



POSTGIS RELATED EXTENSIONS

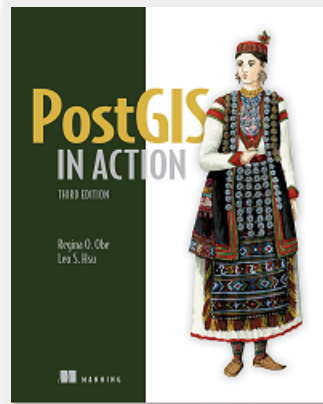
REGINA OBE

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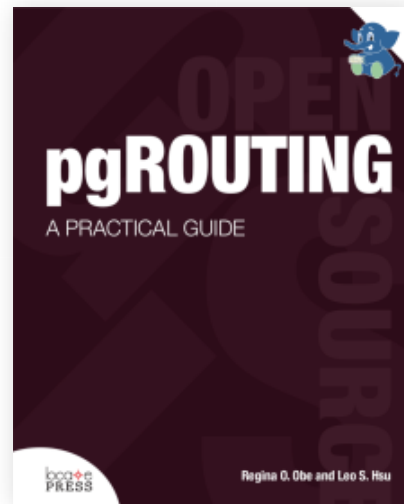
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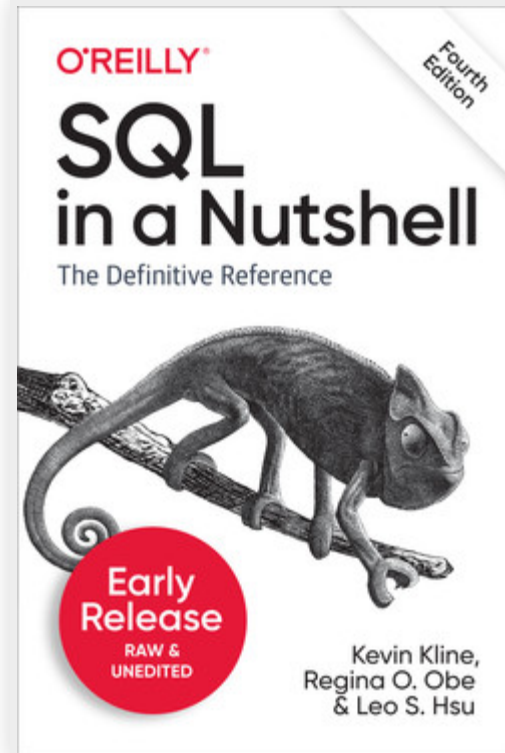
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Books Coming



SQL in a Nutshell 4th Edition

Due out mid next year, available now in early release

The Book of PostgreSQL (No Starch Press)

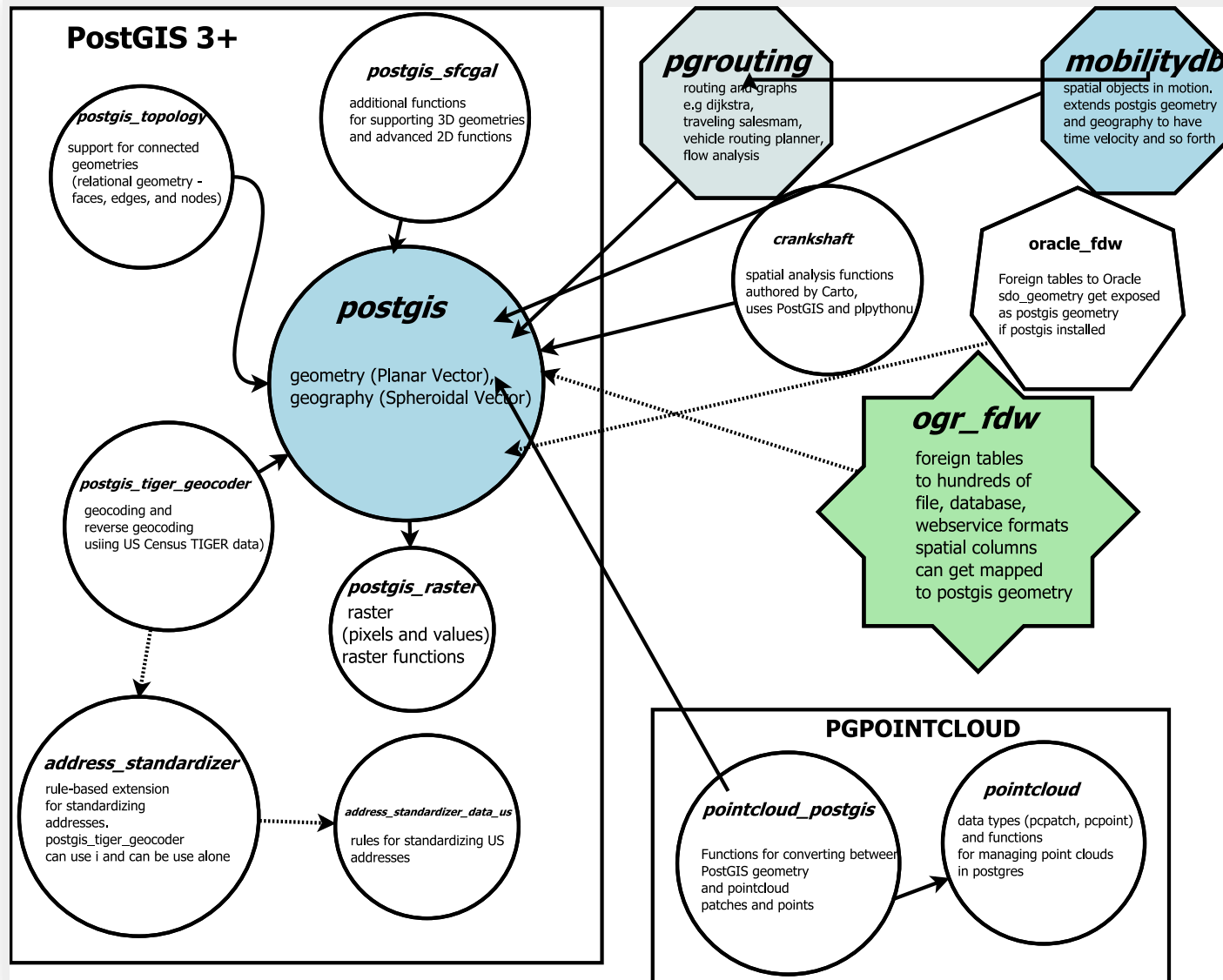
Due out late next year

pgRouting (a practical guide) 2nd Ed (Locate Press)

target late next year.

POSTGIS RELATED EXTENSIONS

CREATE EXTENSION ...;

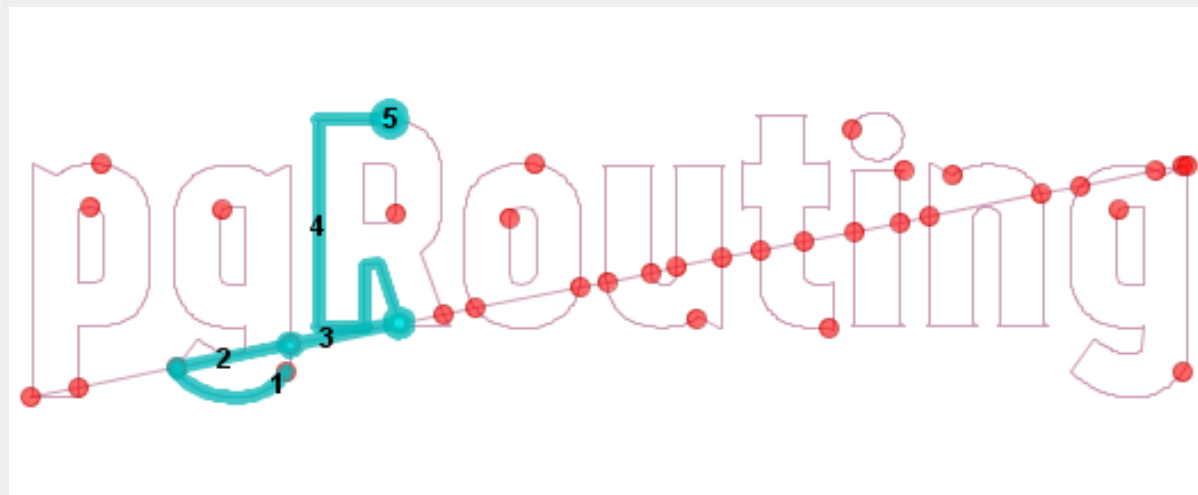


PGROUTING

extension: `pgrouting`

Uses graph algorithms: **edges** have **costs**, **nodes** connect edges.

- Find shortest path consider costs (road network, one way, toll price etc).
- Maximum service area
- Decision trees - compute most favorable path given where you are in the tree.



MOBILITYDB

extension: `mobilitydb`

Analysis and managing spatial movement in a compact way. Follows the [OGC Moving Features spec](#). Extends postgis geometry and geography types with time elements. Raw data often comes in General Transit Feed Specification (GTFS) format and GPX (that stuff from your GPS device). Extends postgis geometry and geography types to form temporal spatial types: `tgeompoint`, `stbox`, `geodstbox`, `periodset` and several others.

- Store massive amounts of movement data in a compact way.
- What's the average speed for X part of the path of a trip.
- Integration with QGIS for viewing movement data.

OGR_FDW

extension: ogr_fdw

Links external (sometimes spatial) data in PostGIS/PostgreSQL format. **It is an abstraction:** this data over there is a table in my database.



- If you have spatial data it can link it.
- If you have non-spatial data, it can link it.
- If you have no clue what this random file someone gave you is, it can probably link it.

POSTGIS MODELS SPACE IN MANY WAYS

Flat, Round, Matrix, Declarative

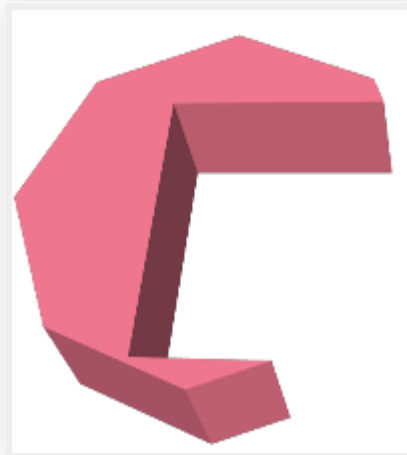
POSTGIS **GEOMETRY** TYPE (FLAT)

extension: `postgis`

The flat space model. Space is a cartesian grid. Supports drawing of linestrings, polygons, 3D polygons, points, 3d points, collections of polygons, points, linestrings, Polyhedral Surfaces, and TINS



Basic geometric types



Polyhedral Surface



Triangulated Irregular Network (TIN)

POSTGIS **GEOGRAPHY** TYPE (ROUND)

extension: `postgis`

Model of space as spheroid. Takes into consideration the earth or any given planet whose spatial reference is defined in *spatial_ref_sys* table.

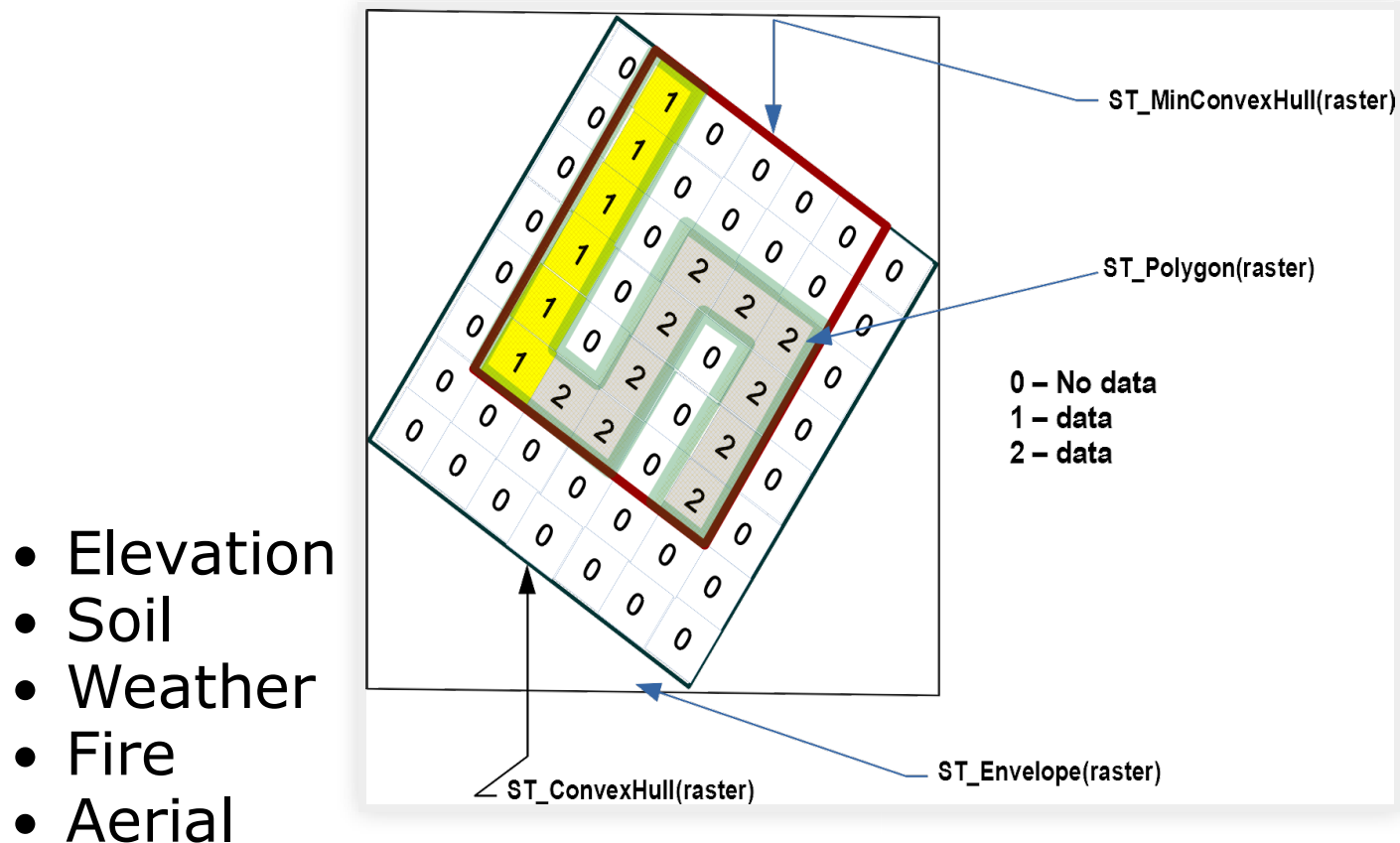
GEODETTIC (GEOGRAPHY) 4326 (WGS 84 LON LAT) IN GEOGRAPHY



POSTGIS **RASTER** TYPE (MATRIX)

extension: `postgis_raster`

Model of space as a flat numeric matrix (with cells (called pixels) that have values (on) or don't have values (off))



POSTGIS **TOPOGEOMETRY** TYPE (DECLARATIVE)

extension: `postgis_topology`

Defined in SQL/MM Topology-Geometry specs. [Spatialite](#) has it too. Topology partitions space into **edges**, **nodes**, and **faces**. Then it says this thing called **topogeometry** is space composed of these **edges**, **nodes**, **faces** and other topogeometries (which are again just a bunch of edges, nodes, and faces). If two topogeometries have the same set of (edges, nodes, faces) then they are the same.

```
(1,1,2,3) -> topology_id, layer_id, id, type
```

```
SELECT topo::geometry AS geom, (topo).*  
FROM some_topo_table;
```



INSTALLING

```
CREATE SCHEMA postgis;
ALTER DATABASE gisdb set search_path=public,postgis;
-- included with postgis
CREATE EXTENSION postgis SCHEMA postgis; --only vector in 3.0
CREATE EXTENSION postgis_raster SCHEMA postgis; -- raster separate in 3.0
CREATE EXTENSION postgis_topology;
CREATE EXTENSION fuzzystmatch; -- needed by geocoder
CREATE EXTENSION postgis_tiger_geocoder;
CREATE EXTENSION postgis_sfcgal SCHEMA postgis;
CREATE EXTENSION address_standardizer;
CREATE EXTENSION address_standardizer_data_us; -- lex and rules

-- packaged separately
CREATE EXTENSION ogr_fdw SCHEMA postgis;
CREATE EXTENSION pgrouting SCHEMA postgis;
CREATE EXTENSION mobilitydb SCHEMA postgis;
CREATE EXTENSION pointcloud SCHEMA postgis;
CREATE EXTENSION pointcloud_postgis SCHEMA postgis;
```

LIVE DEMO IN WORDS

Word Play with Spatial SQL

https://postgis.us/presentations/postgis_day_2021.sql

- postgis_topology
- pgrouting
- postgis_raster
- postgis

```

ALTER DATABASE gisdb SET postgis.gdal_enabled_drivers = 'ENABLE_ALL';
DROP TABLE IF EXISTS happy_raster;

WITH the_words AS
(
    SELECT pos, ST_Translate(
        ST_LettersAsGeometry(word, 'kankin'), 0,
        -pos*100) AS geom
    FROM (VALUES
        (0, 'HAPPY'),
        (1, 'POSTGIS'),
        (2, 'DAY')) AS my(pos, word)
)
, canvas
AS (SELECT ST_MakeEmptyRaster((ST_XMax(ext) - ST_XMin(ext))::integer,
    (ST_YMax(ext) - ST_YMin(ext))::integer, 0, 0, -1, -1, 0, 0, 0) AS rast
    FROM (SELECT ST_Extent(geom) AS ext FROM the_words) AS foo
)
SELECT 1 AS id, ST_Union(ST_AsRaster(geom
    , canvas.rast
    , ARRAY['8BUI', '8BUI', '8BUI']::text[]
    , ARRAY[pos*75, 6, 0], ARRAY[0, 0, 0])
    ) AS rast
INTO happy_raster
FROM the_words CROSS JOIN canvas;

```

Copy and paste in address bar of browser to see the image

```
SELECT 'data:image/png;base64,' || encode(ST_AsPNG(  
  ST_Resize(rast, 0.3,0.3)), 'base64')  
FROM   happy_raster;
```



FIN

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