

CSCI-UA.60-1

Database Design and Implementation

SQLite

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Prof Deena Engel
Department of Computer Science
deena@cs.nyu.edu

Introduction to SQLite

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- ▶ Website: <http://sqlite.org/>
- ▶ Features of SQLite:
 - Open source
 - Small “footprint” (less than 500KiB fully configured)
 - Widely used
 - Cross-platform
 - (With respect to the number of installations ... SQLite is reportedly the most widely used database ... why?)
- ▶ SQLite is used with many widely used applications
 - <http://sqlite.org/famous.html>
 - For class discussion: Adobe’s Photoshop *LightRoom*

SQLite: Suggested Uses

from <http://sqlite.org/features.html>

- ▶ “Application File Format. Rather than using fopen() to write XML, JSON, CSV, or some proprietary format into disk files used by your application, use an SQLite database. You'll avoid having to write and troubleshoot a parser, your data will be more easily accessible and cross-platform, and your updates will be transactional.
- ▶ Database For Gadgets. SQLite is popular choice for the database engine in cellphones, PDAs, MP3 players, set-top boxes, and other electronic gadgets. SQLite has a small code footprint, makes efficient use of memory, disk space, and disk bandwidth, is highly reliable, and requires no maintenance from a Database Administrator.
- ▶ Website Database. Because it requires no configuration and stores information in ordinary disk files, SQLite is a popular choice as the database to back small to medium-sized websites.
- ▶ Stand-in For An Enterprise RDBMS. SQLite is often used as a surrogate for an enterprise RDBMS for demonstration purposes or for testing. SQLite is fast and requires no setup, which takes a lot of the hassle out of testing and which makes demos perky and easy to launch.”

When another RDBMS might be better...<http://sqlite.org/whentouse.html>

- ▶ “Client/Server Applications: If you have many client programs accessing a common database over a network, you should consider using a client/server database engine instead of SQLite.
- ▶ High-volume Websites: SQLite will normally work fine as the database backend to a website. But if your website is so busy that you are thinking of splitting the database component off onto a separate machine, then you should definitely consider using an enterprise-class client/server database engine instead of SQLite.
- ▶ Very large datasets: An SQLite database is limited in size to 140 terabytes (247 bytes, 128 tibibytes). And even if it could handle larger databases, SQLite stores the entire database in a single disk file and many filesystems limit the maximum size of files to something less than this.
- ▶ High Concurrency: SQLite supports an unlimited number of simultaneous readers, but it will only allow one writer at any instant in time.”

Introduction to SQL:

- ▶ SQL is a *design-first datastore*.
 - First you design the schema ...
 - Then you enter data that conforms to the schema.
- ▶ We will write .SQL scripts in class to use with SQLite (locally and on the server) and later with MySQL (on the server) to create and populate our databases.

Introduction to **CRUD** operations

- ▶ CRUD operations include:
 - Create
 - Read
 - Update
 - Delete
- ▶ We will focus on all of writing queries to handle all of these operations in SQLite and MySQL.

Learning SQLite: Keywords

▶ Keywords and Commands

- http://sqlite.org/lang_keywords.html

- CREATE
- TABLE
- DROP
- INSERT
- SELECT
- ASC / DESC
- LIMIT
- WHERE
- ... and more!

SQLite Functions

- ▶ Built-in functions for general purposes
 - http://sqlite.org/lang_corefunc.html
- ▶ Date and Time functions in SQLite
 - http://sqlite.org/lang_datefunc.html
- ▶ Aggregate functions in SQLite
 - http://sqlite.org/lang_aggfunc.html

SQLite Applications

SQLite and Applications

- ▶ SQLite comes bundled with Python 3.x
 - Python documentation:
 - <https://docs.python.org/3/library/sqlite3.html>
 - To use Python 3.x with SQLite:

```
import sqlite3
```

We will write some Python scripts in class to populate and query an SQLite database.

SQLite and Applications

- ▶ SQLite is also used with some Content Management Systems:
 - http://en.wikipedia.org/wiki/List_of_content_management_systems