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Introduction to FireDAC

Fundamentals of Data Access

Slides and samples github.com/jimmckeeth/FireDAC-Fundamentals

Jim McKeeth

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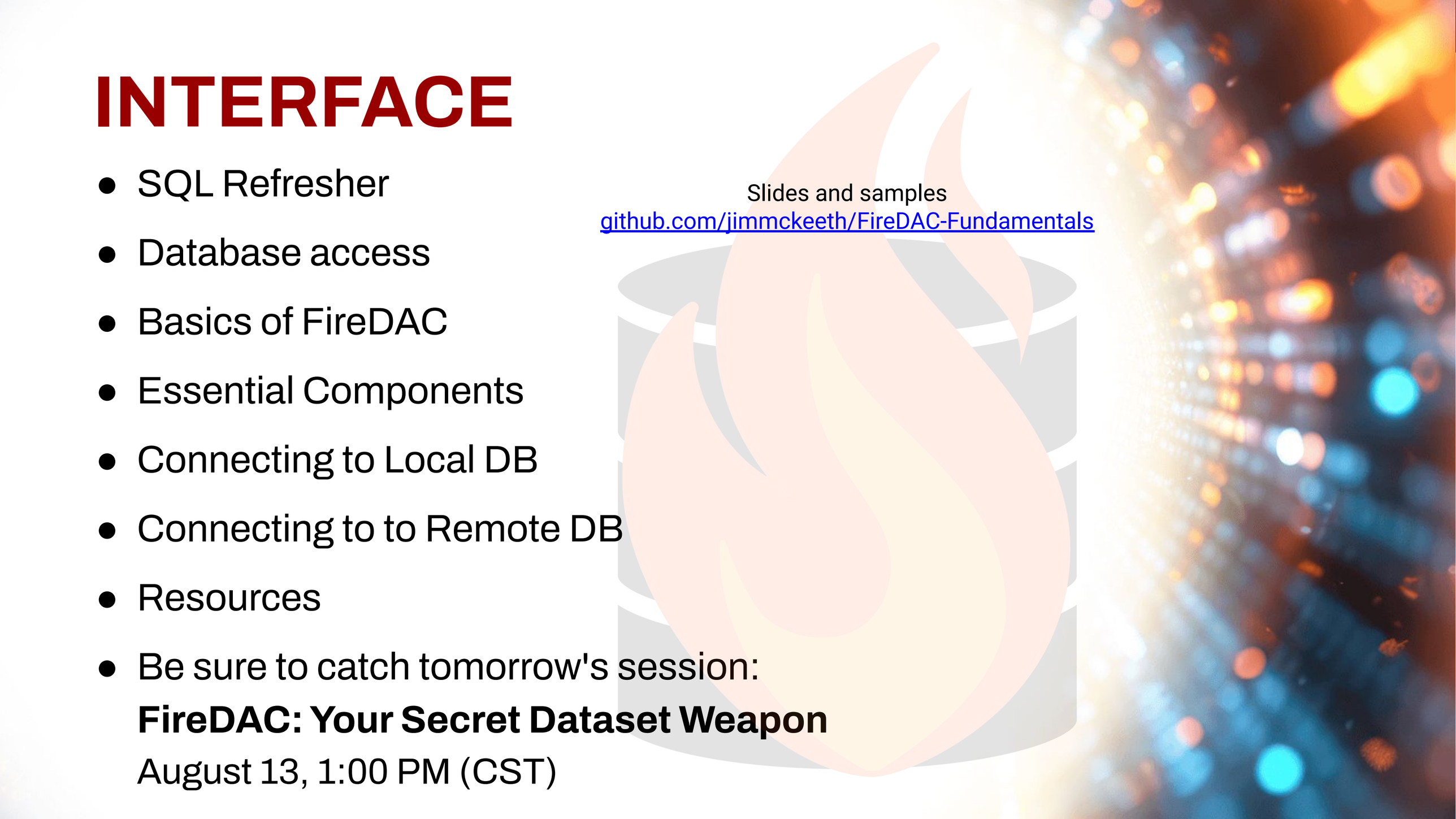
GDK software

INTERFACE

- SQL Refresher
- Database access
- Basics of FireDAC
- Essential Components
- Connecting to Local DB
- Connecting to to Remote DB
- Resources
- Be sure to catch tomorrow's session:
  FireDAC: Your Secret Dataset Weapon
  August 13, 1:00 PM (CST)

Slides and samples
github.com/jimmckeeth/FireDAC-Fundamentals



Introduction to FireDAC: Fundamentals of Data Access

Jim McKeeth, GDK Software

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August 12, 1:00 PM (CST)

Do you want to access data in your application? FireDAC is the answer. This session provides a comprehensive introduction to the essentials of using FireDAC for accessing various types of data and databases across multiple platforms. Whether you're working with local databases or remote servers, you'll learn the foundational techniques to efficiently manage data in your Delphi applications. A basic understanding of SQL is recommended to make the most of this session. Be sure to catch the FireDAC: Your Secret Dataset Weapon session tomorrow!

IMPLEMENTATION

FireDAC Database Access

- Universal data access components
  - Same components for all DBs
- Platform independent
- TDataset descendent
- Data Aware, Live Binding, or GUI *free*
- Database specific features

MariaDB teradata.

SAP Advantage Database Server

PostgreSQL

ORACLE DATABASE

Microsoft® SQL Server®

IBM DB2

SAP SQL Anywhere

Informix®

SQLite

mongoDB®

MySQL

Top Databases

- Top 30 DBMS ranked by db-engines.com

Rank	DBMS	Database Model	Score
1	Oracle	Relational, Multi-model	1258.48
2	MySQL	Relational, Multi-model	1026.86
3	Microsoft SQL Server	Relational, Multi-model	815.18
4	PostgreSQL	Relational, Multi-model	637.39
5	MongoDB	Document, Multi-model	420.98
6	Redis	Key-value, Multi-model	152.71
7	Snowflake	Relational	135.97
8	Elasticsearch	Search engine, Multi-model	129.83
9	IBM Db2	Relational, Multi-model	123
10	SQLite	Relational	104.79
11	Apache Cassandra	Wide column, Multi-model	97
12	Microsoft Access	Relational	96.37
13	Splunk	Search engine	96.1
14	MariaDB	Relational, Multi-model	86.53
15	Databricks	Multi-model	84.46
16	Microsoft Azure SQL Database	Relational, Multi-model	75.03
17	Amazon DynamoDB	Multi-model	68.91
18	Google BigQuery	Relational	55.53
19	Apache Hive	Relational	55.24
20	FileMaker	Relational	46.67
21	Neo4j	Graph	43.9
22	SAP HANA	Relational, Multi-model	42.36
23	Teradata	Relational, Multi-model	42.25
24	Apache Solr	Search engine, Multi-model	36.3
25	SAP Adaptive Server	Relational, Multi-model	33.28
26	Apache HBase	Wide column	27.51
27	Microsoft Azure Cosmos DB	Multi-model	26.22
28	InfluxDB	Time Series, Multi-model	22.63
29	PostGIS	Spatial, Multi-model	20.06
30	Firebird	Relational	19.97

Top Databases

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- Remove "non-relational"
- Leave MongoDB
  (most popular non-relational DB)

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Top Databases

- Top 30 DBMS ranked by db-engines.com
- Remove "non-relational"
- Leave MongoDB
  (most popular non-relational DB)
- Highlight native supported
- Full list:
  docwiki/RADStudio/en/Databases_(FireDAC)

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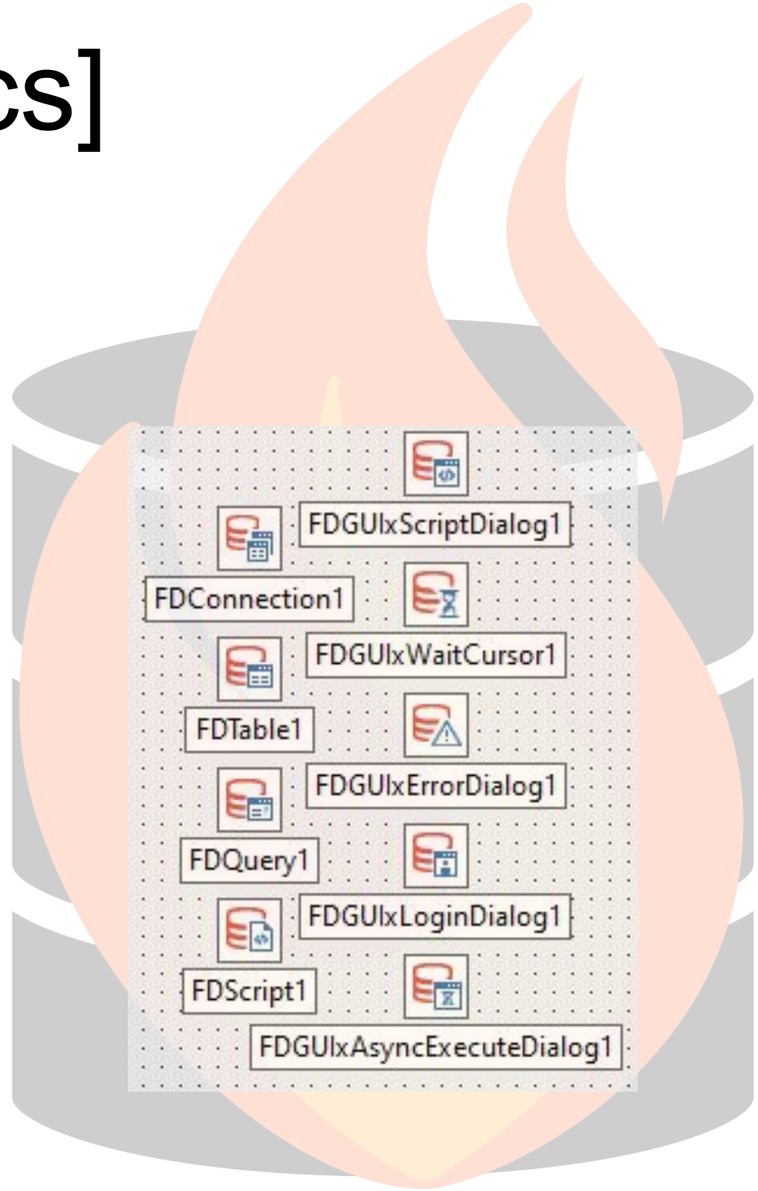
BEGIN

FireDAC Components [Basics]

- `TFDConnection`: Connection to DB
- `TFDTable`: A single DB table
- `TFDQuery`: SQL statement, multiple tables, read and write
- `TFDScript`: Collection of scripts

- `TFDGUIxWaitCursor`: Wait cursor (VCL, FMX, Console)
- `TFDGUIxLoginDialog`: Control login dialog (VCL, FMX)
- `TFDGUIxErrorDialog`: FireDAC exceptions (VCL, FMX)
- `TFDGUIxScriptDialog`: Script progress (VCL, FMX, Console)
- `TFDGUIxAsyncExecuteDialog`: Query progress (VCL, FMX)



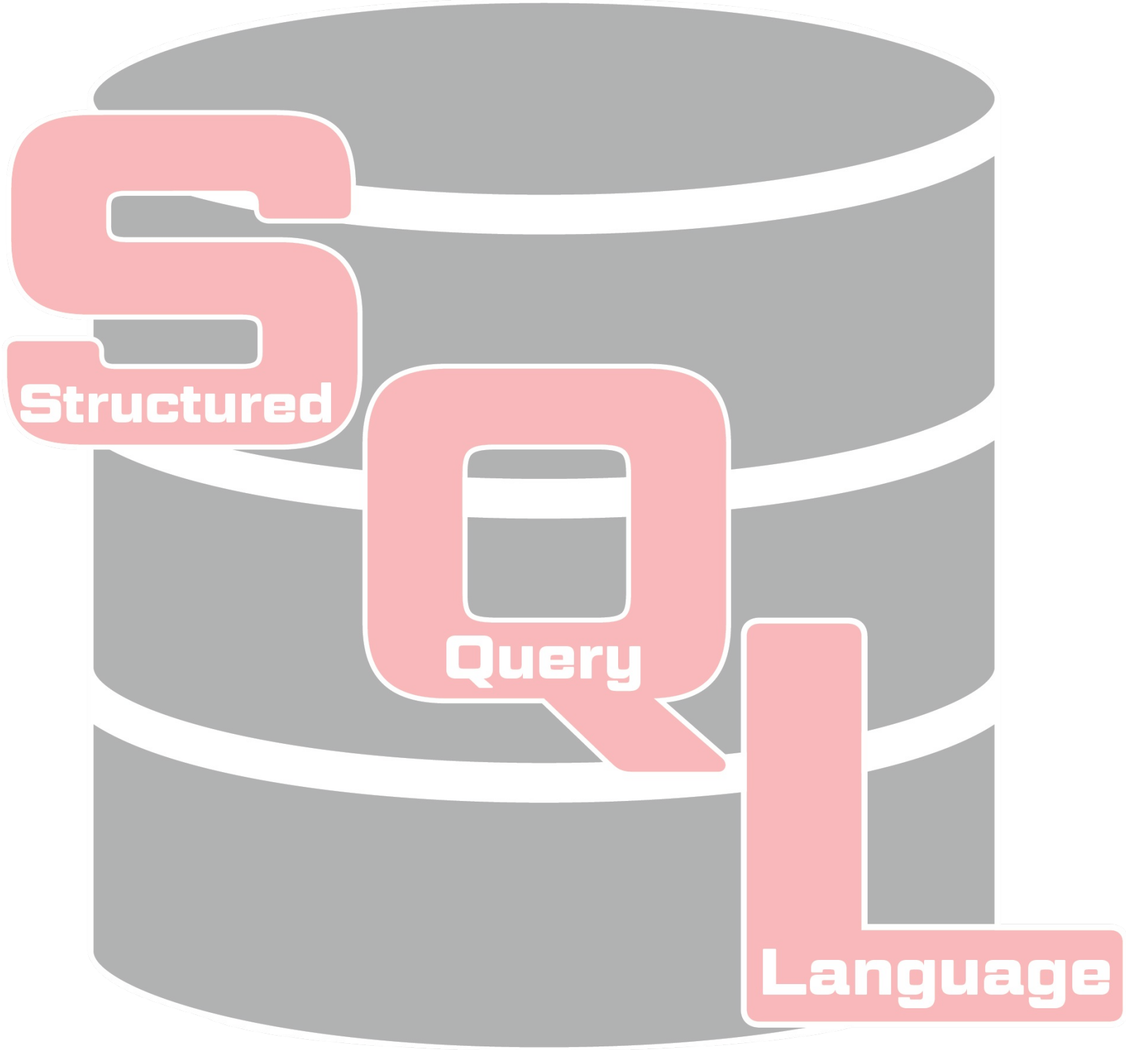
Working with **DBMS**

Database

Base

Management

System



Working with **SQL**

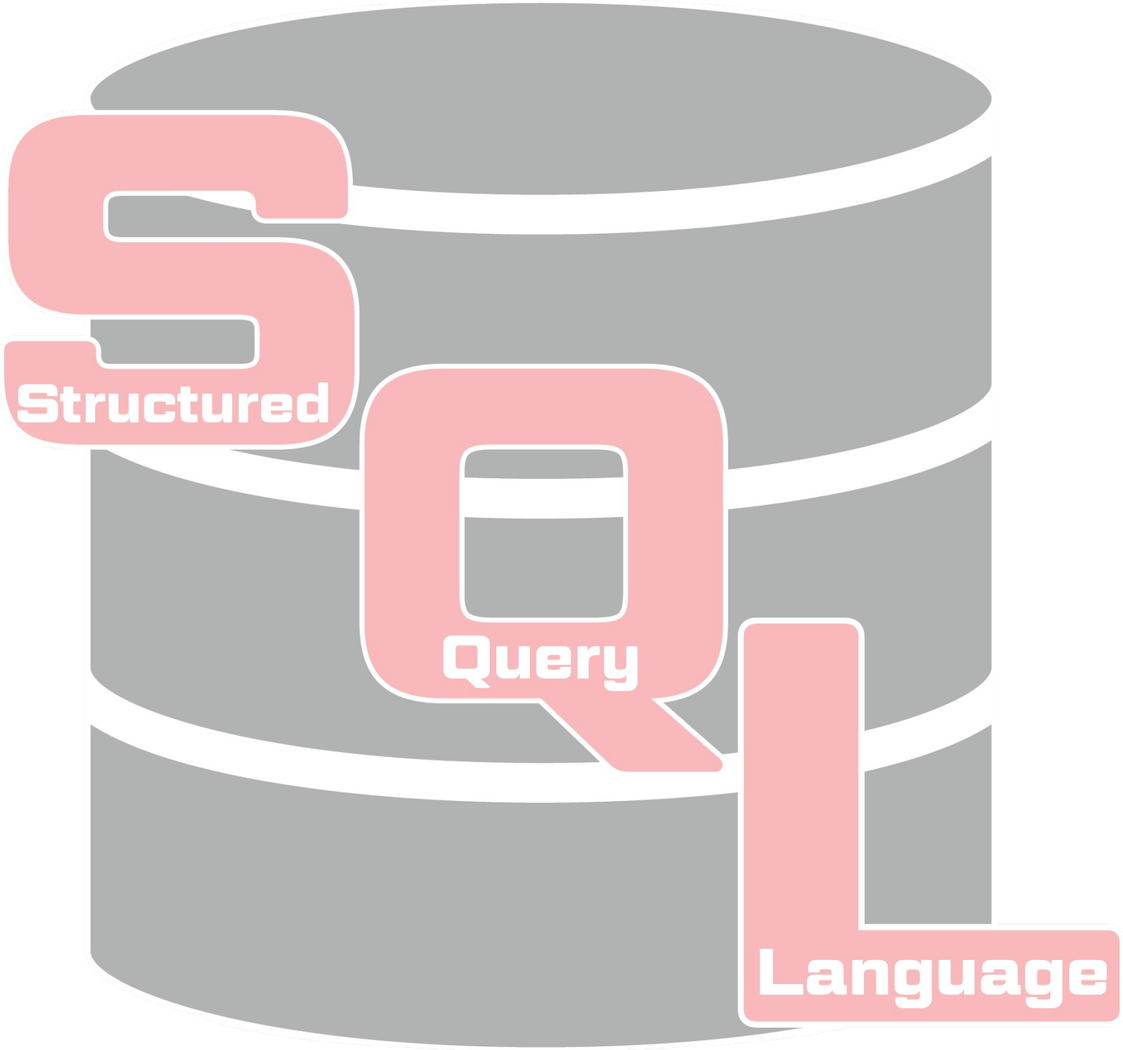
Structured

Query

Language

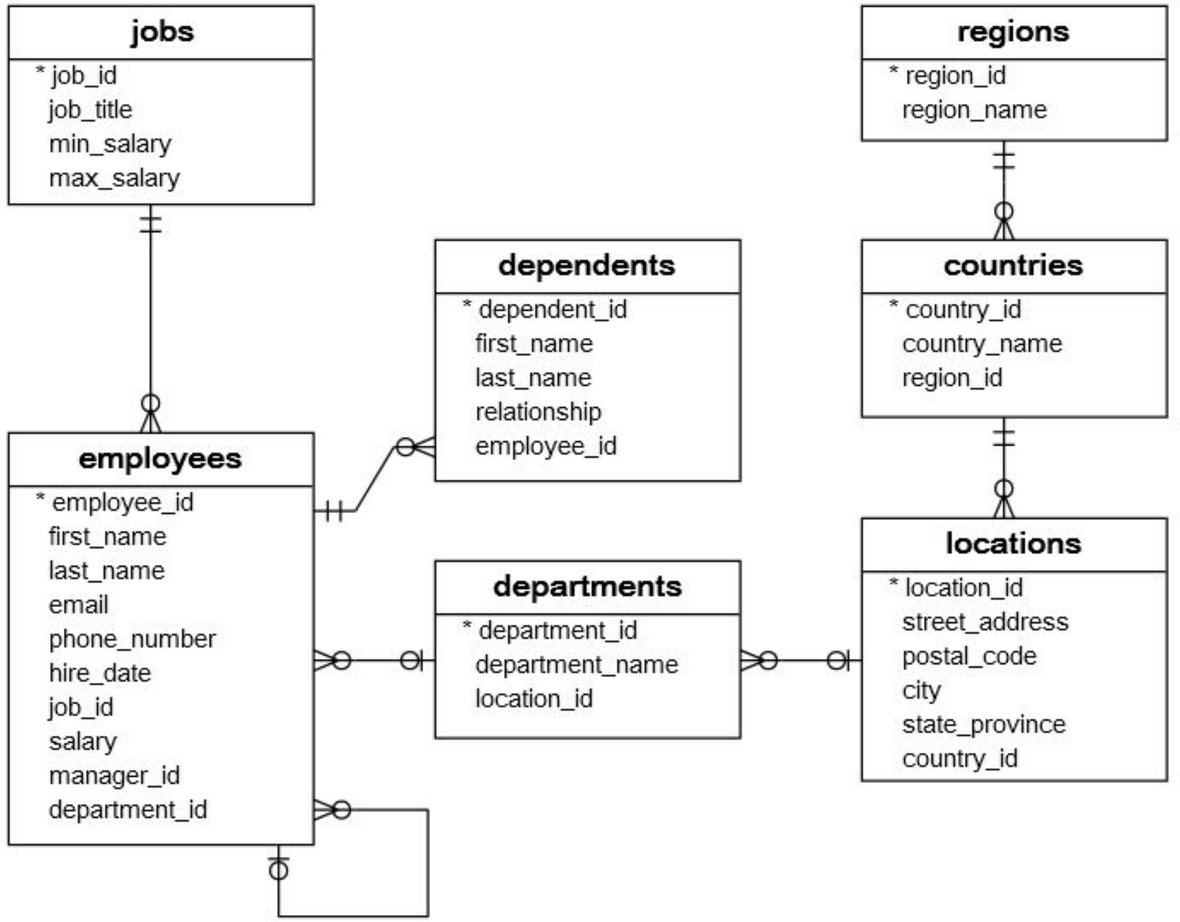
Commonly used with DBMS

Universal with specific dialects



Working with **SQL**

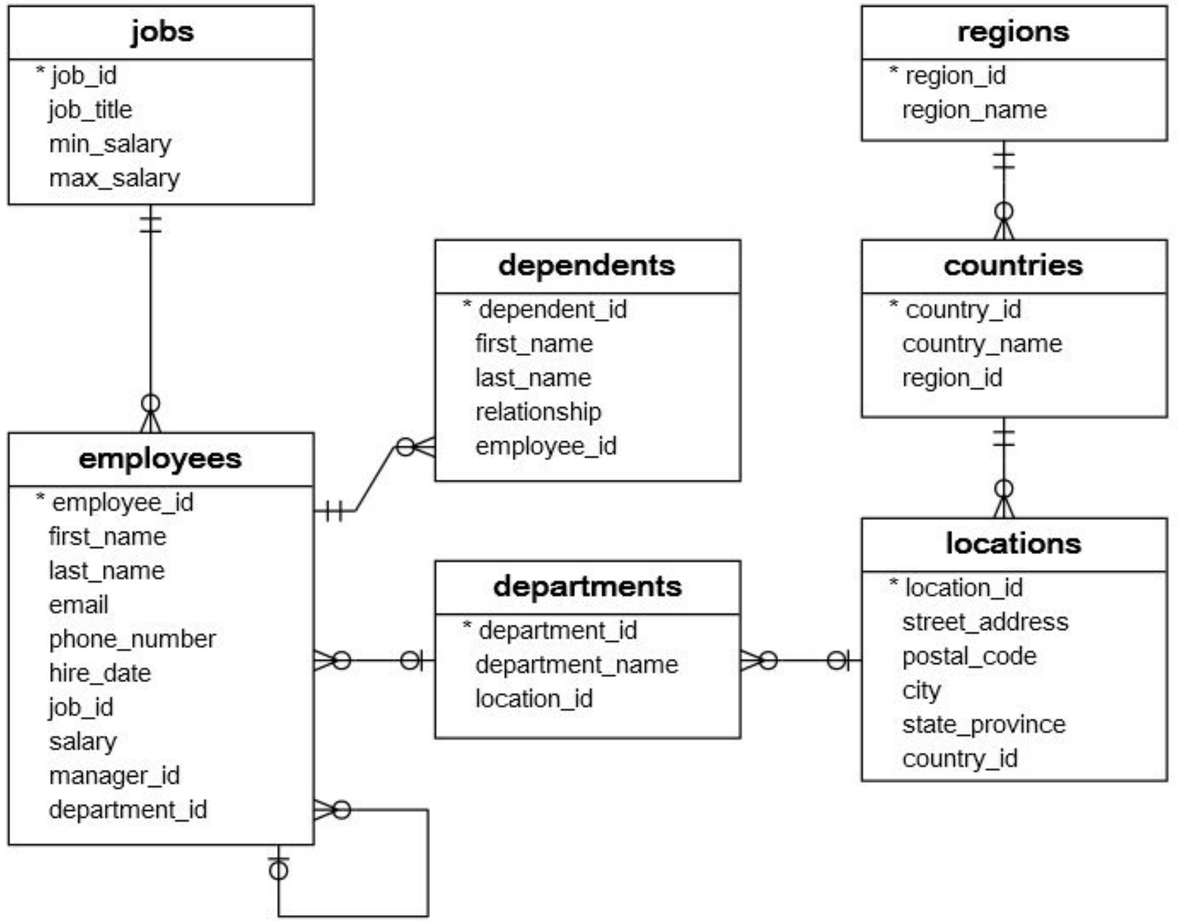
#	Table	Description	Rows
1	`employees`	stores the data of employees.	`40`
2	`jobs`	stores the job data including job title and salary range.	`30`
3	`departments`	table stores department data.	`11`
4	`dependents`	stores the employee's dependents.	`11`
5	`locations`	stores the location of the departments of the company.	`7`
6	`countries`	stores the data of countries where the company is doing business.	`25`
7	`regions`	the data of regions such as Asia, Europe, America, and the Middle East and Africa. The countries are grouped into regions.	`4`



sqltutorial.org/sql-sample-database/

Working with **SQL**

- Each record has an ID unique in that table
- **Employees** have 1 *job*, 1 *department,* and 0 to many *dependents*, stored in separate tables
- They also have 1 *manager*, which is stored in the **employee** table
- **Departments** have 1 *location*
- **Locations** have 1 *country*
- **Countries** have 1 *region*



sqltutorial.org/sql-sample-database/

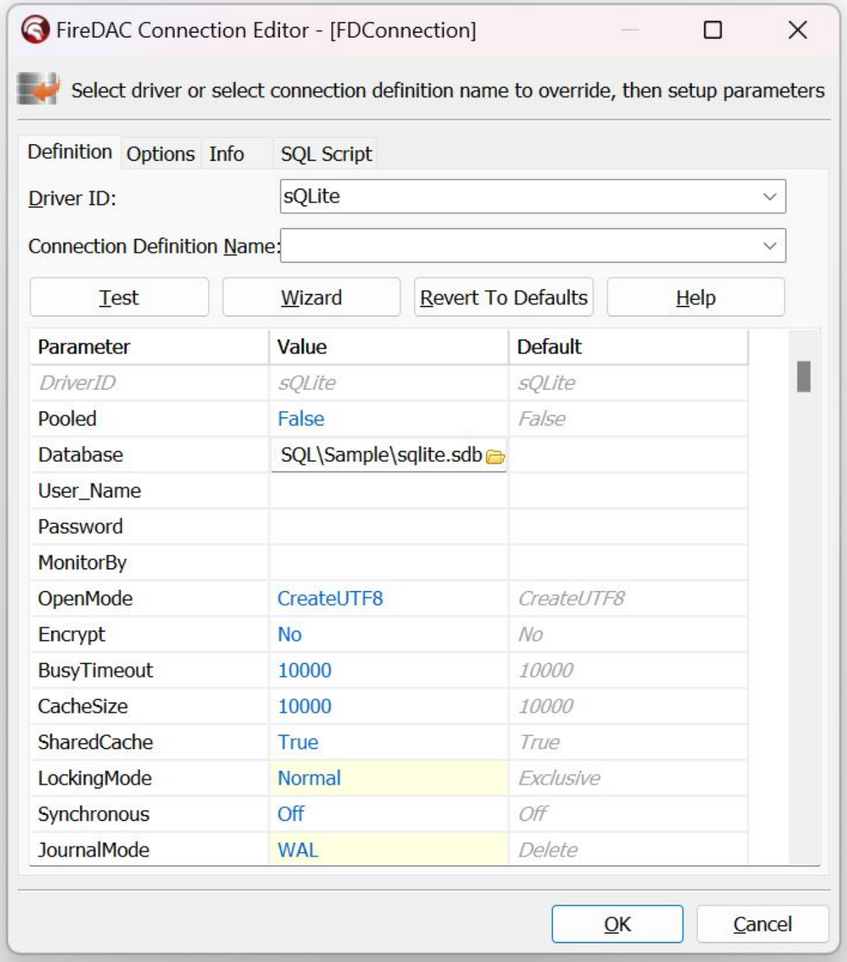
SQLite

- A very simple DBMS that exists as a library functioning as an embedded DBMS. Works across most all platforms.
- Lacks some features common to other DBMS.
- Often enough for simple use cases.
- docwiki/RADStudio/en/Using_SQLite_with_FireDAC ←
- docwiki/RADStudio/en/Connect_to_SQLite_database_(FireDAC)
- docwiki/RADStudio/en/Tutorial:_Connecting_to_a_SQLite_Database_Using_FireDAC
- docwiki/RADStudio/en/Mobile_Tutorial:_Using_FireDAC_and_SQLite_(iOS_and_Android)
- docwiki/RADStudio/en/SQLite_Database_Questions_(FireDAC)

sqlite.org

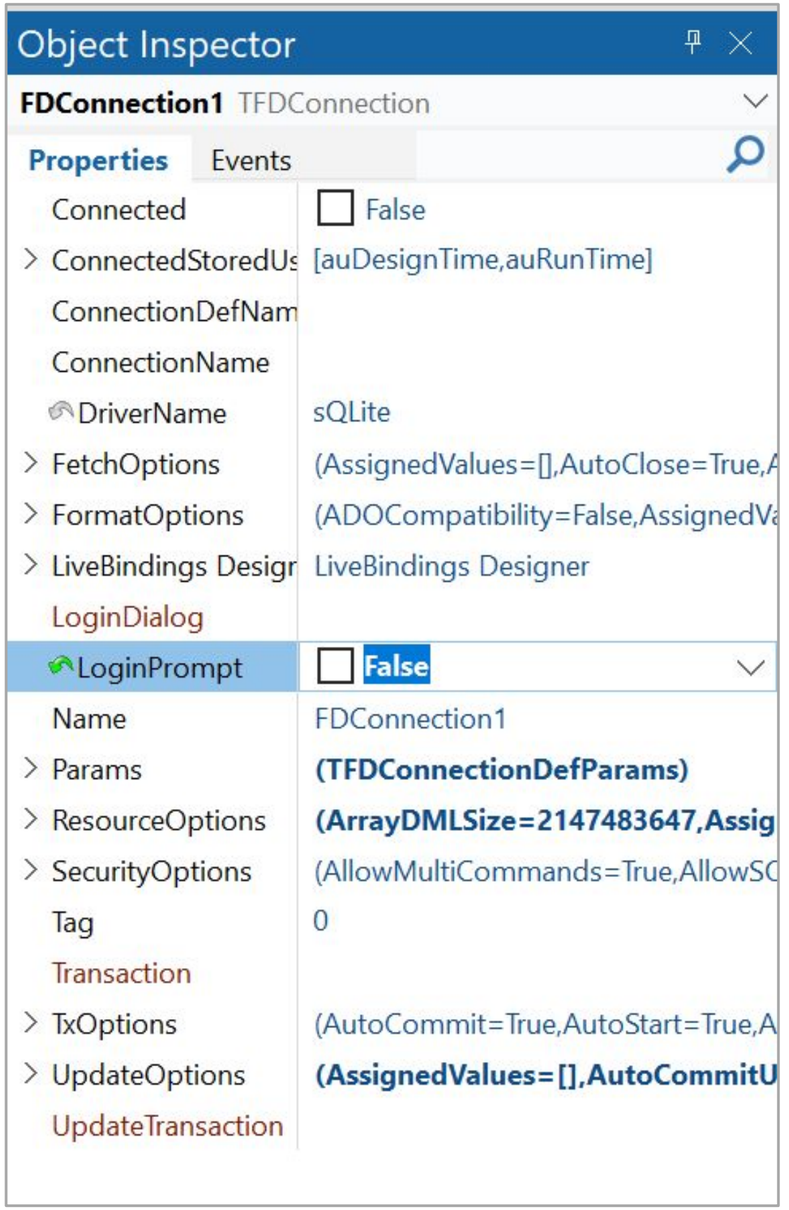
SQLite with FireDAC

- **DriverID**: `SQLite`
- **Database**: `path to db file`
  (defaults to creating if doesn't exist)
- For shared access
  - **JournalMode:** `WAL`
  - **LockingMode**: `Normal`



SQLite with FireDAC

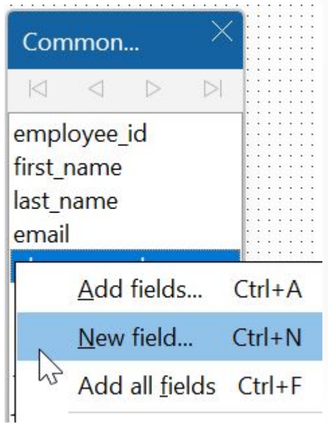
- **LoginPrompt**: False
  - Not *usually* needed
- *Notes*:
  - SQLite doesn't store field sizes
  - *TEXT* = dt*WideMemo*
  - MEMO = dtMemo
  - *NVARCHAR* = dt*WideString*
  - VARCHAR = dtAnsiString

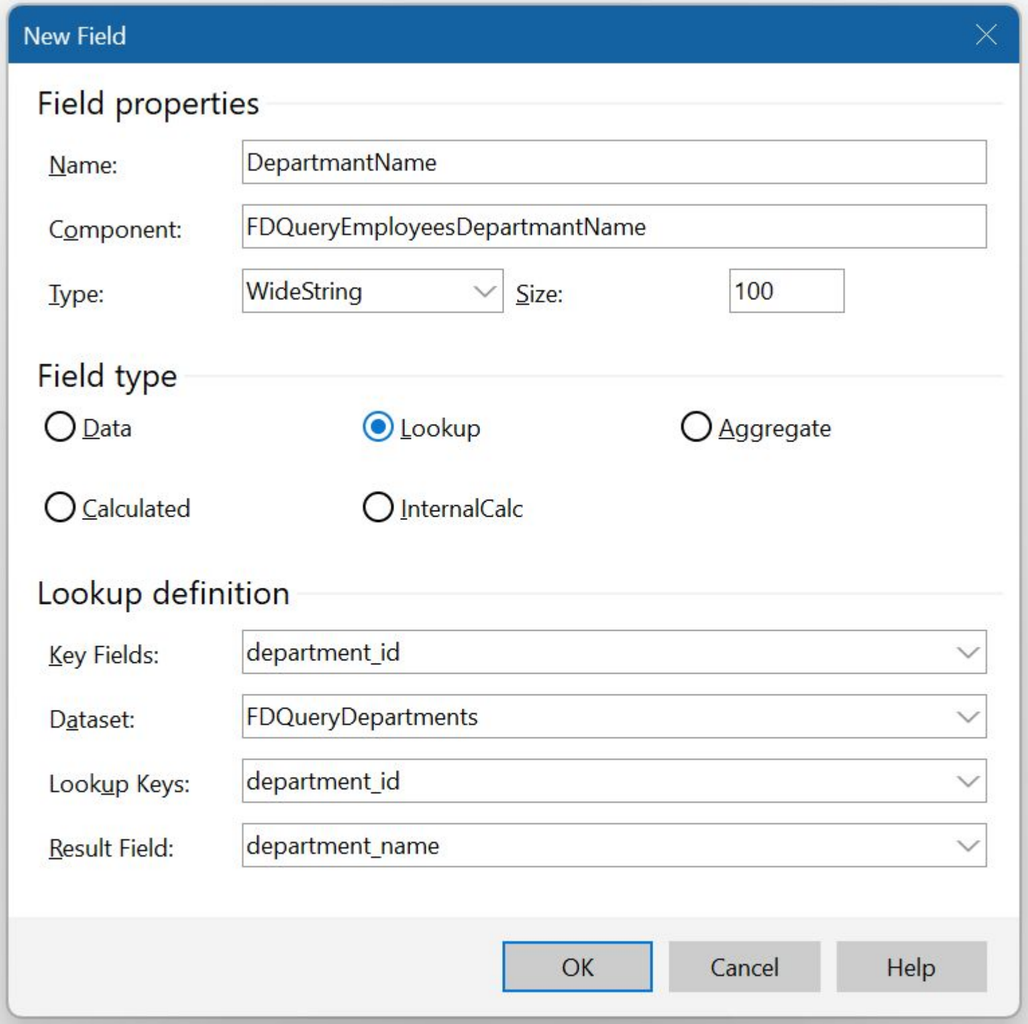


More on SQLite_Data_Types

DBGrid Lookup

- Add a new field to the TFDQuery
- Give it a name and type
- Set Field Type as lookup
- Connect the local key field to the key field of the other dataset
- Result field is displayed





Demonstration

Note on Containers

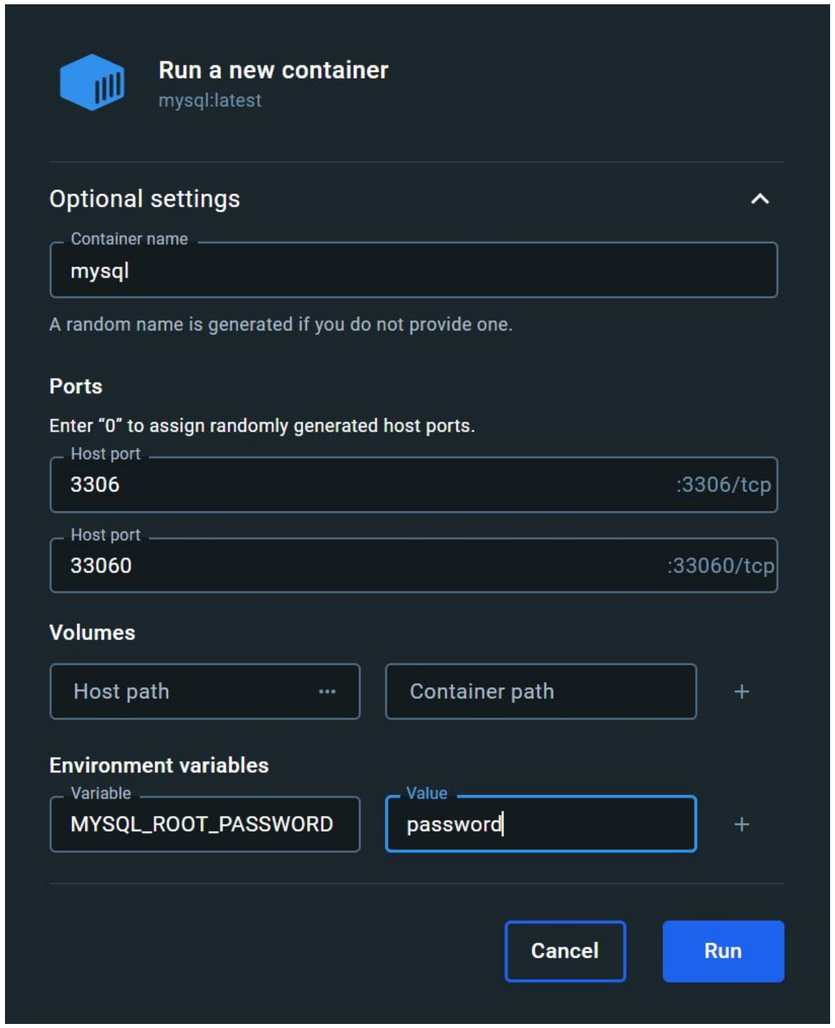
- Docker is the *kleenex* of container platforms
- Recently introduced new license restrictions
- Podman is a new alternative from RedHat
  - Full compatibility and possibly more secure
  - Open Container Initiative (OCI) compliant
- Full containers ecosystem
  - Use with hub.docker.com, quay.io, or other registries
- Worth consideration!

podman

github.com/containers/podman
podman.io

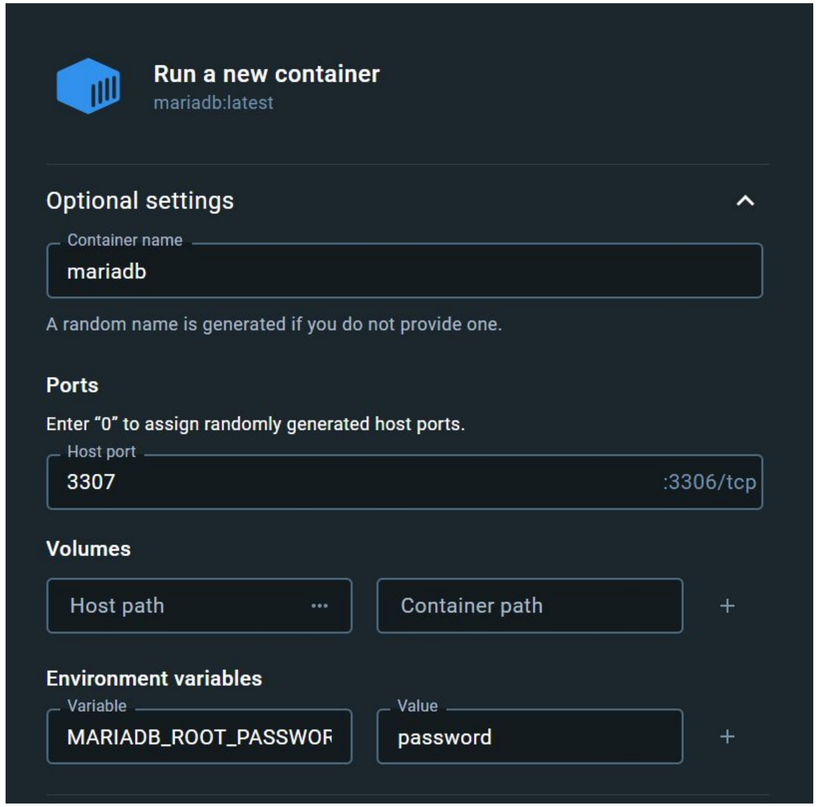
MySQL

- Midrange RDBMS
  - local, embedded or remote
- Now owned by Oracle with 4 editions
  - 1 free, and the other 3 paid
- Very difficult to get client libraries
  - Current client only 64-bit
- Links: hub.docker.com/_/mysql
    - Supply: MYSQL_ROOT_PASSWORD
  - docwiki/RADStudio/
    - Connect_to_MySQL_Server_(FireDAC)
    - MySQL_Server_Questions_(FireDAC)



MariaDB

- New open source (GPLv2) fork of MySQL
  - Intended to maintain high compatibility
- Easy to get 32 or 64-bit client libraries
  - Which are compatible with MySQL
  - mariadb.com/kb/en/mariadb-connector-c/
- Refer to MySQL in DocWiki and FireDAC
  - The FireDAC MySQL native driver supports:
    - **MySQL Server** Community, Enterprise, and Embedded editions, from version 3.21 up to version 8.0.23.
    - **MariaDB**, from version 5.5 up to version 10.6.
- Recommend using MariaDB over MySQL

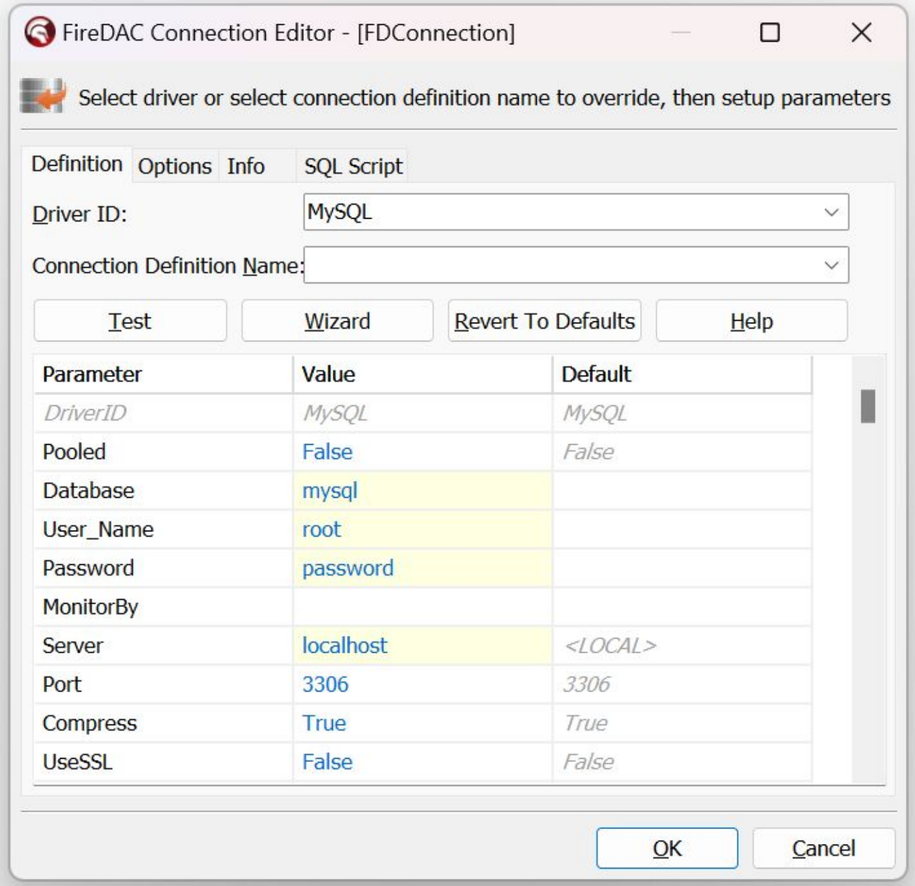


hub.docker.com/_/mariadb

MARIADB_ROOT_PASSWORD

MySQL & MariaDB

- Download and install drivers
  - mariadb.com/kb/en/mariadb-connector-c/
- DriverID: MySQL
- Server: name or IP
- Port: 3306 (default)
- Database: mysql (default-case sensitive)
  - *Instance name within server*
- DocWiki/Connect_to_MySQL_Server_(FireDAC)



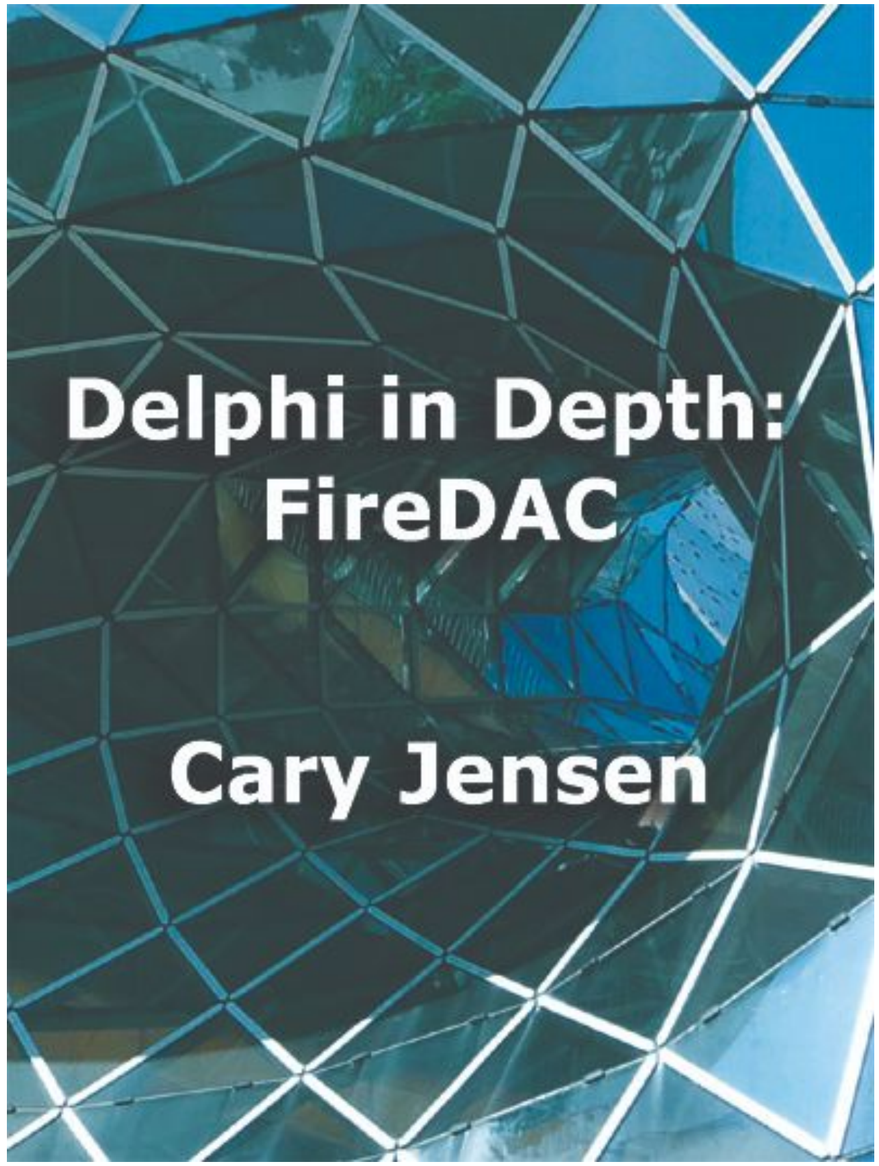
Demonstration

FINALIZATION

Slides and samples
github.com/jimmckeeth/FireDAC-Fundamentals

FireDAC in Depth

- The definitive book about FireDAC
- by Spirit of Delphi winner Dr. Cary Jensen
- jensendatasystems.com/firedacbook
  - Learn how to connect to a wide variety of databases
  - Optimize your connection configurations
  - Explore the world of indexes, searches, and filters
  - Discover the power of persisted datasets
  - Create flexible queries using macros and FireDAC scalar functions
  - Achieve blazing performance with Array DML
  - Master the art of cached updates
  - Add sophisticated features using Local SQL



Resources

- FireDAC DocWiki:
  - docwiki/RADStudio/en/Firedac
  - docwiki/RADStudio/en/Overview_(FireDAC)
  - docwiki/RADStudio/en/Getting_Started_(FireDAC)
  - docwiki/RADStudio/en/FAQ_(FireDAC)
- SQL Reference
  - SQLTutorial.org
  - en.wikibooks.org/wiki/Structured_Query_Language
  - w3schools.com/sql
  - khanacademy.org/computing/computer-programming/sql
  - codecademy.com/learn/learn-sql

See you tomorrow
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