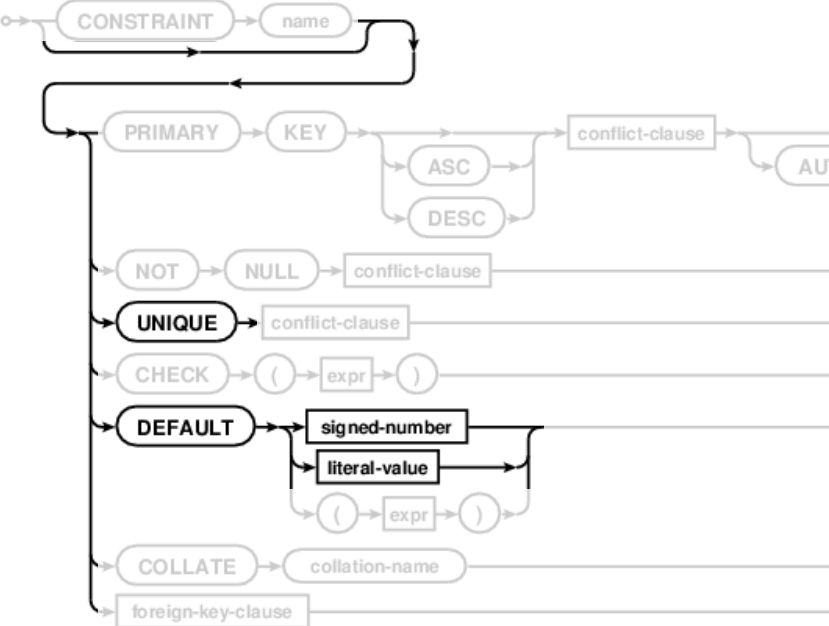
CREATE TABLE expression syntax:



column-def:

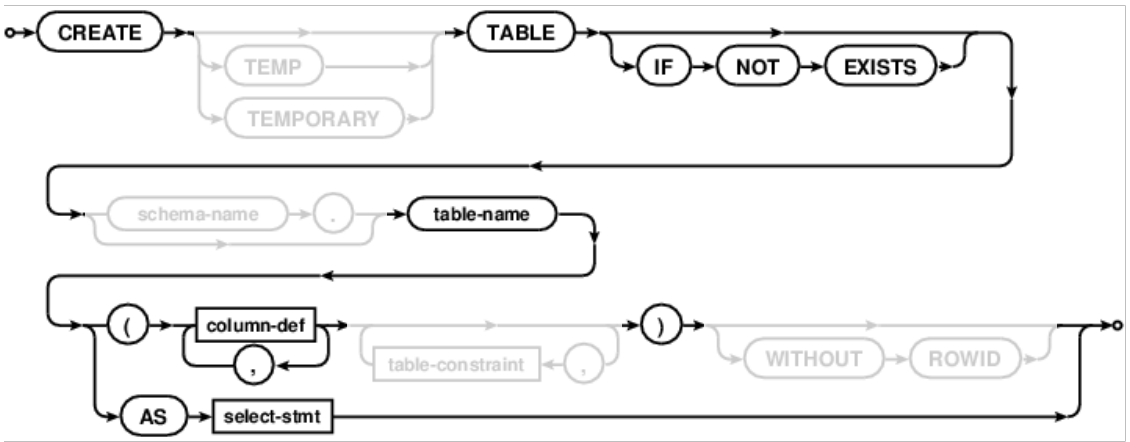


column-constraint:



Create Table

CREATE TABLE expression syntax:

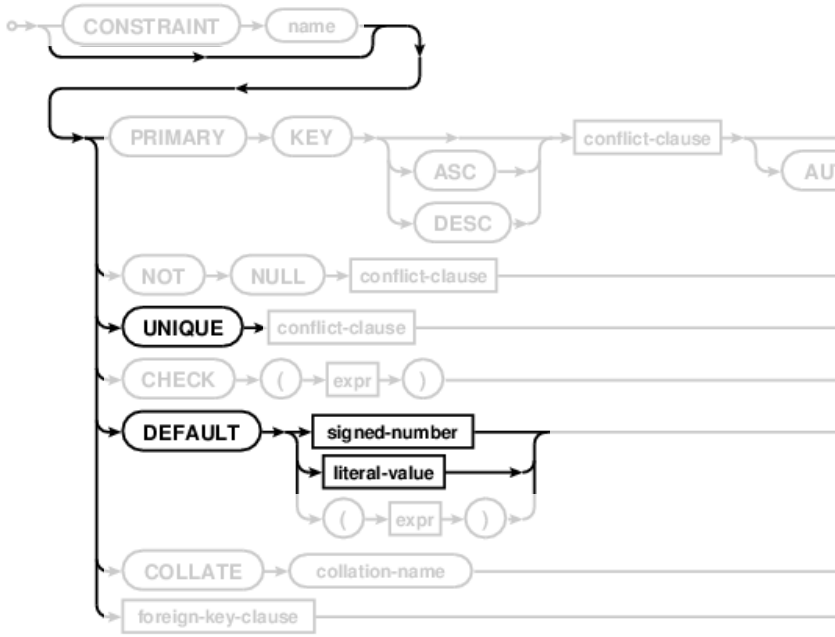


Examples:

column-def:

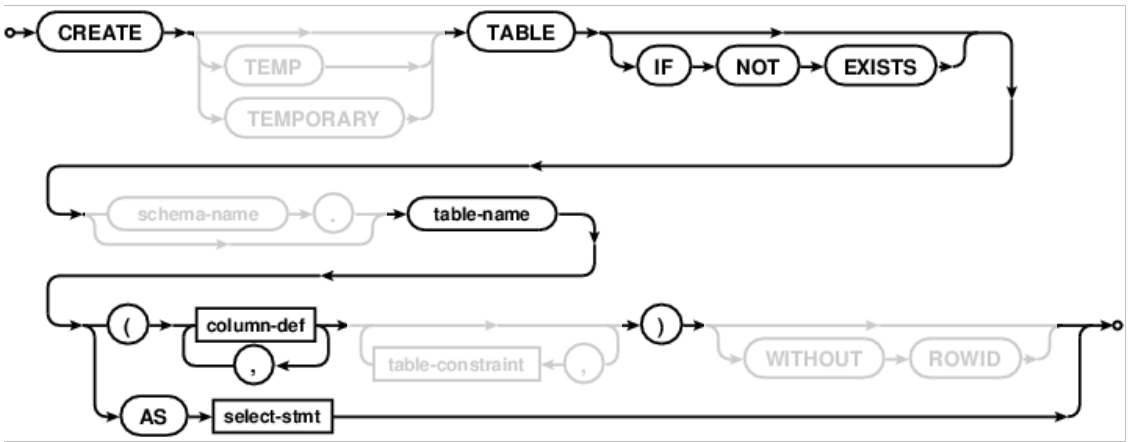


column-constraint:



Create Table

CREATE TABLE expression syntax:



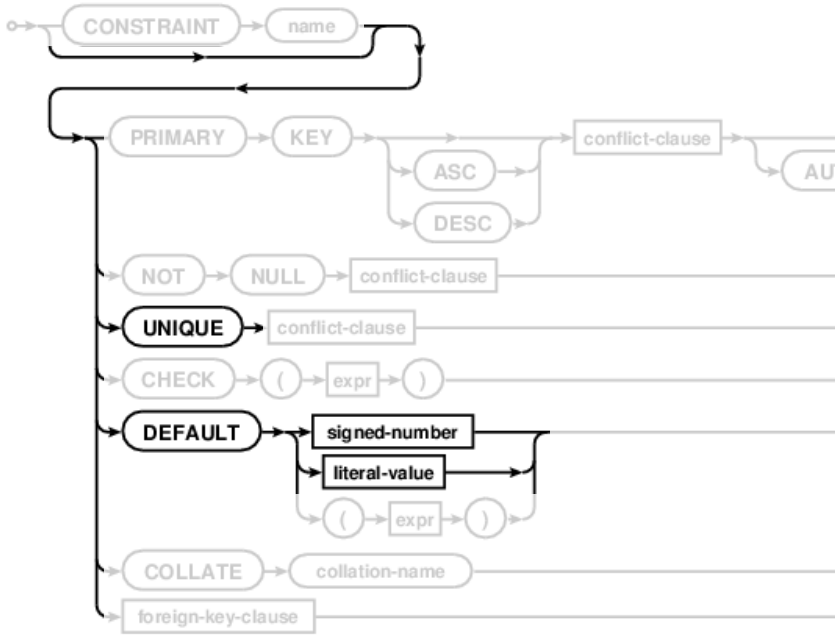
Examples:

```
CREATE TABLE numbers (n, note);  
CREATE TABLE numbers (n UNIQUE, note);  
CREATE TABLE numbers (n, note DEFAULT "No comment");
```

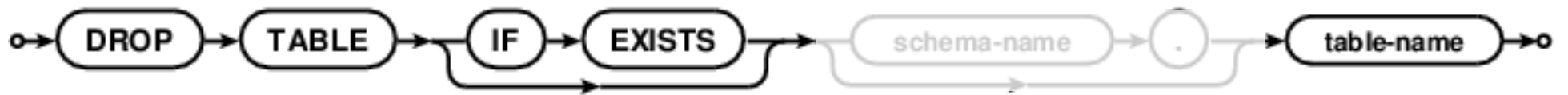
column-def:



column-constraint:

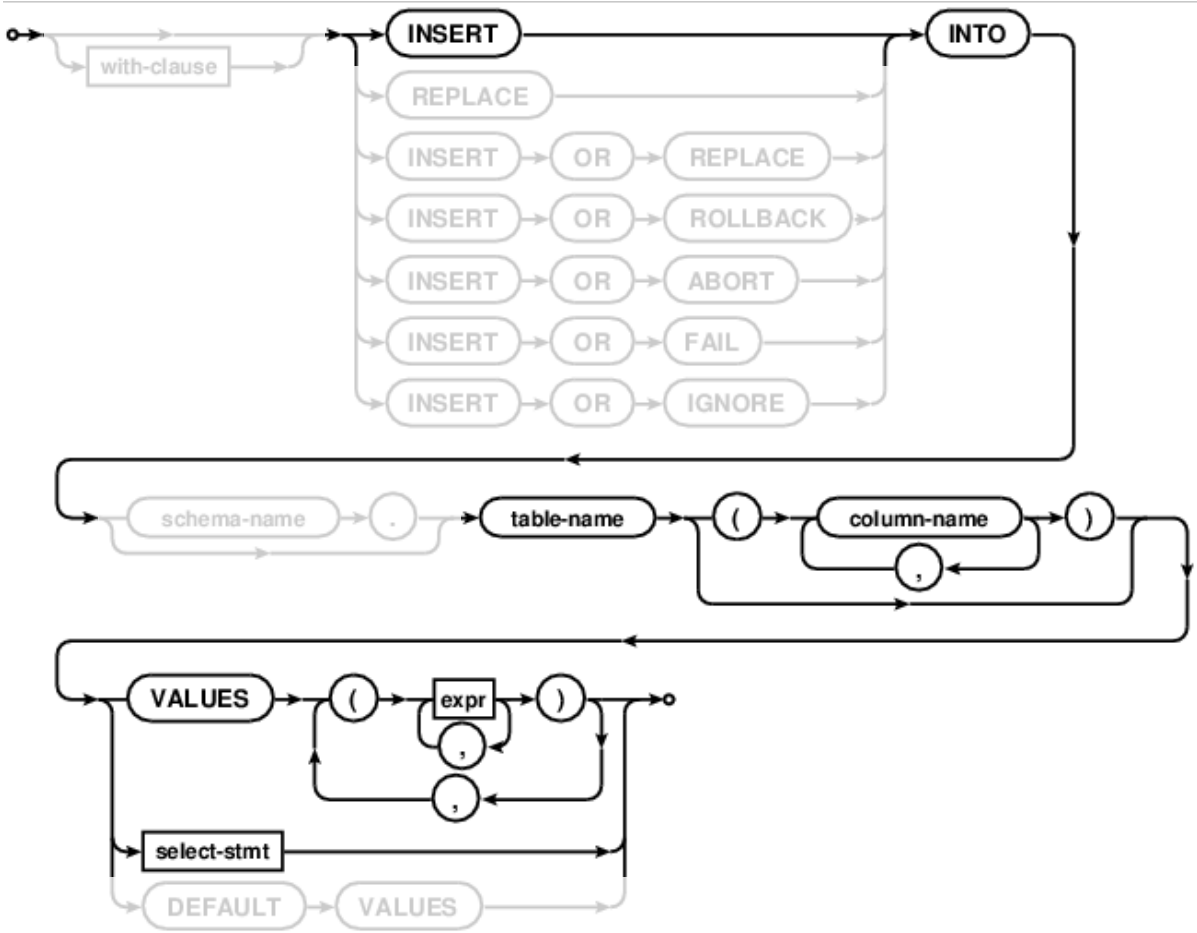


Drop Table

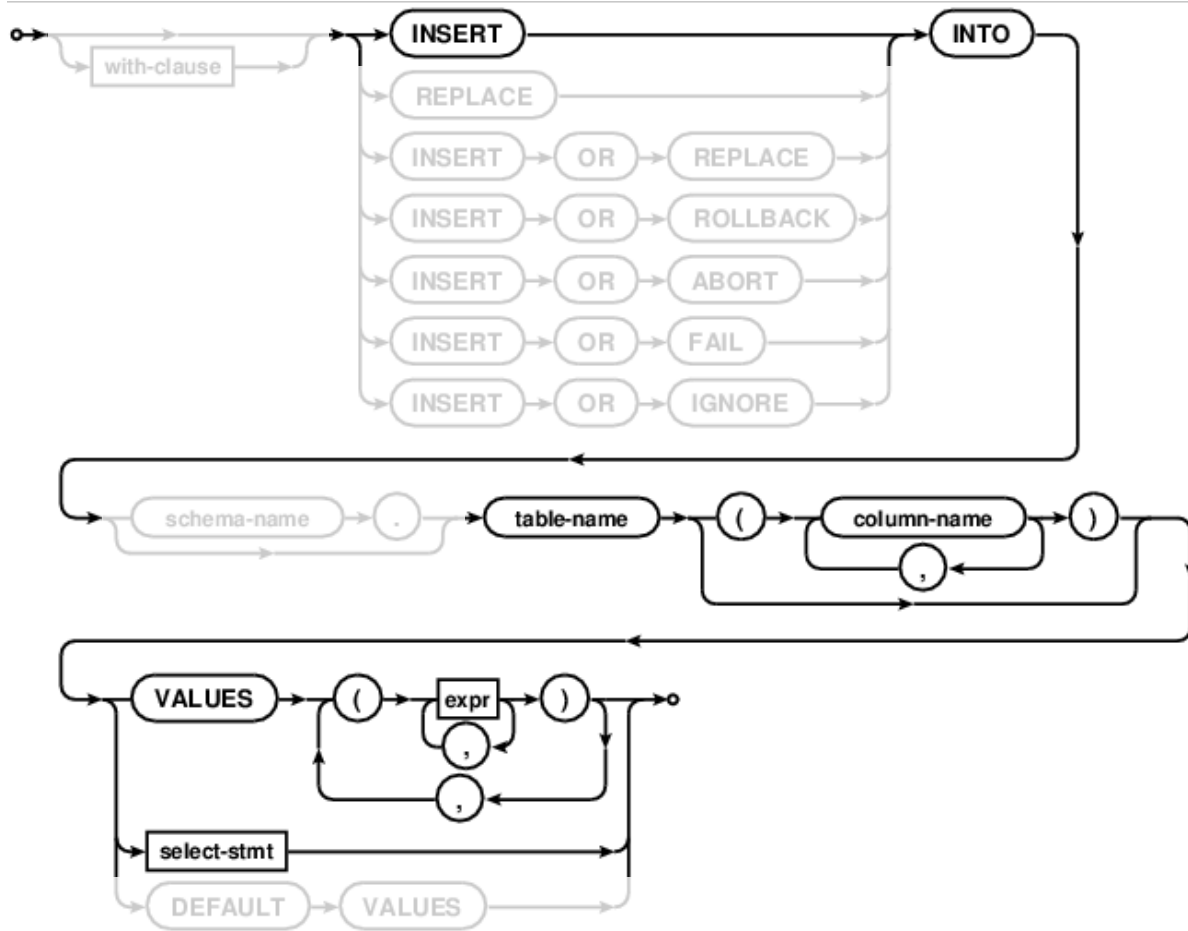


Modifying Tables

Insert

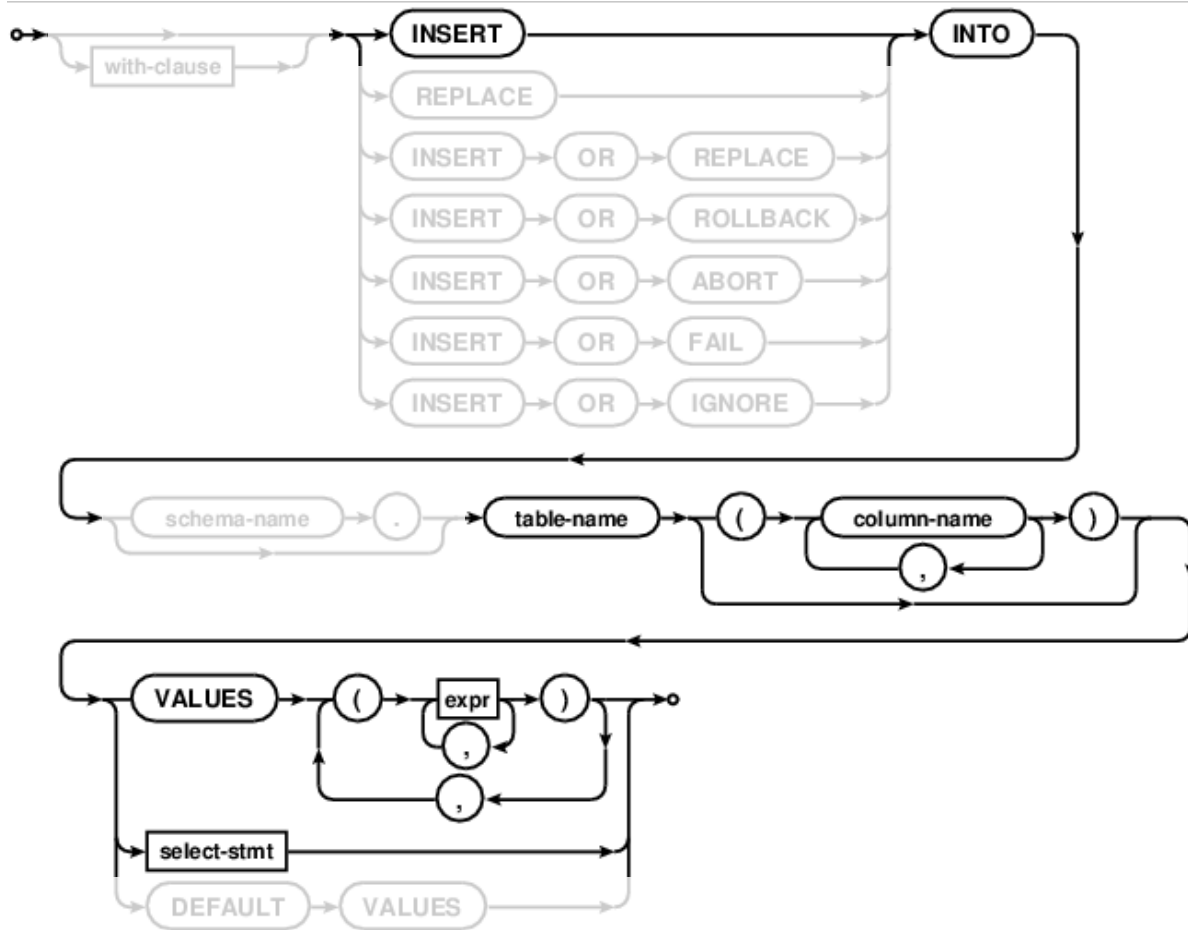


Insert



For a table t with two columns...

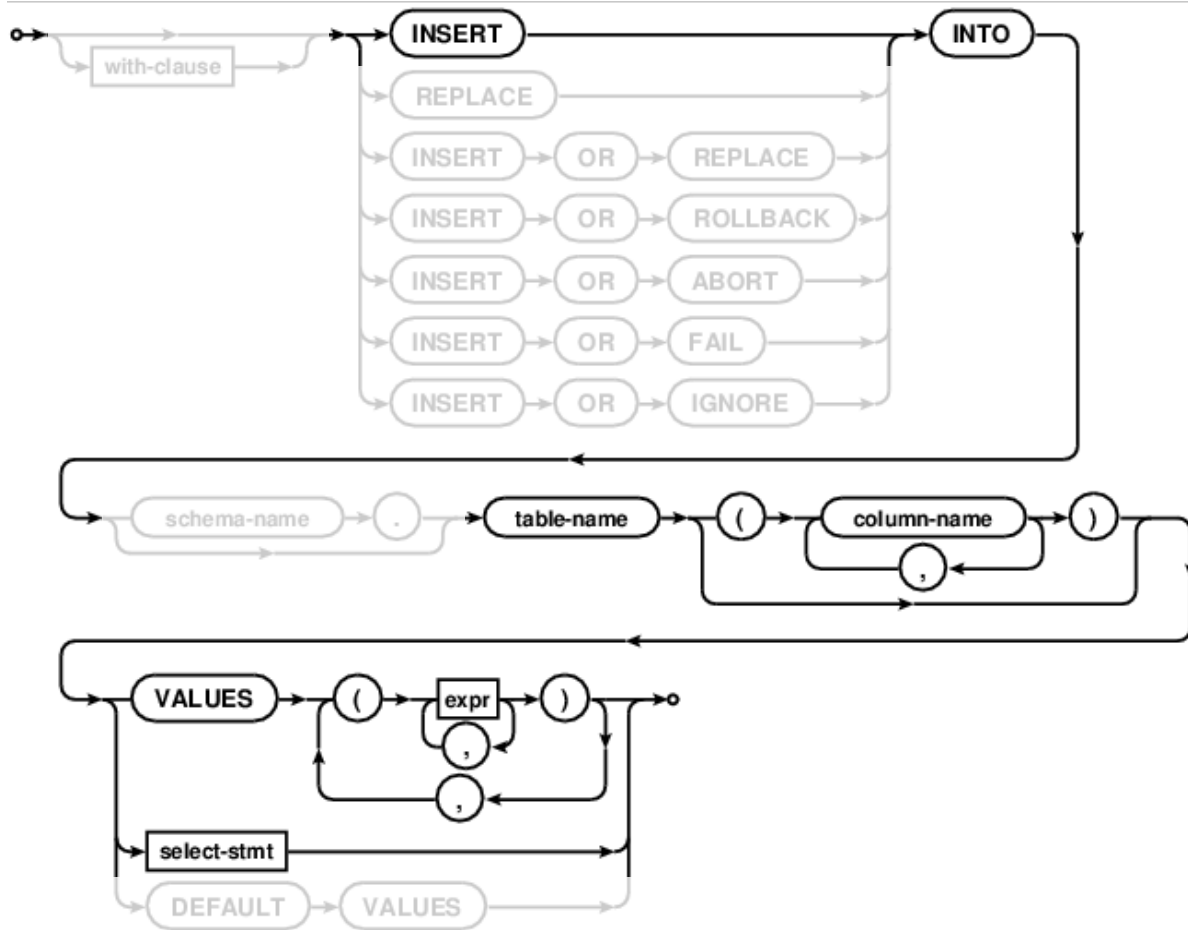
Insert



For a table t with two columns...

To insert into one column:

Insert

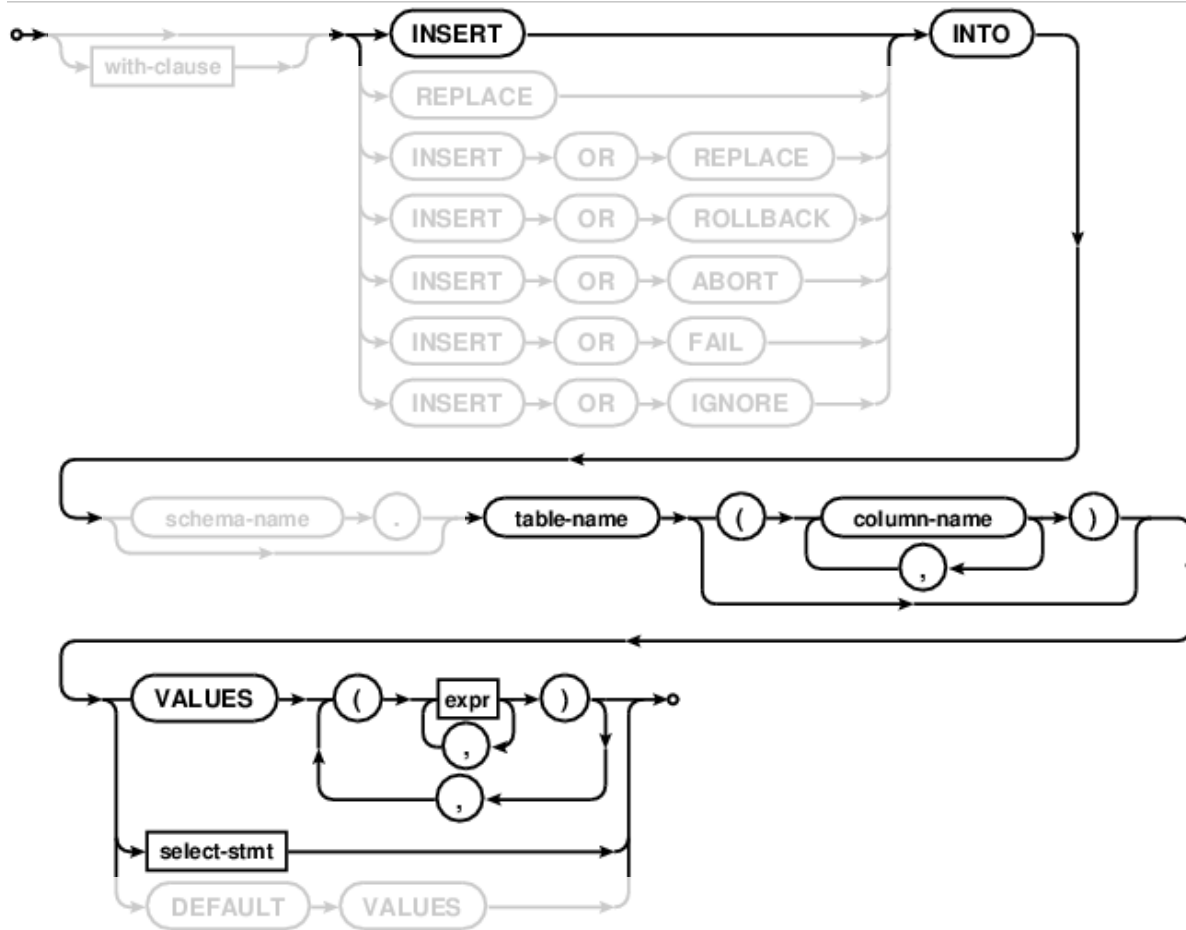


For a table t with two columns...

To insert into one column:

```
INSERT INTO t(column) VALUES (value);
```


Insert



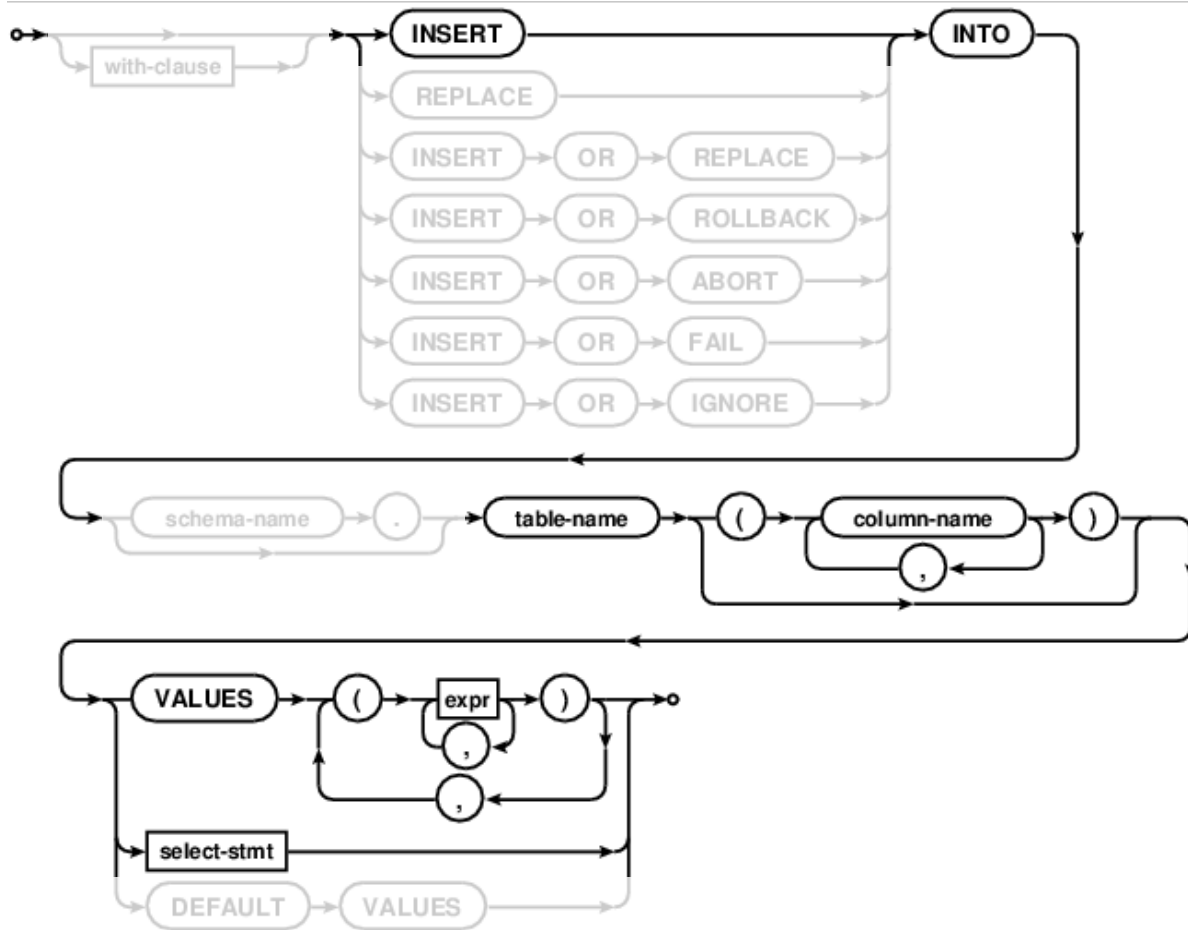
For a table `t` with two columns...

To insert into one column:

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INSERT INTO t(column) VALUES (value);
```

To insert into both columns:

Insert



For a table `t` with two columns...

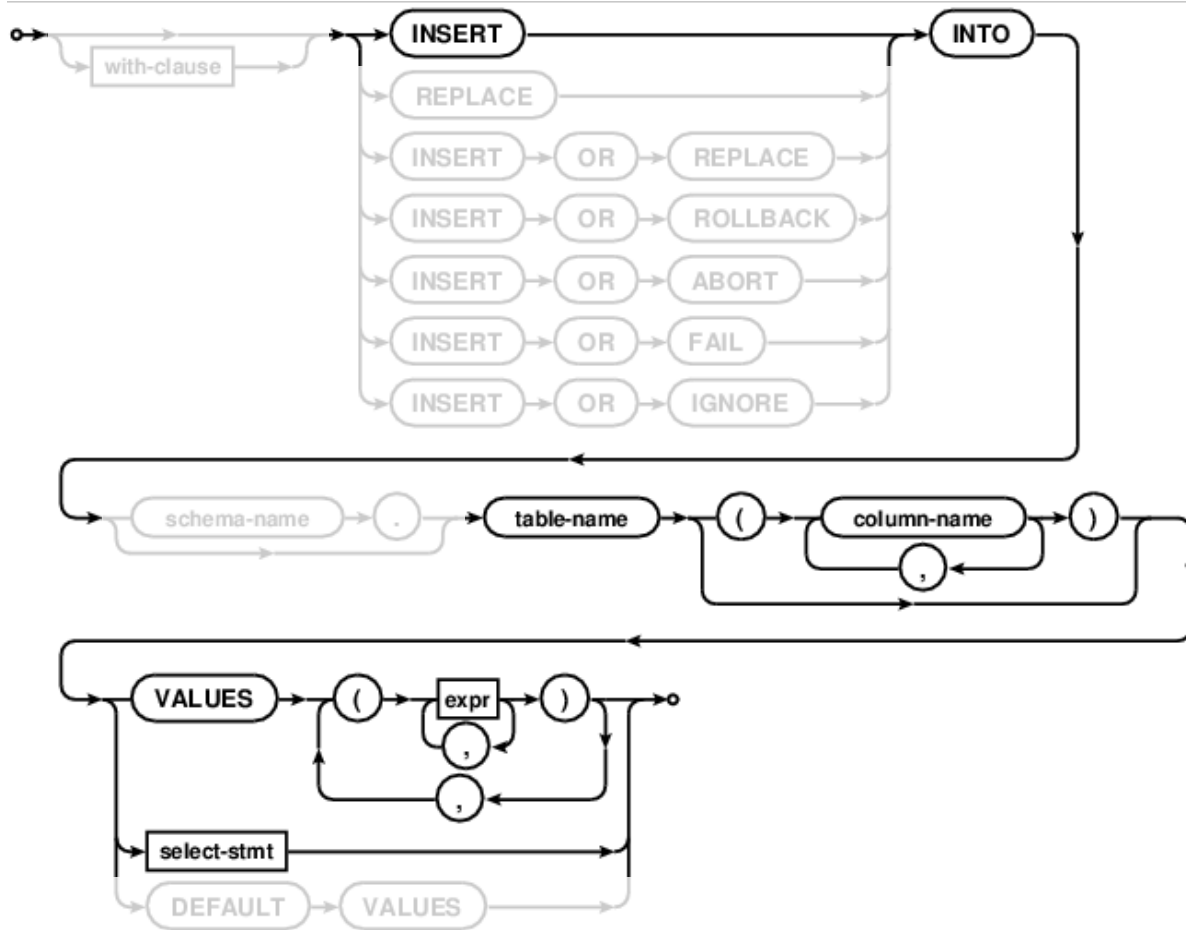
To insert into one column:

```
INSERT INTO t(column) VALUES (value);
```

To insert into both columns:

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

Insert



For a table t with two columns...

To insert into one column:

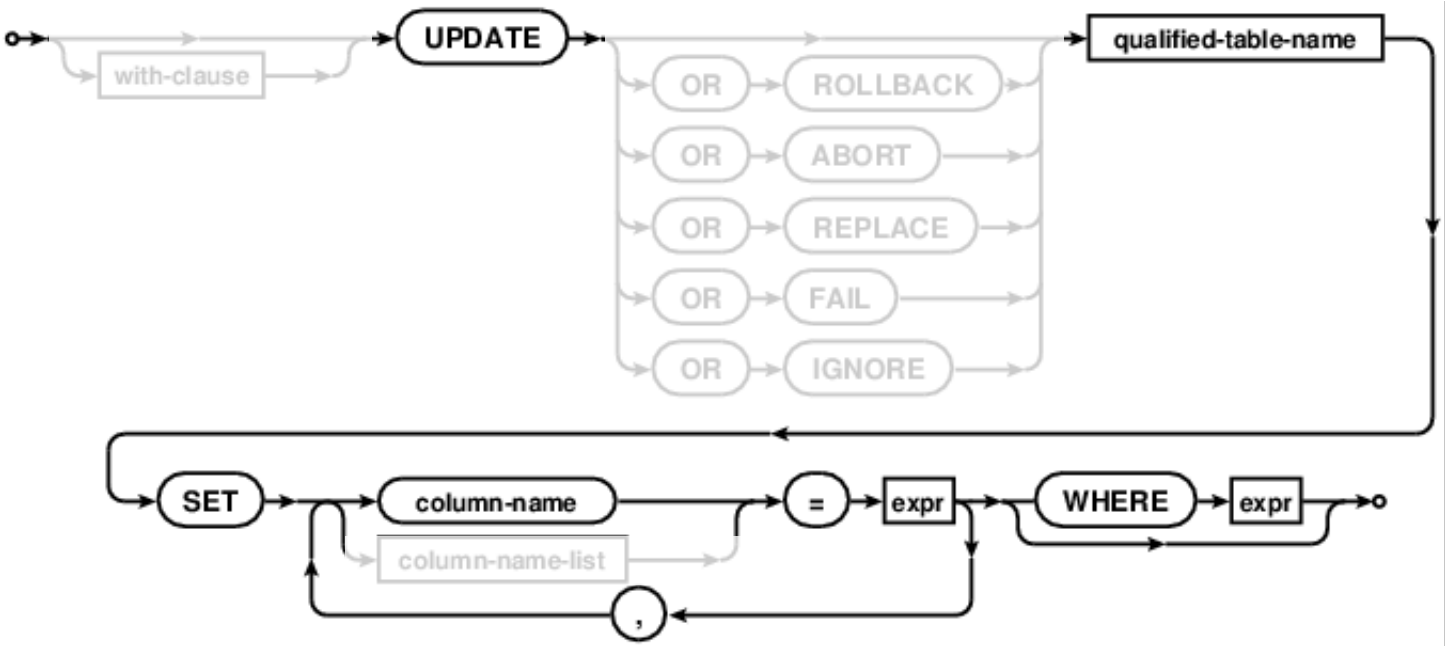
```
INSERT INTO t(column) VALUES (value);
```

To insert into both columns:

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

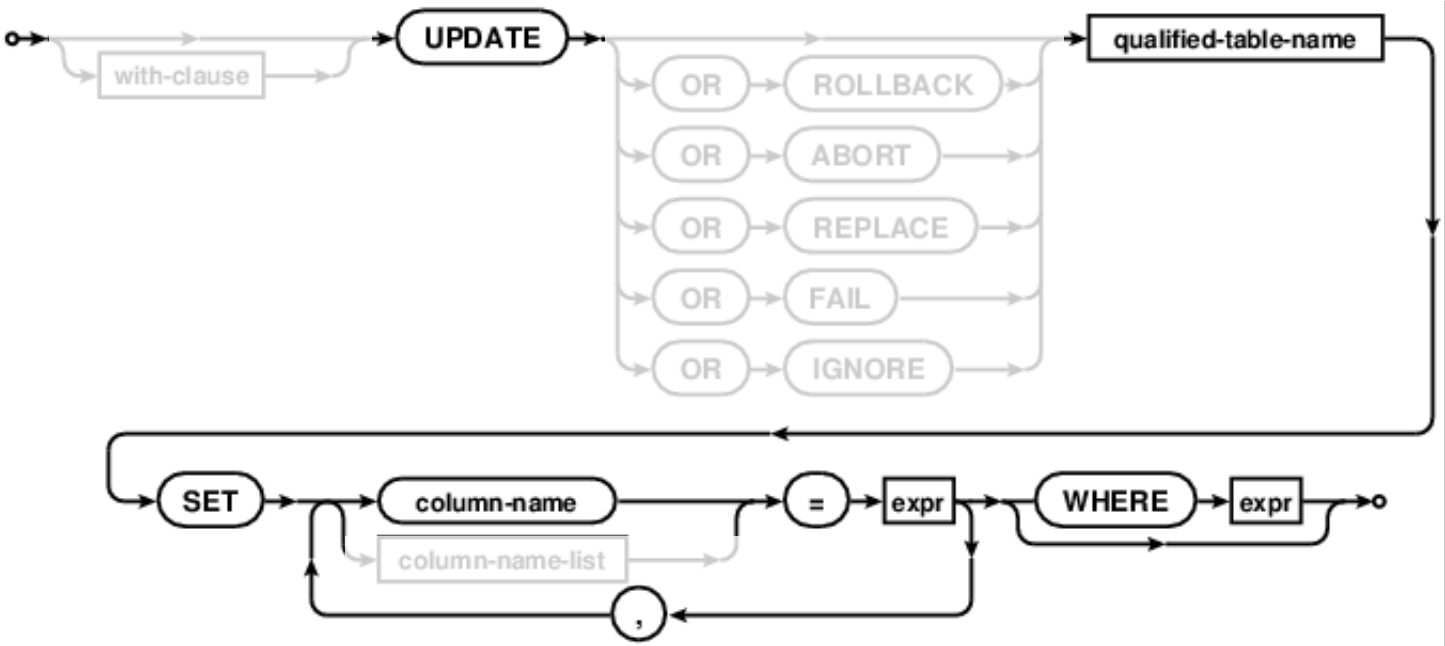
(Demo)

Update



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

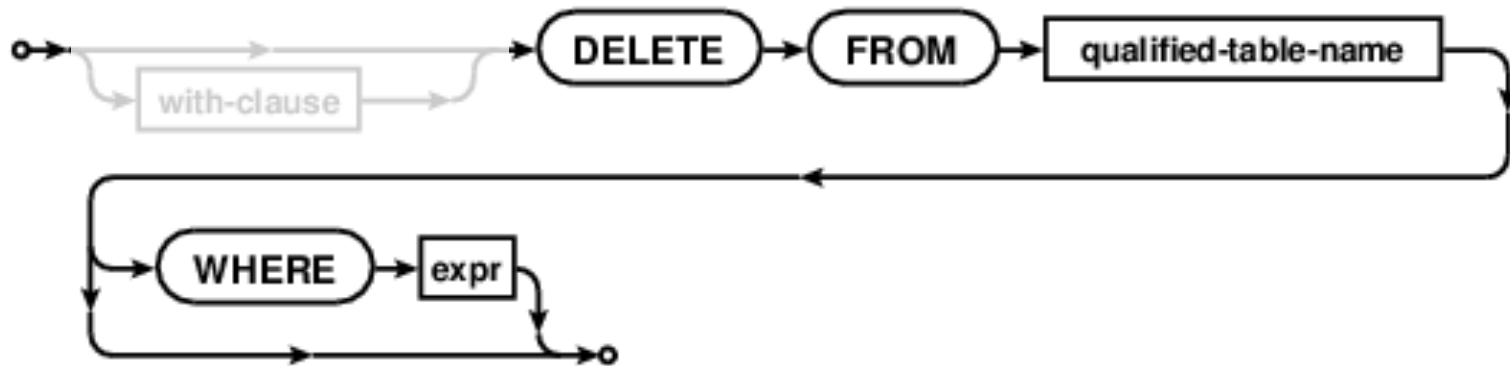
Update



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

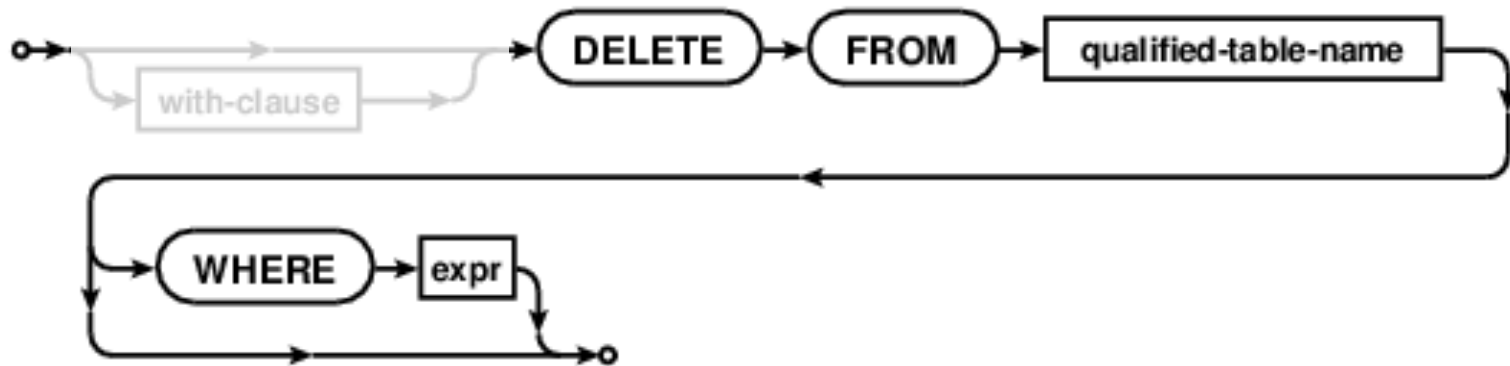
(Demo)

Delete



Delete removes some or all rows from a table.

Delete



Delete removes some or all rows from a table.

(Demo)

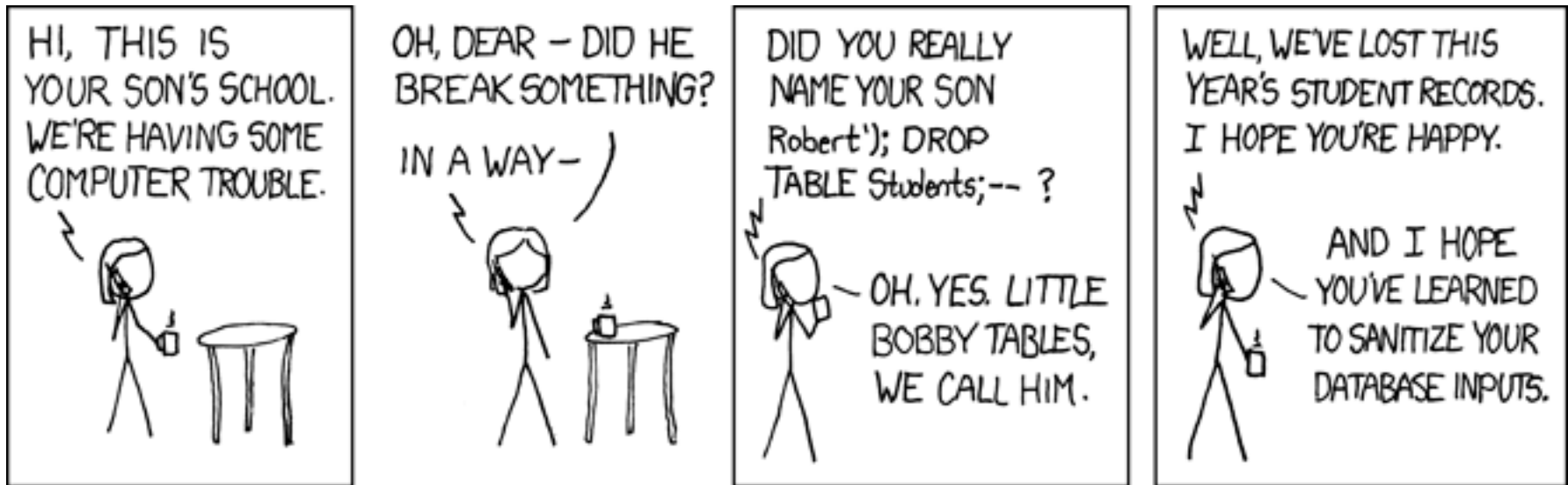
Python and SQL

Python and SQL

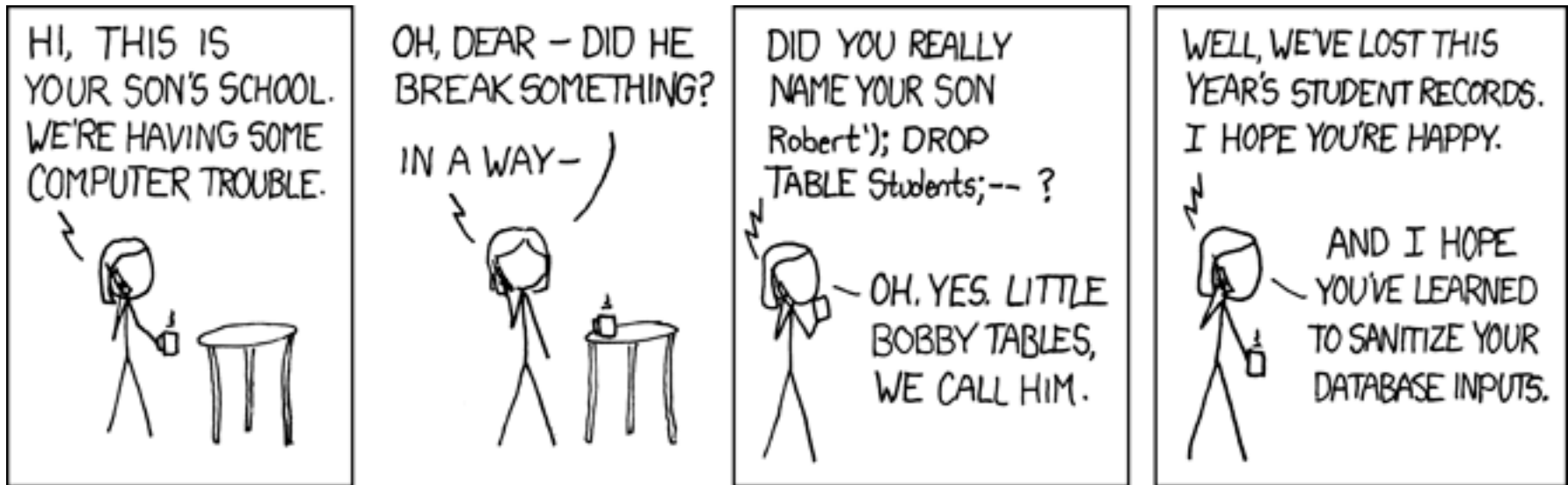
(Demo)

SQL Injection Attack

A Program Vulnerable to a SQL Injection Attack

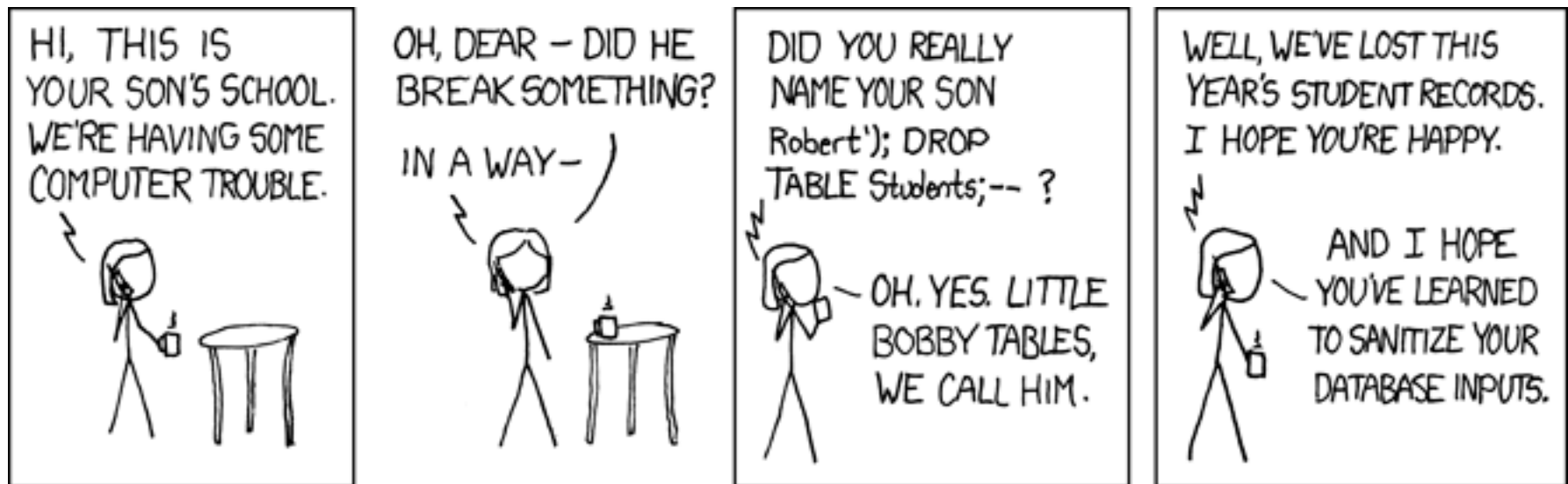


A Program Vulnerable to a SQL Injection Attack



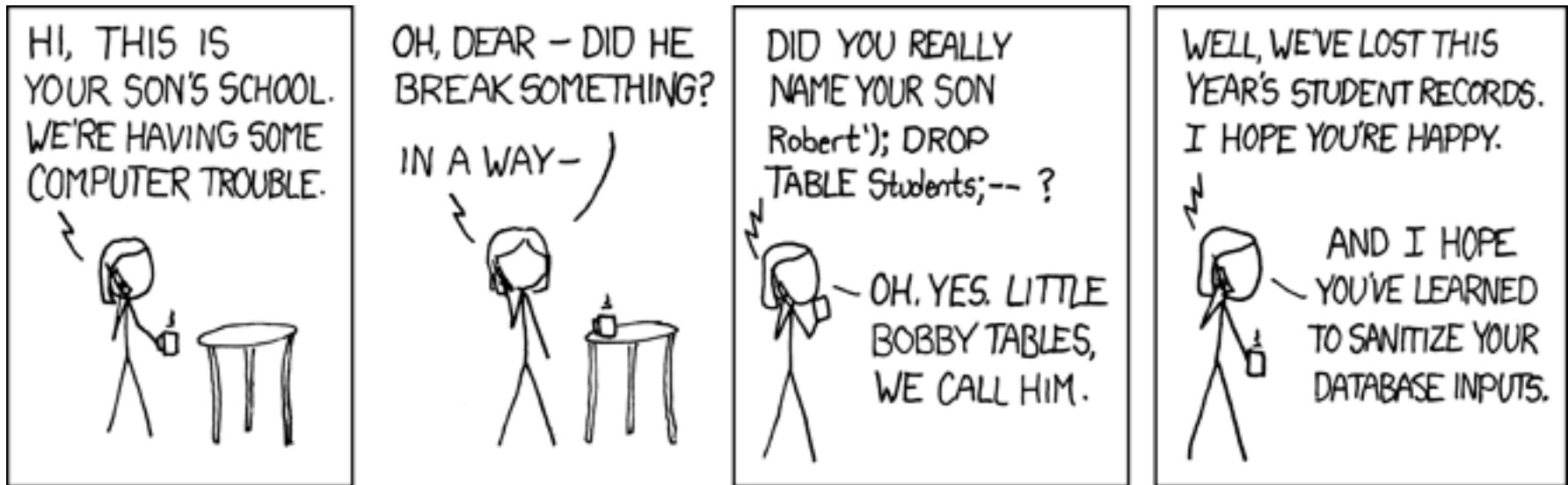
```
name = "Robert'); DROP TABLE Students; --"
```

A Program Vulnerable to a SQL Injection Attack



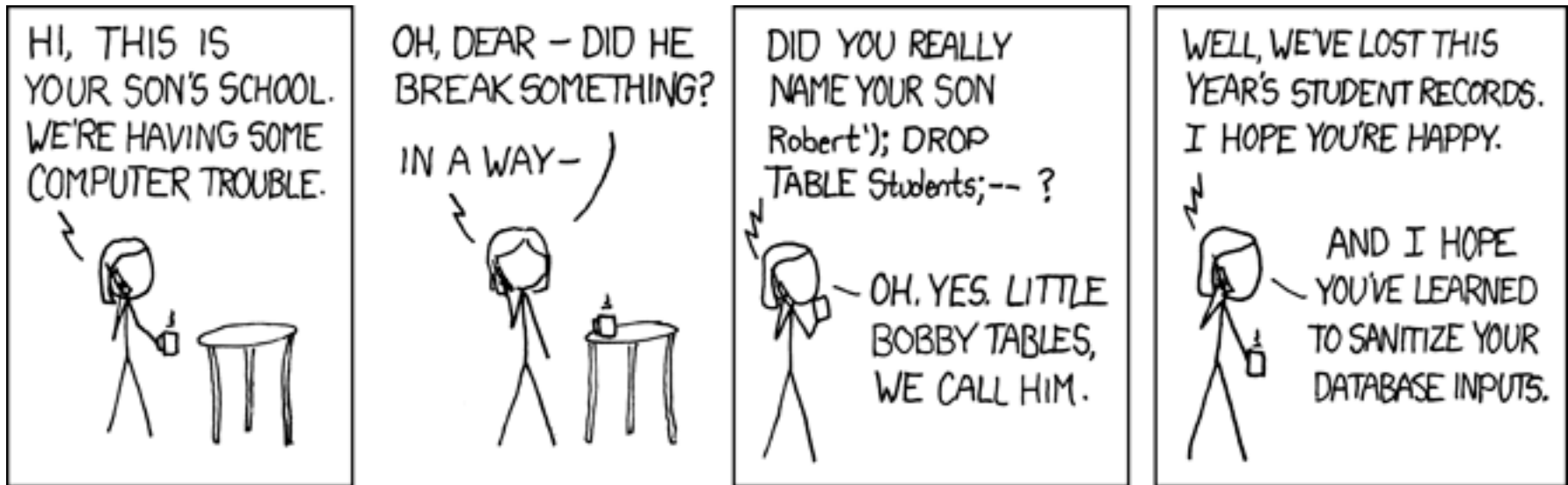
```
cmd = "INSERT INTO Students VALUES ('" + name + "');"
```

A Program Vulnerable to a SQL Injection Attack



`db.executescript(cmd)`

A Program Vulnerable to a SQL Injection Attack

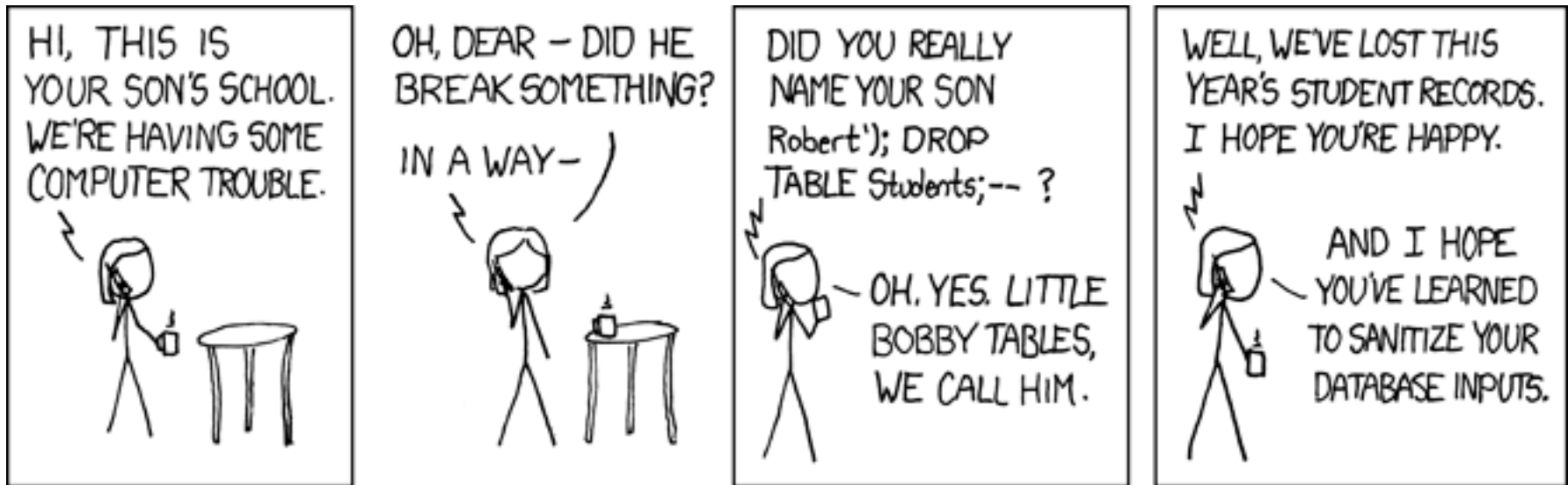


db.executescript(cmd)

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

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

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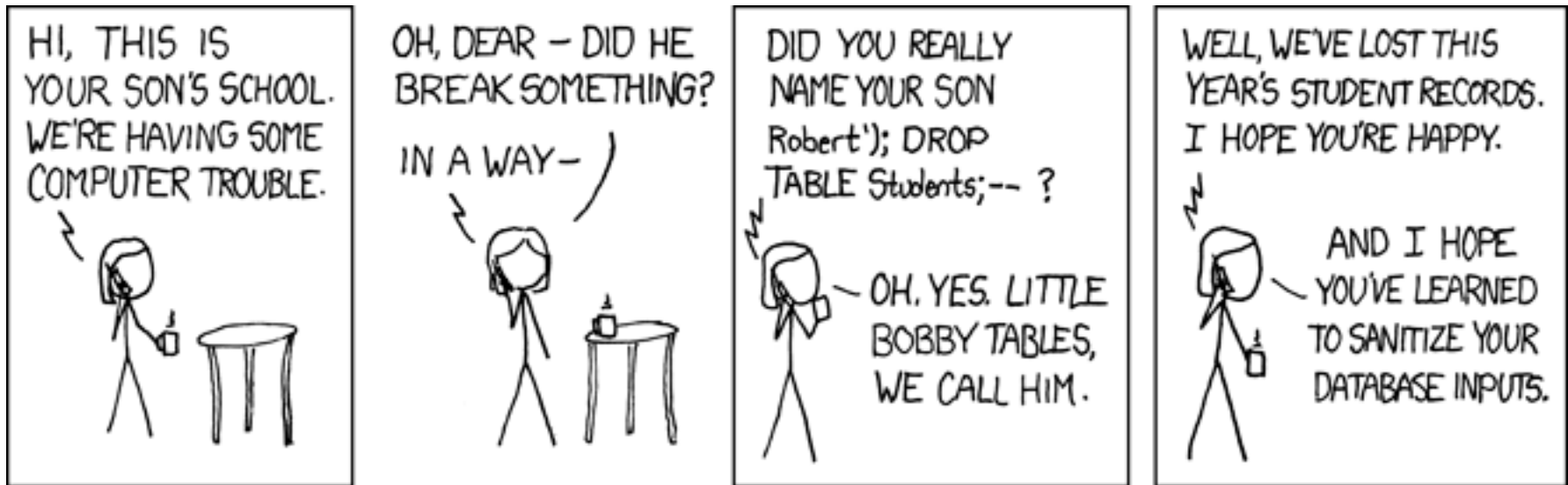


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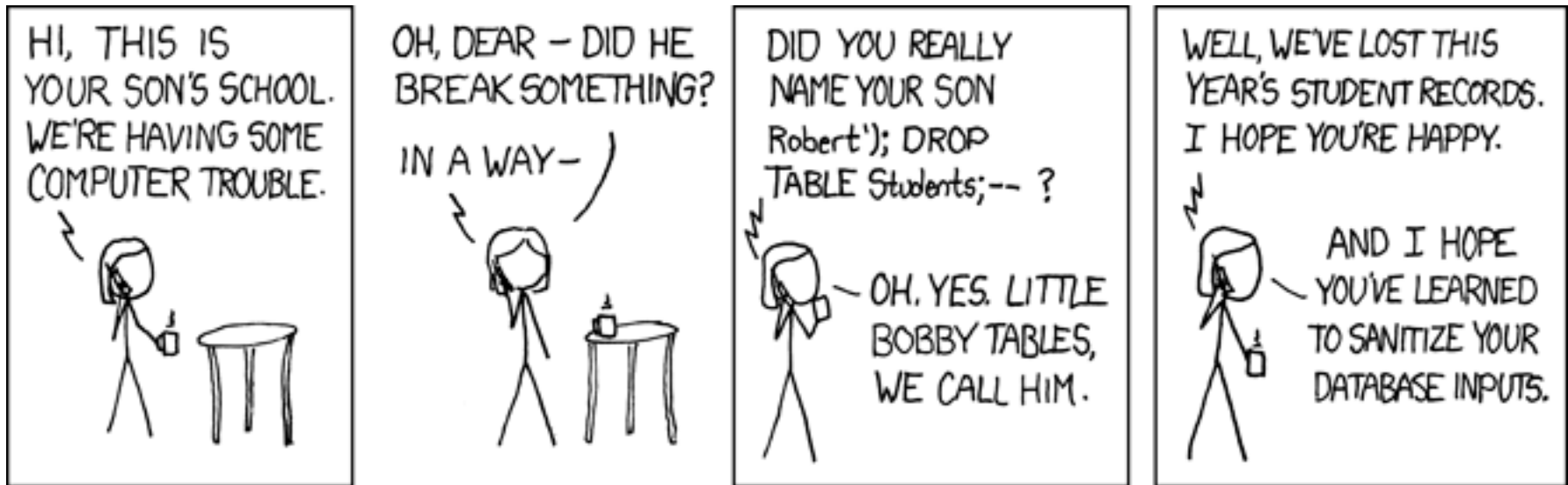


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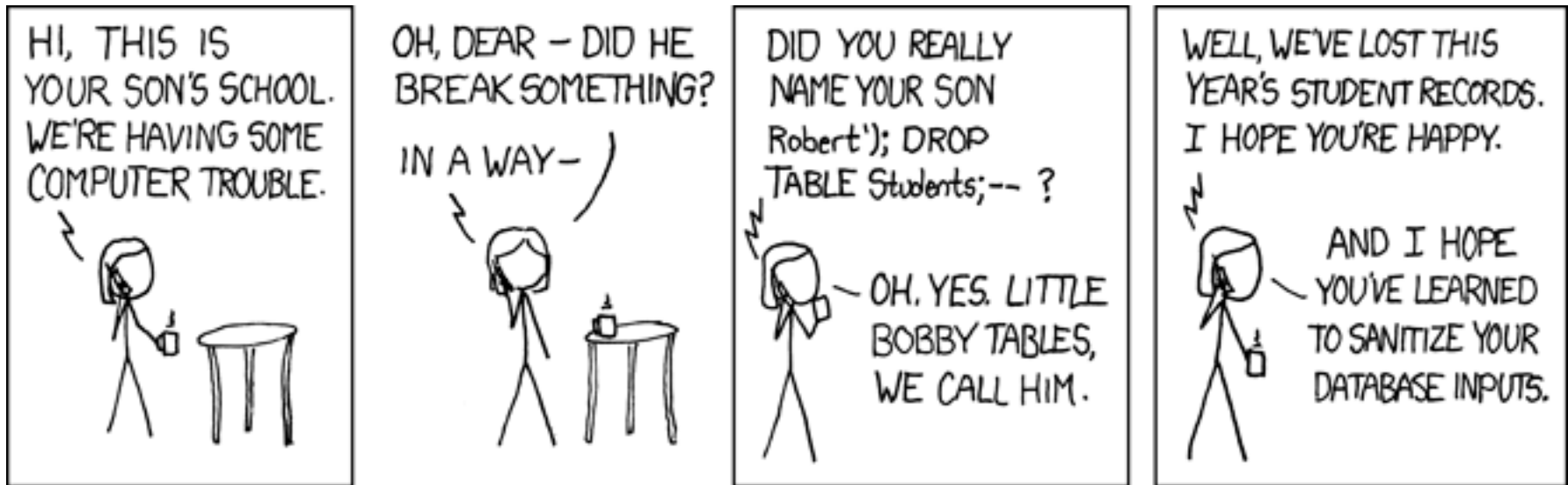


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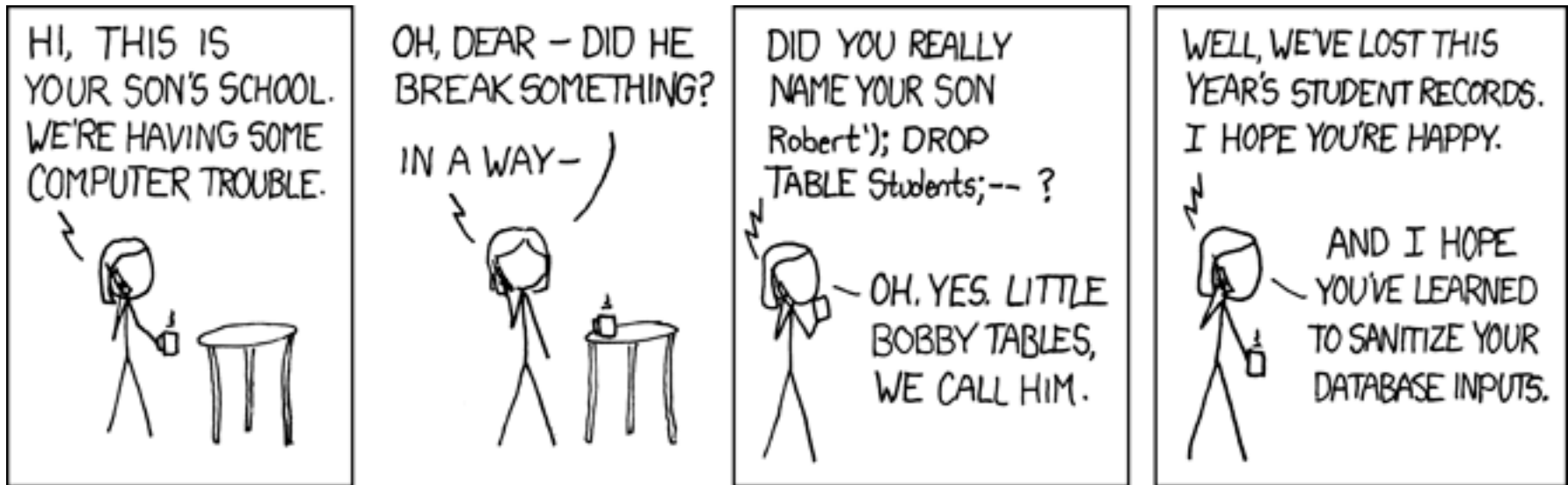


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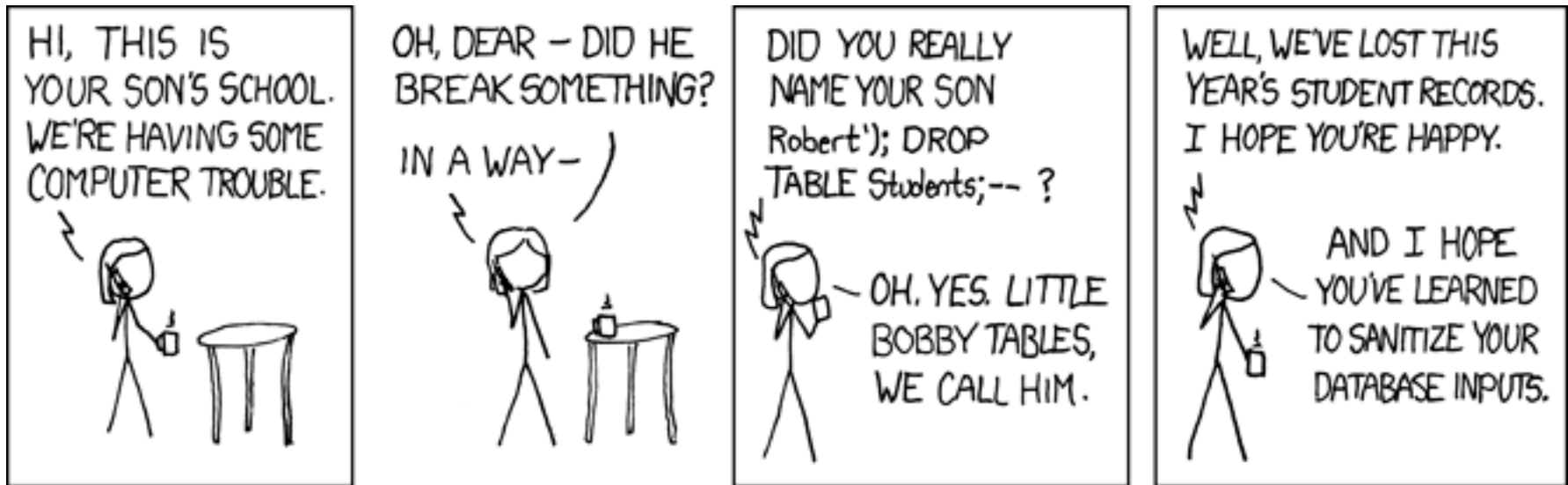


~~db.executescript(cmd)~~ db.execute("INSERT INTO Students VALUES (?)", [name])

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

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

A Program Vulnerable to a SQL Injection Attack



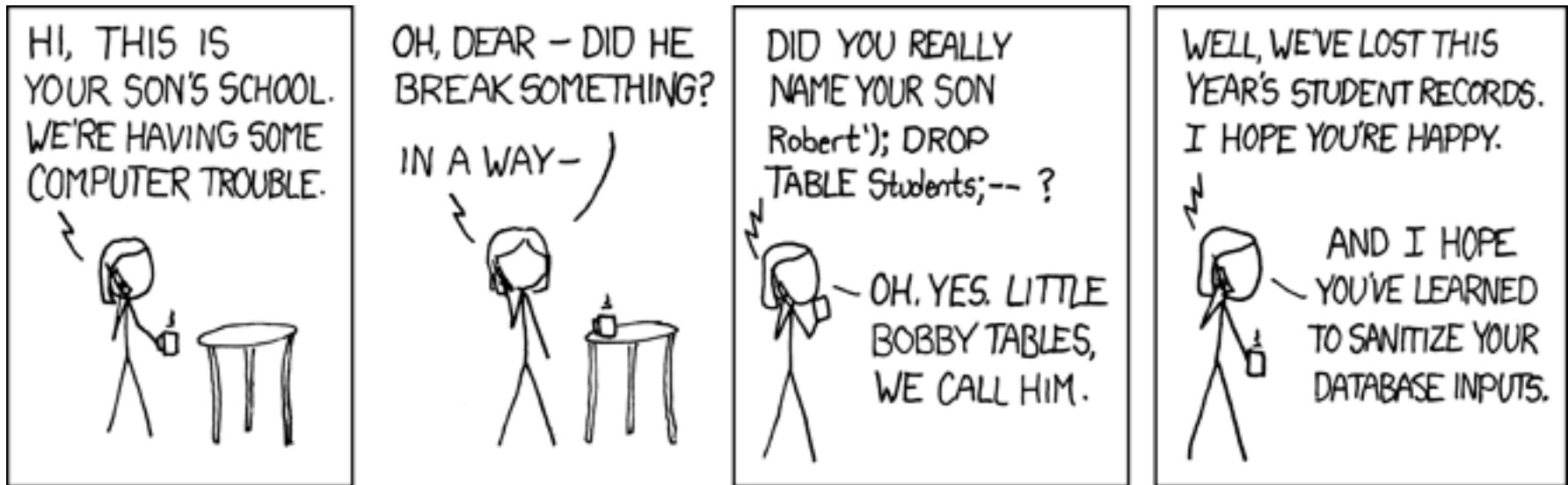
~~db.executescript(cmd)~~ db.execute("INSERT INTO Students VALUES (?)", [name])

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

~~**INSERT INTO** Students **VALUES** ('Robert'); **DROP TABLE** Students; **'**);~~

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

A Program Vulnerable to a SQL Injection Attack



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

Database Connections

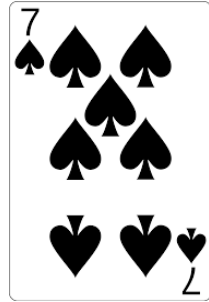
Casino Blackjack

Player:

Dealer:

Casino Blackjack

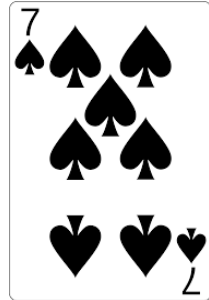
Player:



Dealer:

Casino Blackjack

Player:

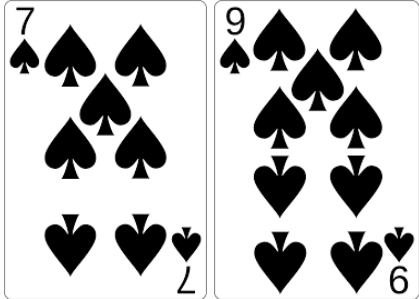


Dealer:



Casino Blackjack

Player:

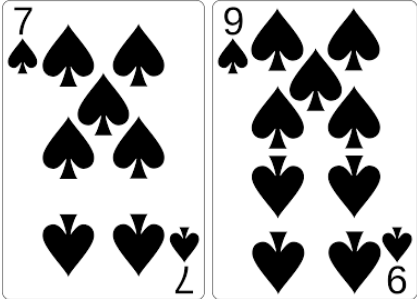


Dealer:

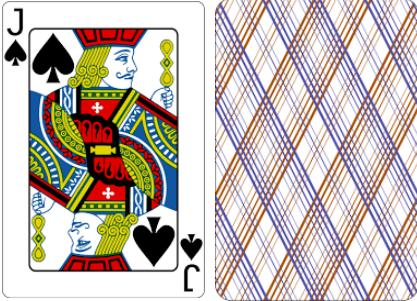


Casino Blackjack

Player:

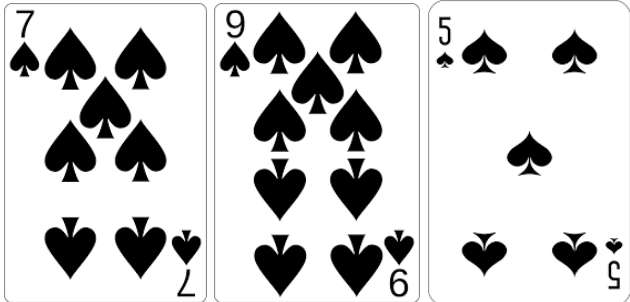


Dealer:

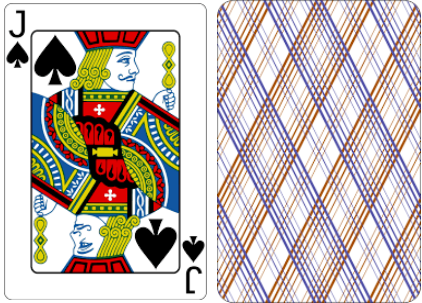


Casino Blackjack

Player:

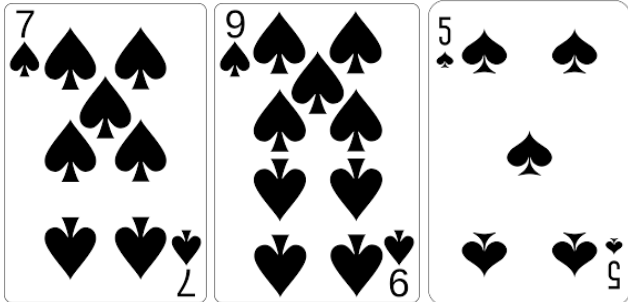


Dealer:

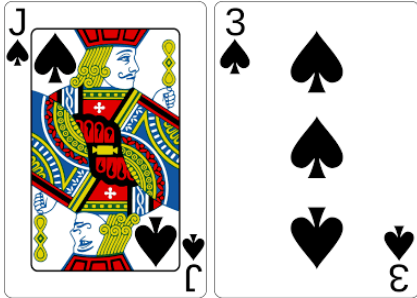


Casino Blackjack

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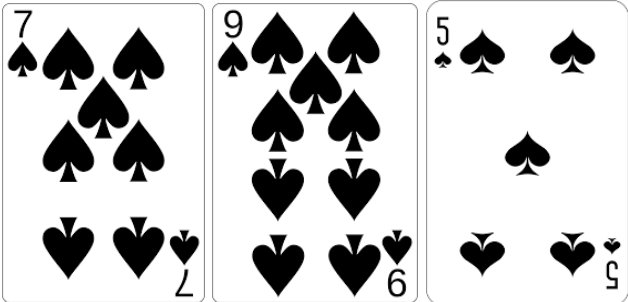


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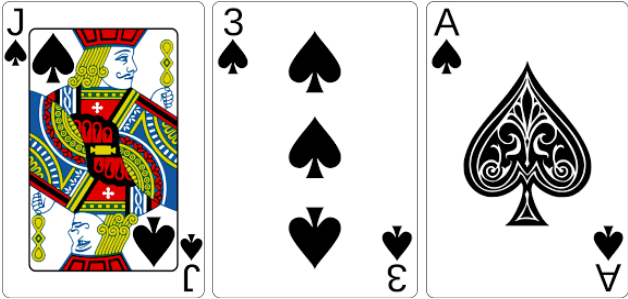


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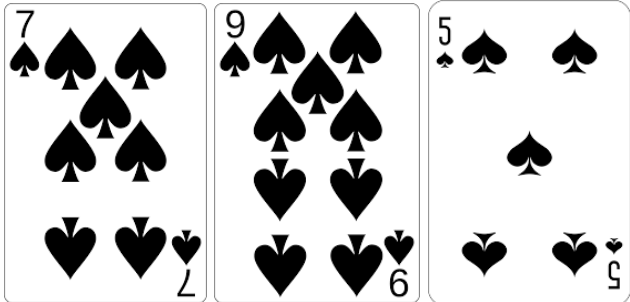


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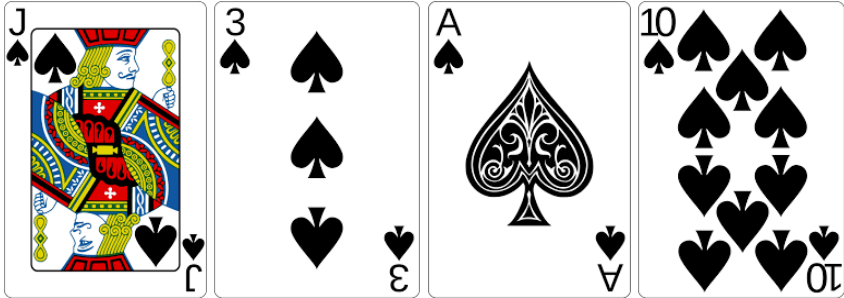


Casino Blackjack

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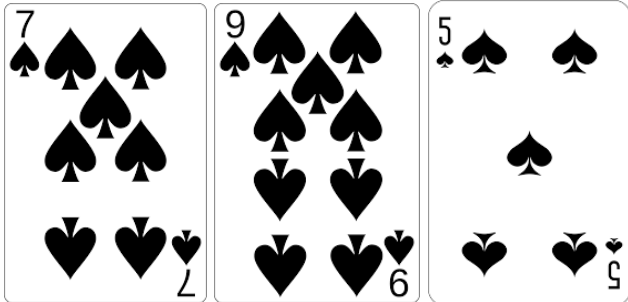


Dealer:



Casino Blackjack

Player:



(Demo)

Dealer:

