Table of Contents

This slide deck consists of slides used in 2 lecture videos in Week 5. Below is a list of shortcut hyperlinks for you to jump into specific sections.

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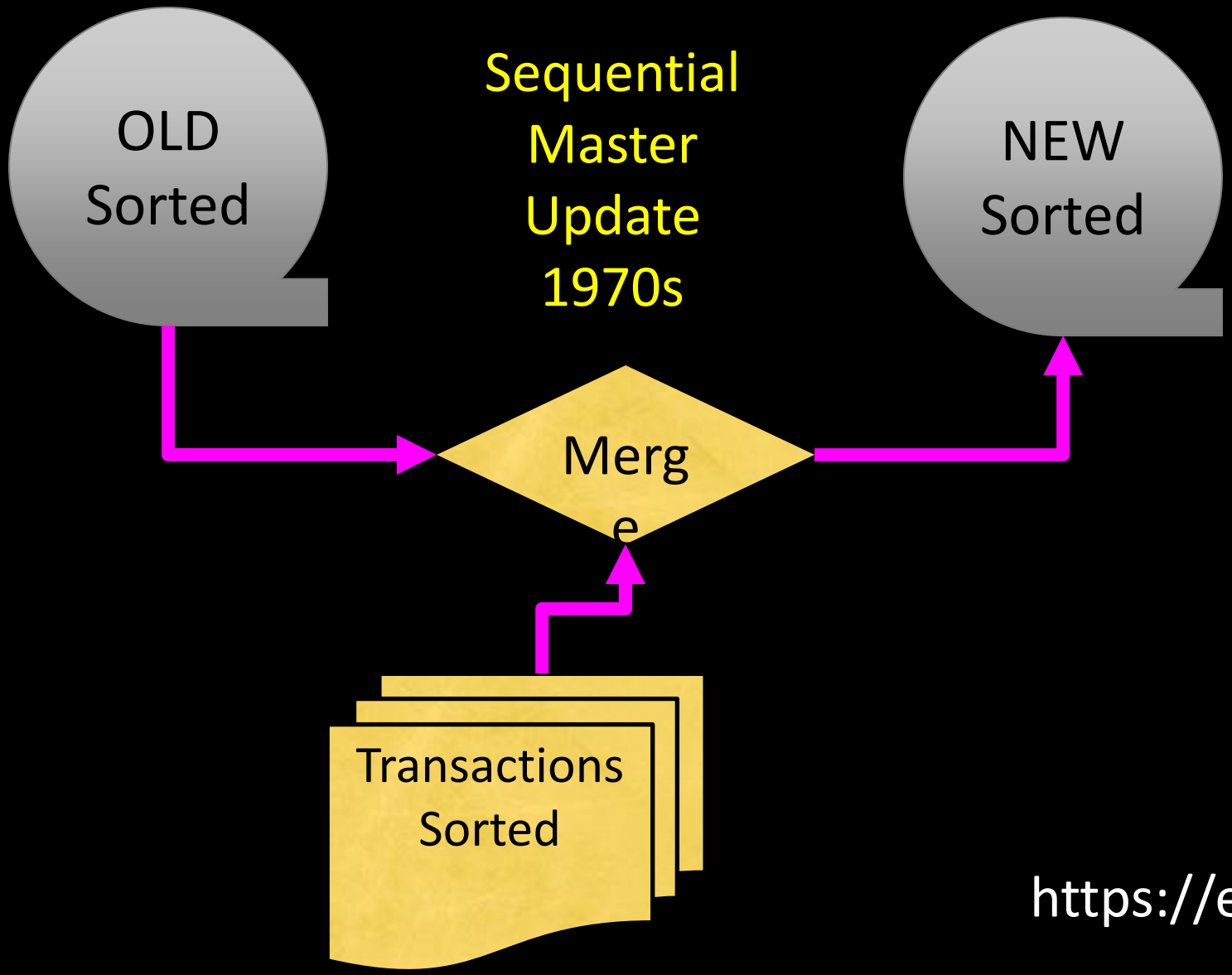
Single Table SQL



https://en.wikipedia.org/wiki/IBM_729

Random Access

- When you can randomly access data...
- How can you layout data to be most efficient?
- Sorting might not be the best idea

https://en.wikipedia.org/wiki/Hard_disk_drive_platter

Structured Query Language

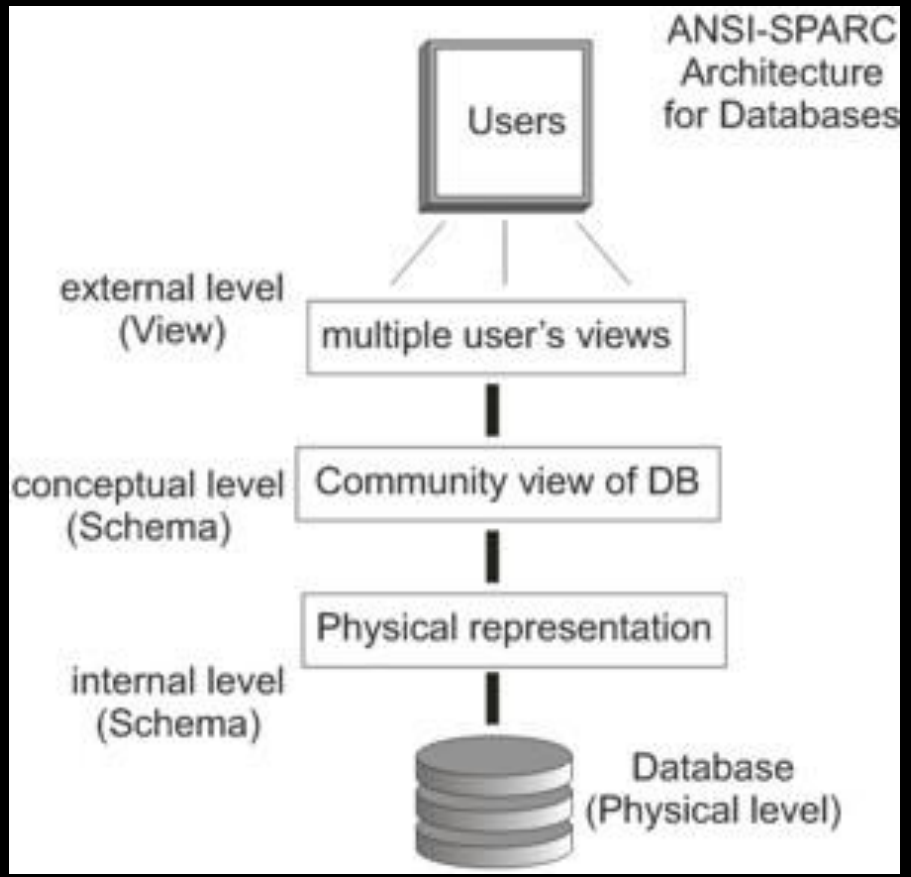
- Structured Query Language (SQL) came out of a government / industry partnership
- National Institute of Standards and Technology (NIST)

https://youtu.be/rLUm3vst87g

SQL

Structured Query Language is the language we use to issue commands to the database

- Create/Insert data
- Read/Select some data
- Update data
- Delete data



http://en.wikipedia.org/wiki/SQL

https://en.wikipedia.org/wiki/ANSI-SPARC_Architecture

Relational Databases

Relational databases model data by storing rows and columns in tables. The power of the relational database lies in its ability to efficiently retrieve data from those tables and in particular where there are multiple tables and the relationships between those tables involved in the query.

http://en.wikipedia.org/wiki/Relational_database

Common Database Systems

- Three major Database Management Systems in wide use
  - Postgres – Open source, enterprise-scale, very tweakable
  - Oracle - Large, commercial, enterprise-scale, very tweakable
  - MySql - Simpler but very fast and scalable - commercial open source
  - SqlServer - Very nice - from Microsoft (also Access)
- Many other smaller projects, free and open source
  - HSQL, SQLite, ...

Database Model

A database model or database schema is the structure or format of a database, described in a formal language supported by the database management system. In other words, a “database model” is the application of a data model when used in conjunction with a database management system.

http://en.wikipedia.org/wiki/Database_model

SQL

Structured Query Language is the language we use to issue commands to the database

- Create data (a.k.a Insert)
- Retrieve data
- Update data
- Delete data

http://en.wikipedia.org/wiki/SQL

Lets Make a Database

https://www.dj4e.com/lectures/SQL-01-Basics.txt

Start Simple - A Single Table

```
$ sqlite3 zip.sqlite3
SQLite version 3.11.0 2016-02-15 17:29:24
Enter ".help" for usage hints.
sqlite> .tables
sqlite> CREATE TABLE Users(
   ...>   id INTEGER NOT NULL
   ...>       PRIMARY KEY AUTOINCREMENT,
   ...>   name VARCHAR(128),
   ...>   email VARCHAR(128)
   ...> ) ;
sqlite> .tables
Users
sqlite> .schema Users
CREATE TABLE Users(
  id INTEGER NOT NULL
      PRIMARY KEY AUTOINCREMENT,
  name VARCHAR(128),
  email VARCHAR(128)
);
sqlite>
```

```
CREATE TABLE Users(
    id integer NOT NULL
      PRIMARY KEY
      AUTOINCREMENT,
  name VARCHAR(128),
  email VARCHAR(128)
);
```

https://www.dj4e.com/lectures/SQL-01-Basics.txt

SQL: Insert

The Insert statement inserts a row into a table

```
INSERT INTO Users (name, email) VALUES ('Kristin', 'kf@umich.edu')
```

SQL: Delete

Deletes a row in a table based on selection criteria

```
DELETE FROM Users WHERE email='ted@umich.edu'
```

SQL: Update

Allows the updating of a field with a where clause

```
UPDATE Users SET name='Charles' WHERE email='csev@umich.edu'
```

Retrieving Records: Select

The select statement retrieves a group of records - you can either retrieve all the records or a subset of the records with a WHERE clause

```
SELECT * FROM Users
```

```
SELECT * FROM Users WHERE email='csev@umich.edu'
```

Sorting with ORDER BY

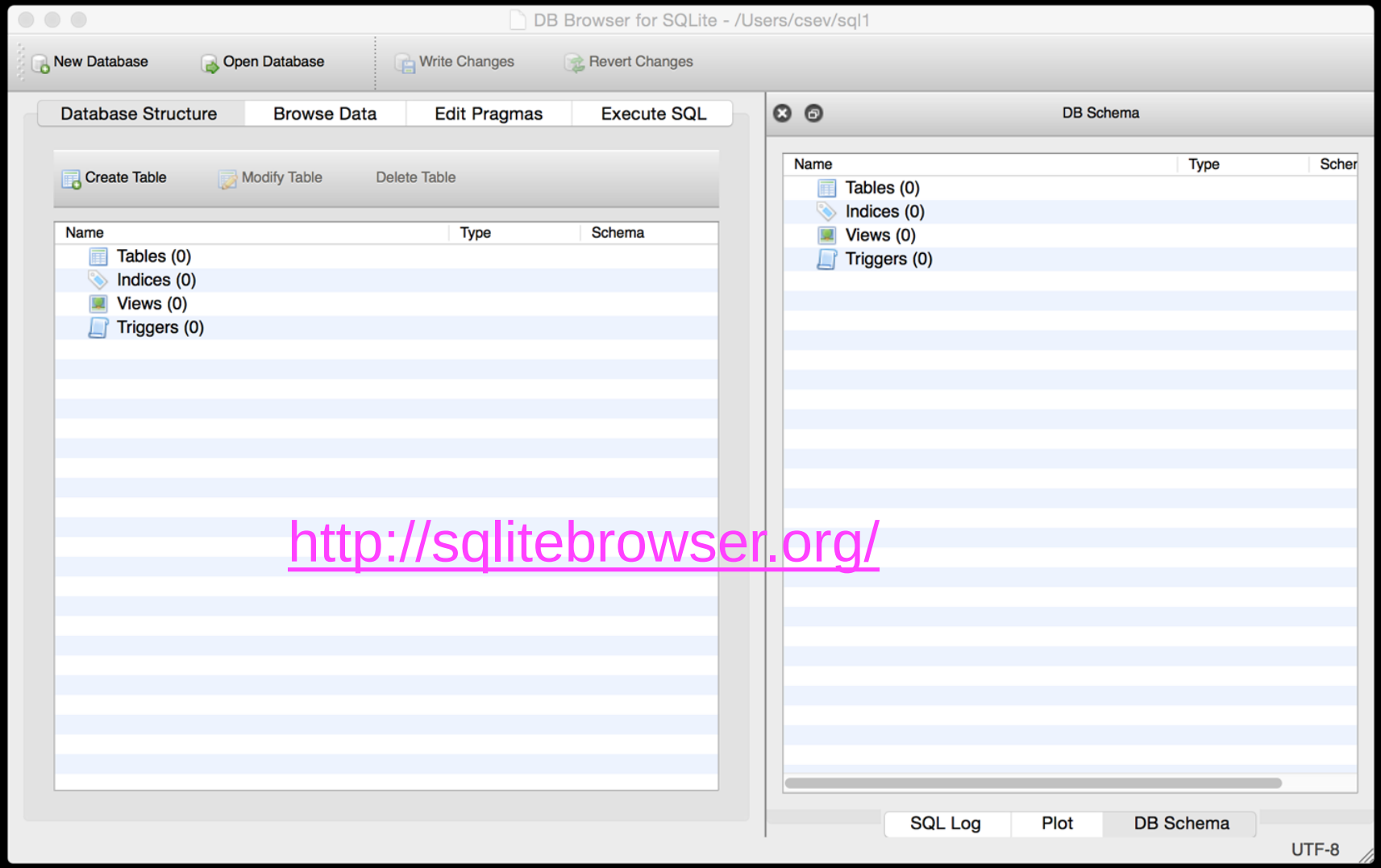
You can add an ORDER BY clause to SELECT statements to get the results sorted in ascending or descending order

```
SELECT * FROM Users ORDER BY email
```

```
SELECT * FROM Users ORDER BY name DESC
```

SQL Summary

```
INSERT INTO Users (name, email) VALUES ('Kristin', 'kf@umich.edu')

DELETE FROM Users WHERE email='ted@umich.edu'

UPDATE Users SET name="Charles" WHERE email='csev@umich.edu'

SELECT * FROM Users

SELECT * FROM Users WHERE email='csev@umich.edu'

SELECT * FROM Users ORDER BY email
```


DB Browser for SQLite - /Users/csev/sql1
New Database
Open Database
Write Changes
Revert Changes
Database Structure
Browse Data
Edit Pragmas
Execute SQL
Create Table
Modify Table
Delete Table
Name
Type
Schema
Tables (0)
Indices (0)
Views (0)
Triggers (0)
http://sqlitebrowser.org/
DB Schema
Name
Type
Scher
Tables (0)
Indices (0)
Views (0)
Triggers (0)
SQL Log
Plot
DB Schema
UTF-8

Acknowledgements / Contributions

Initial Development: Charles Severance, University of Michigan School of Information

Insert new Contributors and Translators here including names and dates

Continue new Contributors and Translators here