Bancos de Dados Geográficos

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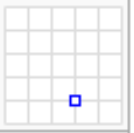
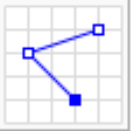
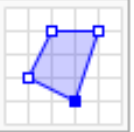
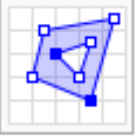
- Armazenam e manipulam Dados Geográficos
- Dado Geográficos
  - “dados que descrevem fatos, objetos e fenômenos do globo terrestre associados à sua localização sobre a superfície terrestre, num certo instante ou período de tempo” (CAMARA et al., 1996)
  - Associados a uma posição geográfica

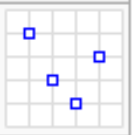
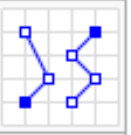
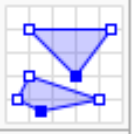
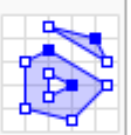
Usando o *PostGIS*

- *PostGIS* é uma extensão para o *PostgreSQL*
  - Site do *PostGIS*:
  - http://www.postgis.org/

Geometry primitives (2D)

Type	Examples	
Point	`POINT (30 10)`	
LineString	`LINESTRING (30 10, 10 30, 40 40)`	
Polygon	`POLYGON ((30 10, 10 20, 20 40, 40 40, 30 10))`	
	`POLYGON ((35 10, 10 20, 15 40, 45 45, 35 10), (20 30, 35 35, 30 20, 20 30))`	

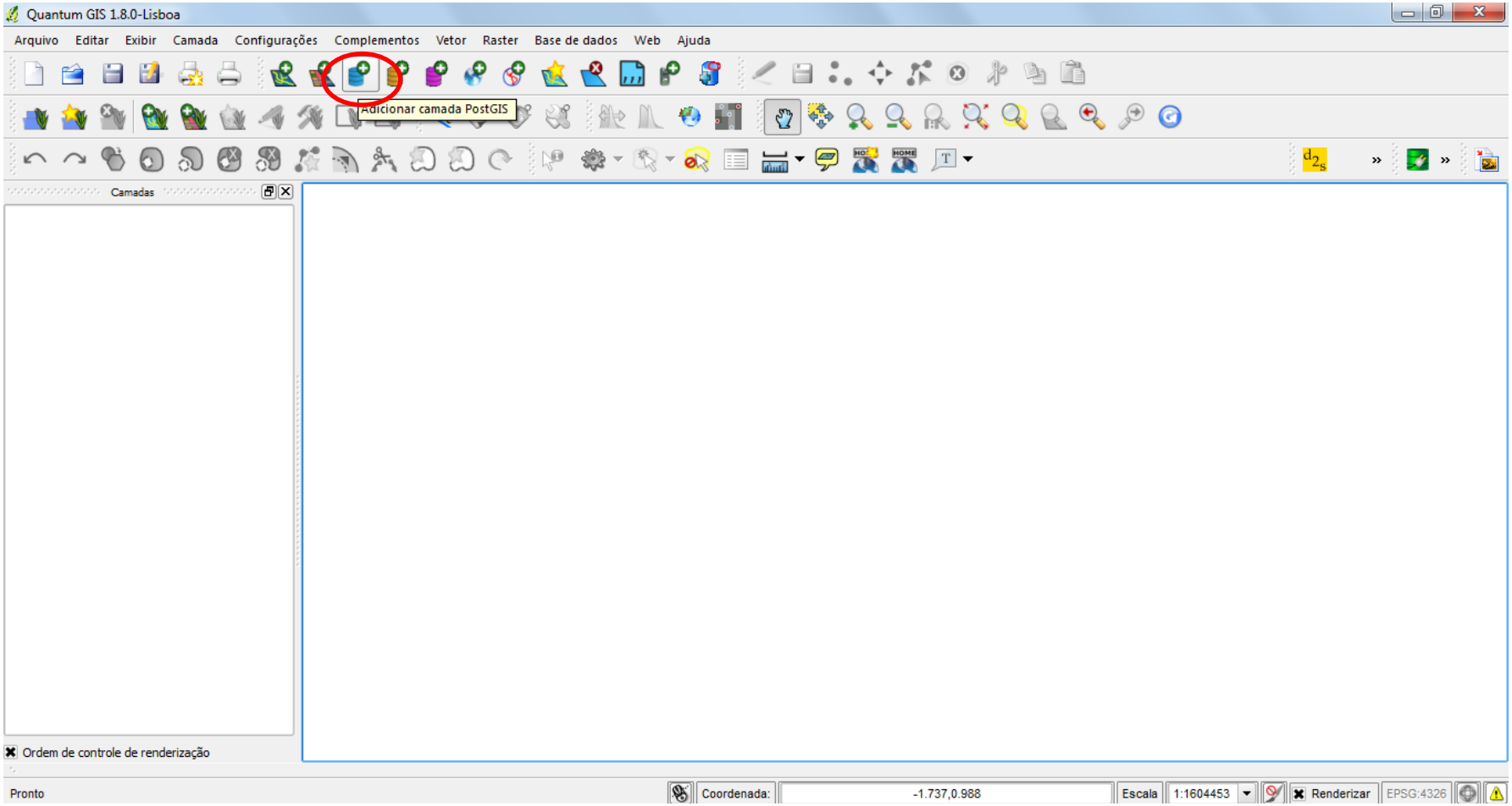
Multipart geometries (2D)

Type	Examples	
MultiPoint	`MULTIPOINT ((10 40), (40 30), (20 20), (30 10))`	
	`MULTIPOINT (10 40, 40 30, 20 20, 30 10)`	
MultiLineString	`MULTILINESTRING ((10 10, 20 20, 10 40), (40 40, 30 30, 40 20, 30 10))`	
MultiPolygon	`MULTIPOLYGON (((30 20, 10 40, 45 40, 30 20)), ((15 5, 40 10, 10 20, 5 10, 15 5)))`	
	`MULTIPOLYGON (((40 40, 20 45, 45 30, 40 40)), ((20 35, 45 20, 30 5, 10 10, 10 30, 20 35), (30 20, 20 25, 20 15, 30 20)))`	

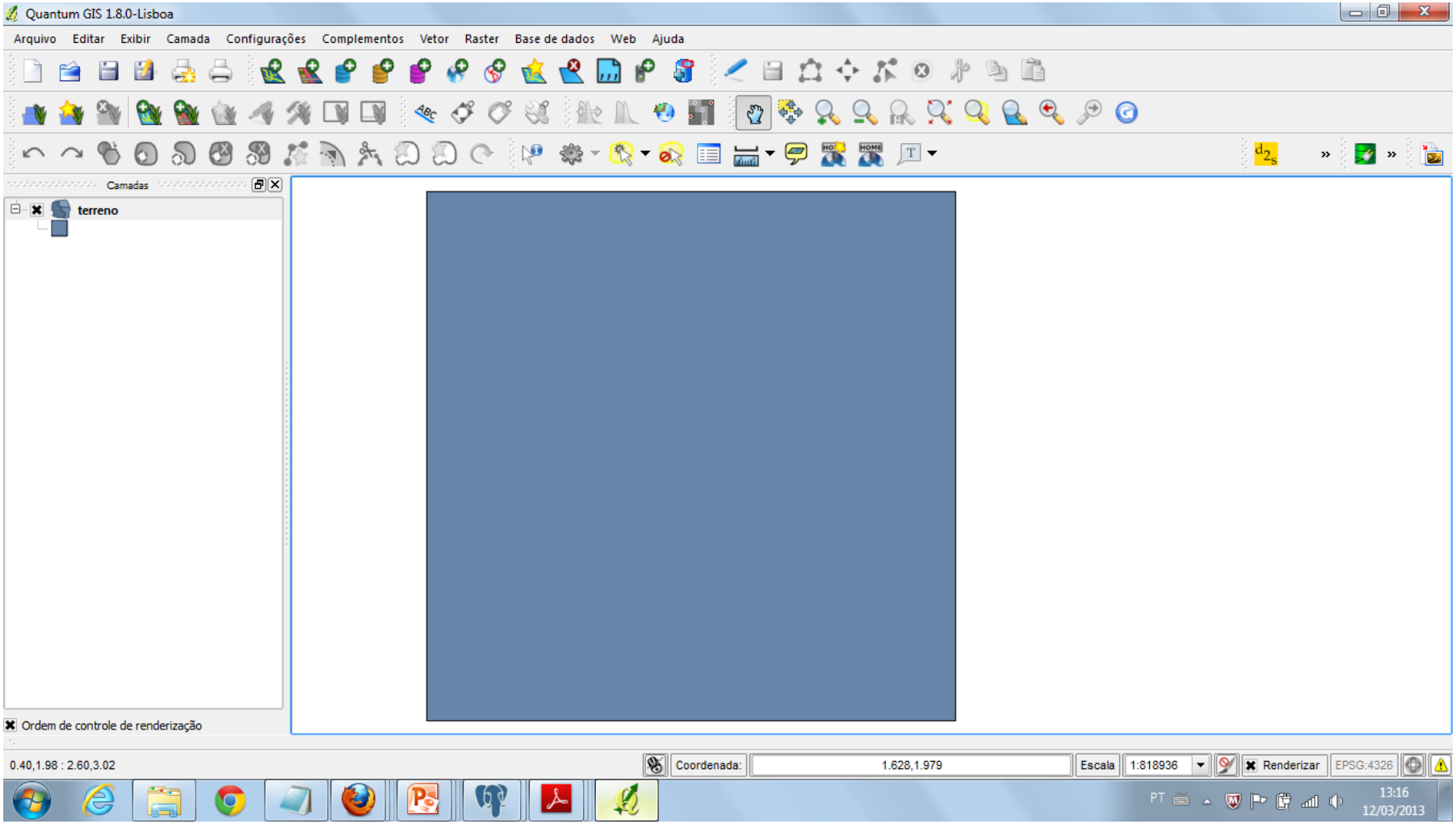
Criando objetos no PostgreSQL

```
create table terreno
            (id int,
             descricao varchar(20),
             primary key (id));

 select AddGeometryColumn('terreno','forma',-1,'POLYGON',2);

INSERT into terreno (id,descricao,forma) values ('4','Some
Text',GeometryFromText('POLYGON((1 2,1 3,2 3,2 2,1 2))'))
```

Quantum GIS



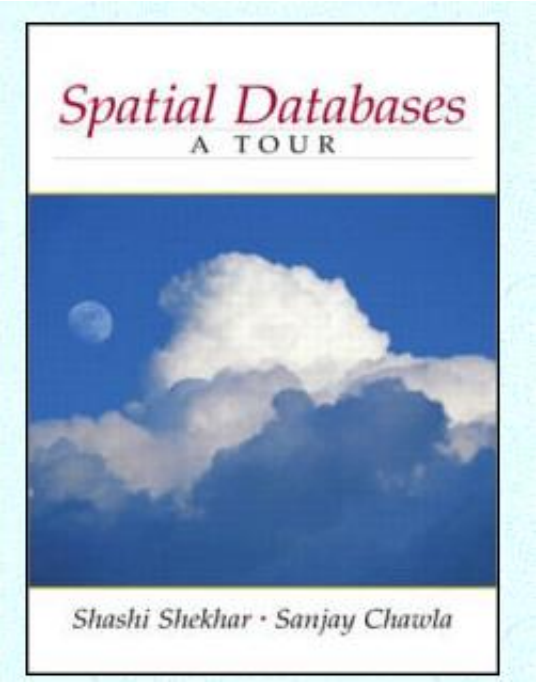
http://en.wikipedia.org/wiki/Quantum_GIS


Quantum GIS 1.8.0-Lisboa
Arquivo Editar Exibir Camada Configurações Complementos Vetor Raster Base de dados Web Ajuda
Camadas
terreno
Ordem de controle de renderização
0.40,1.98 : 2.60,3.02
Coordenada:
1.628,1.979
Escala
1:818936
Renderizar
EPSG:4326
13:16
12/03/2013

Usando exemplo do Livro

- http://www.spatial.cs.umn.edu/Book/

SHEKHAR, S., CHAWLA, S. **Spatial databases**: a tour**.** Upper Saddle River, NJ: Prentice Hall, 2003.



http://www.spatial.cs.umn.edu/Book/labs/vania/spatialQueries.html

Exemplos de consultas

- **Países vizinhos ao USA**

```
select c1.cntry_name as USA_Neighbors from country c1, country c2
where ST_touches(c1.the_geom,c2.the_geom)='T' and
c2.cntry_name='United States';
```

- **Cidades que estão dentro do Canadá**

  - select city_name as Canada_Cities from country co, city ci where ST_contains(co.the_geom,ci.the_geom)='T' and co.cntry_name='Canada';

  - select city_name as Canada_Cities from country co, city ci where ST_contains(co.the_geom,ci.the_geom)='F' and co.cntry_name='Canada';

Bibliografia

- CASANOVA, M. A. et al. Bancos de Dados Geográficos. Curitiba: MundoGEO, 2005 http://www.dpi.inpe.br/livros/bdados/index.html
- CÂMARA, G. et al., Anatomia de Sistemas de Informação Geográfica São José dos Campos: INPE, 1996.
- ELMASRI, R.; NAVATHE, S. B. . Sistemas de Banco de Dados. 6. ed. São Paulo: Pearson Education, 2010.