GIS and PostgreSQL

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What is GIS

- A *geographic information system*

- Store, manage and analyze geographic information with specific reference to Earth

- Different conventions but Open Geospatial Consortium (OGC) promotes a strongly supported standard

- Different conventions for data exchange: ESRI Shape, KML, GML,

  - ESRI Shape – leading GIS software vendor

  - GML – supported by OGC

  - KML – GML-like, used by Google Maps

  - GDF

  - . . .

SQL and GIS

- OGC defines how GIS applications can interact with GIS data via SQL

- Defines two data storage formats: Well-Known Text and Well-Known Binary

- Within these fields, a bunch of things can be stored: points, lines, polygons, two and three dimensional objects

- Well supported by JDBC and a bunch of applications

PostgreSQL and GIS – PostGIS!

- An extension to PostgreSQL, available from http://postgis.refractions.net

- Basically, a couple of SQL files and some C language shared libs

- Implemented using PostgreSQL backend extensibility functionality

  - No backend changes!

- GPL licensed

- OGC certified!

Installation

```
$ psql db < lwpostgis.sql
```

- Can't get easier than that!

Loading GIS data

- PostGIS ships a *loader* which will load Shape files

- http://www.maptools.org contains a bunch of tools which will translate formats into SQL and load them into Postgres

What actually happens?

- The load tools pull meta data and geometric data out of the file

- A table is created with one column for each meta data element, and a $geometry$ column

- Some table meta data is set in the $geometry\_columns$ table

What now?

- Well, we can query the data base and get some interesting information

- Example: we got the land tensure database maintained by the federal government

- Using it, we can answer the question 'How much land is given over to Aboriginal reserves', for example.

Large Aboriginal Reserves

```
postgis=# select name, area(the_geom) * 100 * 100 as area_kms    from
ltpolyd_polygon where feature = 'ABOR_CENT' order by 2 desc limit 10;
        name          |      area_kms
----------------------+-------------------
 WARAKURNA-WING-IRR   | 72089.3517629992
 CENTRAL AUSTRALIA    | 34317.7945249993
 BALGO                | 17866.0343814998
 OOMBULGURRI          | 8784.15340800007
 KIWIRRKURRA          |       4696.466431
 KUNMUNYA             | 4105.47677500027
 COSMO NEWBERRY       | 4101.38525299995
 BEAGLE BAY           | 3192.40140350008
 WARBURTON            | 2499.80955899999
 YANDEYARRA           | 2225.23143099995
(10 rows)
```

We could answer other questions

- Do any Aboriginal reserves share an edge?
- Is there any mining land on Aboriginal reserves?

We can also browser this data

- MapServer provides a CGI which interfaces to PostGIS
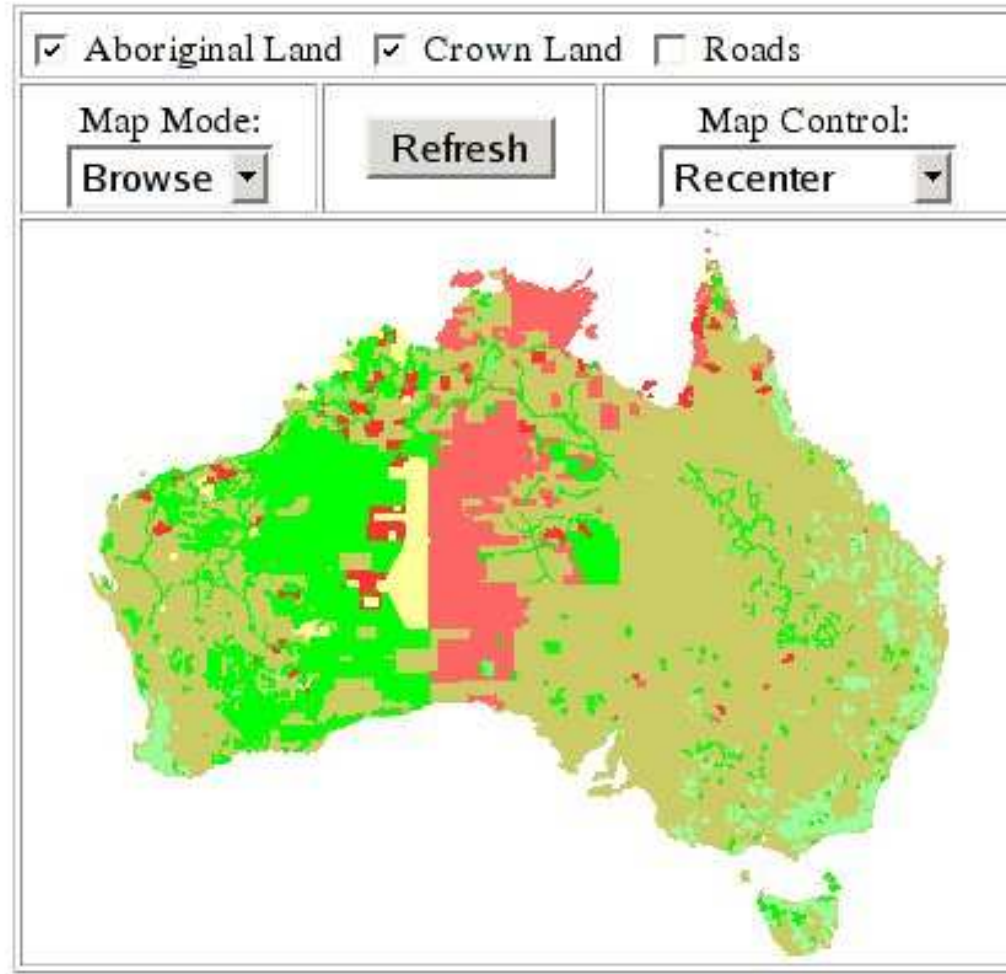- Something like GoogleMaps

Mapserver

GIS data from GA Land Tenure database (+ roads)

☐ Aboriginal Land	☐ Crown Land	☐ Roads

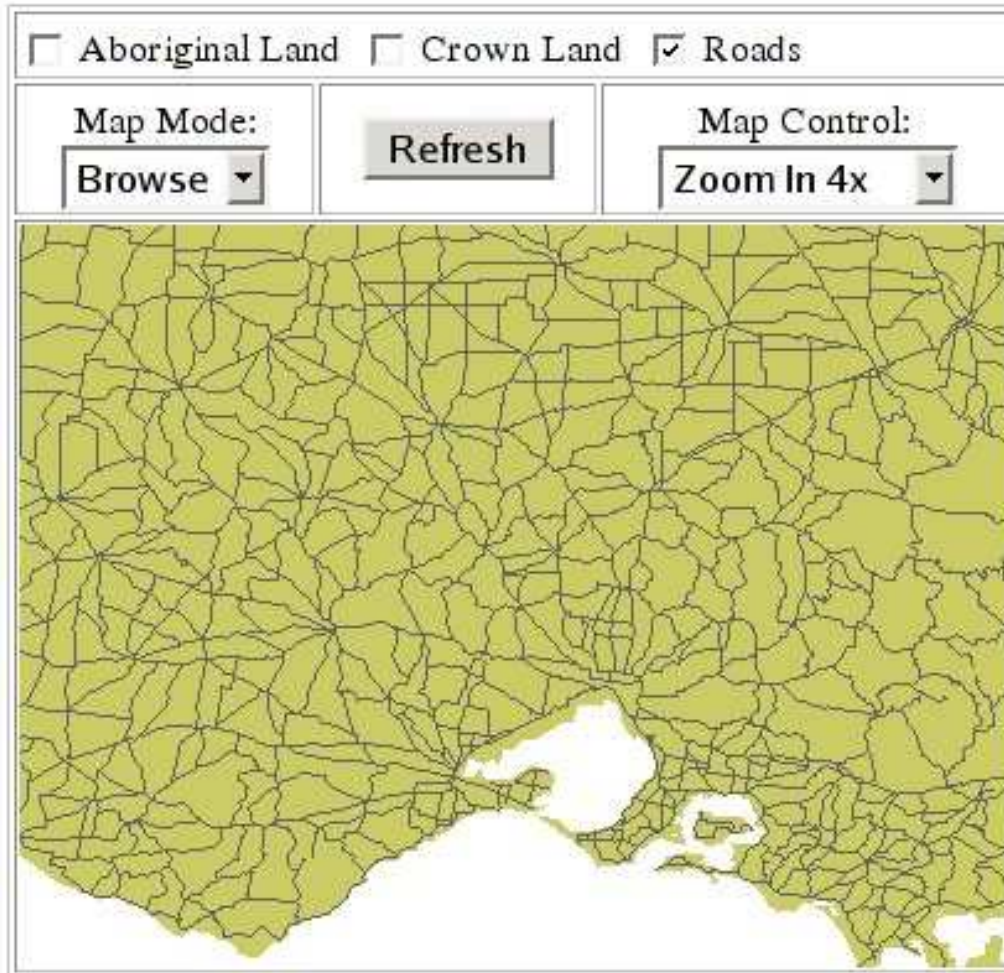| Map Mode:		Map Control:
Browse ▼	Refresh	Recenter ▼

Mapserver

GIS data from GA Land Tenure database (+ roads)

Mapserver

GIS data from GA Land Tenure database (+ roads)

Other benefits to PostGIS

- You can all the PostgreSQL goodness
- Replication
- Point-in-time Recovery
- Simplified backups
- Performance improvements from indexing
- Improved data caching