

Introduction to PostGIS

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What is PostGIS?

- Spatial Extension for PostgreSQL
- Adds support for spatial objects
- Allows spatial queries/analysys using SQL.
- Strong Open Source project (28 contributors and 1642 commits)
- Feature rich (check the next video)
- Highly performant

What is PostGIS?

Paul Ramsey presentation 2019

<https://www.youtube.com/watch?v=g4DgAVCmiDE>

What does PostGIS adds?

- Data types:
 - strings, floats, dates
- Indexes
 - b-tree, hash
- Function
 - `strlen(text)`
 - `pow(float, float)`
 - `now()`

What does PostGIS adds?

Spatial Data types:

- **geometry, geography**

Spatial Indexes

- **t-tree, quad-tree, kd-tree**

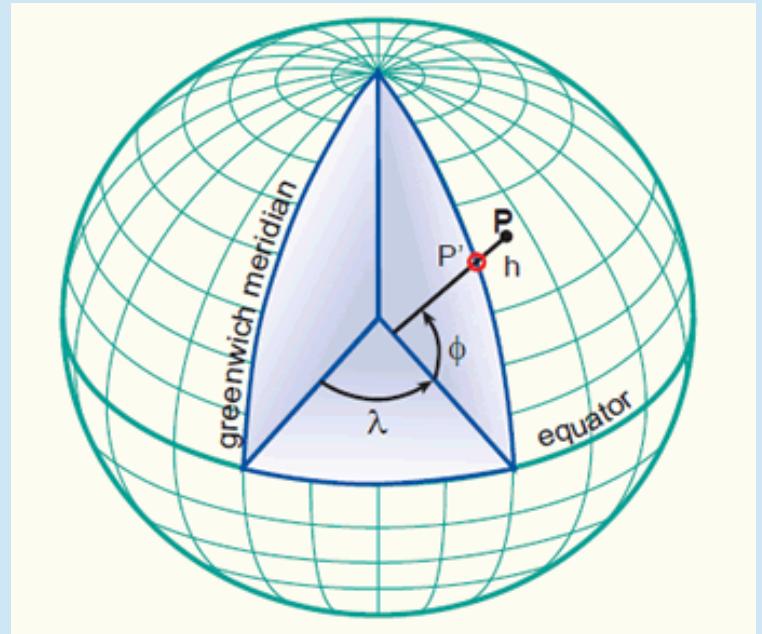
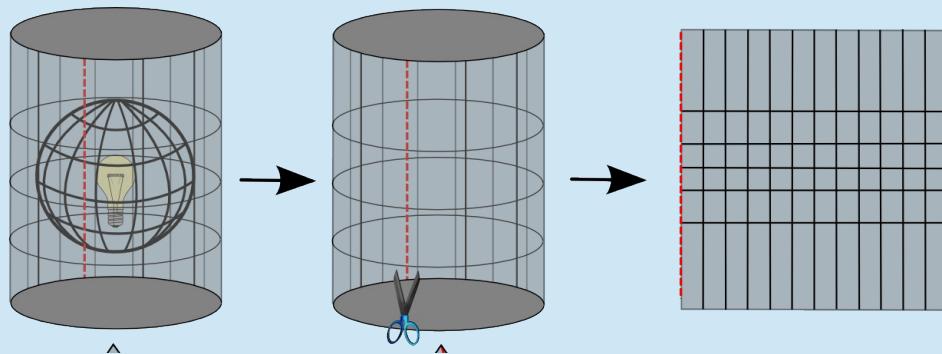
Spatial Function

- **st_length(geometry),
st_x(geometry),
st_buffer(geometry, R)**

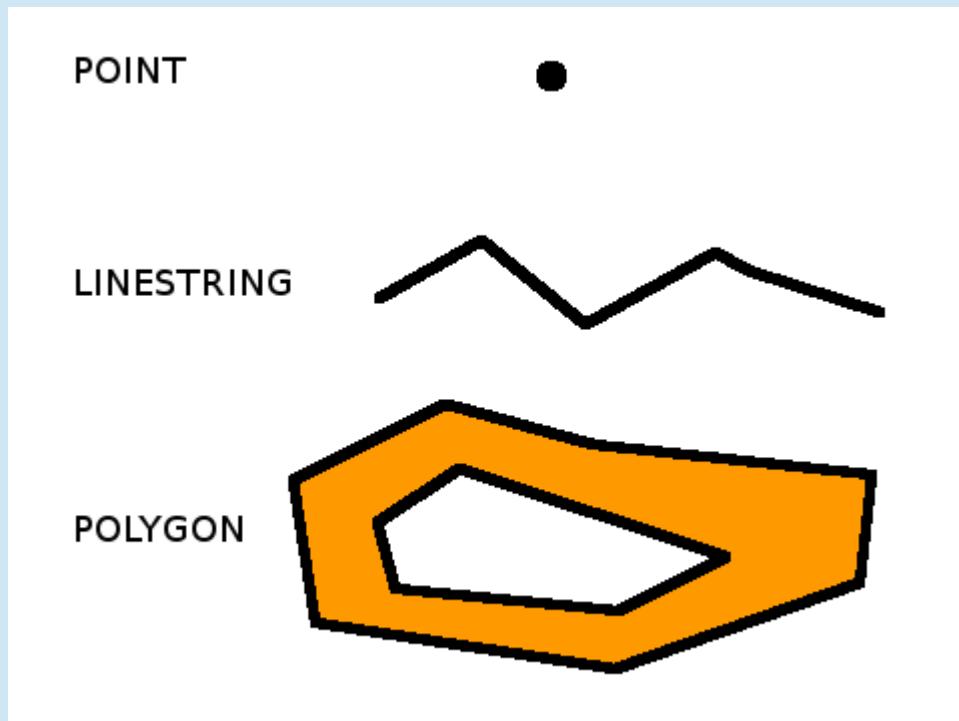
Spatial Data types

Geometry – Planimetric model (cartesian or polar). The ellipsoid projected into a “plain” (X Y Z)

Geography – Spherical model. Latitude and Longitude. Lines are in fact great circles.



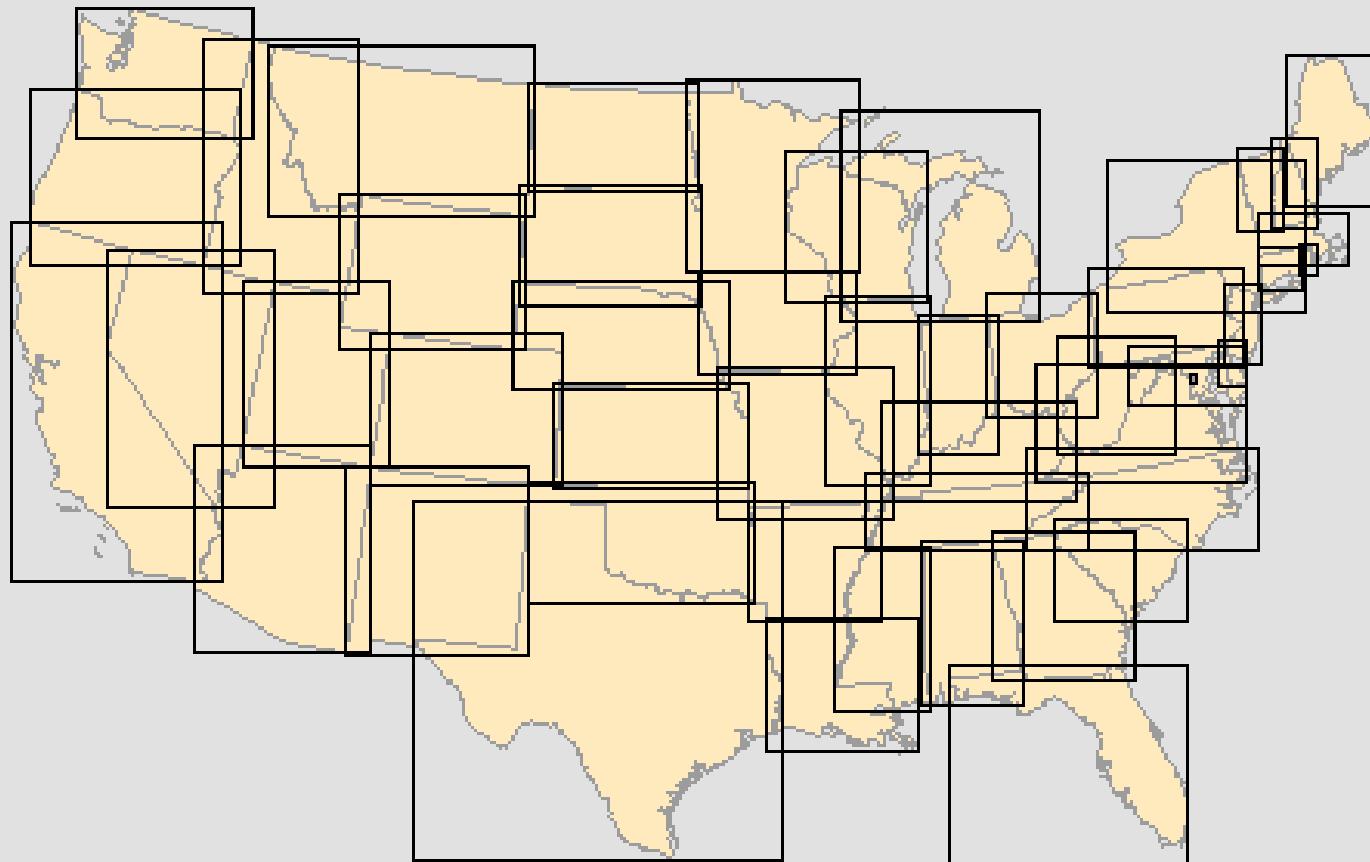
Spatial Data types



Standard Simple Features for SQL
OGC

- POINT(1 1)
- LINESTRING(1 1, 2 2, 1 3, 2 4)
- POLYGON((0 0, 0 1, 1 1, 1 0, 0 0))
- MULTIPOINT(1 1, 3 4, -1 3)
- MULTILINESTRING((1 1, 2 2, 3 4),
(2 2, 3 3, 4 5))
- MULTIPOLYGON((0 0, 0 1, 1 1, 1
0, 0 0), (5 5, 5 6, 6 6, 6 5, 5 5))
- GEOMETRYCOLLECTION(POINT(4
6), LINESTRING(4 6, 7 10))
- POINTZ(1 1 3)
- MULTIPOINTZ(1 1 3, 3 4 2, -1 3 1)
- ...

Spatial Indexes



Spatial (Temporal) Functions

- Over 700 ST_ funtions
- **Construction** (e.g. ST_asGeom)
- **Serialization** (e.g. ST_GeJSON)
- **Predicates** (e.g. ST_intersects)
- **Analysis** (e.g. ST_area)
- **Accessors** (e.g. ST_Boundary)
- **Builders** (e.g. ST_Buffer)
- **Aggregate** (e.g. ST_union)