

Structured Query Language

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What is SQL?

- * A language for building relational databases that makes it easier to modify data tables and query the database.

Why SQL?

- * ANSI has deemed it the standard language in database management systems.
- * Most system databases incorporate although it is typical for them to have their own extensions unique to their system.
- * It was designed by a mudder.
 - Don Chamberlin '66, inventor of the SQL database language.

Different Versions of SQL

- * Commercial SQL Databases
 - IBM DB2
 - Ingres
 - Oracle
 - Informix
 - Sybase
 - CQL++
 - Solid
 - Empress
 - Adabas D
 - mSQL
 - Kubi
 - YARD-SQL
 - JustLogic
 - DBIX
 - LNX-DBMS
 - SQLFlex
 - Taxis
 - Linter
 - Microsoft SQL
 - and many more....

Different Versions of SQL

- * Open Source SQL Databases
 - InterBase
 - MySQL
 - PostgreSQL
 - Gadfly
 - BeagleSQL
 - GNU SQL
 - and many more....

Creating a Database

- * A database consists of one or more tables. These tables consist of an identifying name and several columns and rows.
- * Columns contain the column name, data type, or other attributes; each row holds a record for that column.

Creating a Table

- * To create a table one uses the create statement.

```
create table_name  
(column_1 datatype,  
 column_2 datatype,  
 ...);
```

- * One can also implement constraints for each column:

```
create table_name  
(column_1 datatype constraint,  
 column_2 datatype constraint,  
 ...);
```

Creating a Table

- * Column names can be strings of no more than 30 characters, and can consist of numbers, characters and underscores.
- * Constraints are optional in the create table command. They require that all instances in the specified column must conform to the given constraint.

Creating a Table

- * Commonly used constraints:

unique no two records can have the same value in the specified column

not null the column cannot be left blank

primary key defines a unique key or reference for each record in the table

It should be noted that there are many other constraints that can be used but they will differ depending on the DBMS server you are using.

It should be noted that the Data types supported depend On the DBMS you are using

Creating a Table

- * Commonly used datatypes:

char(size) Fixed-length character string. Size is specified in parenthesis. Max 255 bytes.

varchar(size) Variable-length character string. Max size is specified in parenthesis.

number(size) Number value with a max number of column digits specified in parenthesis.

date Date value

number(size,d) Number value with a maximum number of digits of "size" total, with a maximum number of "d" digits to the right of the decimal.

Logical A column that can hold only two values: TRUE or FALSE.

Example for Creating a Table

```
create famous_people  
(first varchar(30),  
 last varchar(30),  
 hair_color varchar(15),  
 age number(2,0));
```

A Sample Table

First	Last	Hair_Color	age
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Thus now that we can create tables, but we need to be able to store and retrieve data from them.

Adding to a Table

- * Adding records to a table is done using the insert command as follows:

```
insert into table_name
(first_column,...last_column)
values (first_value,...last_value);
```

Example of Adding to a Table

```
insert into famous_people
(first, last, hair_color, age)
values (Bruce, Willis, brown, 45);
```

```
insert into famous_people
(first, last, hair_color, age)
values (Ben, Affleck, brown, 27);
```

```
insert into famous_people
(first, last, hair_color, age)
values (Heather, Graham, blond, 29);
```

The Resulting Table

First	Last	Hair_Color	age
Bruce	Willis	brown	45
Ben	Affleck	brown	27
Heather	Graham	blond	29

Now that we have a table it is important to explain how to access the records stored in the table.

Queries

- * To query a table one uses the select command as follows:

```
select column1 [,column2,etc] from tablename
[where condition];
[] = optional
```

- * The column names that follow the select command will be the information returned by the query. An "*" can be used to specify all columns.
- * The where clause (optional) specifies which data values or rows will be returned or displayed, based on the criteria described after the keyword where.

The where Clause

- * Conditional expressions used in the where clause:

= Equal
> Greater than
< Less than
>= Greater than or equal to
<= Less than or equal to
<> Not equal to

LIKE Will return rows only like what you specify. The % sign can be used as a wildcard before and/or after characters.

Sample Queries

```
select first, last, age
from famous_people
where first LIKE 'B%';
```

First	Last	Age
Bruce	Willis	45
Ben	Affleck	27

```
select *
from famous_people
where first = 'Bruce';
```

First	last	hair_color	age
Bruce	Willis	brown	45

Using a Larger Table

first	last	hair_color	age
Bruce	Willis	brown	45
Ben	Affleck	brown	27
Heather	Graham	blond	29
Will	Smith	black	28
Britney	Spears	blond	18
Julia	Roberts	red	34
Mira	Sorvino	blond	32

Updating a Database

- * To update a record or row in a table the update command can be used as follows:

```
update tablename
set columnname = newvalue[,nextcolumn =
newvalue2...]
where columnname OPERATOR value [and|or column
OPERATOR value];
[ ] = optional
```

Updating a Database Examples

```
update famous_people
set hair_color = 'brown'
where first = 'Britney' and last = 'Spears';
```

```
update famous_people
set age = 33, hair_color = 'brown'
where first = 'Mira' and last = 'Sorvino';
```

```
update famous_people
set last = 'Smith'
where age <= 30;
```

Updated Table

first	last	hair_color	age
Bruce	Willis	brown	45
Ben	Smith	brown	27
Heather	Smith	blond	29
Will	Smith	black	28
Britney	Smith	brown	18
Julia	Roberts	red	34
Mira	Sorvino	brown	33

Deleting

- * To delete a row or record from a table use the delete command function as follows:

```
delete from tablename
where columnname OPERATOR value [and|or column
OPERATOR value];
[ ] = optional
```

- * NOTE: If you leave off the where clause all of the table entries will be deleted!

Deleting

```
delete from famous_people
where last = 'Smith';
```

```
delete from famous_people
where first = 'Julia' or first = 'Mira';
```

Updated Table

first	last	hair_color	age
Bruce	Willis	brown	45

Dropping a Table

- * Using the delete command it is easy to remove all of the entries in a table, but that leaves how one deletes the table from the database. This is done using the drop command which will completely delete the table and all of its entries. The form of the command is:

```
drop table tablename;
```

- * Therefore if we wanted to delete our table of famous people we would simply type:

```
drop table famous_people;
```

References

- * There are many references on the web as well as man pages and books. Although the web sites that are most useful to you will depend on the server you are using. Some sites I found useful were:
 - * www.sqlcourse.com
 - * www.dcs.napier.ac.uk/~andrew/sql/
 - * www.sqlwire.com
 - * www.emuse.net
 - * www.programmingtutorials.com