

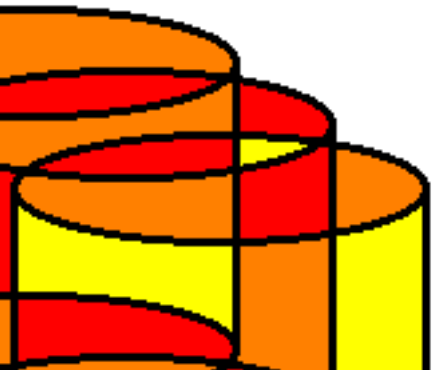
Prostorne baze podataka

- Relacijske baze podataka koje uz standardne tipove definiraju različite vrste prostornih objekata kao i operacije nad njima.

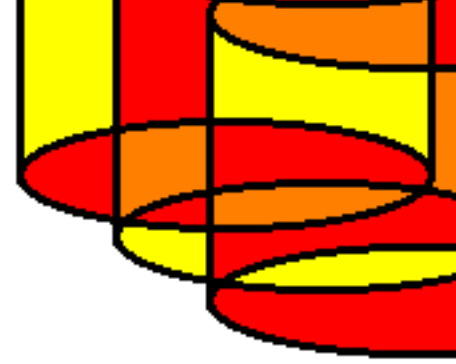
OpenGIS Consortium



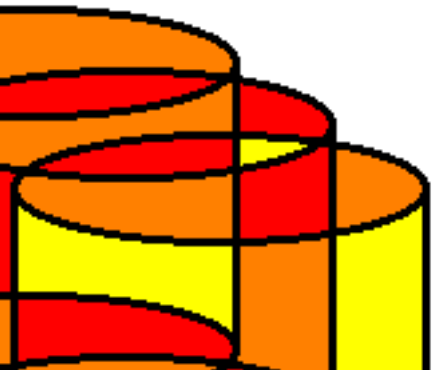
- OGC definira vrste (prostornih) objekata koje prostorni SQL treba podržavati.
- OGC specifikacije definiraju WKT (Well Known Text) i WKB (Well Known Binary) oblike zapisa prostornih objekata.



WKT



- WKT je opisni jezik za reprezentaciju vektorskih geometrijskih objekata na kartama, kartografske projekcije prostornih objekata te transformacije između kartografskih projekcija.
- WKB je binarni ekvivalent WKT posebno prilagođen pohranjivanju u bazama podataka.

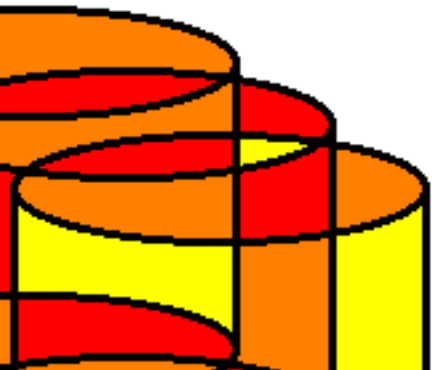


Geometrijski objekti



Objekti koje je moguće opisati putem WKB su:

- točke
- dužine
- n-terokuti
- TIN (Triangular Irregular Network - trigonometrijske nepravilne mreže)
- poliedri

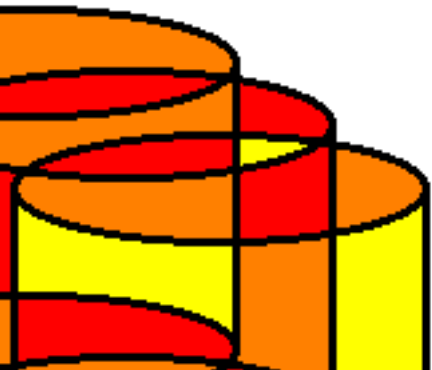


Geometrijski objekti



Multigeometrije (multigeometry) se koriste za reprezentaciju više objekata u istoj dimenziji od jednom (kao jedan objekt).

Kolekcije geometrija se koriste za reprezentaciju skupine objekata u različitim dimenzijama.



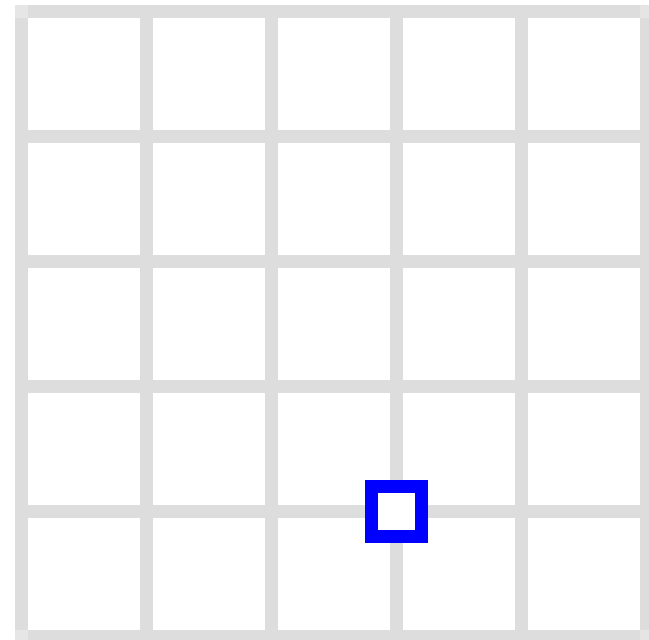
Koordinate

Koordinate objekata mogu biti:

- 2D (X Y)
- 3D (X Y Z)
- 4D (X Y Z M) gdje je M vrijednost linearnog referentnog sustava
- 2D s M vrijednošću (X Y M)

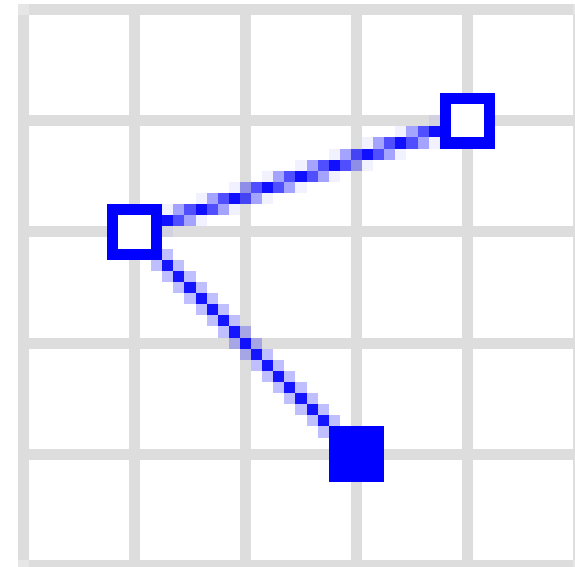
Točka

POINT (30 10)



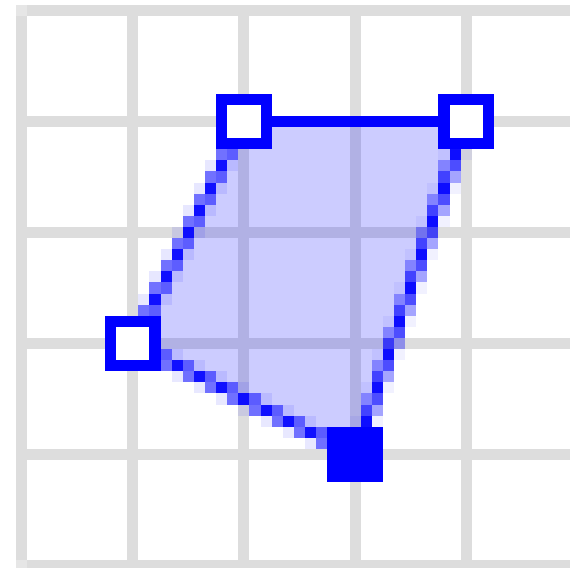
Niz dužina

LINESTRING (30 10, 10 30, 40 40)



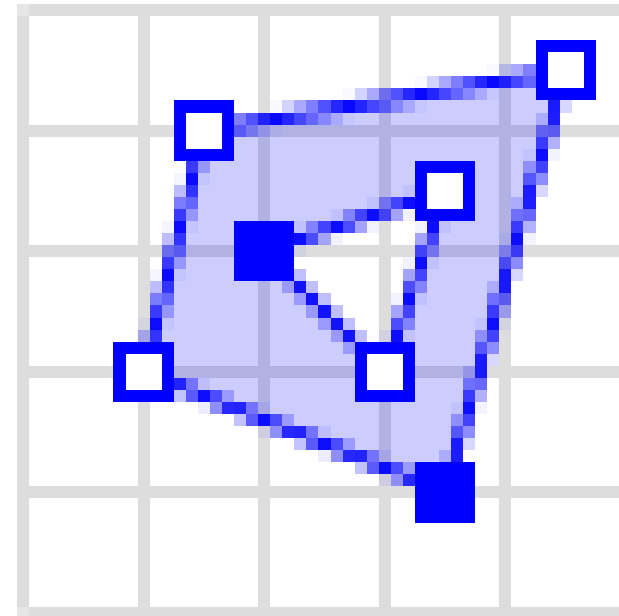
Poligon (n-terokut)

POLYGON ((30 10, 10 20, 20 40, 40
40, 30 10))



Poligon (n-terokut) #2

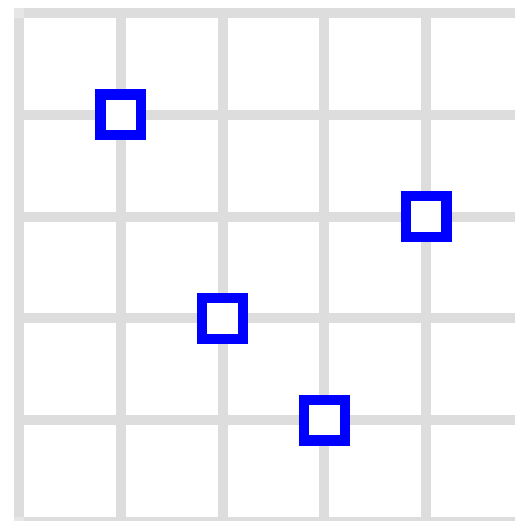
POLYGON ((35 10, 10 20, 15 40, 45 45, 35 10), (20 30, 35 35, 30 20, 20 30))



Skup točaka

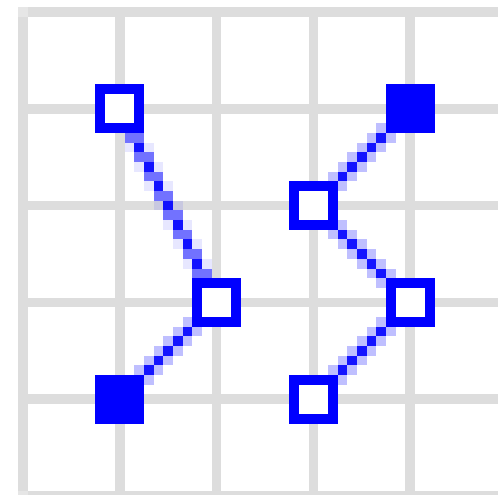
MULTIPOINT ((10 40), (40 30), (20 20), (30 10))

MULTIPOINT (10 40, 40 30, 20 20, 30 10)



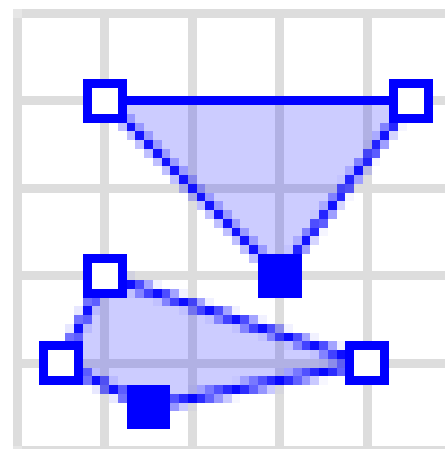
Skup nizova dužina

MULTILINESTRING ((10 10, 20 20, 10 40), (40 40, 30 30, 40 20, 30 10))



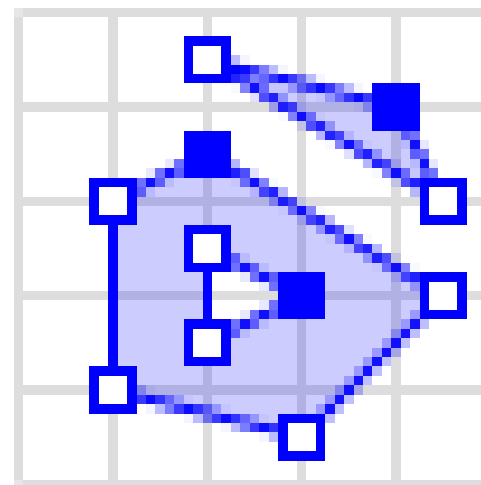
Skup n-terokuta

MULTIPOLYGON (((30 20, 10 40, 45 40, 30 20)),
((15 5, 40 10, 10 20, 5 10, 15 5)))



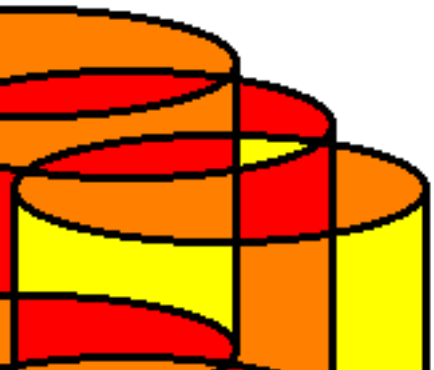
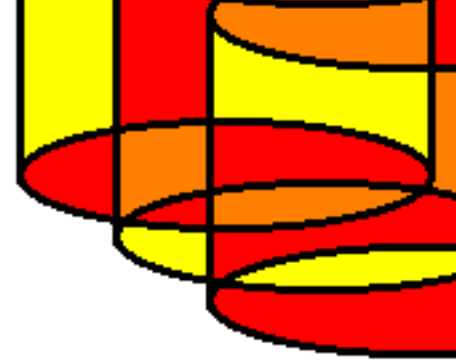
Skup n-terokuta

```
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)))
```



Kolekcija geometrija

GEOMETRYCOLLECTION(POINT(4 6),
LINESTRING(4 6, 7 10))



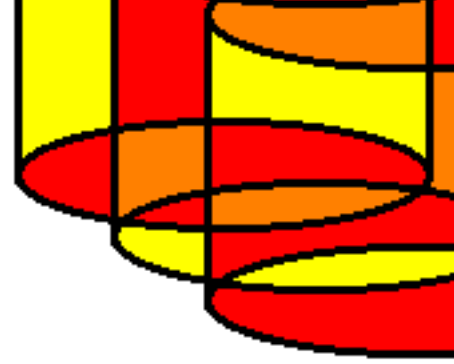
SRID

- OGC standard također zahtjeva korištenje SRID (spacial referencing system identifier) pri pohrani prostornih podataka.

PostGIS

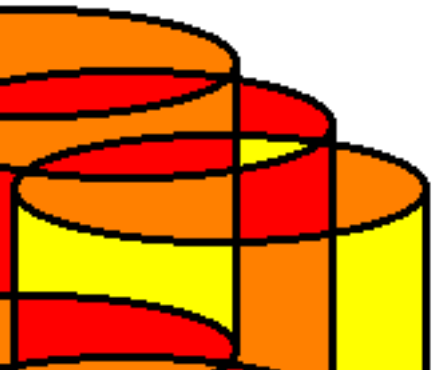
- Za rad s prostornim bazama podataka koristit ćemo PostGIS dodatak za PostgreSQL.
- PostGIS je kompatibilan s OGC standardom te ga proširuje drugim (nestandardnim) tipovima i operacijama.

GEOMETRY i GEOGRAPHY



Geometry – prostorni objekt u linearnom prostoru

Geography – prostorni objekt u sfernom prostoru



PostGIS + QGIS - instalacija



Ako Postgis i QGIS nisu instalirani potrebno ih je instalirati na sljedeći način (PostgreSQL 12):

```
sudo apt install postgresql-12-postgis-3 qgis postgresql-12-postgis-3-scripts
```

Zatim kreirati ekstenziju u psql-u.

```
sudo -u postgres psql
```

```
CREATE EXTENSION adminpack;
```

```
\q
```

NAPOMENA: Ako imate drugu verziju postgresql-a pronađite odgovarajuće pakete naredbom: **sudo apt search postgis**
Paketi imaju oblik **postgresql-[verzija]-postgis-[verzija]** i **postgresql-[verzija]-postgis-[verzija]-scripts**

Kreiranje prostorne baze podataka



- Na konzoli kreirati novu bazu podataka:

```
createdb gis
```

```
psql gis
```

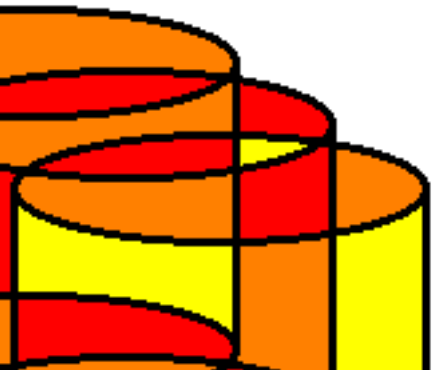
```
CREATE SCHEMA postgis;
```

```
ALTER DATABASE gis SET search_path=public, postgis, contrib;
```

```
\connect gis;
```

```
CREATE EXTENSION postgis SCHEMA postgis;
```

```
\q
```



Unos testnih podataka

- Skinuti podatke za vježbu

```
wget https://qgis.org/downloads/data/training_manual_exercise_data.zip
```

```
unzip training_manual_exercise_data.zip
```

```
cd exercise_data/postgis
```

Prijevod podataka 1/3

- Prevest ćemo podatke na hrvatski i unesti u bazu podataka koju smo kreirali (jedna naredba)

```
shp2pgsql -s 4326 -c -D -I polygons.shp postgis.regija |  
sed -e 's/region/regija/g' | sed -e 's/name/naziv/g' |  
sed -e 's/Queensland/Zagorje/g' | sed -e  
's/Missouri/Međimurje/g' | sed -e 's/Hokkaido/Slavonija/  
g' | sed -e 's/Saskatchewan/Dalmacija/g' | sed -e  
's/Wales/Primorje/g' | sed -e 's/Germania/Podravina/g' |  
sed -e 's/KwaZulu/Istra/g' | psql gis
```

Prijevod podataka 2/3

- Prevest ćemo podatke na hrvatski i unesti u bazu podataka koju smo kreirali (jedna naredba)

```
shp2pgsql -s 4326 -c -D -I points.shp postgis.zgrada |  
sed -e 's/Atlanta/Varaždin/g' | sed -e  
's/Berlin/Čakovec/g' | sed -e 's/Santiago/Split/g' | sed  
-e 's/York/Osijek/g' | sed -e 's/Beijing/Rijeka/g' | sed  
-e 's/name/naziv/g' | sed -e 's/building/zgrada/g' |  
psql gis
```

Prijevod podataka 3/3

- Prevest ćemo podatke na hrvatski i unesti u bazu podataka koju smo kreirali (jedna naredba)

```
shp2pgsql -s 4326 -c -D -I lines.shp postgis.cesta |  
sed -e 's/roadtype/vrsta/g' | sed -e 's/road/cesta/g' |  
sed -e 's/minor/županijska/g' | sed -e 's/major/državna/  
g' | sed -e 's/varchar(5)/varchar(20)/g' | psql gis
```


Isprobavanje

- Ako je unos bio uspješan, ako pokrenemo konzolu trebali bismo imati tri tablice:

```
psql gis
```

```
\dt
```

List of relations

Schema	Name	Type	Owner
postgis	cesta	table	markus
postgis	regija	table	markus
postgis	spatial_ref_sys	table	markus
postgis	zgrada	table	markus

```
(4 rows)
```

QGIS

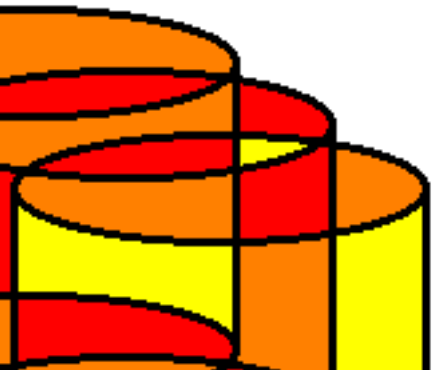
- Sustav za upravljanje zemljopisnim informacijskim sustavima koji omogućuje rad s PostGIS bazom podataka
- Pokrećemo ga s:

qgis &

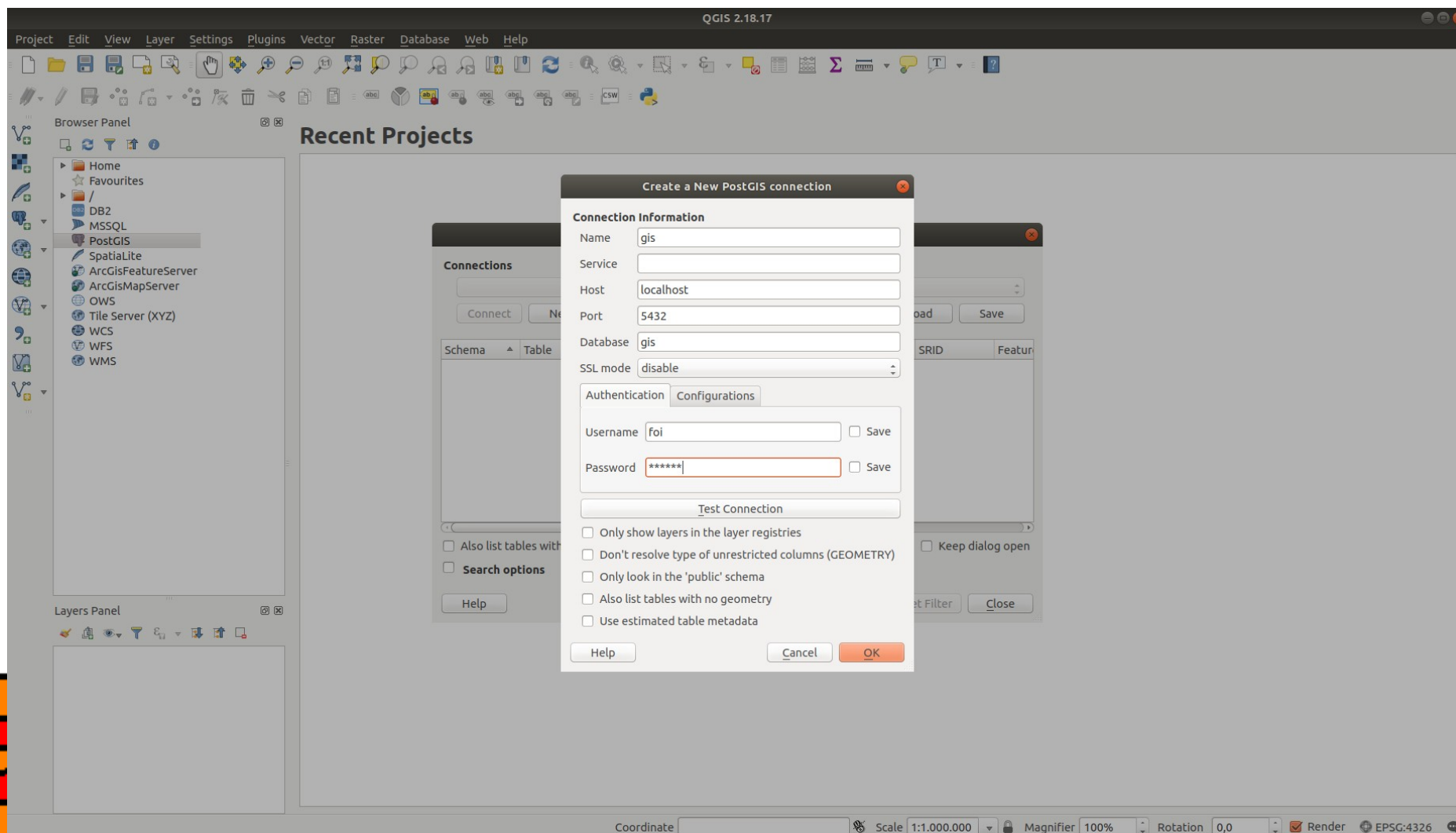
Spajanje na BP



- Browser Panel > PostGIS > dupli klik ili gumbić Add PostGIS table > New
- Unesti podatke za pristup bazi podataka:
 - name: proizvoljno (npr. gis)
 - host: localhost
 - port: 5432
- Pod authentication:
 - username: foi (ili username koji se koristi)
 - password: vjezbe (ili lozinka koja se koristi)
- Test Connection za isprobavanje, ako sve radi, ok i pod Browser Panel bi se trebalo pojaviti stablo koje sadrži tablice zgrada, cesta i regija.



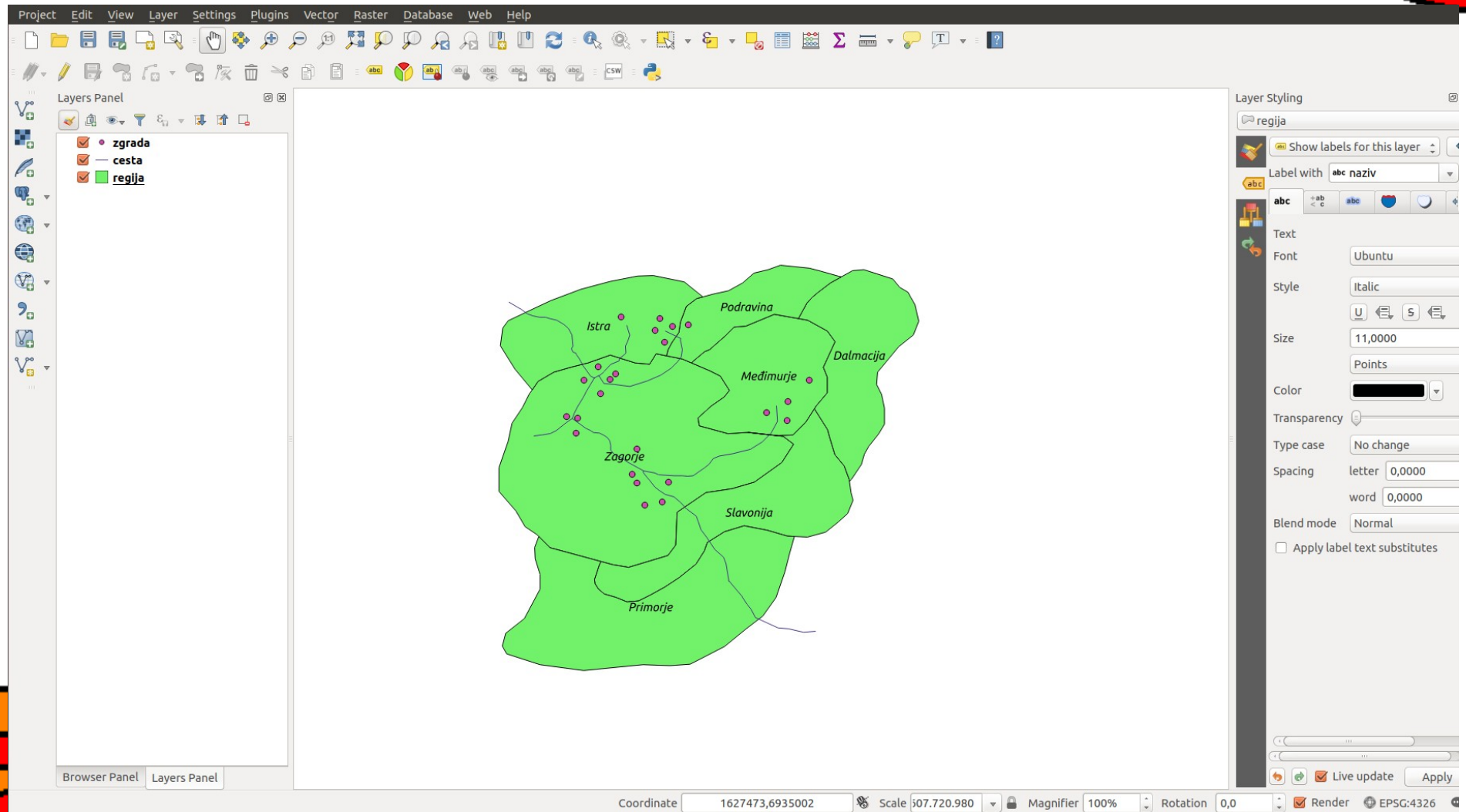
Spajanje na BP



Prikaz prostornih podataka

- Duplim klikom na regija trebale bi se pojaviti regije (površine).
- Duplim klikom na cesta trebale bi se pojaviti ceste (dužine).
- Duplim klikom na zgrada trebale bi se pojaviti zgrade (točke).
- Da bismo uključili oznake idemo na Layer > Labeling te u meniju Layer Styling za sloj regija odabrati Show labels for this layer i odabrati naziv.
- Zatim na meni Database > DB Manager > DB Manager i zatim u novom prozoru koji se otvorio pod Database > SQL Window (ili F2).

Prikaz



Upute

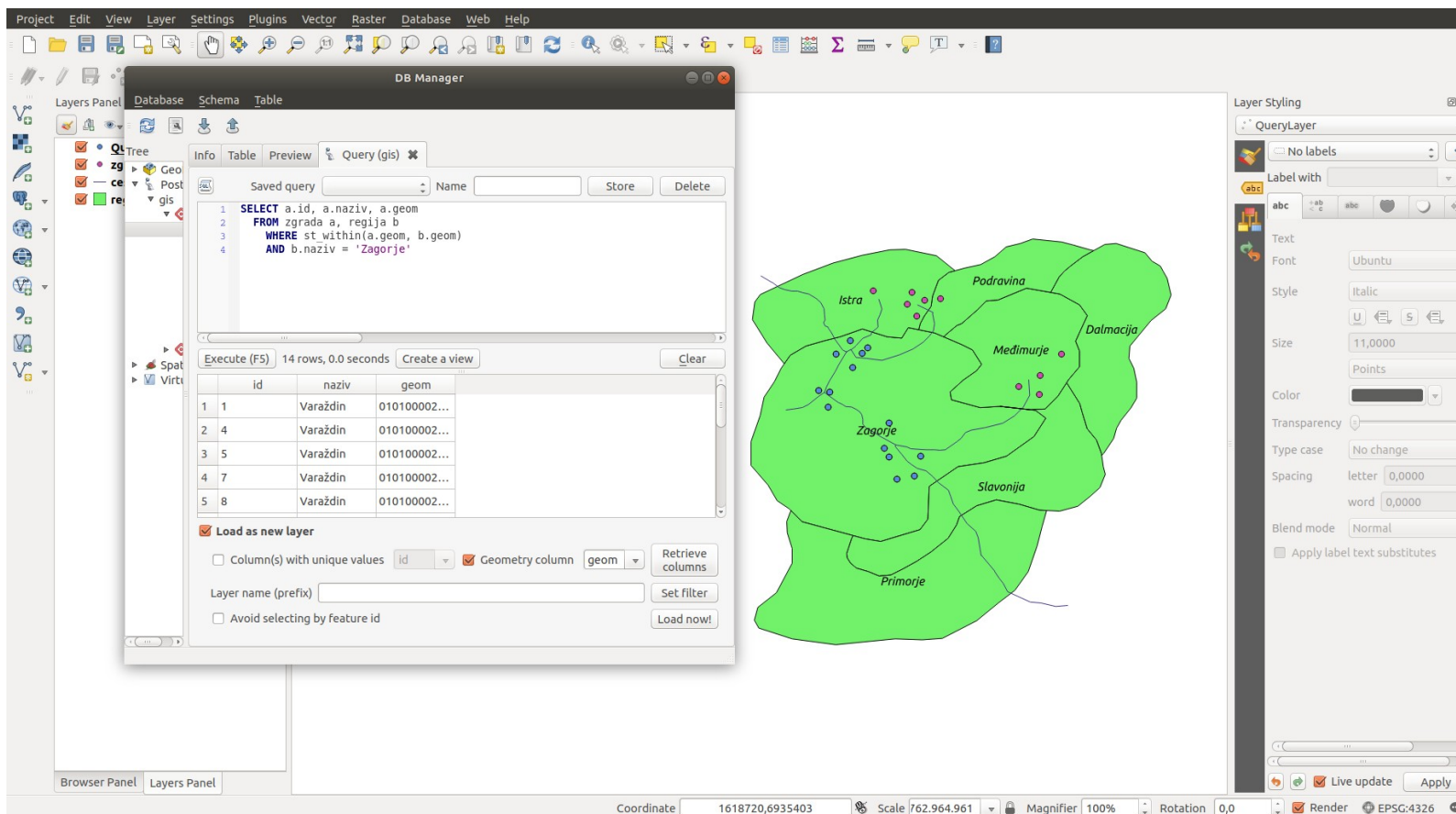
- U nastavku je niz upita koje treba upisati u odgovarajuće polje te postaviti upit s Execute (F5) te uključiti Load as new layer te uključiti Load now!
- Nakon pregleda rezultata, pod Layers Panel maknuti kvačicu pod aktualnim QueryLayer slojem, da se ne prikazuju svi rezultati svih upita.

Primjeri upita

- Sve zgrade u regiji Zagorje:

```
SELECT a.id, a.naziv, a.geom  
FROM zgrada a, regija b  
WHERE st_within(a.geom, b.geom)  
AND b.naziv = 'Zagorje'
```


Očekivani rezultat



The screenshot shows the QGIS interface. The DB Manager window is open, displaying a SQL query:

```
1 SELECT a.id, a.naziv, a.geom
2 FROM zgrada a, regija b
3 WHERE st_within(a.geom, b.geom)
4 AND b.naziv = 'Zagorje'
```

The query results table shows 5 rows of data:

	id	naziv	geom
1	1	Varaždin	010100002...
2	4	Varaždin	010100002...
3	5	Varaždin	010100002...
4	7	Varaždin	010100002...
5	8	Varaždin	010100002...

The map shows the regions of Croatia: Istra, Podravina, Dalmacija, Medimurje, Slavonija, and Primorje. The Zagorje region is highlighted in green. The Layer Styling panel is open, showing the QueryLayer settings.

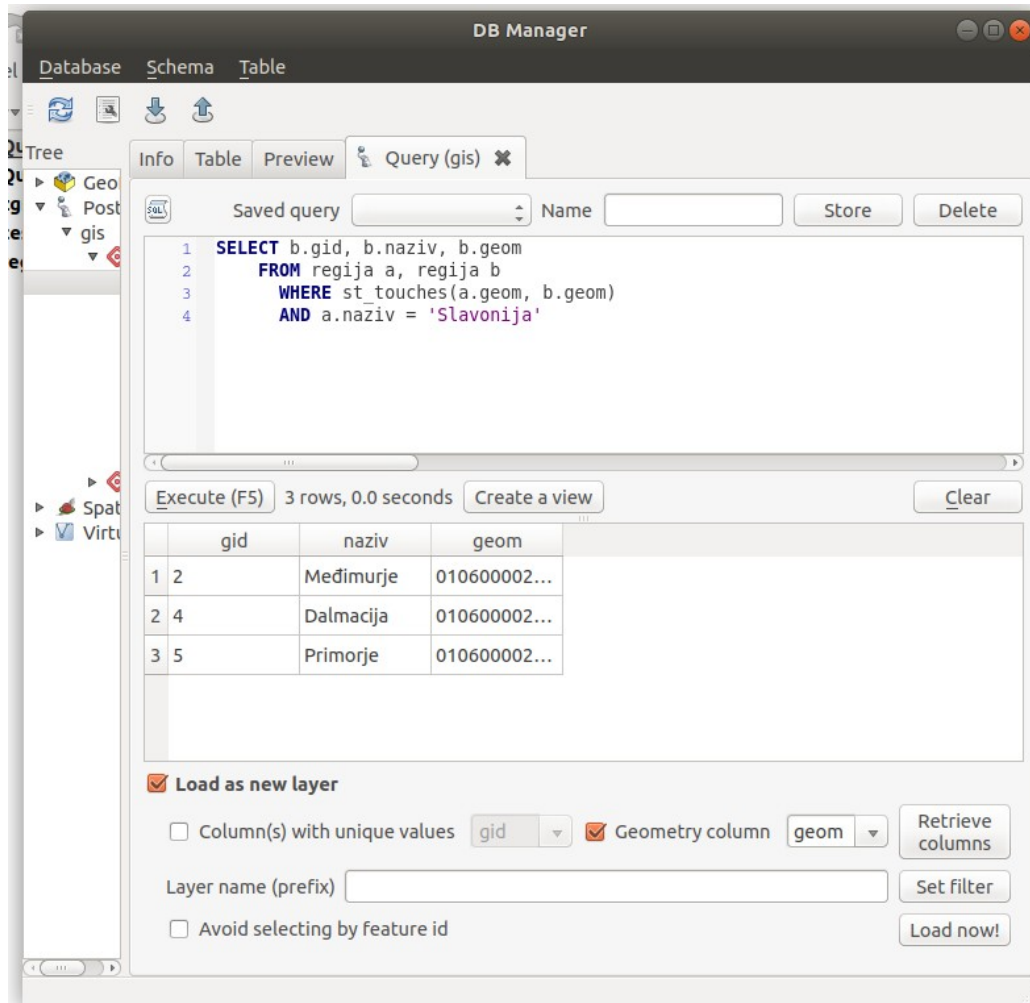
Ako se ne vidi rezultat može se pokušati isključiti sloj zgrade ili sloj QueryLayer staviti iznad sloja zgrada.

Primjeri upita

- Koja zgrada je u kojoj regiji (nema geom - ne treba Load now!):

```
SELECT DISTINCT a.naziv, b.naziv  
FROM zgrada a, regija b  
WHERE st_contains( b.geom, a.geom )
```

Očekivani rezultat



The screenshot shows a DB Manager window with a SQL query editor and a results table. The query is:

```
1 SELECT b.gid, b.naziv, b.geom
2 FROM regija a, regija b
3 WHERE st_touches(a.geom, b.geom)
4 AND a.naziv = 'Slavonija'
```

The results table shows 3 rows:

	gid	naziv	geom
1	2	Međimurje	010600002...
2	4	Dalmacija	010600002...
3	5	Primorje	010600002...

Below the table, there are options for loading the results as a new layer, including checkboxes for 'Load as new layer', 'Column(s) with unique values', 'Geometry column', and 'Avoid selecting by feature id'. There are also buttons for 'Retrieve columns', 'Set filter', and 'Load now!'.

Komentar: Podaci nisu realni ;-)

Primjeri upita

- Sve regije koje dodiruju regiju Slavonija:

```
SELECT b.gid, b.naziv, b.geom  
FROM regija a, regija b  
WHERE st_touches(a.geom, b.geom)  
AND a.naziv = 'Slavonija'
```

Očekivani rezultat

The screenshot displays the QGIS interface. The DB Manager window is open, showing a SQL query that filters buildings based on their location within specific regions. The query is as follows:

```
SELECT DISTINCT a.naziv, b.naziv
FROM zgrada a, regija b
WHERE st_contains(b.geom, a.geom)
```

The query has been executed, resulting in 6 rows. The results are shown in a table below:

	naziv	naziv
1	Čakovec	Zagorje
2	Osijek	Istra
3	Osijek	Podravina
4	Rijeka	Zagorje
5	Split	Međimurje

The map in the background shows the regions of Croatia: Istra, Podravina, Dalmacija, Međimurje, Slavonija, and Primorje. The Zagorje region is highlighted in green. The Layer Styling panel on the right shows the styling for the 'QueryLayer_2' layer, including font settings (Ubuntu, italic, size 11,000) and other options.

Primjeri upita

- Regija Slavonija proširena za 100 mjernih jedinica (engl. buffer):

```
SELECT gid, ST_BUFFER( geom, 100 ) as geom  
FROM regija  
WHERE naziv = 'Slavonija'
```

Očekivani rezultat

The screenshot displays the QGIS interface with a DB Manager window open. The query executed is:

```
1 SELECT gid, ST_BUFFER(geom, 100) as geom
2 FROM regija
3 WHERE naziv = 'Slavonija'
```

The result table shows one row:

gid	geom
1 3	010300002...

The map shows the region of Slavonija highlighted in pink, with other regions (Istra, Podravina, Međimurje, Dalmacija, Zagorje, Primorje) in green. The Layer Styling panel is visible on the right, showing settings for QueryLayer_3.

Primjeri upita

- Sve regije koje dotiču regiju Slavonija proširenu za 100 mjernih jedinica:

```
SELECT b.gid, b.naziv, b.geom
FROM
(
  SELECT gid, ST_BUFFER(geom, 100) as geom
  FROM regija
  WHERE naziv = 'Slavonija'
) a,
regija b
WHERE ST_INTERSECTS(a.geom, b.geom)
AND b.naziv != 'Slavonija'
```


Očekivani rezultat

The screenshot displays the QGIS 2.18.17 interface. The DB Manager window is open, showing a SQL query that creates a buffer around the 'Slavonija' region and finds its intersections with other regions. The query is as follows:

```
SELECT gid, ST_BUFFER(geom, 100) as geom
FROM regija
WHERE naziv = 'Slavonija'
) a,
regija b
WHERE ST_INTERSECTS(a.geom, b.geom)
AND b.naziv != 'Slavonija'
```

The result table shows 4 rows of data:

gid	naziv	geom
1	Zagorje	010600002...
2	Međimurje	010600002...
3	Dalmacija	010600002...
4	Primorje	010600002...

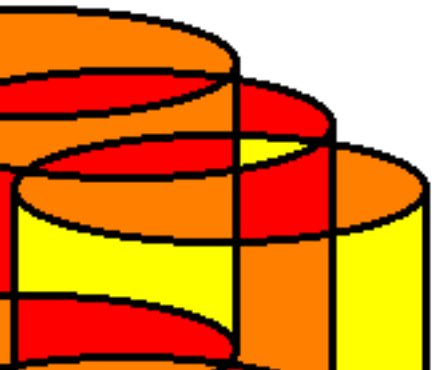
The map shows the regions of Croatia: Istra, Podravina, Međimurje, Dalmacija, Zagorje, Slavonija, and Primorje. The Slavonija region is highlighted in light green, and its 100-unit buffer is shown as a darker green area that overlaps with the Zagorje, Međimurje, Dalmacija, and Primorje regions. The Layer Styling panel on the right shows the styling for 'QueryLayer_4' with 'No labels' and a font of 'Ubuntu' in 'Italic' style.

Primjeri upita



- Isti rezultat, drugi način: sve regije koje su udaljene za manje od 100 mjernih jedinica od pokrajine Slavonija:

```
SELECT b.gid, b.naziv, b.geom  
FROM regija a, regija b  
WHERE ST_DISTANCE (a.geom, b.geom) < 100  
AND a.naziv = 'Slavonija'  
AND b.naziv != 'Slavonija';
```



Očekivani rezultat

DB Manager

```
1 SELECT b.gid, b.naziv, b.geom
2 FROM regija a, regija b
3 WHERE ST_DISTANCE (a.geom, b.geom) < 100
4 AND a.naziv = 'Slavonija'
5 AND b.naziv != 'Slavonija';
6
```

gid	naziv	geom
1	Zagorje	010600002...
2	Međimurje	010600002...
3	Dalmacija	010600002...
4	Primorje	010600002...

Layer Styling

QueryLayer_5

No labels

Label with

Text

Font: Ubuntu

Style: Italic

Size: 11,0000

Color

Transparency

Type case: No change

Spacing: letter 0,0000

word 0,0000

Blend mode: Normal

Apply label text substitutes

Coordinate: 1619568,6935096 Scale: 762.964961 Magnifier: 100% Rotation: 0,0 Render: EPSG:4326

Primjeri upita

- Najkraći put (dužina) od ceste sa šifrom 5 do zgrade sa šifrom 22:

```
SELECT b.gid AS gid,  
       ST_ASTEXT(ST_SHORTESTLINE(a.geom, b.geom)) as text,  
       ST_SHORTESTLINE(a.geom, b.geom) AS geom  
FROM cesta a, zgrada b  
WHERE a.id = 5 AND b.id = 22;
```

Očekivani rezultat

The screenshot displays the QGIS 2.18.17 interface. A DB Manager window is open, showing a SQL query and its results. The query is:

```
1 SELECT b.gid AS gid,  
2 ST_ASTEXT(ST_SHORTESTLINE(a.geom, b.geom)) as text,  
3 ST_SHORTESTLINE(a.geom, b.geom) AS geom  
4 FROM cesta a, zgrada b  
5 WHERE a.id=5 AND b.id=22;  
6
```

The results table shows one row:

gid	text	geom
1 14	LINESTRIN...	010200002...

The map in the background shows a green area with labels "Međimurje" and "Slavonija". The DB Manager window also has options to "Load as new layer" and "Execute (F5)".

Layer Styling panel on the right shows settings for "QueryLayer_6":

- Label with: abc
- Font: Ubuntu
- Style: Italic
- Size: 11,0000
- Color: [Black]
- Transparency: [Slider]
- Type case: No change
- Spacing: letter 0,0000, word 0,0000
- Blend mode: Normal
- Apply label text substitutes: [Unchecked]

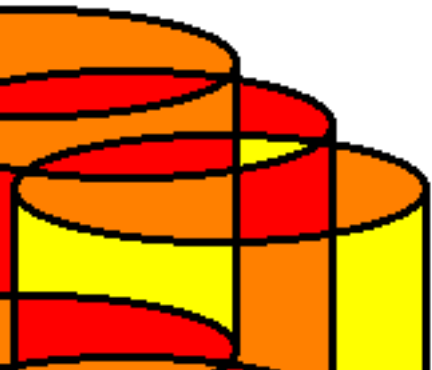
Coordinate: 1623346,6939343 | Scale: 211.717.640 | Magnifier: 100% | Rotation: 0,0 | Render | EPSG:4326

Primjeri upita



- Najveća udaljenost ceste sa šifrom 5 do zgrade sa šifrom 22:

```
SELECT b.gid AS gid,  
       ST_ASTEXT(ST_LONGESTLINE(a.geom, b.geom)) as text,  
       ST_LONGESTLINE(a.geom, b.geom) AS geom  
FROM cesta a, zgrada b  
WHERE a.id = 5 AND b.id = 22;
```



Očekivani rezultat

DB Manager

```
SELECT b.gid AS gid,  
ST_ASTEXT(ST_LONGESTLINE(a.geom, b.geom)) as text,  
ST_LONGESTLINE(a.geom, b.geom) AS geom  
FROM cesta a, zgrada b  
WHERE a.id=5 AND b.id=22;
```

gid	text	geom
14	LINSTRIN...	010200002...

Layer Styling

QueryLayer_7

Text

Font: Ubuntu

Style: Italic

Size: 11,0000

Color: [Black]

Transparency: [Slider]

Type case: No change

Spacing: letter 0,0000, word 0,0000

Blend mode: Normal

Apply label text substitutes: [Unchecked]

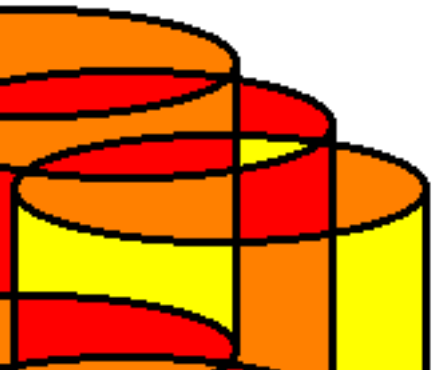
Coordinate: 1620507,6937079 | Scale: 387.176.691 | Magnifier: 100% | Rotation: 0,0 | Render | EPSG:4326

Primjeri upita



- Centroid (centralna točka slike) za cestu sa šifrom 1:

```
SELECT a.gid as gid, ST_CENTROID( a.geom ) as geom
FROM cesta a
WHERE a.id = 1;
```



Očekivani rezultat

The screenshot shows the QGIS DB Manager interface. The SQL query is:

```
1 SELECT a.gid as gid, ST_CENTROID(a.geom) as geom
2 FROM cesta a
3 WHERE a.id = 1;
4
```

The result table shows one row:

gid	geom
1	010100002...

The map in the background shows the regions of Croatia: Istra, Podravina, Međimurje, Zagorje, Slavonija, and Primorje. A yellow dot is visible in the Istra region, representing the centroid of the selected road.

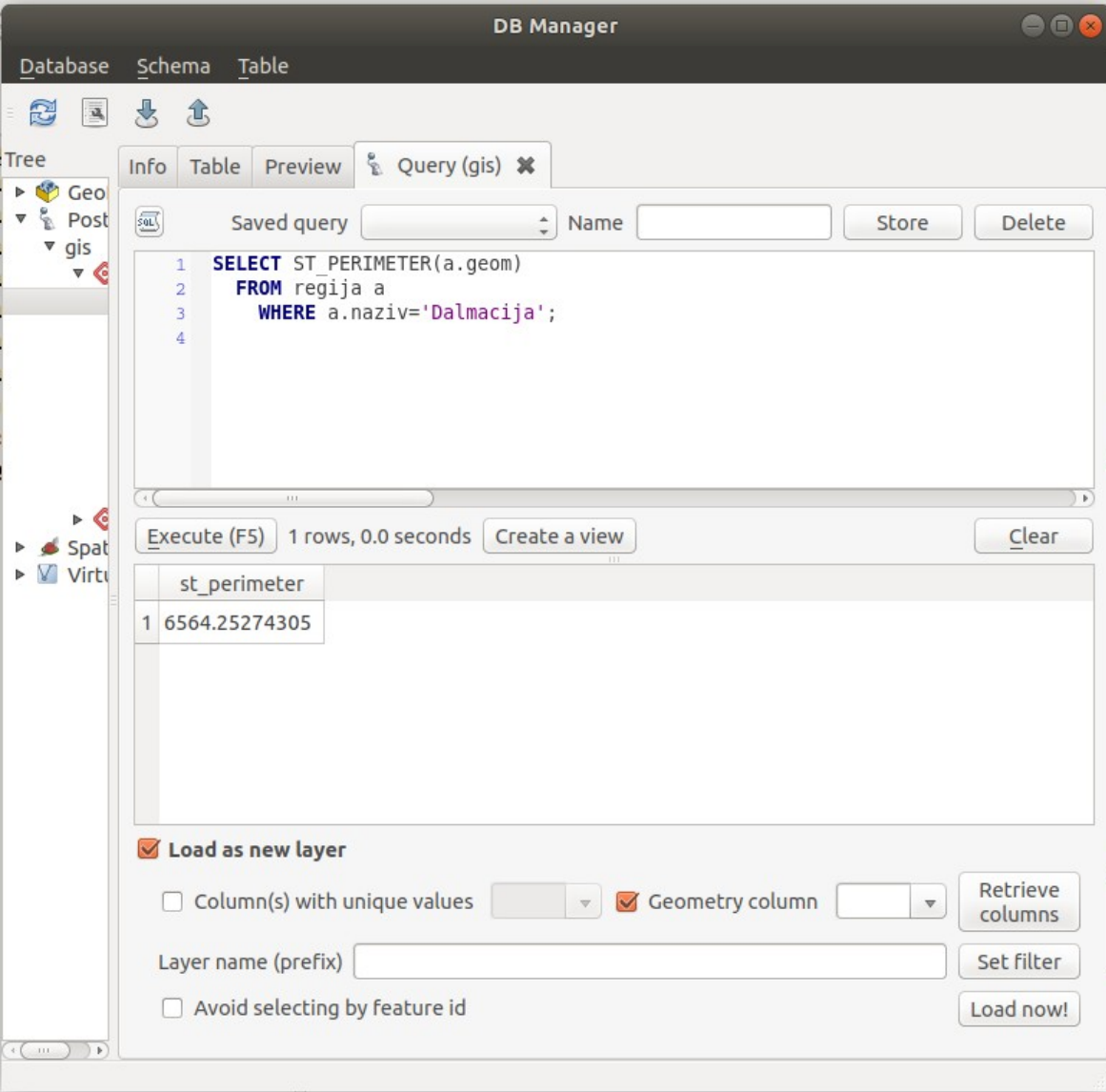
Komentar: Žuta točka u Istri

Primjeri upita

- Promjer regije Dalmacija (nema geom - ne treba Load now!):

```
SELECT ST_PERIMETER( a.geom )  
FROM regija a  
WHERE a.naziv='Dalmacija';
```

Očekivani rezultat



The screenshot shows a DB Manager window with a SQL query editor and a results table. The query is:

```
1 SELECT ST_PERIMETER(a.geom)
2 FROM regija a
3 WHERE a.naziv='Dalmacija';
4
```

The results table shows one row with the value 6564.25274305 for the column st_perimeter.

st_perimeter
1 6564.25274305

Below the table, there are options for loading the result as a new layer:

- Load as new layer
- Column(s) with unique values
- Geometry column
- Layer name (prefix):
- Avoid selecting by feature id

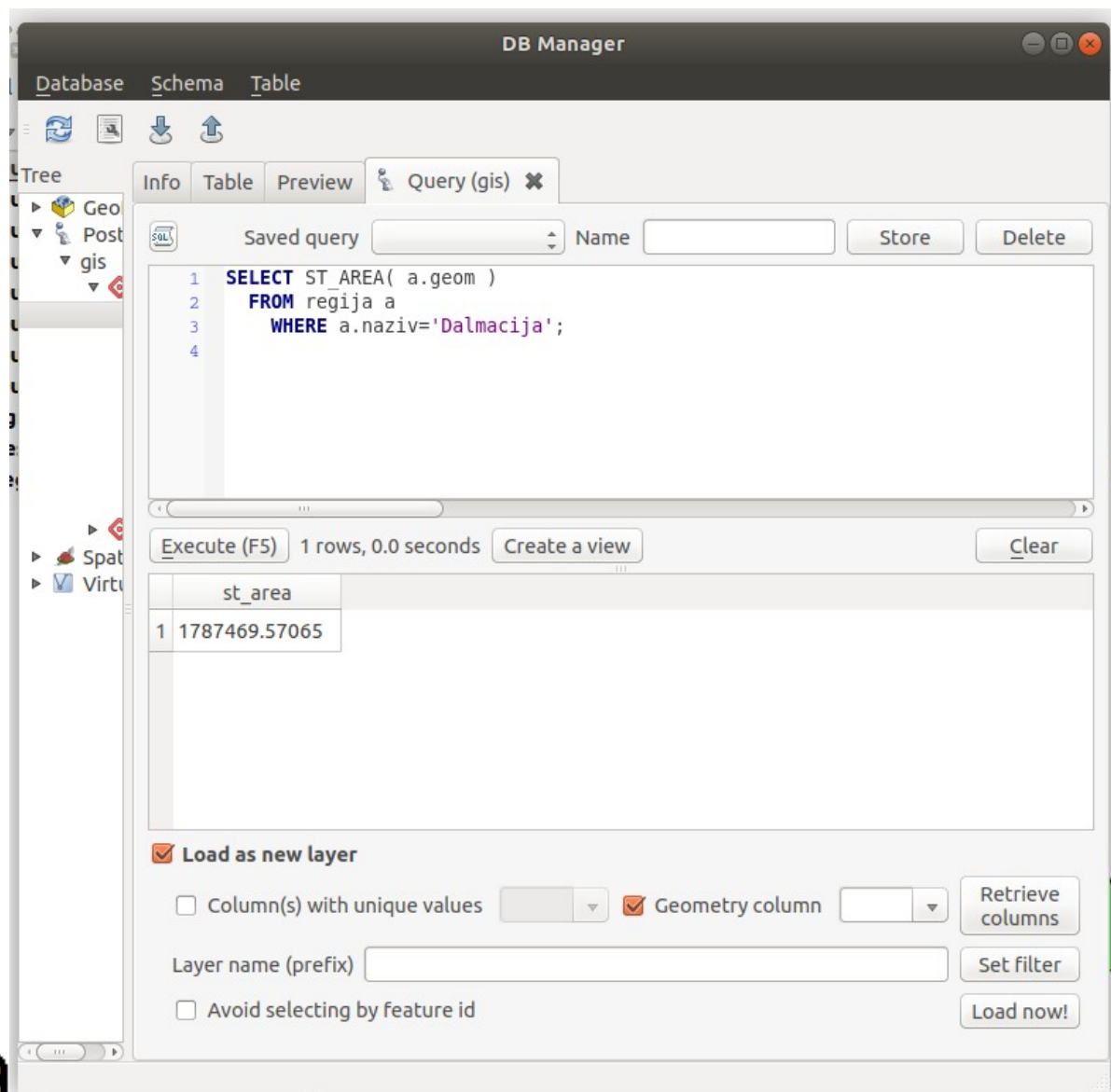
Buttons: Retrieve columns, Set filter, Load now!, Execute (F5), Create a view, Clear.

Primjeri upita

- Površina regije Dalmacija (nema geom - ne treba Load now!):

```
SELECT ST_AREA( a.geom )  
FROM regija a  
WHERE a.naziv='Dalmacija';
```

Očekivani rezultat



The screenshot shows the DB Manager interface with a SQL query window. The query is:

```
1 SELECT ST_AREA( a.geom )
2 FROM regija a
3 WHERE a.naziv='Dalmacija';
4
```

The result of the query is displayed in a table below the query window:

st_area
1 1787469.57065

Below the table, there are options to load the result as a new layer:

- Load as new layer
- Column(s) with unique values
- Geometry column
- Layer name (prefix):
- Avoid selecting by feature id

Buttons for 'Retrieve columns', 'Set filter', and 'Load now!' are also visible.

Primjeri upita

- Pojednostavljenje cesta na zrnatost 20 mjernih jedinica (ugasiti sloj cesta):

```
SELECT gid, ST_Simplify( geom, 20 ) AS geom  
FROM cesta;
```

Očekivani rezultat

The screenshot displays the QGIS interface. The DB Manager window is open, showing a SQL query: `SELECT gid, ST_Simplify(geom, 20) AS geom FROM cesta;`. Below the query, a table shows 7 rows of data with columns 'gid' and 'geom'. The 'Load as new layer' checkbox is checked, and the 'Geometry column' is set to 'geom'. The map view shows a green-shaded map of Croatia with labels for regions: Istra, Podravina, Međimurje, Dalmacija, Zagorje, Slavonija, and Primorje. The Layer Styling panel on the right shows settings for 'QueryLayer_9', including 'No labels', 'Label with', 'Text', 'Font: Ubuntu', 'Style: Italic', 'Size: 11,0000', 'Color', 'Transparency', 'Type case: No change', 'Spacing: letter 0,0000', 'word 0,0000', 'Blend mode: Normal', and 'Apply label text substitutes'.

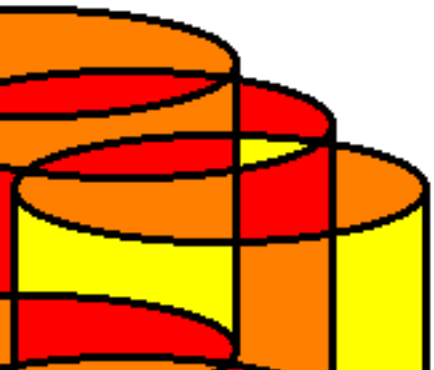
gid	geom
1	010500002...
2	010500002...
3	010500002...
4	010500002...
5	010500002...

Primjeri upita



- Pojednostavljenje cesta na zrnatost 50 mjernih jedinica (ugasiti sloj cesta):

```
SELECT gid, ST_Simplify( geom, 50 ) AS geom  
FROM cesta;
```



Očekivani rezultat

The screenshot displays the QGIS interface. On the left, the DB Manager window is open, showing a query window with the following SQL code:

```
1 SELECT gid, ST_Simplify(geom, 50) AS geom
2 FROM cesta;
```

Below the query window, a table shows the results of the query:

gid	geom
1	010500002...
2	010500002...
3	010500002...
4	010500002...
5	010500002...

The map in the center shows a green-shaded area representing Croatia, divided into regions labeled: Istra, Podravina, Dalmacija, Međimurje, Zagorje, Slavonija, and Primorje. The DB Manager window also shows options to load the query results as a new layer, with the 'Load as new layer' checkbox checked.

On the right, the Layer Styling panel for 'QueryLayer_10' is visible, showing settings for labels, font (Ubuntu), style (Italic), size (11,0000), and color.

Primjeri upita



- Konveksno zatvaranje (engl. convex hull - https://en.wikipedia.org/wiki/Convex_hull - najmanji konveksni n-terokut takav da sadrži sve točke) - kompleksna prostorna agregacija skupova zgrada koje se nalaze u istom gradu - rezultat je najmanja moguća površina grada koja uključuje sve zgrade u tom gradu:

SELECT

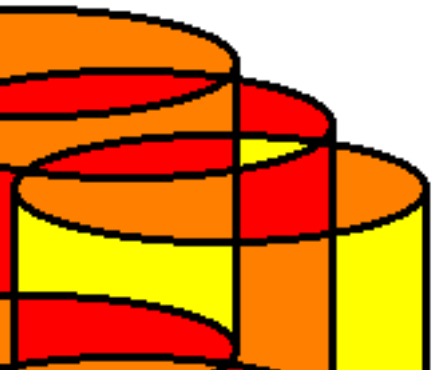
```
ROW_NUMBER() over (order by a.naziv) as id,
```

```
a.naziv as grad,
```

```
ST_CONVEXHULL(ST_COLLECT(a.geom)) AS geom
```

```
FROM zgrada a
```

```
GROUP BY a.naziv;
```



Očekivani rezultat

DB Manager

```
SELECT
1  ROW_NUMBER() over (order by a.naziv) as id,
2  a.naziv as grad,
3  ST_CONVEXHULL(ST_COLLECT(a.geom)) AS geom
4  FROM zgrada a
5  GROUP BY a.naziv;
```

id	grad	geom
1	Čakovec	010300002...
2	Osijek	010300002...
3	Rijeka	010300002...
4	Split	010300002...
5	Varaždin	010300002...

Layer Styling

QueryLayer_11

Show labels for this layer

Label with abc grad

abc

Text

Font Ubuntu

Style Italic

Size 11,0000

Points

Color

Transparency

Type case No change

Spacing letter 0,0000

word 0,0000

Blend mode Normal

Apply label text substitutes

Coordinate 1617627,6935508 Scale :68.452.834 Magnifier 100% Rotation 0,0 Render EPSG:4326

Možemo uključiti Show labels for this layer i odabrati atribut grad (pod Layer Styling za sloj zadnjeg upita QueryLayer_11)

Zadatak

- Implementirajte sljedeće upite:
 - Upit koji vraća sve regije koje **ne** graniče s Istrom
 - Upit koji vraća sve ceste proširene za 5 mjernih jedinica
 - Upit koji vraća sve zgrade koje nisu u Zagorju ili Međimurju
- Za sve upite napravite sliku zaslona rezultata
- Napravite kopiju vaše baze podataka uz alat pg_dump