SQLite (pre-pdf fix)

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SQLite

Background

- Most widely deployed database in the world
- Can be easily embedded into other software
- Fully self-contained
- Serverless
- Reads and writes directly to ordinary disk files
- Wide range of uses: web browsers, commercial airplanes and WhatsApp.

SQLite

History

- Developed by Richard Hipp in the year 2000.
- As an alternative to Informix.
- To store data used on a battleship.
- The result was a very compact database, less than 250 kilobytes.

SQLite

History

Based on **PostgreSQL**

- *"What would PostgreSQL do?"*

KEY DIFFERENCES:

	SQLite	PostgreSQL
DBMS	Embedded	Client-server model
Setup size	<500 kB	~200 MB
Data Types	NULL, BLOB, INTEGER, TEXT, REAL	Any?
etc...	Portability, access, functionality, speed...	-

SQLite

File format

- Multiple tables, indices, triggers, and views contained in a single disk file.
- Stable, cross-platform, and backwards compatible
- SQLite database files are commonly used:
  - As containers to transfer content between systems
  - As a long-term archival format for data
- Source code is in the public-domain

SQLite

Design and Architecture Overview

- "**SQLite** is a **C-language** library that implements a **small, fast, self-contained, high-reliability, full-featured, SQL database engine**"

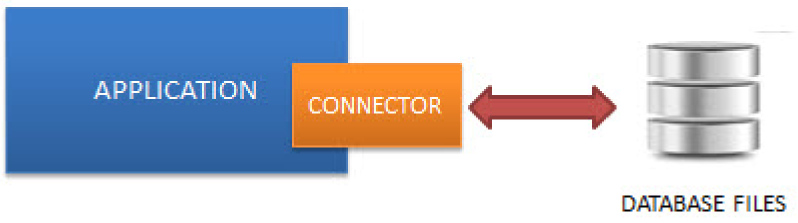
- "The SQLite file format is **stable, cross-platform, and backwards compatible**"

— from sqlite.org

SQLite

Design and Architecture Overview

Serverless - Not client-server, but an *embedded* database



SQLite

Design and Architecture Overview

- **Zero-configuration**
  - Only disk file access required

- **Transactional SQL database engine**
  - Follows **ACID**
  - Atomic, Coherent/Consistent, Isolated, and Durable

SQLite

Design and Architecture Overview - ACID

- **Atomic**
  - all database operations in the transaction must succeed
- **Coherent/Consistent**
  - all database operations must satisfy the database rules and leave the database in a valid state
- **Isolated**
  - concurrent transactions must leave the database in the same state as that if the transactions were run sequentially
- **Durable**
  - once the database has confirmed the transaction has been committed, the database must retain the changes if an unexpected error occurs

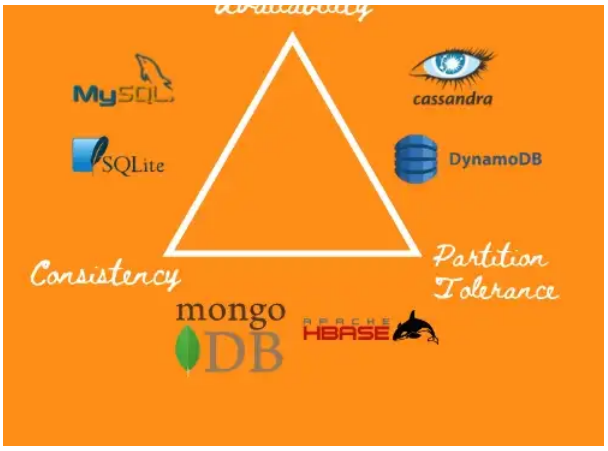
SQLite

Where does it fall on the CAP model?

SQLite = **Consistent** and **Available** - but *not tolerant* to **Partitions**

—>> SQLite = CA

(Aside - who made this grim diagram?)



SQLite

Pros and Cons

Lightweight & Portable

- So used as embedded software with TVs, phones, cameras, home electronics etc.
- Fast & only overwrites edited parts of file
- Compatible with all programming languages
- Open source

Reliable

- Updates data continuously, minimal loss in power loss event
- Content updated with concise SQL queries

SQLite

Pros and Cons

Disadvantages

- Used to handle low to medium traffic HTTP requests (generally <100k hits/day, most!)
- Not suitable if concurrency required: unlimited readers, one writer, rest queue up

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SQLite

Popularity

SQLite is found in:

- Every Android device
- Every iPhone and iOS device
- Every Mac
- Every Windows10 machine
- Every Firefox, Chrome, and Safari web browser
- Every instance of Skype
- Every instance of iTunes
- Every Dropbox client
- Every TurboTax and QuickBooks
- PHP and Python
- Most television sets and set-top cable boxes
- Most automotive multimedia systems
- Countless millions of other applications

It is estimated that there are over one trillion SQLite databases in active use.
