SpatiaLite, the Shapefile of the future?

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About Sourcepole

- **GIS-Knoppix: first GIS live-CD**
- **QGIS**
  - Core development & PSC membership
  - QGIS Mapserver
- **OGR / GDAL**
  - Interlis driver
  - schema support for PostGIS driver
- **Ruby on Rails**
  - MapLayers plugin
  - Mapfish server plugin

SpatiaLite introduction

- Spatial extension to SQLite embedded database
- Like PostGIS extends PostgreSQL
- Single file storage, SQL support
- Spatial data types & functions
- Licenses: MPL, GPL , LGPL

History

- Alessandro Furieri, Italy
- Initial development for management of timetables for train and buses
- Tuscany Region Government (Transportation Dept.)
- Version 1.0: 21.3.2008
- Current Version 2.3.1 (2.4.0RC3a)

SQLite

- **Embedded database**
  - File based, no server process
  - C programming language
  - Access via library (<275KiB)
  - SQL API
  - Dynamic type system
- **Well-proven and widely used**
  - Version 1.0: 17.8.2000
  - Mozilla, PHP, Symbian, Apple, Adobe, Skype, ...
- **Good SQL-92 compatibilty**
  - Joins, views, triggers
  - Transactions

SQLite Locking

- Write ahead logging (WAL) introduced in 3.7
- Before that write access locked database also for reading
- Activation: PRAGMA journal_mode=WAL
- Reading and writing can proceed concurrently
- Spatialite 2.4.0RC3 uses SQLite 3.7.0

SpatiaLite data types

- **OGC Simple Feature types (WKT, WKB)**
  - Point, MultiPoint
  - LineString, MultiLineString
  - Polygon, MultiPolygon
  - XY, XYZ, XYM, XYZM
- **R*Tree index tables or BBOX In-Memory-Cache**
- **Networks (Routing)**
- **Raster data**

SpatiaLite Features

- GEOS library
- Geometry access
  - ST_GeomFromText, ...
  - ST_AsText, ST_Area, ST_IsValid, ...
- Queries and operations
  - ST_Intersects, ST_Contains, ST_Touches, ...
  - ST_Union, ST_Intersection, ST_Buffer, ...
  - ST_Generalize, SimplifyPreserveTopology
- OGC Metadata
  - geometry_columns, spatial_ref_sys tables

Spatial SQL examples

```
SELECT t2.Name, t2.Peoples,
    ST_Distance(t1.geom, t2.geom) AS Distance
  FROM Towns AS t1, Towns AS t2
  WHERE t1.Name = 'Firenze' AND
  ST_Distance(t1.geom, t2.geom) < 10000;

SELECT Regions.Name, COUNT(*)
  FROM Towns, Regions
  WHERE ST_Within(Towns.geom, Regions.geom)
  AND Towns.ROWID IN
  (SELECT pkid FROM idx_Towns_geom WHERE
  xmin > MbrMinX(Regions.geom) AND
  xmax < MbrMaxX(Regions.geom) AND
  ymin > MbrMinY(Regions.geom) AND
  ymax < MbrMaxY(Regions.geom))
  GROUP BY Regions.Name;
```

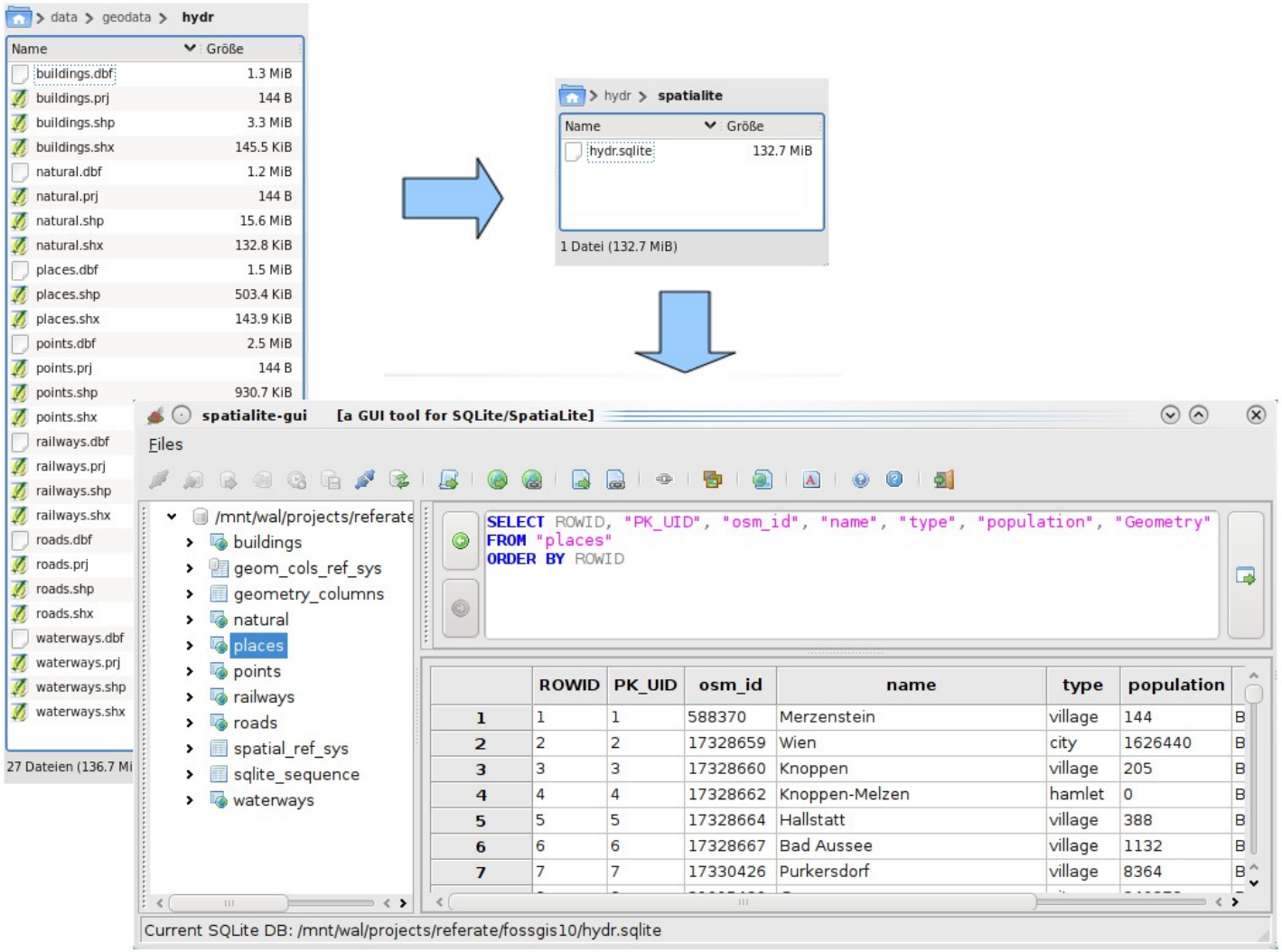
More features

- Built-in Shapefile import- and export
- Coordinate reprojection via PROJ.4 library
- Charset conversion with GNU libiconv
- Use of external Shapefiles (+DBF) and CSV/TxtTab files as virtual tables
- Raster data library
- Library for networks and routing

SpatiaLite Tools

- **Command line:**
  - spatialite, sqlite
- **GUI:**
  - spatialite-gui
  - spatialite-gis
- **OSS GIS Tools:**
  - QGIS
  - OGR/GDAL (UMN Mapserver, ...)
  - GeoTools (GeoServer, ...)
  - FDO (MapGuide Open Source, FME, ...)

Import Shapefiles



Shapefile comparison

- Less files (multiple layers, indices, ...)
- Eliminate column name limits (>10!)
- 64-bit IEEE Floating point type
- Embedded Unicode support
- Integrated metadata (Projection, etc.)
- Library with SQL API (Insert, Join, etc.)

GUI Demos

- spatialite-gui
- spatialite-gis
  - Routing
  - Rasterdata
- QGIS

Links

- http://www.gaia-gis.it/spatialite/
- http://en.wikipedia.org/wiki/Shapefile
- http://gis.hsr.ch/wiki/HSR_Texas_Geo_Database_Benchmark
- OSGEO Live DVD!

Thank you! - Questions?

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