

Final Project: MySQL Versus SQLite

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CS200: SQL and Relational Databases

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## **Description**

SQLite is a server-less database management system that implements a compact form of a similar database management system: MySql. SQLite is a project developed by D. Richard Hipp which began on May 5, 2000. It is a self-contained, C-language library that is less than 750KiB in size, which is comparably much smaller than other database management systems. According to the SQLite website, it is the “most widely deployed database in the world” and includes several “high-profile projects” (Hipp 2023).

## **Key Features Compared to MySQL**

<b>Sqlite</b>	<b>MySql</b>
Fully featured MySql with advanced capabilities	Fully featured MySql
Developed using C programming language	Developed using both C and C++ programming languages
Open-source project	Licensed
Dynamic Schema	Fixed Schema
Does not require a server to run	Requires a server to run

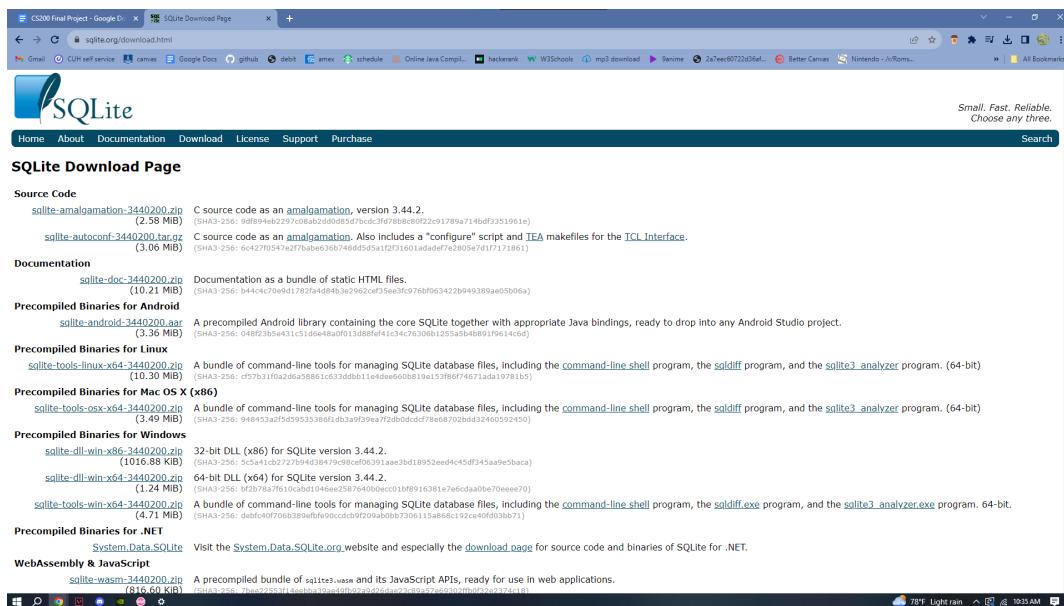
Compared to MySQL, SQLite has many key features that differentiates it from the former. For example, SQLite claims to have “advanced capabilities” compared to MySql. These capabilities include, but are not limited to having “partial indexes, indexes on expressions, JSON, common table expressions, and window functions” (Hipp 2023). Adding on, while MySql utilizes both C and C++ programming languages, SQLite only uses C. In addition, this database engine is an open-source project, allowing anyone to use the code for any commercial or public setting. SQLite also features a dynamic schema compared to MySql that uses a fixed schema.

This refers to the fact that the schema, also known as the structure of your database, is able to change simultaneously as data is inputted. As mentioned previously, SQLite is also serverless. Being serverless has many pros and cons. While having a server can provide “better protection against bugs in the client application,” as well as being able to more accurately control and access the database, being serverless also has its own number of advantages (Hipp 2023). One instance being that there is no separate server process needed to “install, setup, configure, initialize, manage, or troubleshoot the database” (Hipp 2023). This means any program that is able to access the disk is able to use SQLite. Because of features such as its licensing, scalability, and data model, SQLite proves to be a strong competitor amongst many database management systems.

## Installation and Setup

PC:

1. Begin by going to the Sqlite download page: <https://www.sqlite.org/download.html>

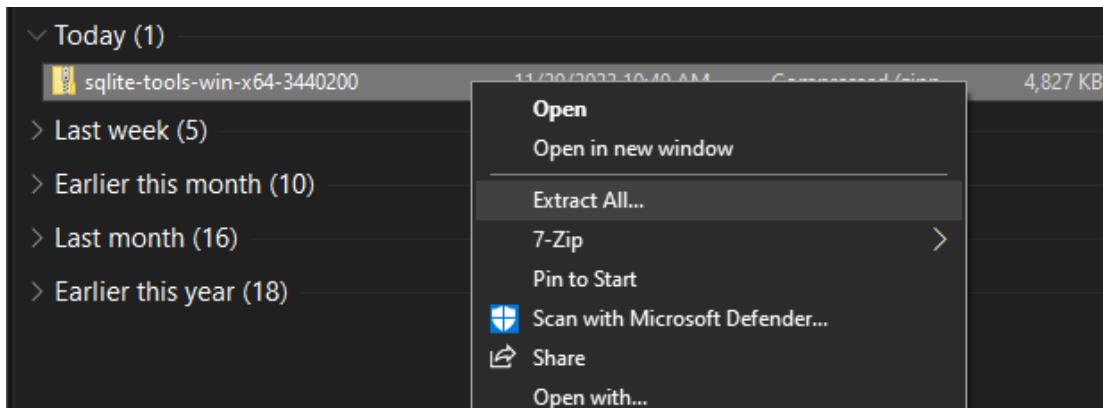


- Click on the third download under “Precompiled Binaries for Windows.” It should be titled “sqlite-tools-win-x64-3440200.zip”

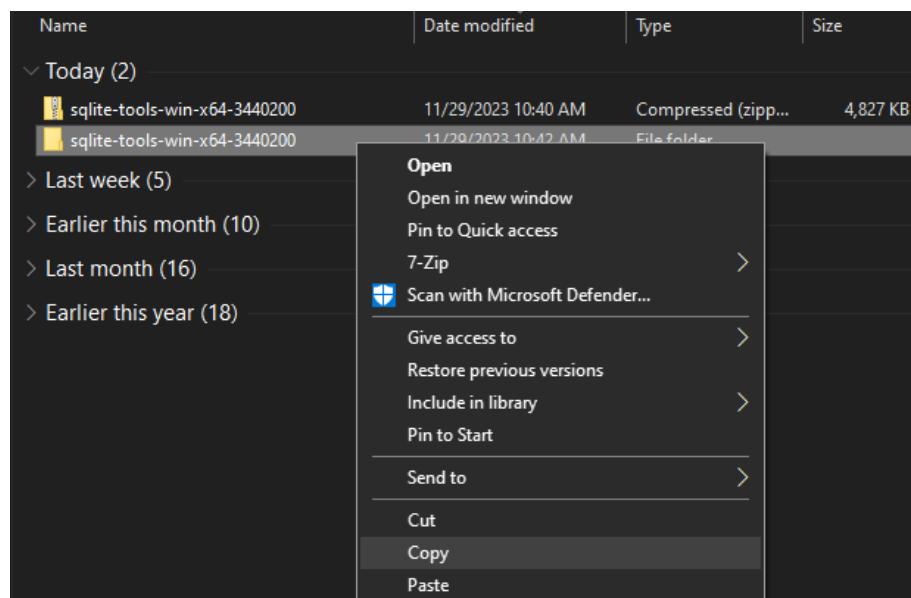
**Precompiled Binaries for Windows**

<a href="#">sqlite-dll-win-x86-3440200.zip</a>	32-bit DLL (x86) for SQLite version 3.44.2. (1016.88 KB) (SHA3-256: 5c5aa1cb2272b94d38479c98ce0f06391aae3bd18952eed4c45df345aa9e5baca)
<a href="#">sqlite-dll-win-x64-3440200.zip</a>	64-bit DLL (x64) for SQLite version 3.44.2. (1.24 MB) (SHA3-256: bf2b78a7f610cabd1046ee258764000ecc01bf8916381e7e6cd8a0be70eeee70)
<a href="#">sqlite-tools-win-x64-3440200.zip</a>	A bundle of command-line tools for managing SQLite database files, including the <a href="#">command-line shell</a> program, the <a href="#">sqlldiff.exe</a> program, and the <a href="#">sqlite3_analyzer.exe</a> program. 64-bit. (4.71 MB) (SHA3-256: debfc40f706b389efbf90ccdc9f209ab0bb7306115a868c192ce40fd03bb71)

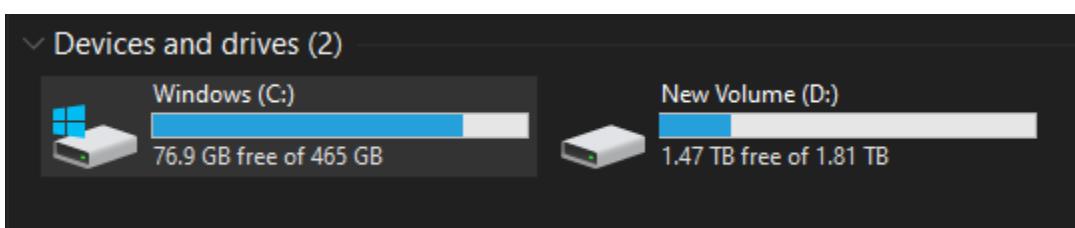
- Once downloaded, right click on the downloaded file, extract all the files,



and copy the extracted files.



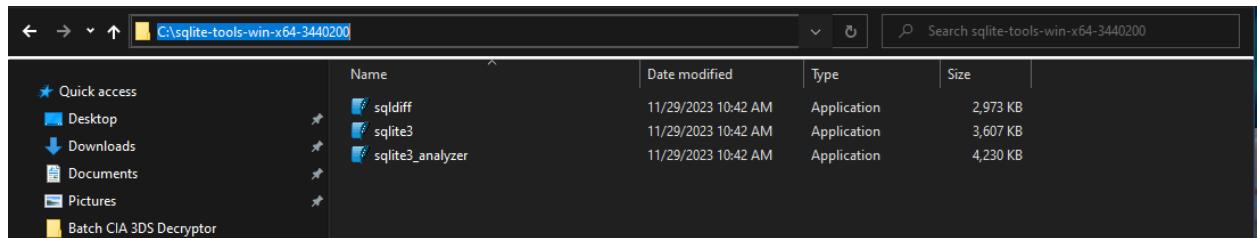
- Next locate your c:drive.



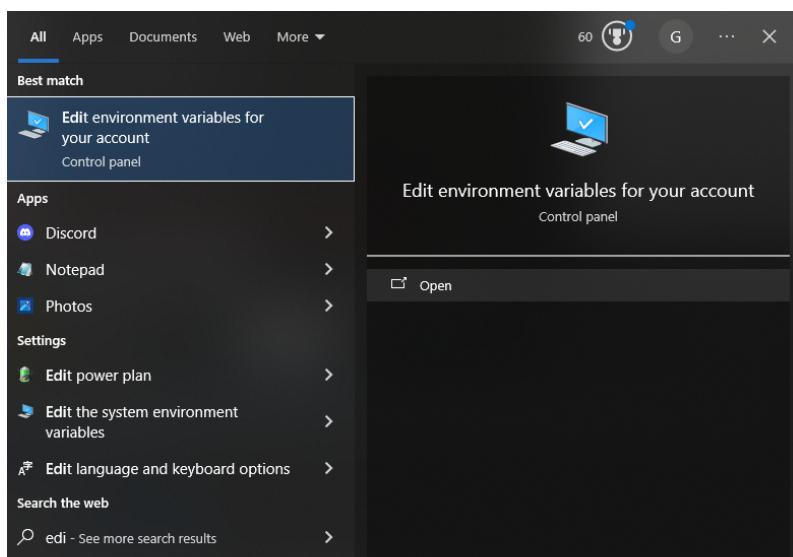
Paste the files into the drive,

Name	Date modified	Type	Size
AMD	8/11/2021 10:56 AM	File folder	
Medal	11/29/2023 10:19 AM	File folder	
PerfLogs	12/6/2019 11:14 PM	File folder	
Program Files	11/25/2023 1:37 PM	File folder	
Program Files (x86)	3/21/2023 6:20 PM	File folder	
Riot Games	7/20/2022 3:02 PM	File folder	
sqlite-tools-win-x64-3440200	11/29/2023 10:44 AM	File folder	
Users	10/3/2022 8:02 PM	File folder	
Windows	11/18/2023 4:45 PM	File folder	
XboxGames	9/11/2023 10:28 PM	File folder	

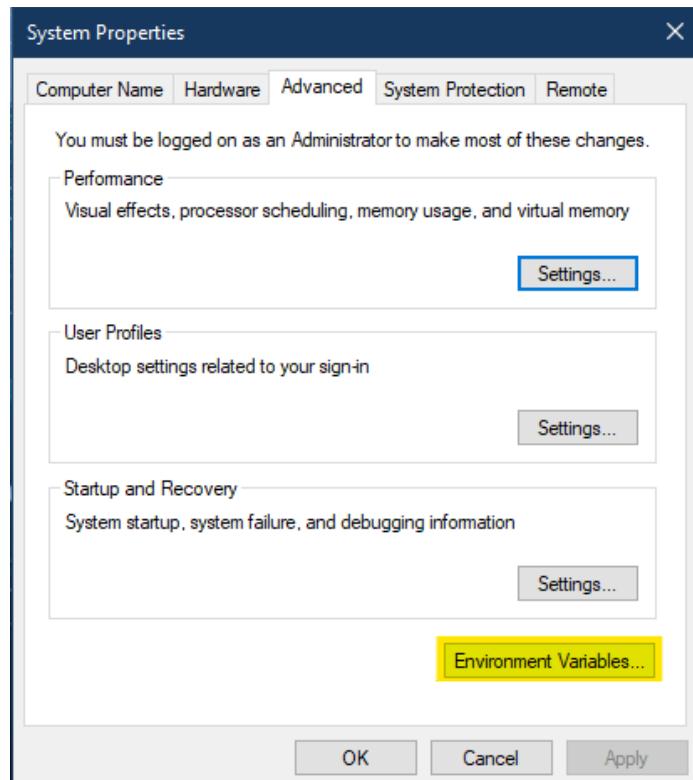
and copy the c:drive file's location.



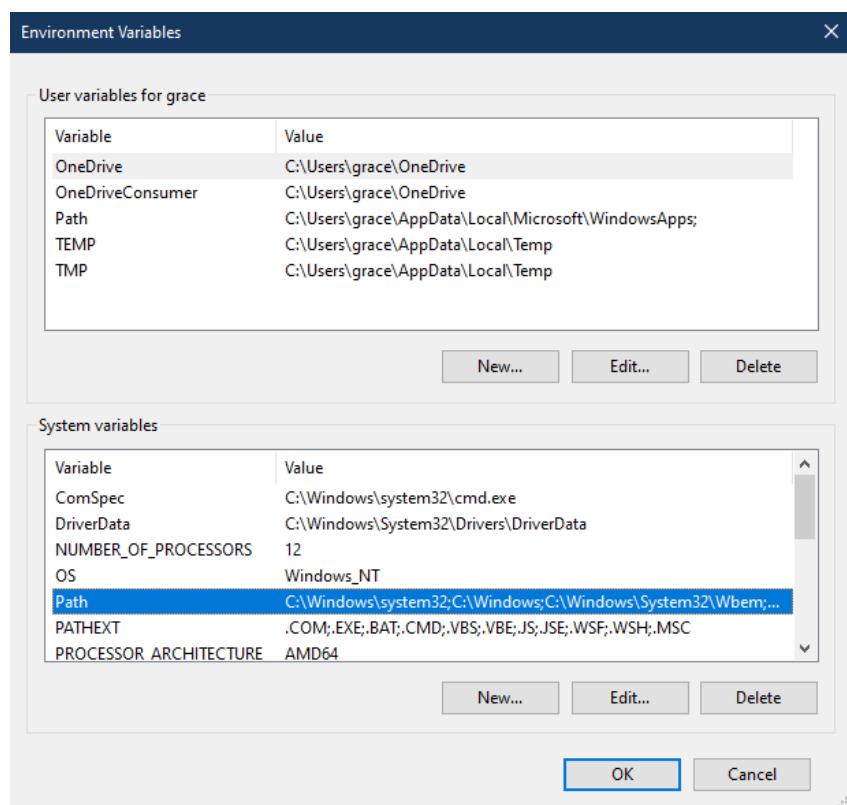
5. Search for the control panel named “edit the system environment variables” in the search bar. Click “open.”



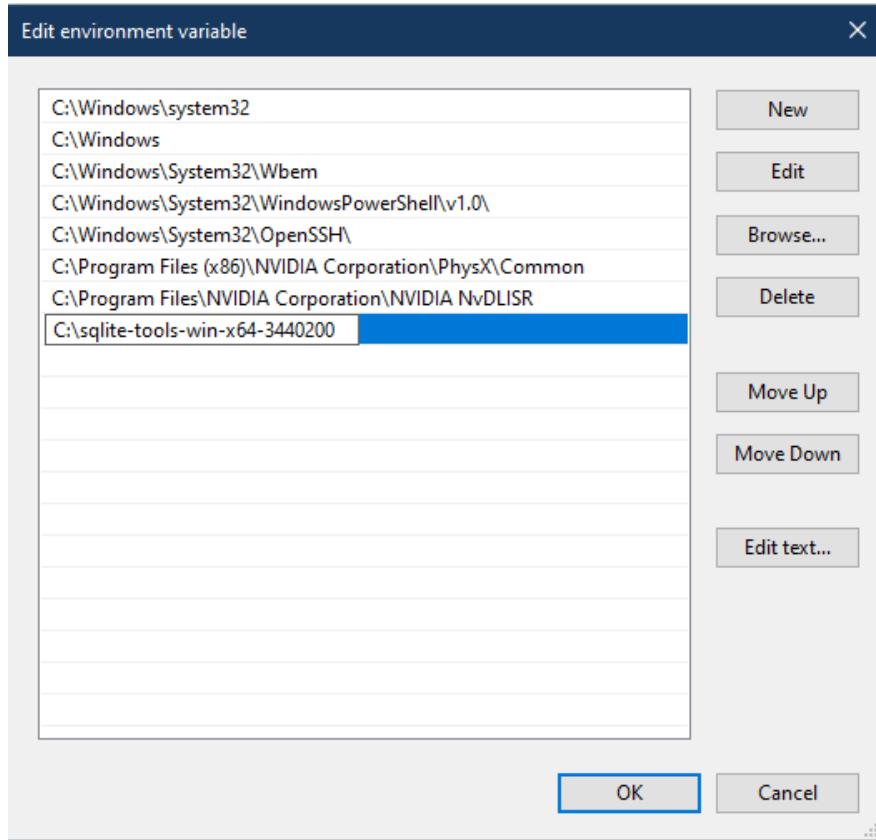
6. Once the system properties tab is opened, click on “Environment Variables.”



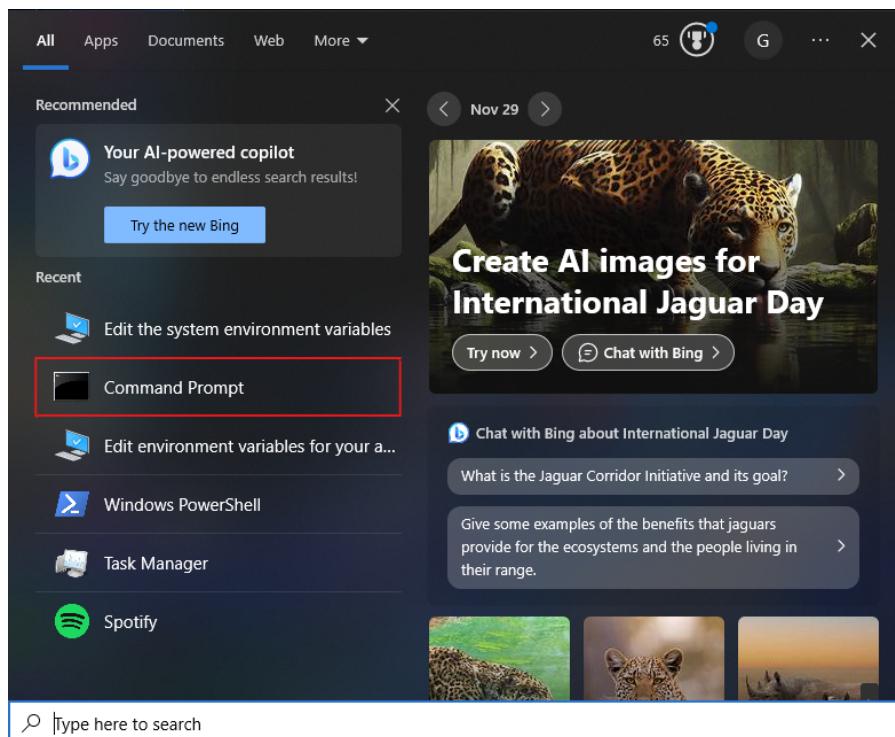
7. Once you are in Environment Variables, double click on “Path” located under “System Variables.”



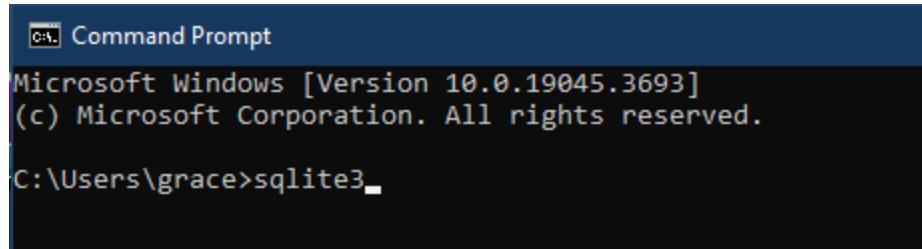
Then, click “new” and paste the copied c:drive file location into the path.



#### 8. Open CommandPrompt.



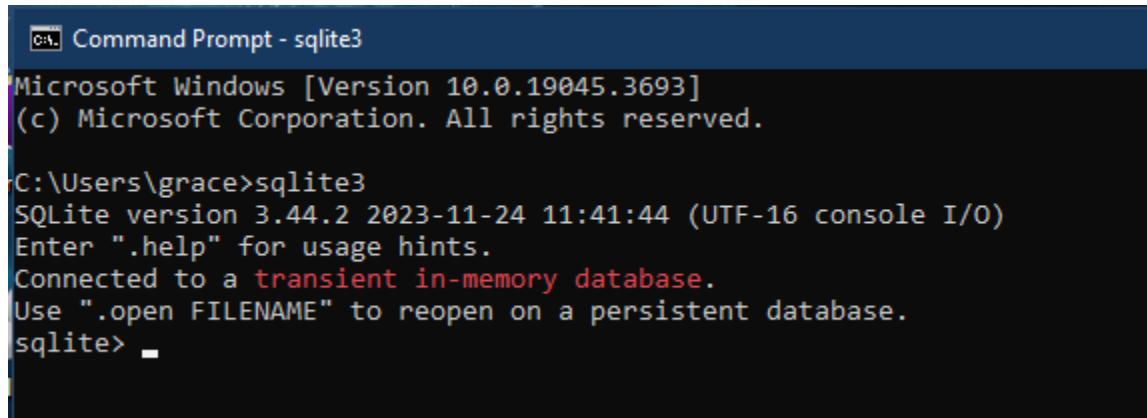
Type Sqlite3 and hit enter (or return depending on your keyboard layout).



```
Command Prompt
Microsoft Windows [Version 10.0.19045.3693]
(c) Microsoft Corporation. All rights reserved.

C:\Users\grace>sqlite3
```

Once you see this text appear, you have completed the Sqlite installation for windows.



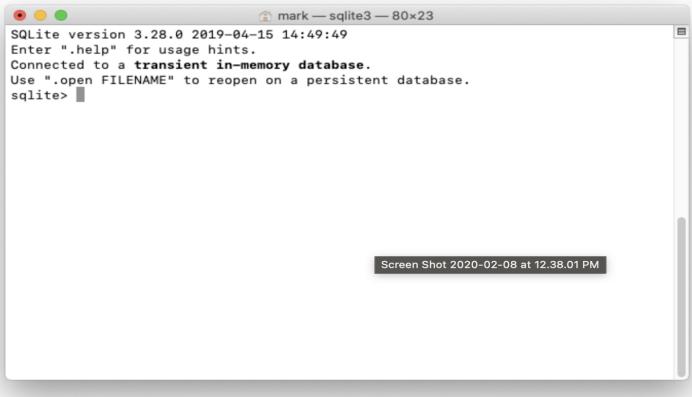
```
Command Prompt - sqlite3
Microsoft Windows [Version 10.0.19045.3693]
(c) Microsoft Corporation. All rights reserved.

C:\Users\grace>sqlite3
SQLite version 3.44.2 2023-11-24 11:41:44 (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>
```

Mac:

Most Mac systems already come with SQLite preinstalled

SQLite comes preinstalled on Mac, so you can simply open the terminal application and type sqlite3 to launch the server.



However, in the case that it is not, here are the steps to do so:

1. Begin by going to the Sqlite download page: <https://www.sqlite.org/download.html>

Small. Fast. Reliable.  
Choose any three.

**Common Links**

- Features
- When to use SQLite
- Getting Started
- Try it live!
- Prior Releases
- SQL Functions
  - Pragmas
  - SQL functions
  - Date & time functions
  - Aggregate functions
  - Window functions
  - Math functions
  - JSON functions
- C/C++ Interface Spec
  - Introduction
  - List of C-language APIs
- The Test Interface Spec
- Quirks and Gotchas
- Frequently Asked Questions
- Commits History
- Bugs
- News

Ongoing development and support of SQLite is made possible in part by [SQLite Consortium](#) members, including:

**Expensify** **Bloomberg** **Bentley Engineering** **Navigation Data Standard**

2. You will then be guided to this page, which includes a number of different links to different versions of SQLite. (note: you only need to focus on your OS)

**SQLite Download Page**

**Source Code**

- [sqlite-amalgamation-3440200.zip](#) C source code as an **amalgamation**, version 3.44.2. (2.58 MB) (SHA3-256: 9df894eb2297c08ab2dd0d85d7bcd3f078b8c80f22c91789a714bd3351961e)
- [sqlite-autoconf-3440200.tar.gz](#) C source code as an **amalgamation**. Also includes a "configure" script and **TCL Interface**. (3.06 MB) (SHA3-256: 6c427f0547e2f7babef636b748dd5d5a1f231601adaef7e2805e7d1f7171861)

**Documentation**

- [sqlite-doc-3440200.zip](#) Documentation as a bundle of static HTML files. (10.21 MB) (SHA3-256: b44ac4c709d1782f84d84b3e2962cef35ee3fc976b0f63422b949389ae05b06a)

**Precompiled Binaries for Android**

- [sqlite-android-3440200.aar](#) A precompiled Android library containing the core SQLite together with appropriate Java bindings, ready to drop into any Android Studio project. (3.36 MB) (SHA3-256: 04bf23b5e431c51d6e48a0f013d88fe41c34c76306b1255a5b4b8919614c6d)

**Precompiled Binaries for Linux**

- [sqlite-tools-linux-x64-3440200.zip](#) A bundle of command-line tools for managing SQLite database files, including the **command-line shell** program, the **sqldiff** program, and the **sqlite3\_analyzer** program. (64-bit) (SHA3-256: c57b31f0a2d6a58861c533dbbb1e4dee660b819e1538f674671ada19781b5)

**Precompiled Binaries for Mac OS X (x86)**

- [sqlite-tools-osx-x64-3440200.zip](#) A bundle of command-line tools for managing SQLite database files, including the **command-line shell** program, the **sqldiff** program, and the **sqlite3\_analyzer** program. (64-bit) (SHA3-256: 948453a2f5d59535386f1db3a9f39ea7f2db0dcdf78e68702bdd32460592450)

**Precompiled Binaries for Windows**

- [sqlite-dll-win-x86-3440200.zip](#) 32-bit DLL (x86) for SQLite version 3.44.2. (1016.88 KB) (SHA3-256: 9cf841cb27279b94d38479c98ce0f6391aae3bd18952eed4c45df345aa9e5baca)
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3. Click on the download under precompiled Binaries for Mac OS

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4. It should then be the most recent download located within your downloads folder

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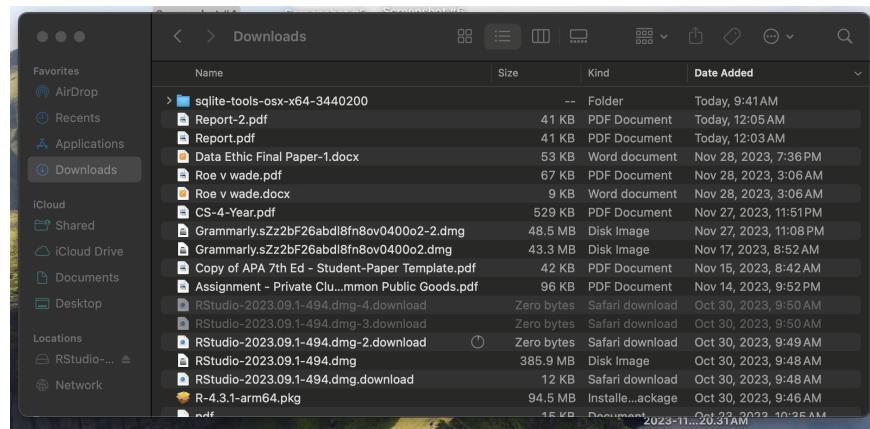
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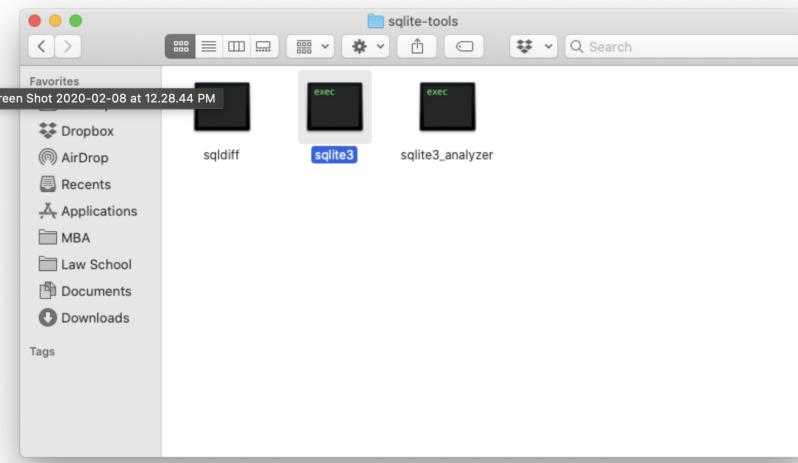
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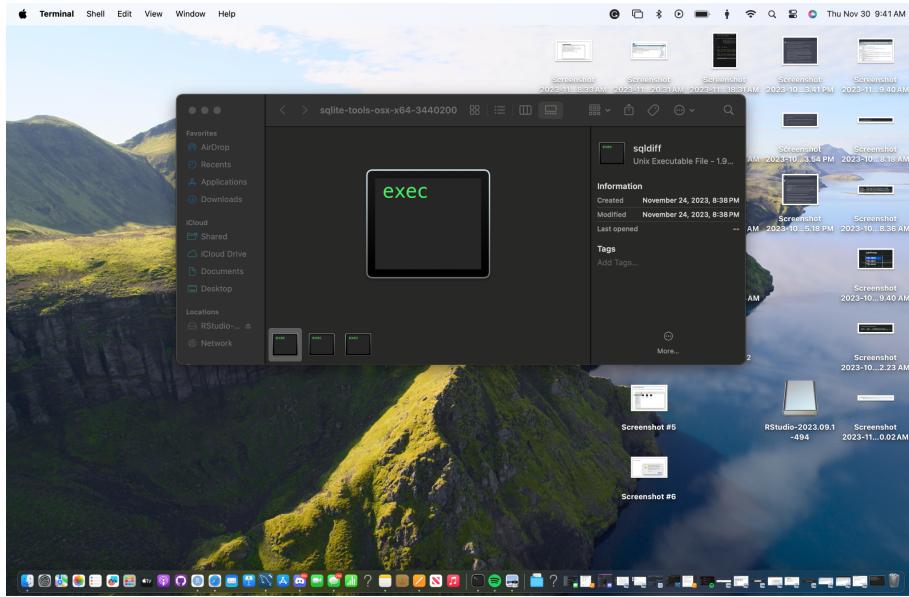
5. You should be able to view in your files.



6. After opening, you will be presented with 3 different SQLite options.



7. Right click on the “SQLite3” file and click open.

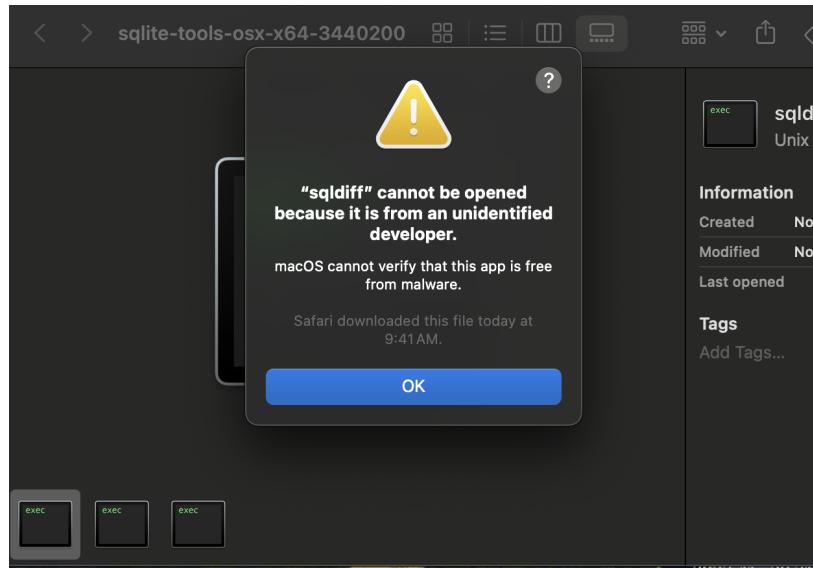


8. When done properly, you will be presented with this screen and you can click “open” (you may skip step 9 if this step appears).

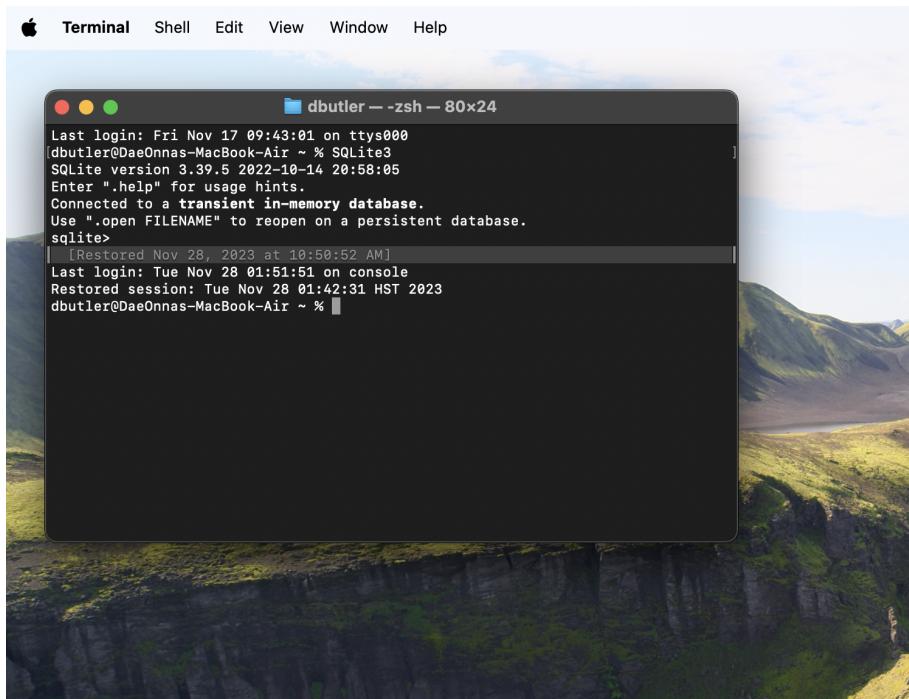
Click the Open button:



9. If this is the screen that appears, then there is a very likely chance that SQLite is already installed on your Mac and in which case you can just use the finder tool to open the terminal.



10. Type Sqlite3 and hit return (or enter depending on your keyboard layout).



11.

The server can be quit in Mac OS X by using the .quit command.

### Code Cases

2 Code Cases for others to practice.

- a. Create a database or starting application.
- b. Create 3x tables – At least 5 columns per table.
- c. Insert data – At least 5 records per table.
- d. Query data examples.
- e. Saving and ending case.

-- Creating a new SQLite database

```
CREATE DATABASE IF NOT EXISTS MyDatabase;
```

-- Switch to the newly created database

```
USE MyDatabase;
```

-- Create tables

```
CREATE TABLE IF NOT EXISTS Users (
```

```
    UserID INTEGER PRIMARY KEY,
```

```
    FirstName TEXT,
```

```
    LastName TEXT,
```

```
    Age INTEGER,
```

```
    Email TEXT
```

```
);
```

```
CREATE TABLE IF NOT EXISTS Products (
```

```

ProductID INTEGER PRIMARY KEY,
ProductName TEXT,
Price REAL,
StockQuantity INTEGER,
Category TEXT
);

```

```

CREATE TABLE IF NOT EXISTS Orders (
    OrderID INTEGER PRIMARY KEY,
    UserID INTEGER,
    OrderDate DATE,
    TotalAmount REAL,
    FOREIGN KEY (UserID) REFERENCES Users(UserID)
);

```

```

-- Insert data into Users table

INSERT INTO Users (FirstName, LastName, Age, Email) VALUES
    ('John', 'Micheal', 30, 'john.micheal@example.com'),
    ('Jenette', 'Smith', 25, 'jen.smi@example.com'),
    ('Brandon', 'Johnson', 35, 'johnson2brandon@example.com'),
    ('Avery', 'Williams', 28, 'avery2757@example.com'),
    ('Charlie', 'Bowing', 40, 'c.bowing1345@example.com');

```

-- Insert data into Products table

```
INSERT INTO Products (ProductName, Price, StockQuantity, Category) VALUES
('Laptop', 1200.00, 50, 'Electronics'),
('Smartphone', 699.99, 100, 'Electronics'),
('Bookshelf', 149.99, 30, 'Furniture'),
('Coffee Maker', 49.95, 75, 'Appliances'),
('Running Shoes', 79.99, 50, 'Clothing');
```

-- Insert data into Orders table

```
INSERT INTO Orders (UserID, OrderDate, TotalAmount) VALUES
(1, '2023-01-01', 2500.00),
(2, '2023-02-15', 500.00),
(3, '2023-03-10', 120.00),
(4, '2023-04-05', 700.00),
(5, '2023-05-20', 300.00);
```

## Useful Links

Sqlite: <https://www.sqlite.org/index.html>

How to install SQLite on Mac:

[https://www.youtube.com/watch?si=MkqtxTc0xkrBXvSQ&v=PC4phLbiZgk&feature=youtu.be&ab\\_channel=ProgrammingKnowledge2](https://www.youtube.com/watch?si=MkqtxTc0xkrBXvSQ&v=PC4phLbiZgk&feature=youtu.be&ab_channel=ProgrammingKnowledge2)

How to install SQLite on Mac, Windows, and Linux:

<https://www.servermania.com/kb/articles/install-sqlite>

SQLite features: <https://www.sqlite.org/features.html>

SQLite downloads: <https://www.sqlite.org/download.html>

## **Summary**

Overall SQLite is a versatile and reliable database engine that is well suited for applications with moderate data storage and access requirements. Its simplicity, portability and performance make it a popular choice in various development environments. The use for SQLite and MySQL depends on the requirements for the project. SQLite is favored for simplicity and smaller projects. While SQL is chosen for larger applications with higher scalability needs and a client-server architecture.

## References

Hipp, R. D. (2023, November 23). *SQLite*. Retrieved from

<https://www.sqlite.org/index.html>