In this module, we will look at spatialite databases and explore ways in which QGIS can interact with them. We will also learn about database syntax (SQL basics) and how to do simple geoprocessing.

You try:

**Goal: To learn how to create and populate databases and run SQL queries**

**Problem:** The government wants to expand OR Tambo international airport by a radius of 50km. Visualize the extent of the new airport do all processing in the database.

- Load the listed layer in the table into QGIS.
- Create a new spatialite database.
- Filter the countries layer using to only show South Africa. Besides creating a filter what other methods can you use to identify South Africa ?.
- Perform a spatial selection to select urban areas and airports that are within South Africa.
  Hint Use Select by Location Algorithm
- Use the DB manager to load the filtered countries layer and the selected features from the airports and urban areas into the spatialite database.
  Hint: Use the import options specified and name the layers as countries, airports and urban_areas respectively.
- Open the SQL window in DB Manager.
- Create a table and call it buffer using the buffer layer expression. Load the resultant table in QGIS.
  What is the difference between a buffer done in the database and one done in QGIS ?.
- Create a table urban_precinct using the urban_precinct layer expression provided.
• Modify the *urban_precinct layer expression* to enable it to calculate the area affected by the expansion.
  What other methods can you use to calculate the area ?.
• Is it possible to combine the *buffer* and *urban_precinct* expressions to be a single expression. If possible write an expression that joins the two expressions into one ?.

<table>
<thead>
<tr>
<th>Name</th>
<th>Expectation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Layers from natural earth</td>
<td>ne_10m_airports, ne_10m_admin_0_countries</td>
</tr>
<tr>
<td>Import Options</td>
<td>Toggle import selected, create spatial index, geom, reproject to target SRID 3857</td>
</tr>
<tr>
<td>buffer layer expression</td>
<td>select id, st_buffer(geom,50000) as geometry from airports where name like ‘OR T%’</td>
</tr>
<tr>
<td>urban_precinct layer expression</td>
<td>select a.id, st_union(st_intersection(a.geom,b.geom)) as geom from buffer as a join urban_areas as b where st_intersects (a.geom,b.geom)</td>
</tr>
</tbody>
</table>

**Check your knowledge:**

1. A database is:
   a. A storage device where GIS activities will take place
   b. A GIS database representing vector features.
   c. A type of data store that is used to store geographic data and non geographic

2. In which instance would you prefer a spatial database:
   a. When you have a lot of CSV files or spreadsheets containing data for analysis
   b. When you need to do some advanced processing of the data.
c. Generally, whenever I get hold of a data source I should load it into a spatial database.

3. Why is it important to generate a spatial index for each layer loaded in the database?
   a. To speed up rendering and fast retrieval of data when running SQL queries.
   b. To ensure that data is arranged in a chronological order using the primary key.

Further reading:

- Spatialite-3.0.0-BETA: [https://www.gaia-gis.it/spatialite-3.0.0-BETA/spatialite-sql-3.0.0.html](https://www.gaia-gis.it/spatialite-3.0.0-BETA/spatialite-sql-3.0.0.html)

Click [here](http://www.bostongis.com/PrinterFriendly.aspx?content_name=spatialite_tut01) to download the sample data for the lesson.