PostGIS Integration Tips

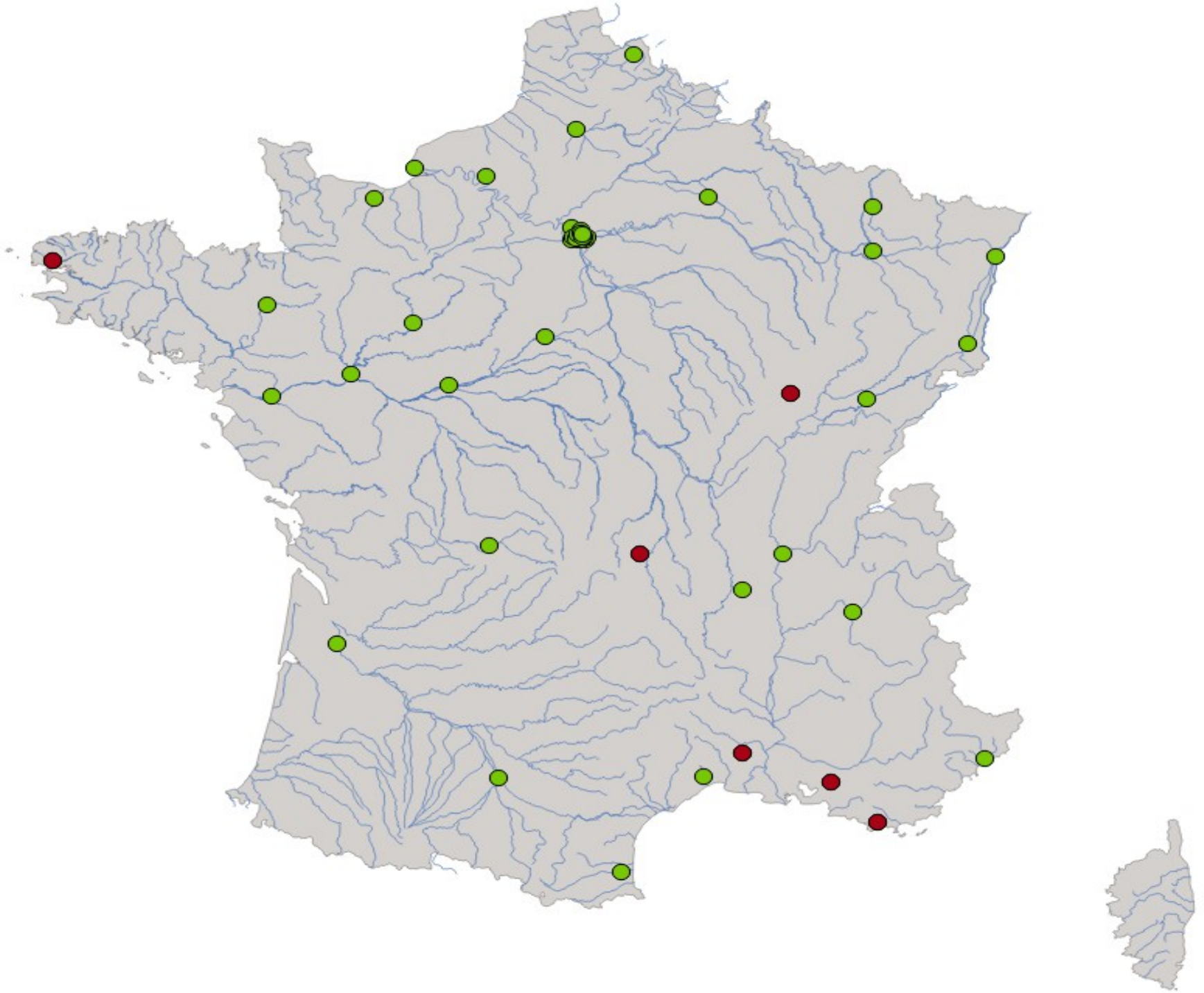
PG Session #7 - 2015 - Paris

A quoi sert un SIG ?

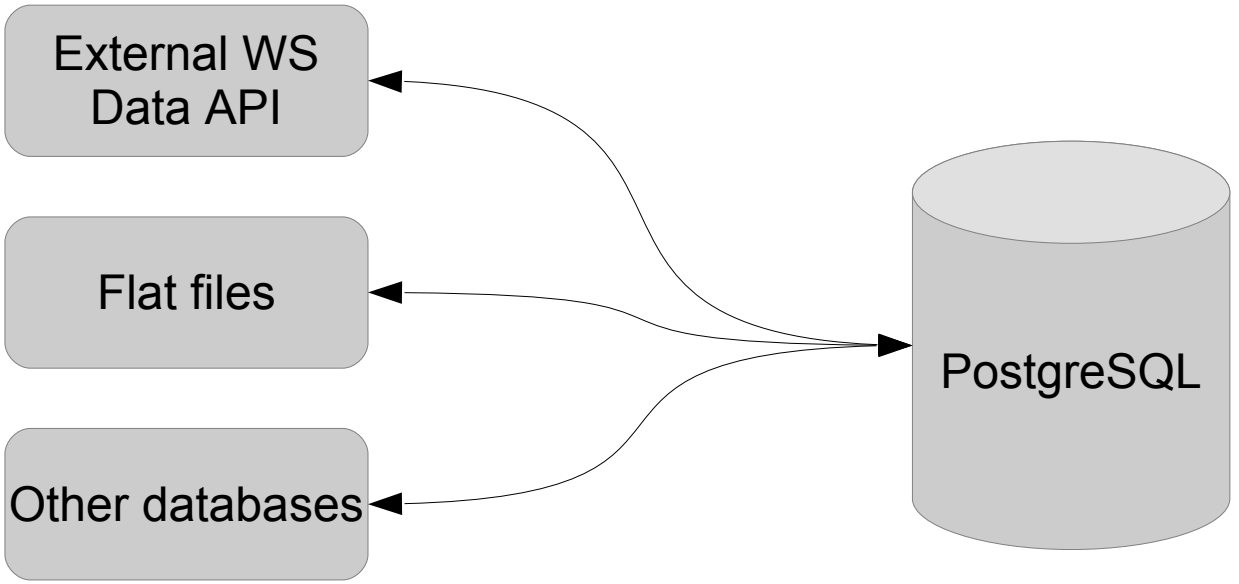
« Fleuve, Pont, Ville... »

```
SELECT nom_comm
FROM commune
WHERE     population * 1000 > 100000
      AND code_dept != '75'

EXCEPT

SELECT DISTINCT nom_comm
  FROM commune co, cours_eau ce
  WHERE
        Population * 1000 > 100000
    AND ce.classe='1'
    AND co.toponyme != ''
    AND ST_Intersects(co.geom, ce.geom)
```

CLERMONT-FERRAND
NIMES
BREST
DIJON
AIX-EN-PROVENCE
TOULON



#1 Data Intégration



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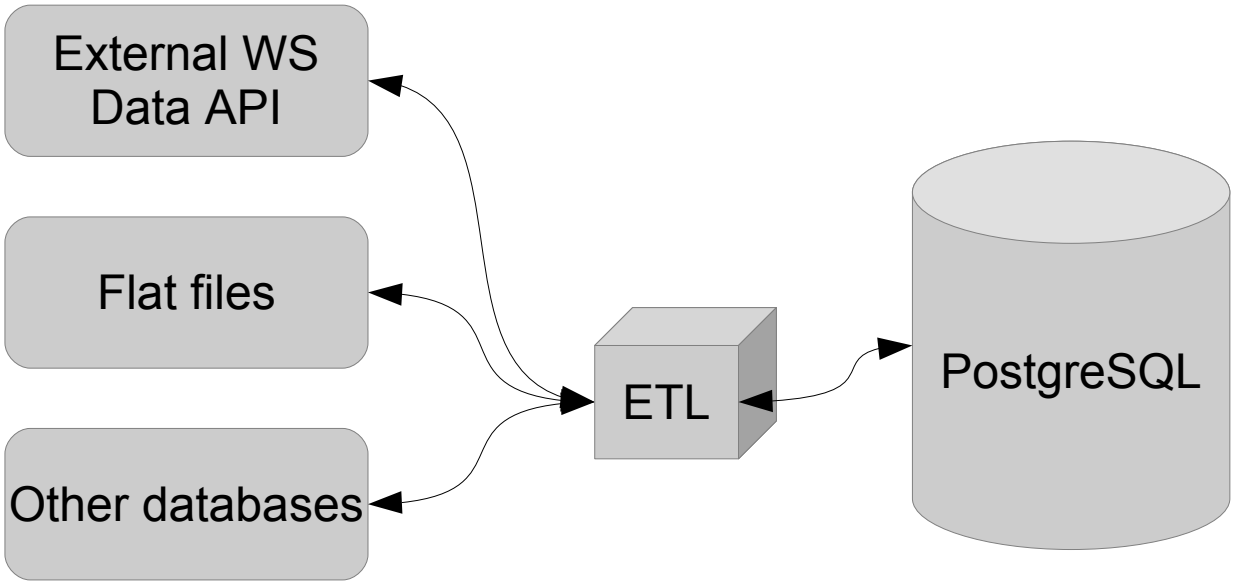
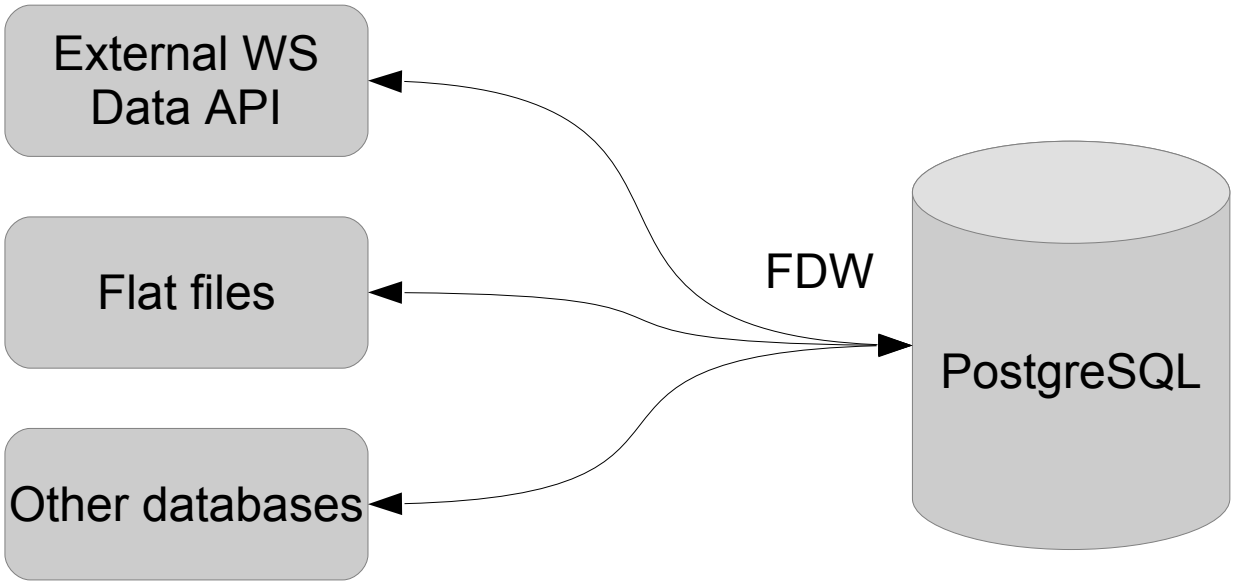


Réponse courante « Utilisez un ETL »

#1 Data Intégration



Réponse alternative :
« Utilisez les Foreign Data Wrapper de PostgreSQL »

https://wiki.postgresql.org/wiki/Foreign_data_wrappers

SQL Management of External Data (SQL/MED) ajouté au standard SQL
Permet l'accès à des objets distants à la base de données via du SQL
Disponible dans PostgreSQL depuis la 9.3

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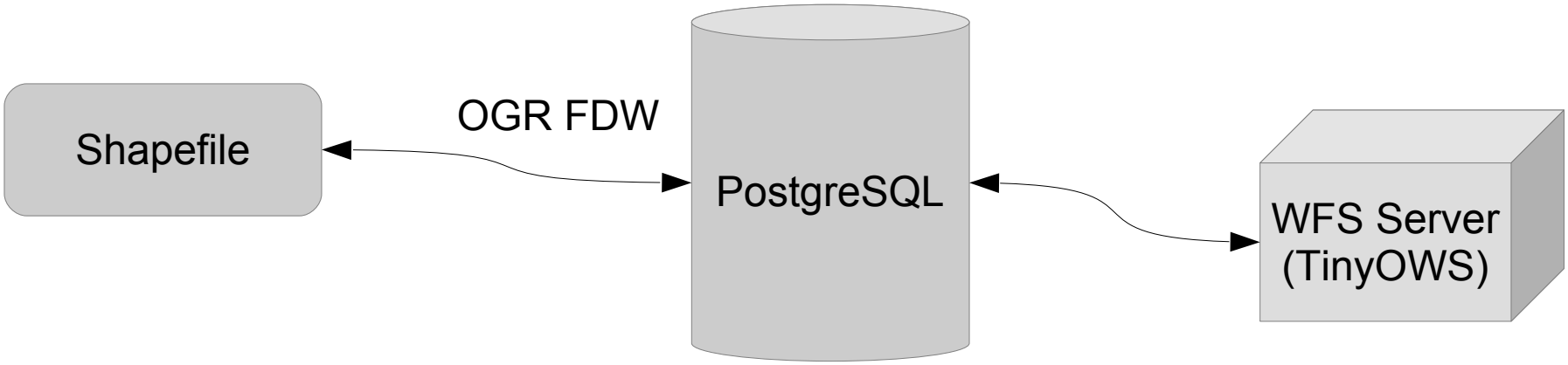
~50 connecteurs natifs déjà disponibles
(et plus encore via l'extension Multicorn)


Shapefile
OGR FDW
PostgreSQL
WFS Server
(TinyOWS)

https://github.com/pramsey/pgsql-ogr-fdw

Installation de OGR FDW

```
git clone https://github.com/pramsey/pgsql-ogr-fdw.git
cd pgsql-ogr-fdw
make
sudo make install
```

Définition d'un FDW wrapper

```
CREATE EXTENSION postgis;
CREATE EXTENSION ogr_fdw;

CREATE SERVER shapefile_france
  FOREIGN DATA WRAPPER ogr_fdw
  OPTIONS (
    datasource '/tmp/fdw_ogr/france.shp',
    format 'ESRI Shapefile'
  );
```

Récupération des données attributaires du shapefile

```
ogrinfo -al -so /tmp/fdw_ogr/france.shp
```

Création de la Foreign Table

```
CREATE SCHEMA shp;

CREATE FOREIGN TABLE shp.france (
  id_geofla integer,
  geom geometry,
  code_chf_l varchar,
  nom_chf_l varchar,
  x_chf_lieu varchar,
  y_chf_lieu varchar,
  x_centroid integer,
  y_centroid integer,
  nom_dept varchar,
  code_reg varchar,
  nom_region varchar,
  code_dept varchar
)

SERVER shapefile_france
OPTIONS (layer 'france');
```

Vérification

```
SELECT id_geofla, ST_AsEWKT(ST_Centroid(geom)) AS geom
FROM shp.france LIMIT 1 ;
```

Création d'une vue pour la Foreign Table
https://github.com/pramsey/pgsql-ogr-fdw/issues/11

```
CREATE OR REPLACE VIEW shp.france_wfs AS

SELECT id_geofla,
       ST_Multi(ST_SetSRID(geom,27572))::geometry(MultiPolygon,27572) AS geom,
       code_dept,
       nom_dept
FROM france;
```

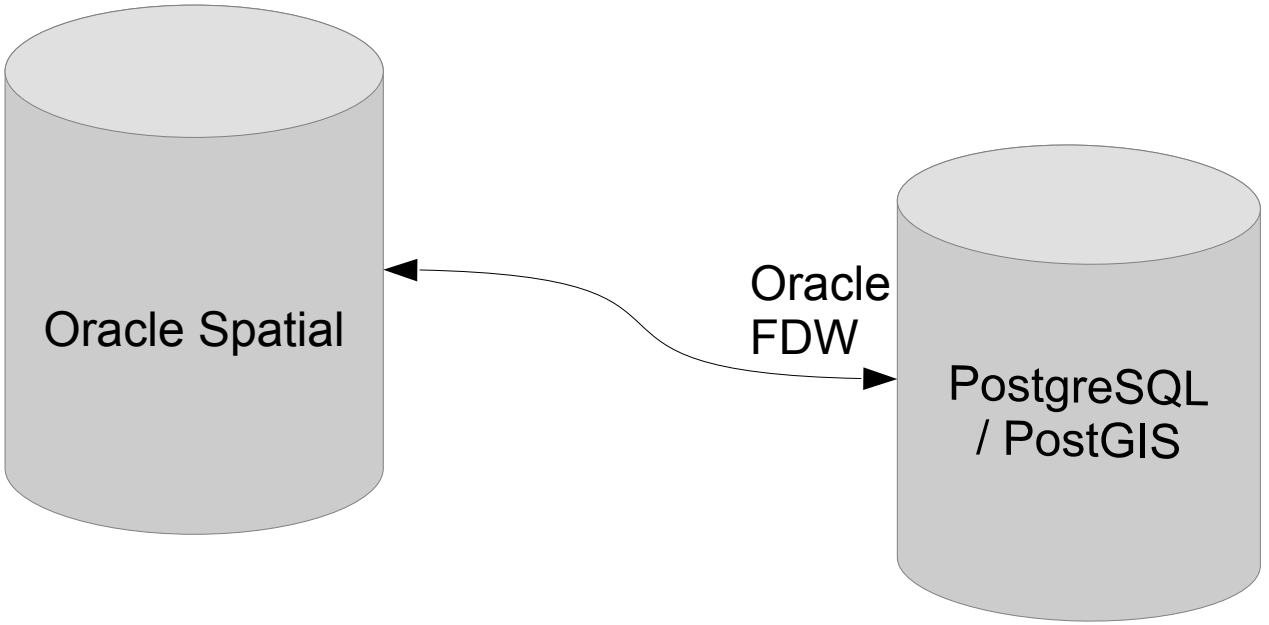
Configuration TinyOWS

```
<tinyows online_resource="http://127.0.0.1/cgi-bin/tinyows"
         schema_dir="/usr/local/share/tinyows/schema/"
         estimated_extent="1"
         display_bbox="0">

  <pg host="127.0.0.1" user="pggis" password="***" dbname="db" />

  <metadata name="TinyOWS WFS Server"
            title="TinyOWS Server – OGR FDW Service" />

  <layer retrievable="1"
         writable="0"
         ns_prefix="tows"
         ns_uri="http://www.tinyows.org/"
         schema="shp"
         name="france_wfs"
         title="france" />

</tinyows>
```

Vérification

```
wget -O out http://127.0.0.1/cgi-bin/tinyows?
SERVICE=WFS&REQUEST=GetFeature&Typename=tows:france_wfs
```

#2 Data intégration : Oracle Spatial



http://pgxn.org/dist/oracle_fdw/

```
CREATE EXTENSION postgres_fdw;
CREATE EXTENSION oracle_fdw;

CREATE SERVER orcl FOREIGN DATA WRAPPER oracle_fdw
OPTIONS (dbserver '${ORACLE_URI}');
```

Mapping utilisateur Oracle

```
GRANT USAGE ON FOREIGN SERVER orcl TO ${PGUSER};

CREATE USER orcl_map FOR ${PGUSER}
SERVER orcl
OPTIONS (user '${ORAUSER}', password '${ORAPWD}');
```

```
CREATE SCHEMA fdw;

CREATE FOREIGN TABLE fdw.foo (
     id double precision,
     label varchar,
     last_update date,
     geom geometry(POINT, 2154),
)
SERVER orcl
OPTIONS (schema '${ORAUSER}', table 'FOO');
```

```
CREATE SCHEMA mat;
CREATE MATERIALIZED VIEW mat.foo AS SELECT * FROM fdw.foo;
```

```
 CREATE UNIQUE INDEX ON mat.foo(id);
 CREATE INDEX ON mat.foo USING GIST(geom);
```

```
REFRESH MATERIALIZED VIEW CONCURRENTLY mat.foo;
```

#3 Data Validity

```
SELECT count(*) FROM my_schema.my_table WHERE NOT ST_IsValid(geom);
```

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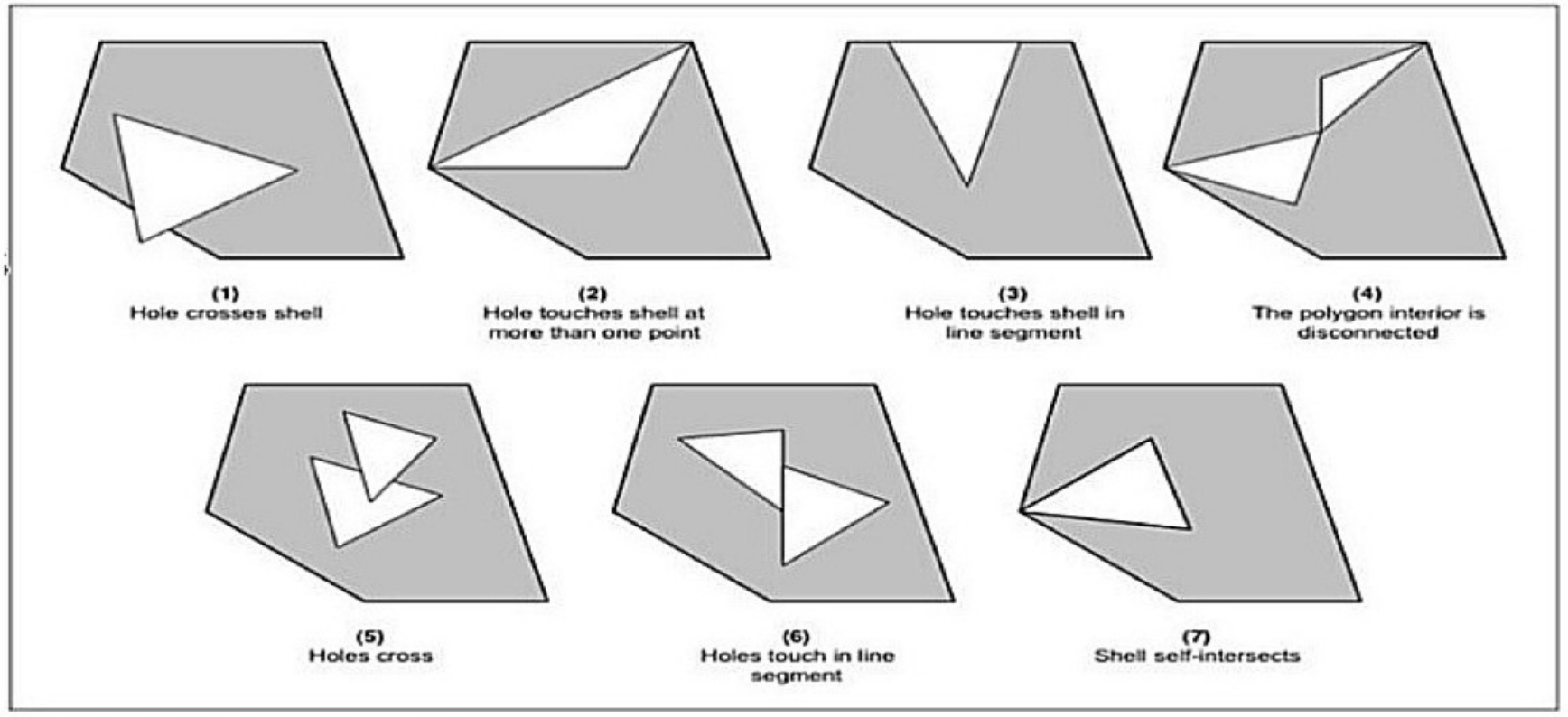


```
UPDATE my_schema."my_table"

SET geom=ST_CollectionExtract(ST_MakeValid(geom), 3)

WHERE ST_IsValidReason(geom) != 'Valid Geometry'
        AND (GeometryType(geom) = 'POLYGON'
        OR GeometryType(geom) = 'MULTIPOLYGON');
```

```
UPDATE my_schema."my_table"

SET geom=ST_CollectionExtract(ST_MakeValid(geom), 3)

WHERE ST_IsValidReason(geom) != 'Valid Geometry'
        AND (GeometryType(geom) = 'POLYGON'
        OR GeometryType(geom) = 'MULTIPOLYGON');
```

Autres cas à gérer :

- Surface nulle → Empty
- Linéaire avec un seul point → infime translation ending point

#4 Traitement données avec PL/Python

Utilisation librairie Python existante depuis PostgreSQL
Appel depuis fonction SQL

Un exemple avec GeoPy, Installation :

```
sudo apt-get install postgresql-plpython-9.4 python3-geopy

createdb db
createlang plpython3u db
psql db -c "CREATE EXTENSION postgis"
```

S'inscrire sur GeoNames
Activer free WebService sur votre compte

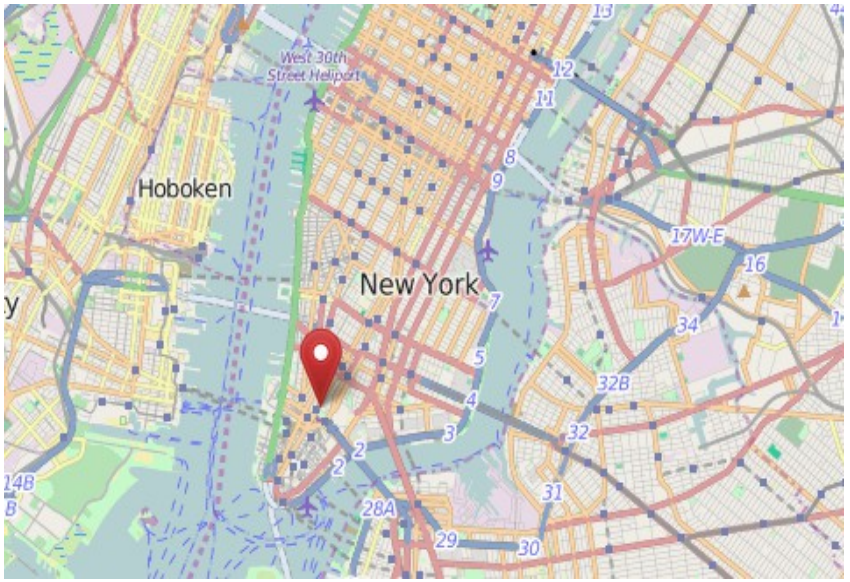
Function de géocodage basique en Pl/Python

```
CREATE OR REPLACE FUNCTION geoname(toponym text)
                    RETURNS geometry(Point,4326)
AS $$

    from geopy import geocoders
    g = geocoders.GeoNames(username="YOUR_USERNAME")

    try:
        place, (lat, lng) = g.geocode(toponym)

        result = plpy.execute(
        "SELECT 'SRID=4326;POINT(%s %s)'::geometry(Point, 4326) AS geom"
        % (lng, lat), 1)

        return result[0]["geom"]

    except:
        plpy.warning('Geocoding Error')
        return None


$$ LANGUAGE plpython3u;
```

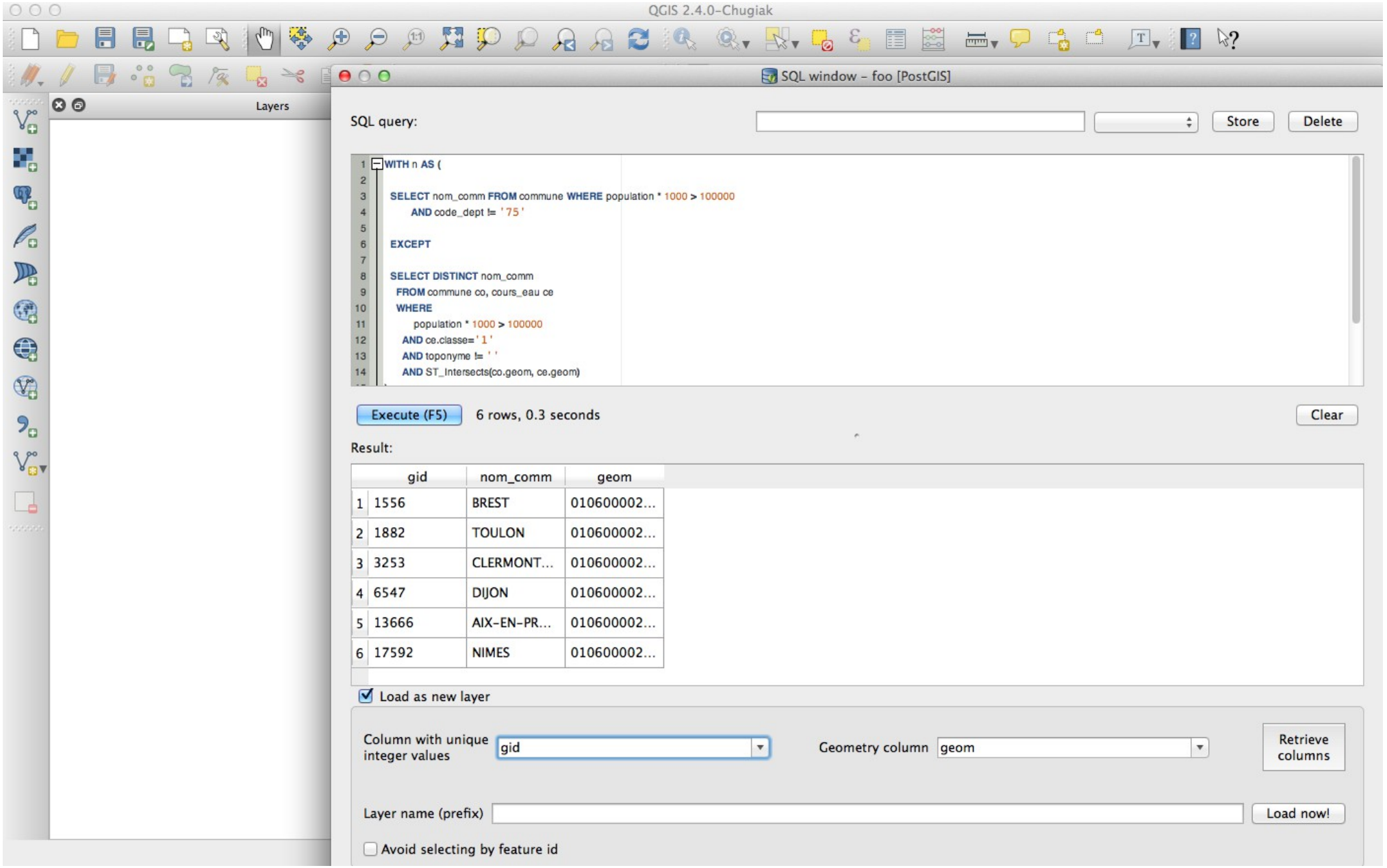
Vérification :

```
psql db -c
"SELECT ST_AsGeoJSON(geoname('New York, NY 10022'))"

{"type":"Point","coordinates":[-74.00597,40.71427]}
```

http://www.openstreetmap.org/?mlon=-74.00597&mlat=40.71427&zoom=12



#5 QGIS Db Manager



```
;
```

```
(row_number() OVER())::integer AS gid
```

www.oslandia.com

http://www.oslandia.com/pages/jobs.html