

GIS Databases



What is GIS?

"...the merging of cartography, statistical analysis, and database technology."



Open GIS: Background & History

- OGC (Open Geospatial Network Consortium)
 - Unix, NASA, Corps of Engineers, Ag. Dept., Sun
 - GRASS (Geographic Resource Analysis Support System)
- Standards (Alphabet Soup...)
 - SFA (Simple Feature Access)
 - WKT (Well Known Text)
 - WKB (Well Known Binary)
 - WFS (Web Feature Service)
 - WMS (Web Map Service)

Spatial Databases

MongoDB

Esri

SpaceBase

CouchDB

CartoDB

IBM DB2

Oracle Spatial

Microsoft SQL Server

PostgreSQL DBMS

MySQL DBMS

Neo4j

AllegroGraph

Boeing's Spatial

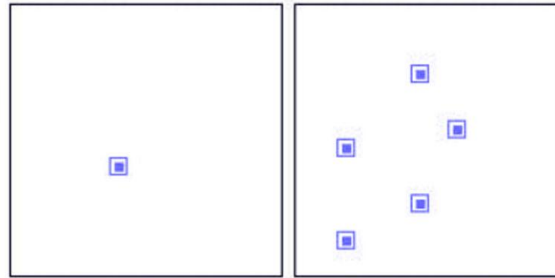
Query Server

Smallworld VMDS

Spatialite extends

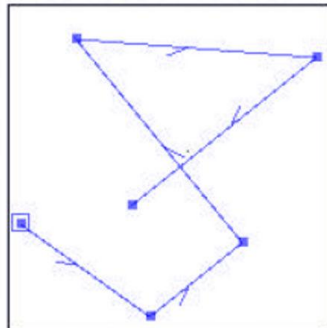
Sqlite

Standard OGC Geometry Types

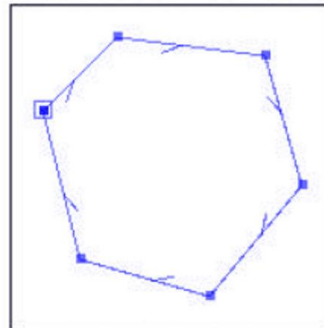


Point

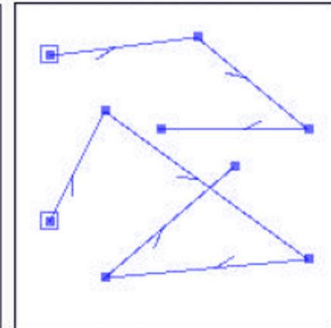
MultiPoint



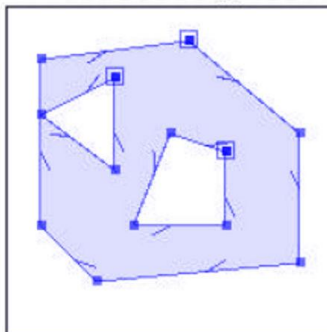
LineString



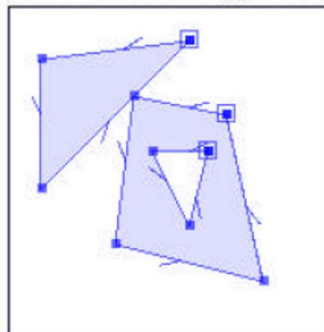
LinearRing



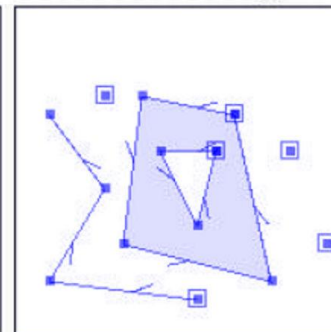
MultiLineString



Polygon



MultiPolygon



GeometryCollection

Spatial Queries: PostGIS Example

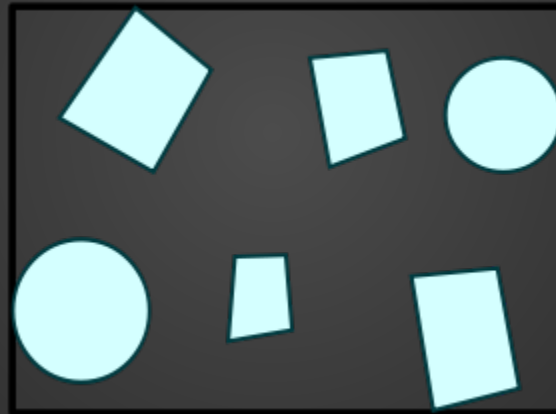
- Distance(geometry, geometry) : number
- Equals(geometry, geometry) : boolean
- Disjoint(geometry, geometry) : boolean
- Intersects(geometry, geometry) : boolean
- Touches(geometry, geometry) : boolean
- Crosses(geometry, geometry) : boolean
- Overlaps(geometry, geometry) : boolean
- Contains(geometry, geometry) : boolean
- Length(geometry) : number
- Area(geometry) : number
- Centroid(geometry) : geometry



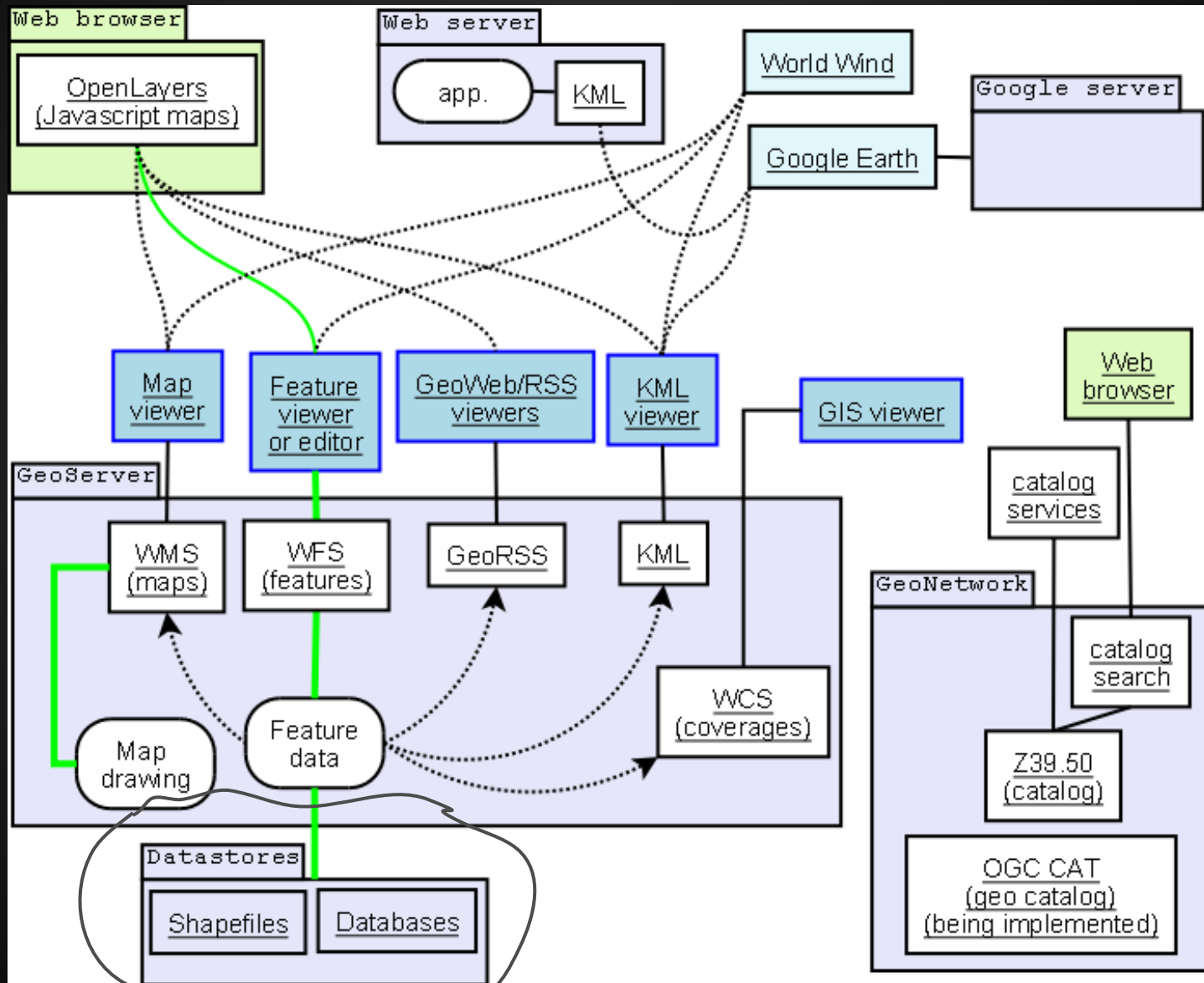
Spatial Indices: Optimizing Spacial Queries

- Grid
- Z-order
- Quadtree
- Octree
- UB-tree
- R-tree
- R+ tree
- R* tree
- Hilbert R-tree
- X-tree
- KD-tree
- M-tree

Indexing Example: Minimum Bounding Rectangle



GIS Technology Stack



Bibliography

File:GeoServer GeoNetwork with web app.png. (n.d.).Wikipedia, the free encyclopedia. Retrieved from http://en.wikipedia.org/wiki/File:GeoServer_GeoNetwork_with_web_app.png

Geographic information system. (2012, November 3).Wikipedia, the free encyclopedia. Retrieved from http://en.wikipedia.org/w/index.php?title=Geographic_information_system&oldid=521136246

Simple feature access. (2012, October 22).Wikipedia, the free encyclopedia. Retrieved from http://en.wikipedia.org/w/index.php?title=Simple_feature_access&oldid=515909953

Spatial database. (2012, October 12).Wikipedia, the free encyclopedia. Retrieved from http://en.wikipedia.org/w/index.php?title=Spatial_database&oldid=517379046

Spatial query. (2012, October 16).Wikipedia, the free encyclopedia. Retrieved from http://en.wikipedia.org/w/index.php?title=Spatial_query&oldid=430843056

Well-known text. (2012, October 11).Wikipedia, the free encyclopedia. Retrieved from http://en.wikipedia.org/w/index.php?title=Well-known_text&oldid=515910084

Open Geospatial Consortium. (2012, November 4). OGC. Retrieved from <http://www.opengeospatial.org/>