Leveraging SQLite and ArcGIS

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Introduction

- What is SQLite?
- What SQLite options are available in ArcGIS?
- Strengths and Weaknesses of each option.
- Esri Support.
- How can you leverage SQLite Databases?
What is SQLite?
What is SQLite?

- Created in 2000 by D Richard Hipp as part of a project for the U.S. Navy.
- May be the most installed RDBMS.
- SQLite is a public domain relational database management system contained in a C programming library.
- It is not a client–server database engine.
- It is meant to be embedded in an application.
What SQLite options are available in ArcGIS?
What SQLite options are available in ArcGIS?

- SQLite
- ST_Geometry
- SpatiaLite
- GeoPackage
What SQLite options are available in ArcGIS?

SQLite

- Read SQLite data files as tabular data.
- Version 3.16.2
- Must have “.sqlite” as an extension
- Limited Type System
What SQLite options are available in ArcGIS?

- Must have “.sqlite” as an extension
- Enforces the ESRI type system.
What SQLite options are available in ArcGIS?

SpatiaLite

- Version 4.0.
- Must have “.sqlite” as an extension.
- Uses the SQLite native type system.
What SQLite options are available in ArcGIS?

GeoPackage

- OGC Standard
- Version 1.0 (1.0.1), 1.1 and 1.2 supported at 10.5.1/2.0
- Shares the same geometry type definition with ST_Geometry.
- Must have “.gpkg” as an extension.
- Type system defined in the standard.
- Includes Tiled Raster Support.
Strengths and Weaknesses of each option.
Strengths and Weaknesses

Strengths

• SQLite
  - Shareware.
  - Light weight.
  - Portable.
Strengths and Weaknesses

Strengths

• **ST_Geometry**
  - Strong implementation based on standards.
  - Esri type system.
  - Compact geometry type.
Strengths and Weaknesses

Strengths

• SpatiaLite
  - Popular implementation.
  - Shareware.
Strengths and Weaknesses

Strengths

- GeoPackage
  - OGC Standard
  - Tiled Raster
Strengths and Weaknesses

Weaknesses

• SQLite
  - No spatial type.
  - No raster support.
  - Limited type system.
Strengths and Weaknesses

Weaknesses

• ST_Geometry
  - Esri product, not shareware or open source.
  - Vector only.
Strengths and Weaknesses

Weaknesses

• SpatiaLite
  - Shareware, but not a standard.
  - Geometry type is not compact.
  - Compressed geometry uses lossy compression
  - SQLite native type system.
  - No time type.
  - No empty shape types.
Strengths and Weaknesses

Weaknesses

• GeoPackage
  - Relatively new standard. Limited acceptance.
Esri Support
Esri Support
Software

- ArcMap, ArcCatalog (10.2.1)
- ArcGIS Pro (1.2)
- Runtime (10.2.4 java, 10.2.8 Android)
Esri Support
General

- Create
  - CreateSQLiteDatabase Geoprocessing Tool
Esri Support

Vector

- Draw
- Import/Export
  - Copy/Paste, FeatureClass2FeatureClass, Table2Table
- Query
- Edit only through code. No edit session.
- ST_Geometry functions
• The OGC standard that defines ST_Geometry includes a set of functions that allow you to create, insert, update and query the ST_Geometries via SQL.

• Using the SQLite3.exe command line tool you can open a ST_Geometry database, import the ST_Geometry dll and then execute the ST_Geometry functions.

• Select the buildings that are not completely contained within one lot:
  
  SELECT DISTINCT (building_id) FROM bfp, lots WHERE st_intersects (lot, footprint) = 1 AND st_contains (lot, footprint) = 0;
In ArcGIS Desktop the ST_Geometry libraries can be found in Desktop10.5\DatabaseSupport\SQLite\Windows32 or from my.esri.com

To load bring up SQLite3.exe.

SQLite3 MyData.sqlite
> SELECT load_extension('c:\Program Files\ESRI\Desktop10.5\DatabaseSupport\SQLite\Windows32\stgeometry_sqlite.dll','SDE_SQL_func_cs_init');
• **Draw**
  - 10.4.1, 1.5 and before: Use Add Raster Layer.
  - 10.5, 2.0: Add like any other supported raster.

• **Import**
  - 10.4.1, 1.5 and before: Raster2GPKG
    - [https://github.com/Esri/raster2gpkkg](https://github.com/Esri/raster2gpkkg)
  - 10.5, 2.0: AddRasterToGeoPackage Geoprocessing Tool.
How can you leverage SQLite Databases?
How can you leverage SQLite Databases?

- Data exchange between internal or external sites
- Data exchange where shareware is a requirement.
- Data exchange where a standard is required.
Conclusion
Conclusion

- What is SQLite!
- What SQLite options are available in ArcGIS
- Strengths and Weaknesses of each option.
- Esri Support
- How can you leverage SQLite Databases?
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