

Introduction to SQL

Introduction to the Structured Query Language (SQL)

- ❖ By now you're familiar with just how easy it is to structure a database using SQLite Studio, phpMyAdmin, and/or SQL Server Management Studio.
- ❖ You've also used these tools to manually manipulate data within the respective database system.
- ❖ Using a DBMS is great for quick updates and retrieval of information but it does us no good if we want to perform updates or retrieve data directly from a Python application.
- ❖ This is where the **Structured Query Language (SQL)** comes in.

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- ❖ In this series of lectures we'll focus on the language of today's relational database: The Structured Query Language, or SQL (pronounced "sequel").
- ❖ SQL was established in the 1970s as a way of interacting with the current database technologies of the time.
- ❖ Like other programming languages, SQL is comprised of keywords, operators, functions, and more.
- ❖ All of the various SQL commands form statements.
- ❖ Statements can range from a simple few to a complex string of subqueries and joins.

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- ❖ While there is a standard form of the SQL language that all databases support, most databases offer a proprietary extension that only works with their database system. As an example, Microsoft's version of SQL is known as Transact-SQL or TSQL for short. Oracle's version of SQL is known as Procedural Language SQL or PL/SQL for short. The list goes on and on.
- ❖ Although this series of lectures cannot begin to cover all there is to know on the subject, it can provide you with an introduction to beginning and advanced SQL statements, clauses, joins, subqueries, and more.
- ❖ The concepts you learn here will help you interact with data in your relational database on a more advanced level using Python. Once you've picked the database system that you prefer, you can study its documentation and take your learning further.

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Just as your savings account would be useless without a valid ID or bank card to get to that money, information contained within a database is useless data unless you have the means of extracting it. SQL is the language that does just that; it allows for quick and complex access to the data contained in your database through the use of queries. Queries pose the questions and return the results to your application. In general, SQL allows you to:

- ❖ Execute queries against a database
- ❖ Retrieve data from a database
- ❖ Insert records into a database
- ❖ Update records in a database
- ❖ Delete records from a database
- ❖ Create new databases

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To understand the role of SQL a bit more, consider trying to extract information from our employees table. Remember, the employees table has the following structure:

Field Name	Data Type
employeeid	int
name	varchar
username	varchar
password	varchar
email	varchar
roleid	int

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And could include the following rows of data:

employeeid	name	username	password	email	roleid
1	Wally	wwebmaster	password	wally@vectacorp.com	1
2	Wilbur	wfounder	password	wilbur@vectacorp.com	2
3	Tina	ttechie	abc123	tina@vectacorp.com	1
4	Agnes	aaccountant	12345	agnes@vectacorp.com	2
5	Damon	ddeveloper	ispeakbinary	damon@vectacorp.com	1

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- ❖ Now what? You have the table created, columns and data types have been outlined, and you have rows of data in the table.
- ❖ If we were a technical support representative we could use spreadsheets and manually keep track of help desk support tickets, employees working at the company, etc. within Excel or similar product. This would be inefficient, a waste of time from many different standpoints, and would defeat the purpose of even creating a database.
- ❖ The purpose of the database is store the data electronically and then provide automated access to that data via an application.
- ❖ That data access comes in the form of SQL and more specifically in the form of **commands**.

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Some of the most important SQL commands

- ❖ SELECT - extracts data from a database
- ❖ UPDATE - updates data in a database
- ❖ DELETE - deletes data from a database
- ❖ INSERT INTO - inserts new data into a database
- ❖ CREATE DATABASE - creates a new database
- ❖ ALTER DATABASE - modifies an existing database
- ❖ CREATE TABLE - creates a new table within a database
- ❖ ALTER TABLE - modifies a table
- ❖ DROP TABLE - deletes a table