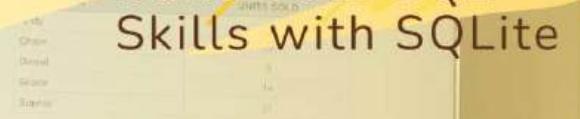


SELF-GUIDED SQL

Build Your SQL Skills with SQLite



Develop your skills and master the technology through hands-on lessons.



Andrew Comeau
Comeau Software Solutions

Self-Guided SQL

Build Your SQL Skills with SQLite

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Ocala, Florida

Early Release Edition
Updated March 2025

This is an early release of the upcoming book, “Self-Guided SQL”.

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*For Moose –
You were loved.*

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Introduction

If you've picked up this book, you probably already know that you need to learn Structured Query Language (SQL) and don't need me to spend a lot of time on the reasons why. With data and databases a part of everyday work and life, being able to retrieve and analyze that data will be a valuable skill for many years to come and it's a great addition to your skillset. The real question is how this particular book can help you.

Some books present you with a lot of theory before setting you loose to work and, by the time you get to the exercises, they feel like an afterthought. This book does the opposite. In this book, you learn SQL by *doing*. Each lesson is made up of steps you will take to actually see SQL and database operations in action, with enough explanation in between so you'll understand what you are doing. Every lesson is designed to build on the last. Also, while I supply all the SQL code for these lessons in electronic form, *your best results will come from actually typing and executing the samples on your own.*

This is not a book that you can passively read through over a cup of coffee; it's a hands-on workshop that will encourage you to use and experiment with the skills you're learning at all times. Beyond simply teaching you SQL and SQLite, my intent is to show you how to actively explore a new area of technology. Hopefully, by the time you finish here, you will have a firm grasp on SQL *and* be better prepared to approach the next subject you learn, whatever that might be.

Having taught SQL in the classroom and being self-taught, I know there are three things that are essential to mastering SQL or any other subject - desire, focus and curiosity. The last one is especially important and makes the difference between someone who just passes tests and someone who excels and whose talent will eventually be noticed and sought out by others. Curiosity takes a person beyond any one book or resource and motivates them to spend time on that all-important experimentation and discovery.

In every lesson of this book, I will encourage you to ask questions and try things for yourself, even if ... especially if ... they result in error messages. They won't hurt you and you're going to see them at some point so you might as well find out what causes them.

Using SQLite

I've worked with a variety of database software from Microsoft Access to MySQL. Every software has its place in the scheme of things, its advantages and its disadvantages. For this book, I chose SQLite as the software to teach for a few reasons:

- SQLite is in the public domain; it's completely free to use. The database browser program that you'll be using is also free and open source. You don't have to pay a cent for either.
- Neither of these programs require any installation beyond copying some files to a directory. SQLite itself is a single DLL file. You won't clutter up your computer with hidden files or registry changes. You can even run them from a flash drive if you want. It also works on both Windows and Linux.
- Despite the last two items, SQLite is actually a very popular database format that's used for standalone applications on smartphones, PCs and other devices. If you're going to learn about databases, it's a good one to know.

Additional Resources

Throughout this book, I'll be pointing you to additional resources such as websites and videos that will provide additional information on SQL and SQLite to help you in your mastery of these subjects. SQL is a large and interesting language, there is a world of information out there and exploring it will help you maximize your SQL skills.

Researching a subject on your own is also an integral part of self-learning and it's a good idea to have a library of resources on hand. The advantage of *this* book is that I've evaluated the resources so that I can filter out the noise and recommend the best ones that will give you the most value for your time.

A Note on Formatting

As I said earlier, this book centers around the actions you need to take to use and learn SQL. These actions are presented in numbered steps for emphasis and should be your first focus when moving through the book. Each chapter should be read as a list of instructions to be completed with some notes on theory here and there.

Because of this, many chapters have a *single* numbered list of steps that runs through the chapter, rather than restarting the numbering after section headings, etc.. This might make it appear that lists are starting in the middle but they are actually *continuing*. I also believe this will help readers maintain their position within a chapter and reference specific actions more easily.

I also don't show a lot of query results throughout the book, except where I feel it's necessary to

demonstrate the performance of the SQL. Readers are strongly encouraged to try each one of the queries shown and view the results for themselves.

Statement on A.I. Use

The content in this book was not written by A.I.. It is the result of my research into SQL and SQLite and the words are my own.

I do use A.I. as an assistant. At times, during the writing process, I have consulted with ChatGPT and other tools for answers on specific technical questions as it's often easier than going down the rabbit hole of modern search engine results.

I have asked it to suggest SQL exercises based on the sample databases shown in this book as, for me, that's the most time consuming part of writing a book like this. I have personally tested and verified all SQL code shown here and, in most cases, I've written it myself or heavily modified it from that suggested by the A.I. tools.

I have also used tools such as Google's NotebookLM as part of the editing process to verify coverage of concepts, fact-check, check readability, etc..

I am including this statement because I believe that quality content created by humans is inherently more valuable than that generated by A.I. There is no shortcut to true quality or substitute for the willingness of an author to associate their work with their name and reputation. There are also serious issues of intellectual property, copyright and reliability in the training of A.I. tools. Authors and readers both have a responsibility to demand responsibility and transparency in the use of artificial intelligence.

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Feedback and Updates

This is an early release edition of the book which is still in production so I'm especially interested in hearing whether this book was of help to you and what you got out of it. You can contact me with any feedback at books@comeausoftware.com.

Also, while I've done everything possible to avoid any errors in the book, it's always possible you might find a typo here or there. Please let me know if you do. For minor corrections and announcements of updates to the book, please check the official page on my website at ComeauSoftware.com.

<https://www.comeausoftware.com/self-guided-sql-sqlite/>

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January 2025

Section 1 – Installation and Setup

1.1 - Installation

For this book, you'll be installing the SQLite utilities which include a text-only console program along with the **DB Browser for SQLite** graphical database browser which will enable you to see a lot more about the databases at a glance rather than typing in a lot of commands. I believe it's important to be familiar with both so that you're not dependent on one or the other and can be productive no matter which tool is available.

In Windows, these programs are available with installation routines and with no-install versions for which the files can simply be copied into a folder and run manually. I will be focusing on the no-install option for simplicity.

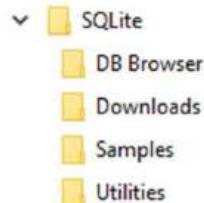
In Linux, it's best to install both through the Terminal program and let Linux handle the rest. I'll provide the instructions for this in the section on Linux.

Windows

If you would like a video guide to the Windows installation you can find a link to the demo video I made on this book's official page at:

<https://www.comeausoftware.com/self-guided-sql-sqlite/>

I recommend creating a new directory on your computer to hold all the files that you'll be downloading. You could even create it on your Windows desktop if that's easiest for you. I'd suggest the following names with 'SQLite' being the main directory and the others as subdirectories:



1. In your web browser, go to the site <https://sqlite.com>. Take a moment to read the short introduction "What is SQLite" and the About page to get some more facts about the software. Then click on the **Download** link at the top of the page.
2. Scroll down to the section titled "Precompiled Binaries for Windows".
3. At this point, you're probably using a 64-bit version of Windows but there is a 32-bit version if needed. The filename is based on the most recent version so it will change by the time you read this book.
4. Download either the 32-bit or 64-bit "sqlite-dll-win..." file containing the DLL and the "sqlite-tools-win..." files and save them to the **SQLite\Downloads** folder you created earlier.

Precompiled Binaries for Windows

sqlite-dll-win-x86-3460000.zip	32-bit DLL (x86) for SQLite version 3.46.0. (SHA3-256: 41eafc690909cc4244166f46f86c5f9704e4e6 (1.01 MiB)
sqlite-dll-win-x64-3460000.zip	64-bit DLL (x64) for SQLite version 3.46.0. (SHA3-256: f4824402a8a08af1d05f22d77e487b238d9ff (1.26 MiB)
sqlite-tools-win-x64-3460000.zip	A bundle of command-line tools for managing SQLite, including the sqldiff.exe program, and the sqlite3_analyzer.exe tool. (SHA3-256: a0cf6a21509210d931f1f174fe68cbfaa1979d (4.80 MiB)

You can download SQLite for 32-bit and 64-bit systems along with command line tools from the official site at SQLite.com.

5. Both files are in ZIP format so they should open easily in any modern version of Windows. Extract the contents from both of the files to the **SQLite\Utilities** folder you created earlier.

That's it for the installation of the SQLite utilities. You should have five files in your Utilities folder.

- **sqlite3.dll** – Main SQLite software library
- **sqlite3.def** – Support file
- **sqldiff.exe** – Program for finding differences between databases.
- **sqlite3.exe** – Console program for querying and managing databases.
- **sqlite3_analyzer.exe** – Analysis tool for database files.

Installing the graphical database browser is just as easy.

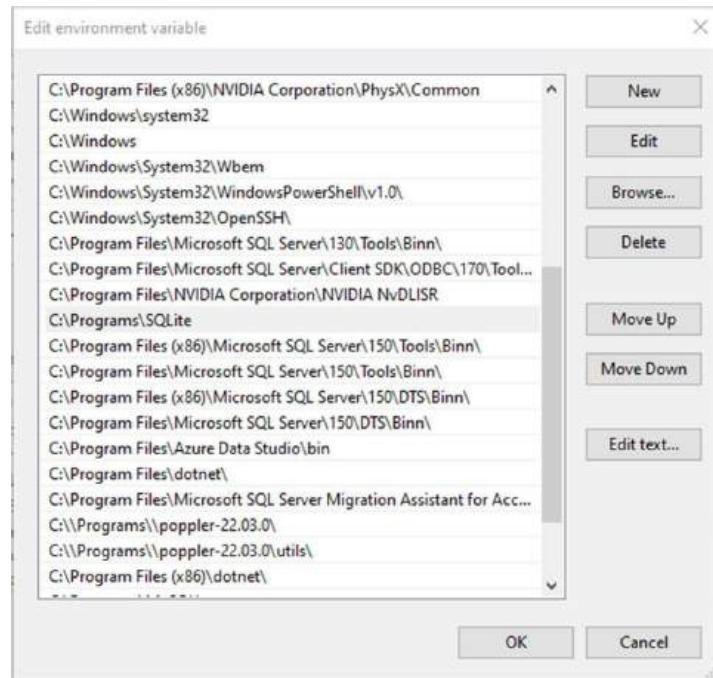
1. In your web browser, go to the site <https://sqlitebrowser.org/> and click on the **Download** link at the top of the page.

2. Download either the 32-bit or 64-bit version of the software depending on your system. Again, I'm recommending the version labeled "no installer". This is also a ZIP file.
3. Extract the ZIP file to the **SQLite\DB Browser** folder you created earlier.
4. In the extracted file, find the file **DB Browser for SQLite.exe**. This is the program file that you will run to start the software. You should probably create a shortcut to this file somewhere on your Windows Desktop or wherever else you can easily get to it.

That's all for the Windows installation. You now have SQLite on your system along with the utilities and a browser program. In the next lesson, we'll find some sample databases to work with.

For both programs, you can create shortcuts on your desktop or you can add the directories to your system PATH statement.

1. On the Windows taskbar search box, type "system environment". The best match will be a selection called **Edit the System Environment Variables**.
2. On the **System Properties** screen that appears, select **Environment Variables** at the bottom.
3. Under the **System Variables** section, double-click the **Path** setting. This will open the list of directories contained in the Path statement.
4. Click the **New** button and enter the path to the folder that contains the SQLite files you downloaded (i.e. C:\SQLite) and press **Enter**.
5. Click **OK** and close the System Properties panel.



Linux

The following instructions should work in Ubuntu-based Linux distributions and others.

1. Open the Linux Terminal program and enter the following commands. You will likely be asked for your password and to verify that you wish to install the software.

```
sudo apt-get update
sudo apt-get install sqlite3 libsqlite3-dev
```

2. After the installation finishes, enter the following command:

```
sqlite3
```

3. If SQLite has been installed, this will open the SQLite console. At the console prompt, you can type `.quit` to leave the console.

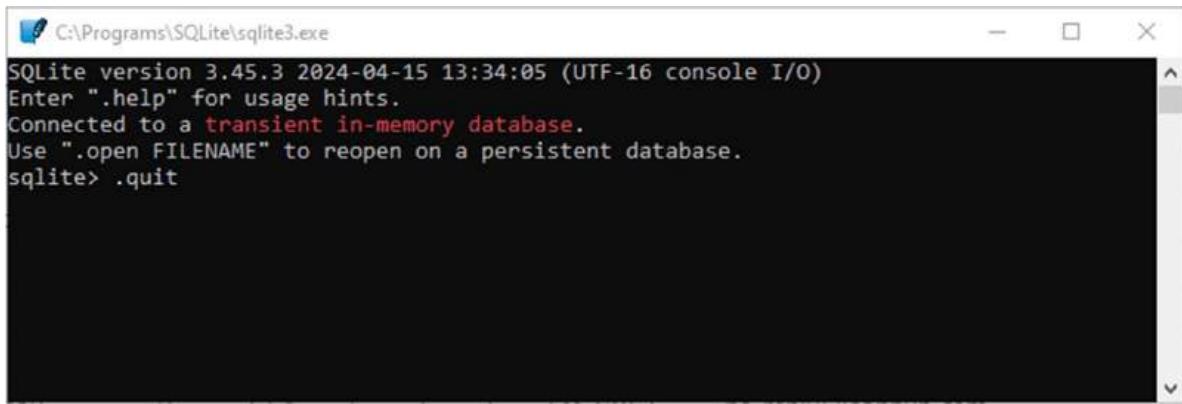
4. To install the DB Browser for SQLite software, type the following command in the Terminal.

```
sudo apt-get install sqlitebrowser
```

If you are running a Linux distribution that does not support apt-get commands, see the [Downloads](#) page for the browser program at the following address:

<https://sqlitebrowser.org/dl>

Once the installation is finished, there should be a new shortcut on your Linux menu, maybe under the **Programming** section, that will open the program.



A screenshot of a Windows command-line window titled "C:\Programs\SQLite\sqlite3.exe". The window displays the following text:

```
SQLite version 3.45.3 2024-04-15 13:34:05 (UTF-16 console I/O)
Enter ".help" for usage hints.
Connected to a transient in-memory database.
Use ".open FILENAME" to reopen on a persistent database.
sqlite> .quit
```

The .quit command will close down the SQLite console.

Exploring Further

This section has shown the basics of SQLite and its installation which is enough to get you started in using the software. If you're really interested in its place in the bigger picture of database design and operations, I encourage you to bookmark the following links for reference and explore them at your leisure. Some of the information is written for experienced database professionals so don't worry if it seems fairly technical at this point.

SQLite Official Site - <https://sqlite.com/>

SQLite on Wikipedia - <https://en.wikipedia.org/wiki/SQLite>

1.2 – Downloading the Sample Databases and Code Samples

Before we can start exploring these new tools and the SQL language, we need some sample data to play around with. Fortunately, there are some excellent sample databases available for free on the web.

- The **Chinook** database is based on a fictional music company and has a dozen or so tables for albums and artists as well as employees and customers.
- The **Northwind** database is a classic order management database based on a company that sells specialty and gourmet foods. It has many of the tables you would expect including a product listing, employees, customers and customer orders.
- The **Sakila** database was originally developed for MySQL and is based on a movie rental store although the data is obfuscated with actor names like “Cuba Olivier” and fake movie titles. It's a very large database so there's plenty of room to explore.

Together, these databases will provide you with a variety of data on which you can develop your SQL skills. You can find these databases around the web but, for to keep things simple, I'm also hosting them on this book's GitHub page along with all the example queries shown in this book and a file containing the solutions to the exercises for each chapter.

1. In your web browser, go to the GitHub page at <https://github.com/ajcomeau/SelfGuidedSQL> and click on the green **Code** button.
2. The pulldown menu will give you the option of downloading a ZIP file. Select this option and save the file to your computer in the **SQLite\Samples** directory you created earlier.
3. Extract the ZIP file to the **Samples** directory. You should now have three database files – Northwind.db, Chinook.db and sqlite-Sakila.db, along with diagrams for each database in PNG format.

Licensing

Most of the time, when downloading free software and resources from the web, you shouldn't have to worry about licensing issues, especially if it's just for your own training use. Still, it's a good idea to be aware of the licensing terms under which you're using a piece of software. The SQLite software and sample databases each have their own licensing terms and I'm including a few notes on them below.

- The main **SQLite** software is Public Domain. According to the official site, “*Anyone is free to copy, modify, publish, use, compile, sell, or distribute the original SQLite code, either in source code form or as a compiled binary, for any purpose, commercial or non-commercial, and by any means.*” See more at <https://sqlite.com/copyright.html>.
- **DB Browser for SQLite** is an open-source software distributed under the Mozilla Public License, version 2 and GNU General Public License, version 3. This essentially gives you the right to freely use and distribute the software provided that, if you distribute it, you do so under the same license terms as you received it and communicate those terms as part of the distribution. See the following link for more information:
<https://github.com/sqlitebrowser/sqlitebrowser?tab=License-1-ov-file>
- The **Chinook sample database** is copyrighted by Luis Rocha with a custom license that permits free use and distribution of the database. It can be found at <https://github.com/lerocha/chinook-database?tab=License-1-ov-file>.
- The **Northwind database** was originally created by Microsoft for use with Microsoft Access. Multiple SQLite versions might be available online. The primary version I found is available under the MIT license allowing for free use and distribution. See
<https://github.com/jpwhite3/northwind-SQLite3?tab=MIT-1-ov-file> for more information. The script for the database is also available on Wikiversity at
https://en.wikiversity.org/wiki/Database_Examples/Northwind/SQLite.
- The **Sakila movie database** was developed for MySQL. The SQLite version is copyrighted by the DB Software Laboratory (ETL-Tools.com) under the BSD license which permits use and redistribution on the condition that the copyright notice and disclaimers are maintained and that the copyright holder name is not used to endorse any redistribution. My copy of the database was obtained from: <https://www.kaggle.com/datasets/atanaskanev/sqlite-sakila-sample-database>

These links and the licenses are also included in the sample databases download file on ComeauSoftware.com.

Early Release Edition

You've been reading an early edition of "Self-Guided SQL", the newest book from Andrew Comeau and Comeau Software Solutions. This book is due to be released in 2025 and this advance edition is available to you at a lower cost.

If you're interested in learning more about SQL and the SQLite database management software and have found this book helpful, please bookmark the following pages to stay up to date on the status of this release. Your feedback is also very important and you can send whatever questions or comments you have on this book to me through the site or to books@comeausoftware.com

Official page: <https://www.comeausoftware.com/self-guided-sql-sqlite/>

Leanpub: <https://leanpub.com/self-guided-sql>

Github: <https://github.com/ajcomeau/SelfGuidedSQL>

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