

Przetwarzanie i analiza danych przestrzennych Oracle Spatial - Raport

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Po pierwszych zajęciach zainstalowałem u siebie lokalnie program Oracle SQL Developer i zacząłem iść zgodnie z instrukcją od nowa.

Wstęp

Po pobraniu programu, uruchomiłem go i zalogowałem się zgodnie z instrukcjami prowadzącego. Dane logowania:

```
Hostname = dbmanage.lab.ii.agh.edu.pl  
Port = 1521  
SID = DBMANAGE  
Username = student  
Password = stu638dent
```

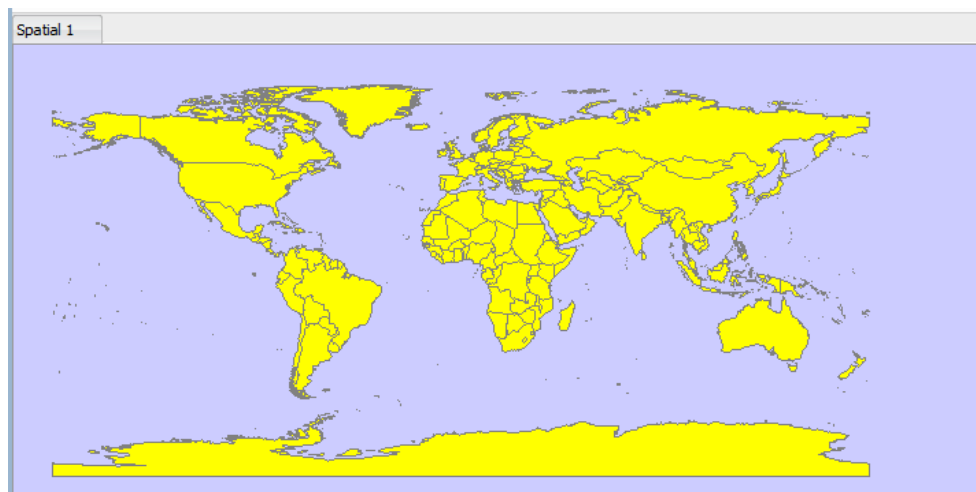
Abym był w stanie aktywować kwerendy użyłem

```
ALTER SESSION SET CURRENT_SCHEMA = US_SPAT;
```

Początkowa wizualizacja

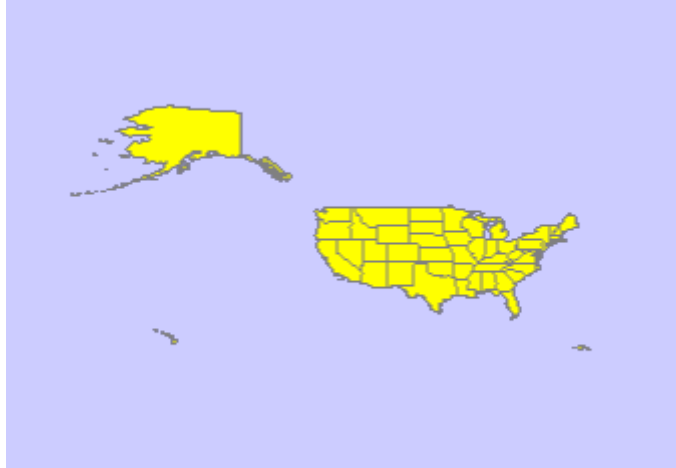
Program, który zainstalowałem u siebie lokalnie jest najnowszą wersją oprogramowania, działającą na systemie Windows. Na komputerach w pracowni zainstalowana była kilkuletnia wersja na system Linux, z zapisanymi ustawieniami innych studentów. Przygotowałem dlatego Map View i wyświetliłem początkową kwerendę.

```
select * from world_countries;
```

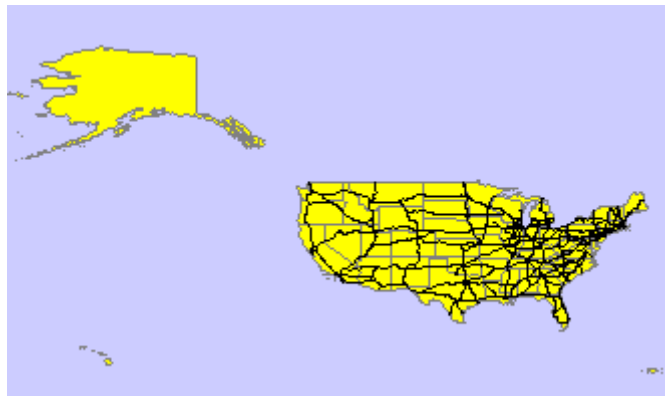


Zadanie 1 - Zwizualizuj przykładowe dane

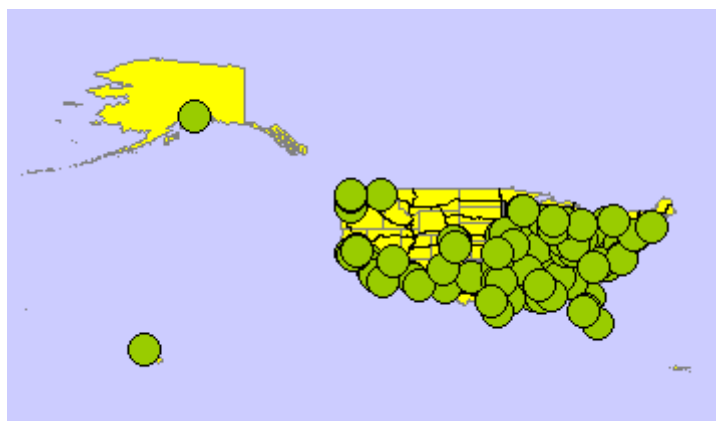
```
select * from us_states;
```



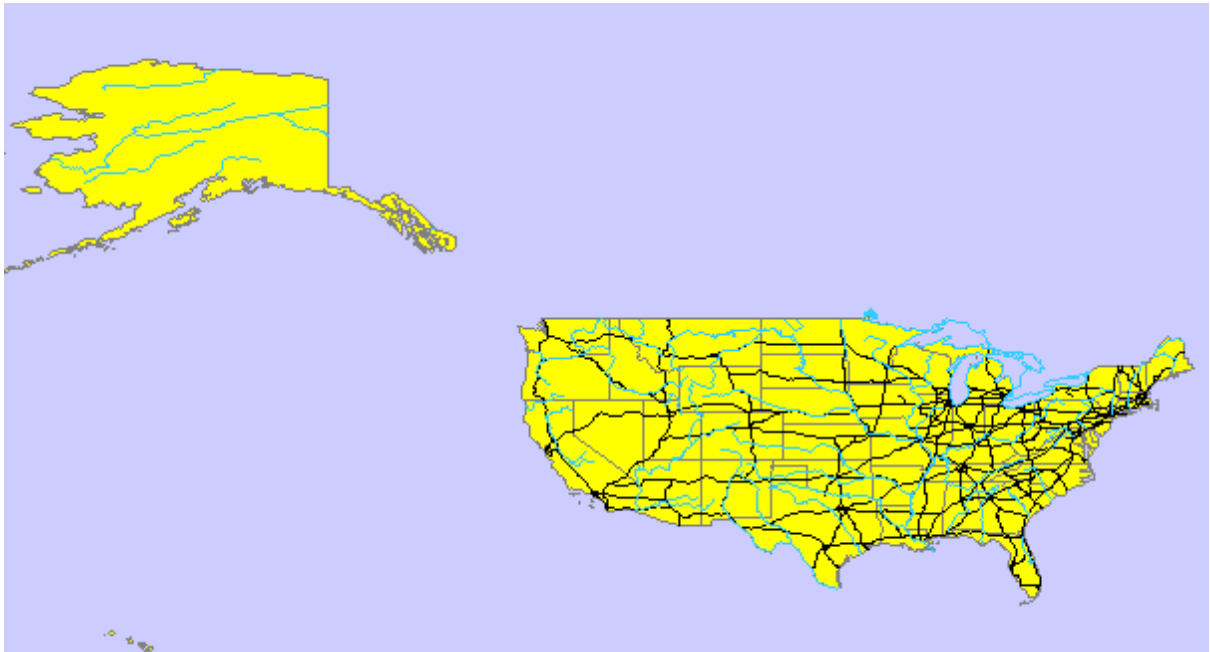
```
select * from us_interstates;
```



```
select * from us_cities where rank90 < 100;
```

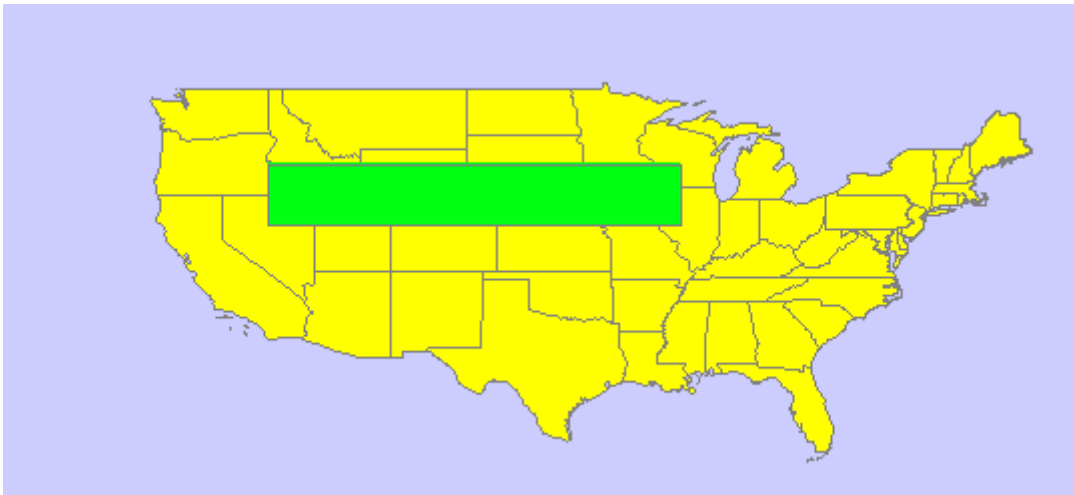


```
select * from us_rivers;
```

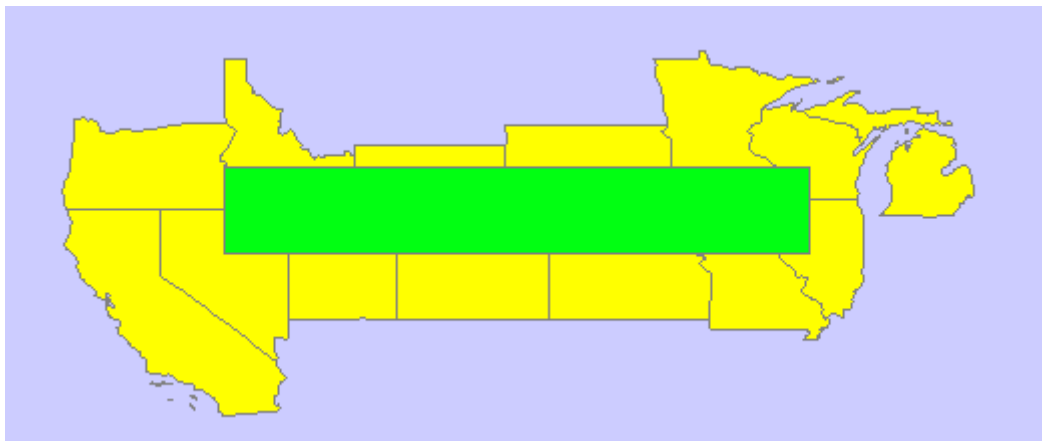


Zadanie 2 - Znajdź wszystkie stany, których obszary mają część wspólną ze wskazaną geometrią

```
select sdo_geometry (
    2003, 8307, null,
    sdo_elem_info_array (1,1003,3),
    sdo_ordinate_array ( -117.0, 40.0, -90., 44.0)
) g
from dual;
```



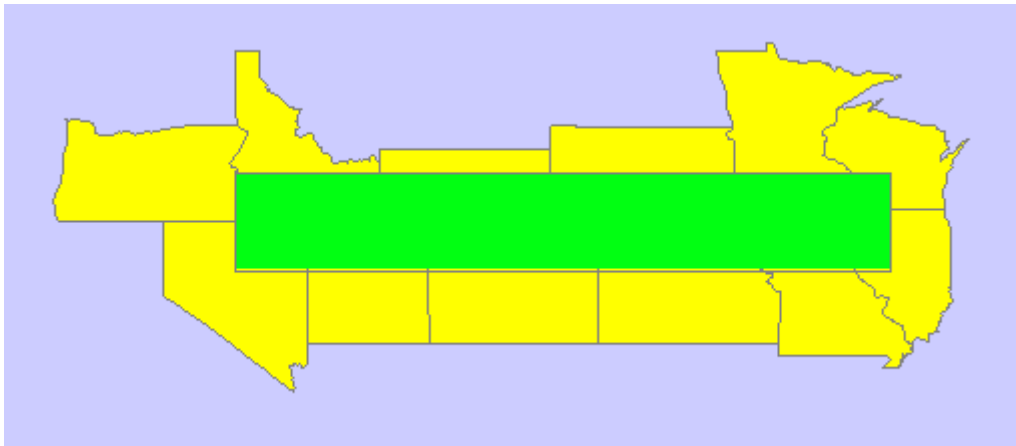
```
SELECT state, geom FROM us_states
WHERE sdo_filter (
    geom,
    sdo_geometry (2003, 8307, null,
    sdo_elem_info_array (1,1003,3),
    sdo_ordinate_array ( -117.0, 40.0, -90., 44.0)
    )
) = 'TRUE';
```



```

SELECT state, geom FROM us_states
WHERE sdo_anyinteract (
    geom,
    sdo_geometry (
        2003, 8307, null,
        sdo_elem_info_array (1,1003,3),
        sdo_ordinate_array ( -117.0, 40.0, -90., 44.0)
    )
) = 'TRUE';

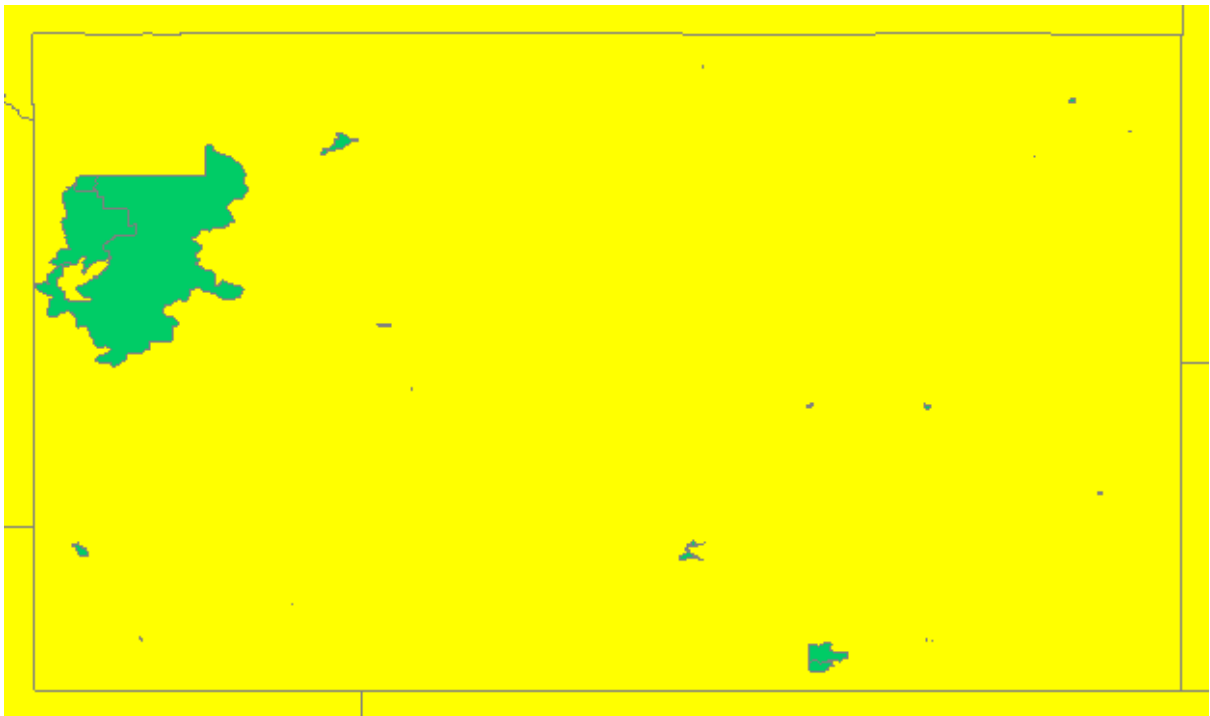
```



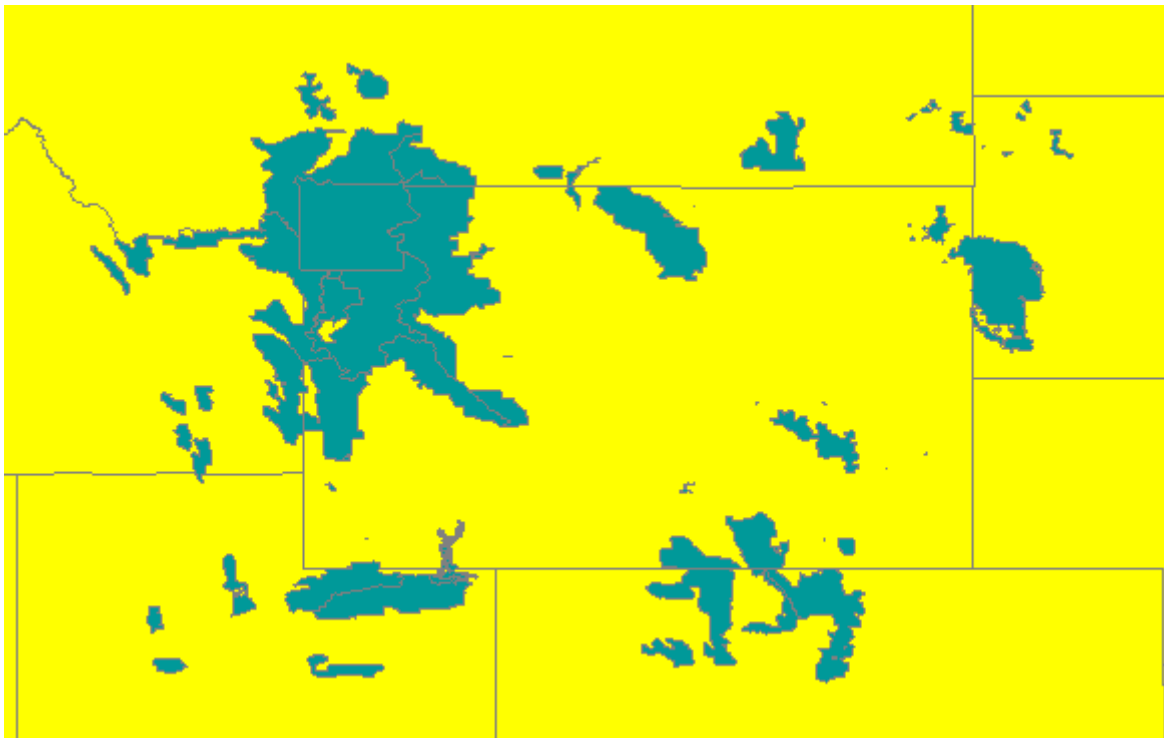
Jak można bez problemu zauważyć, `anyinteract` wybrał dokładnie te stany, na które nachodzi prostokąt, natomiast `filter` pokazuje niektóre błędne.

Zadanie 3 - Znajd wszystkie parki, których obszary znajdują się wewnątrz stanu Wyoming

```
SELECT p.name, p.geom
FROM us_parks p
WHERE p.id in (
    SELECT p.id
    FROM us_parks p, us_states s
    WHERE s.state = 'Wyoming'
    AND SDO_INSIDE (p.geom, s.geom) = 'TRUE'
);
```



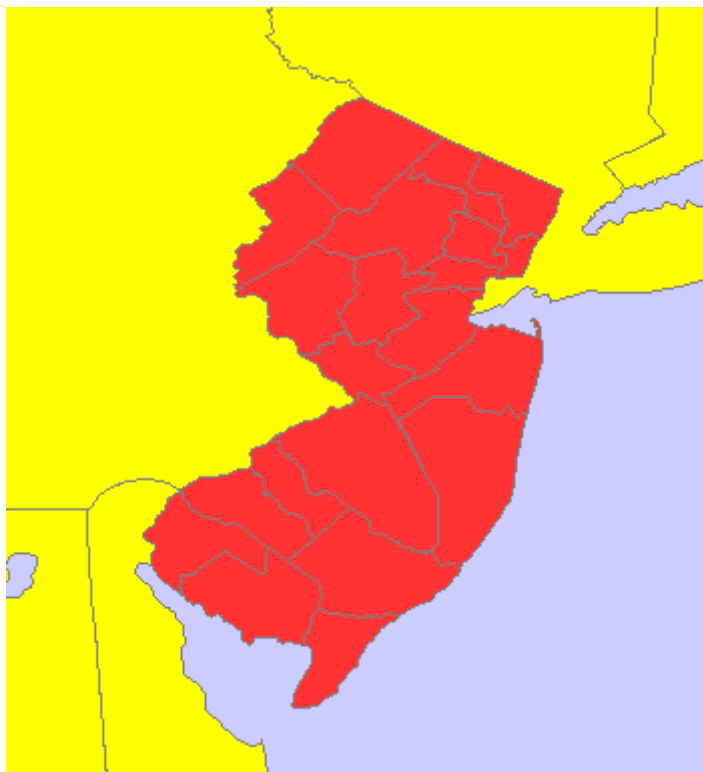
```
SELECT p.name, p.geom
FROM us_parks p
WHERE p.id in (
    SELECT p.id
    FROM us_parks p, us_states s
    WHERE s.state = 'Wyoming'
    AND SDO_ANYINTERACT (p.geom, s.geom) = 'TRUE'
);
```



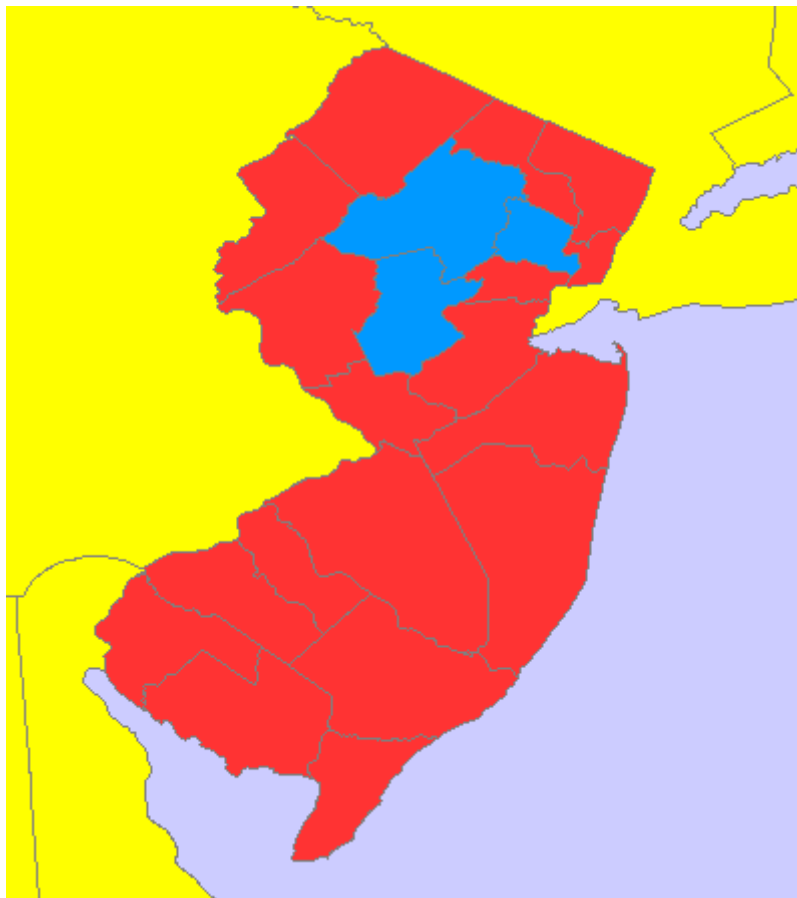
Jak można łatwo zauważyć, `anyinteract` zwraca wszystkie parki, których kawałek znajduje się w Wyoming, natomiast `inside` zwraca te, które w całości się tam znajdują.

Zadanie 4 - Znajdź wszystkie jednostki administracyjne wewnątrz stanu New Jersey

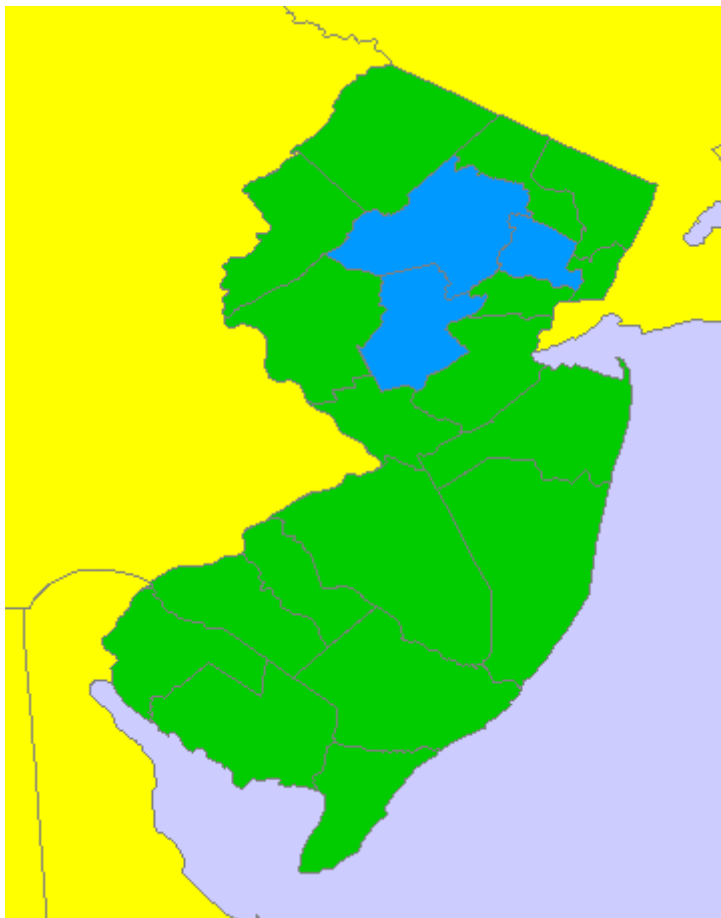
```
SELECT c.county, c.state_abrv, c.geom
FROM us_counties c
WHERE c.id in (
    SELECT c.id
    FROM us_counties c, us_states s
    WHERE s.state = 'New Jersey'
    AND SDO_RELATE (
        c.geom, s.geom, 'mask=INSIDE+COVEREDBY'
    ) = 'TRUE'
);
```




```
SELECT c.county, c.state_abrv, c.geom
FROM us_counties c
WHERE c.id in (
    SELECT c.id
    FROM us_counties c, us_states s
    WHERE s.state = 'New Jersey'
    AND SDO_RELATE (
        c.geom, s.geom, 'mask=INSIDE'
    ) = 'TRUE'
);
```



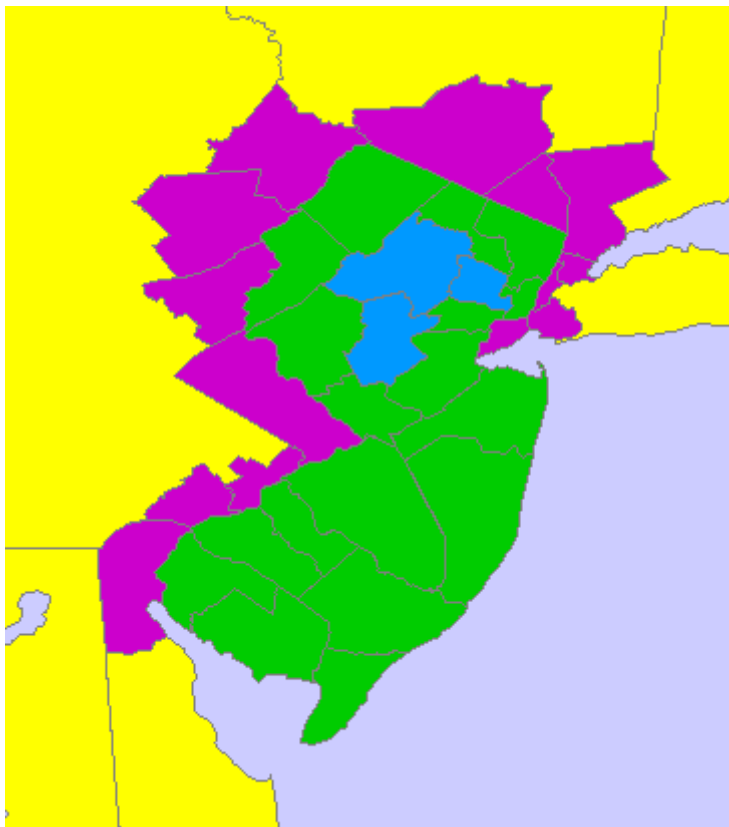
```
SELECT c.county, c.state_abrv, c.geom
FROM us_counties c
WHERE c.id in (
    SELECT c.id
    FROM us_counties c, us_states s
    WHERE s.state = 'New Jersey'
    AND SDO_RELATE (
        c.geom, s.geom, 'mask=COVEREDBY'
    ) = 'TRUE'
);
```



```

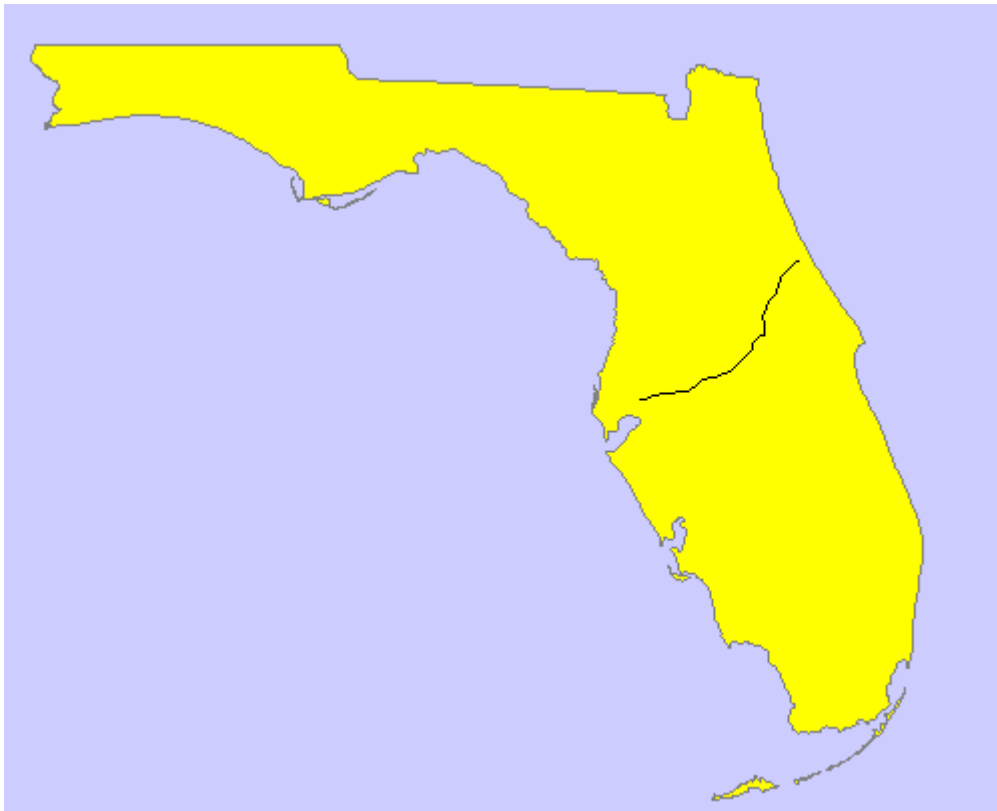
SELECT c.county, c.state_abrv, c.geom
FROM us_counties c
WHERE c.id in (
    SELECT c.id
    FROM us_counties c, us_states s
    WHERE s.state = 'New Jersey'
    AND SDO_RELATE (
        c.geom, s.geom, 'mask=TOUCH'
    ) = 'TRUE'
);

```

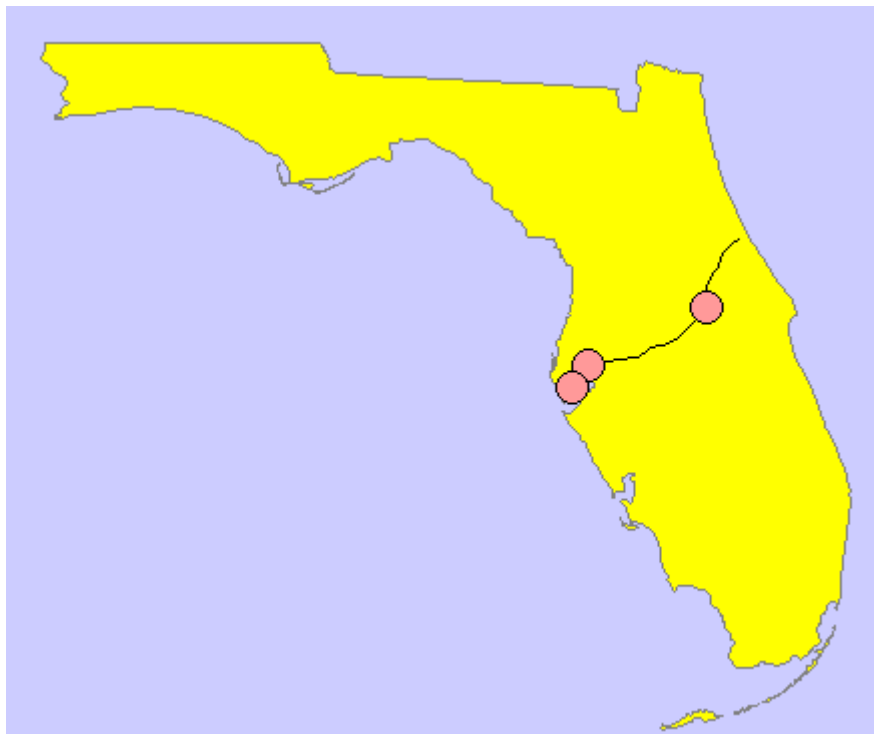


Zadanie 5 - Znajdź wszystkie miasta w odległości 50 mili od drogi I4

```
SELECT *  
FROM us_states  
WHERE state_abrv = 'FL';  
  
SELECT *  
FROM us_interstates  
WHERE interstate = 'I4';
```



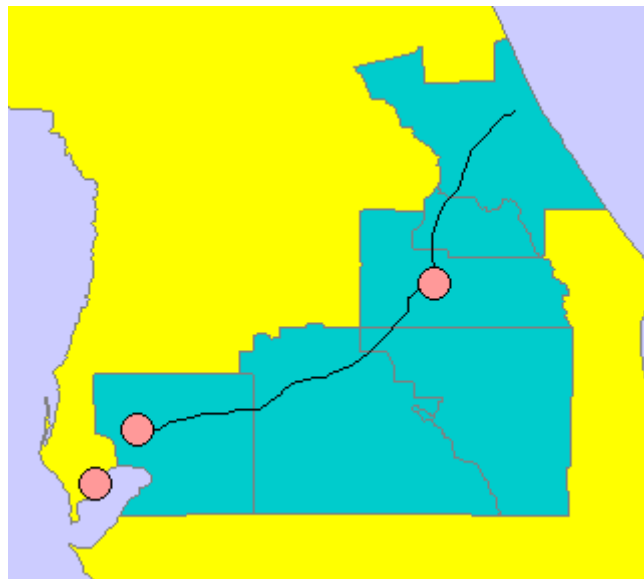
```
SELECT c.city, c.state_abrv, c.location
FROM us_cities c
WHERE ROWID IN (
    SELECT c.rowid
    FROM us_interstates i, us_cities c
    WHERE i.interstate = 'I4'
    AND sdo_within_distance (
        c.location, i.geom, 'distance=50 unit=mile'
    ) = 'TRUE'
);
```



Zadanie 5 - Dodatkowo

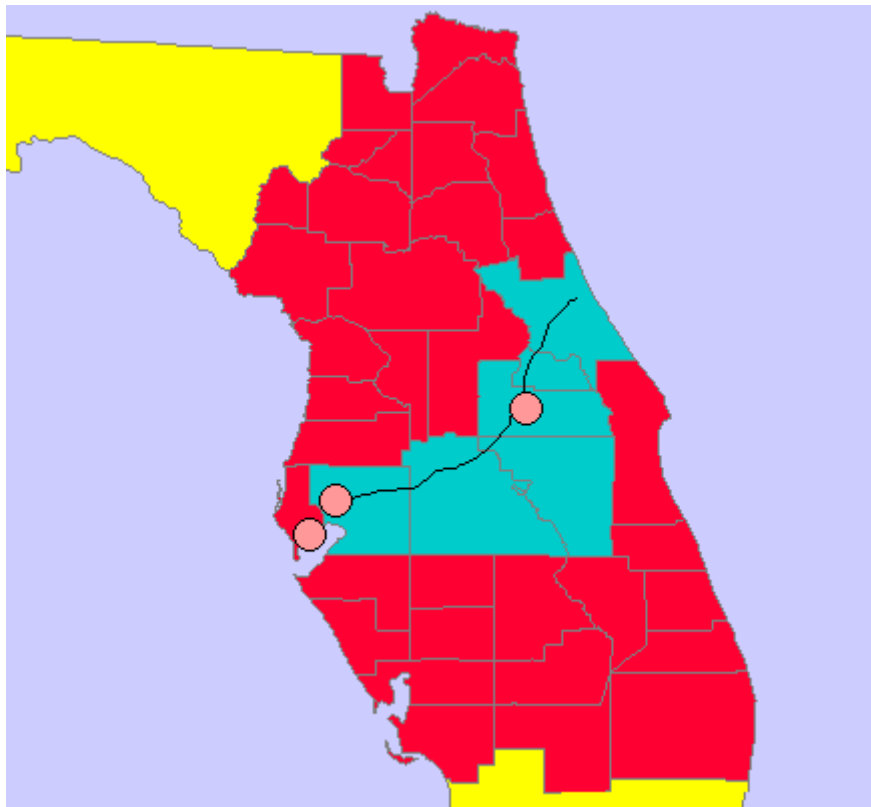
- znajdź wszystkie jednostki administracyjne, przez które przechodzi I4

```
SELECT c.county, c.state_abrv, c.geom
FROM us_counties c
WHERE c.id in (
    SELECT c.id
    FROM us_interstates i, us_counties c
    WHERE i.interstate = 'I4'
    AND SDO_ANYINTERACT (
        c.geom, i.geom
    ) = 'TRUE'
);
```



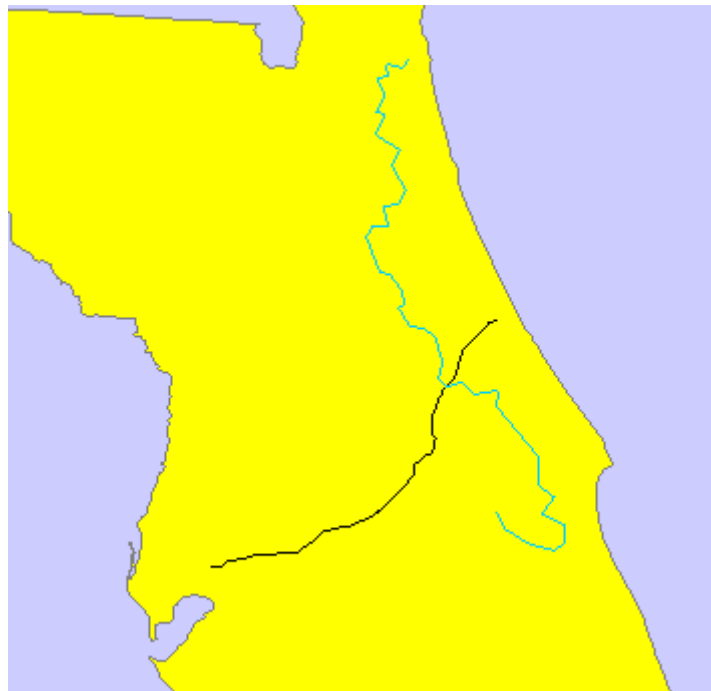
- znajdź wszystkie jednostki administracyjne w pewnej odległości od I4

```
SELECT c.county, c.state_abrv, c.geom
FROM us_counties c
WHERE c.id in (
    SELECT c.id
    FROM us_interstates i, us_counties c
    WHERE i.interstate = 'I4'
    AND SDO_WITHIN_DISTANCE (
        c.geom, i.geom, 'distance=100 unit=mile'
    ) = 'TRUE'
);
```



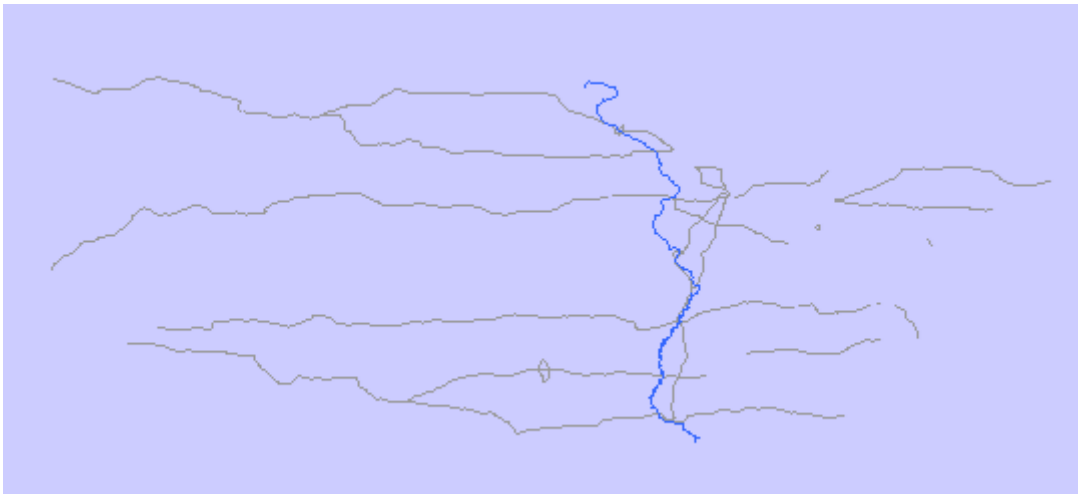
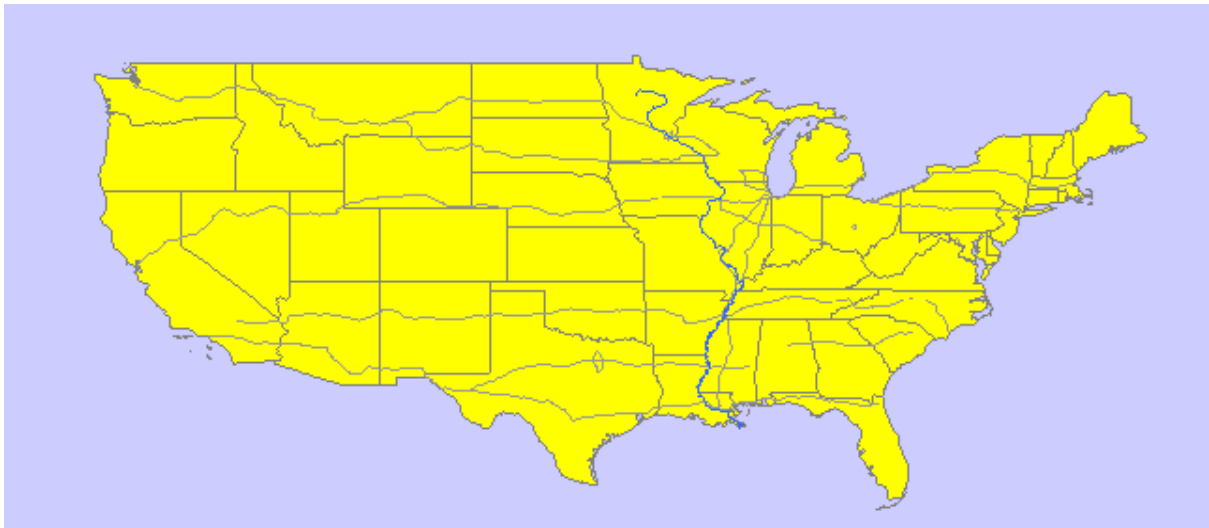
- znajdź rzeki, które przecina droga I4

```
SELECT r.name, r.geom
FROM us_rivers r
WHERE r.id IN (
    SELECT r.id
    FROM us_interstates i, us_rivers r
    WHERE i.interstate = 'I4'
    AND SDO_ANYINTERACT (
        i.geom, r.geom
    ) = 'TRUE'
);
```



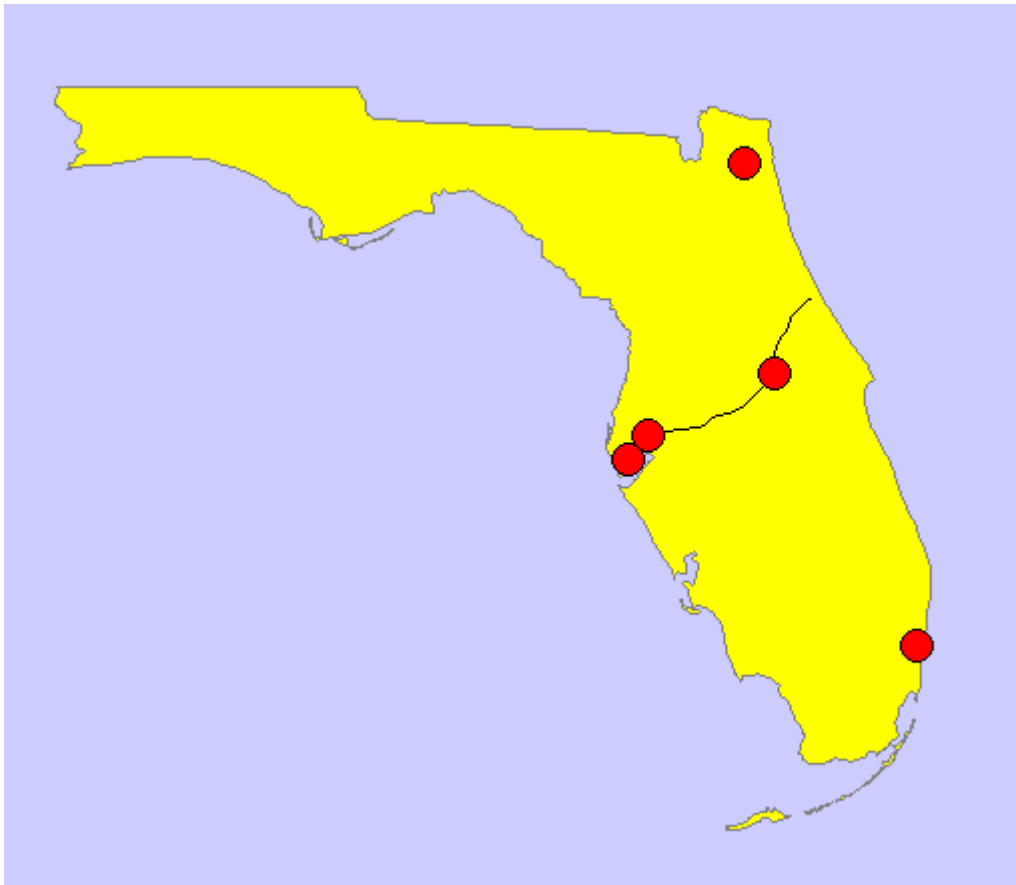
- znajdź wszystkie drogi, które przecinają rzekę Mississippi

```
SELECT i.interstate, i.geom
FROM us_interstates i
WHERE i.id IN (
  SELECT i.id
  FROM us_interstates i, us_rivers r
  WHERE r.name = 'Mississippi'
  AND SDO_ANYINTERACT (
    i.geom, r.geom
  ) = 'TRUE'
);
```



Zadanie 6 - Znajdź 5 najbliższych miast drogi I4

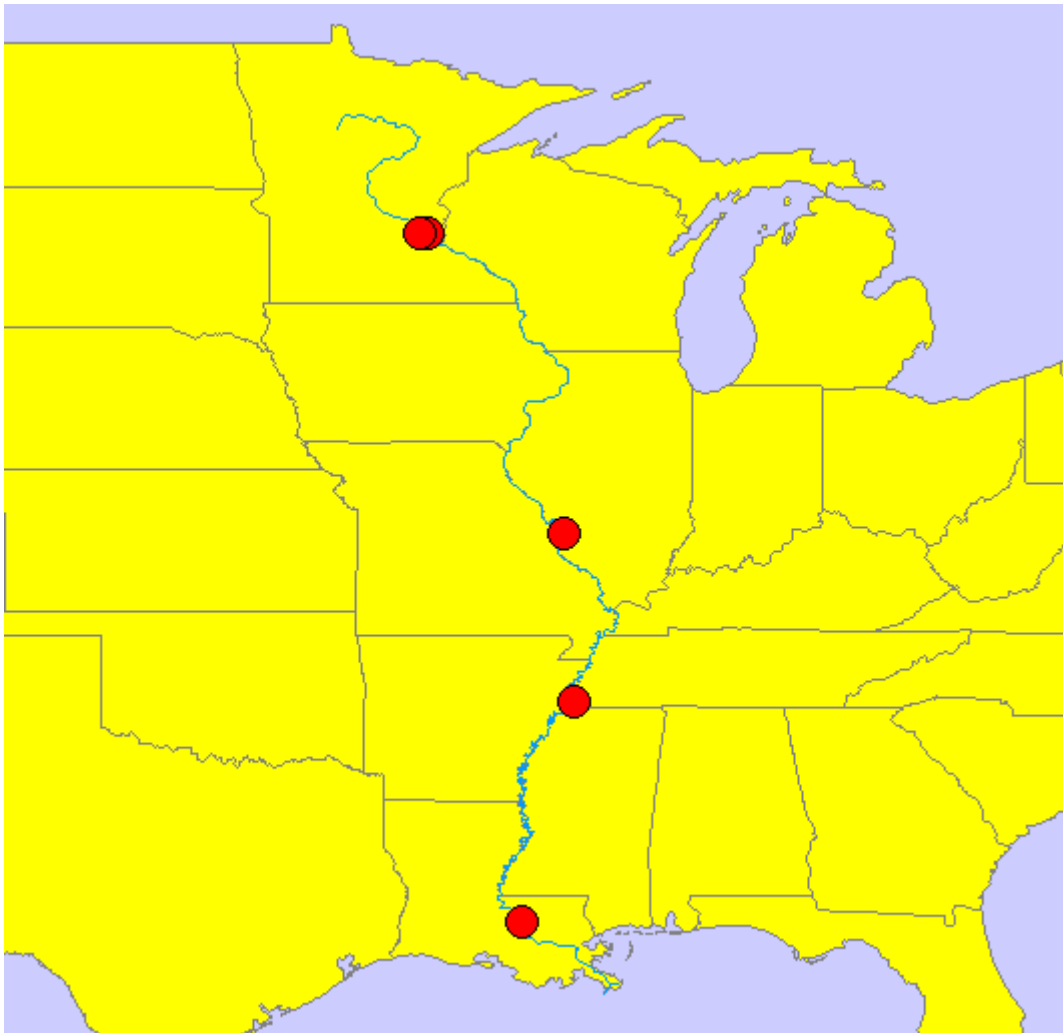
```
SELECT c.city, c.state_abrv, c.location
FROM us_cities c
WHERE c.city IN (
    SELECT c.city
    FROM us_interstates i, us_cities c
    WHERE i.interstate = 'I4'
    AND sdo_nn(
        c.location, i.geom, 'sdo_num_res=5'
    ) = 'TRUE'
);
```



Zadanie 6 - Dodatkowo

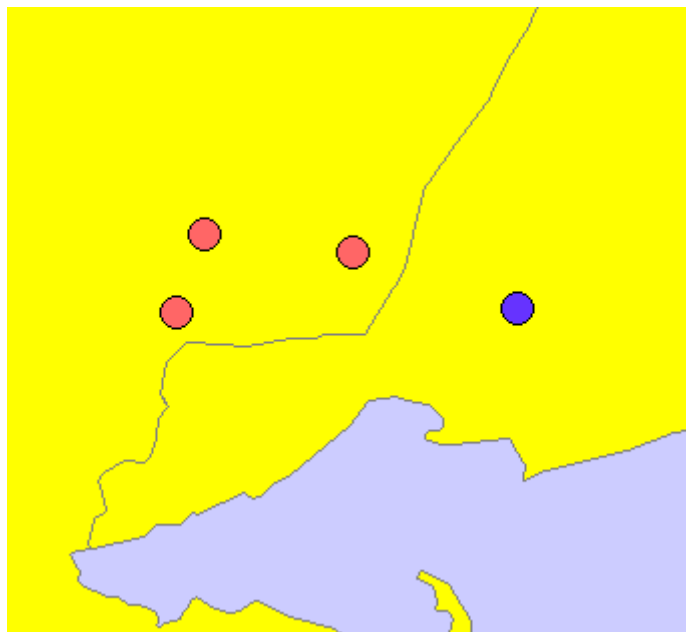
- znajdź kilka miast najbliższych rzece Mississippi

```
SELECT c.city, c.state_abrv, c.location
FROM us_cities c
WHERE c.city IN (
  SELECT c.city
  FROM us_rivers r, us_cities c
  WHERE r.name = 'Mississippi'
  AND sdo_nn(
    c.location, r.geom, 'sdo_num_res=5'
  ) = 'TRUE'
);
```



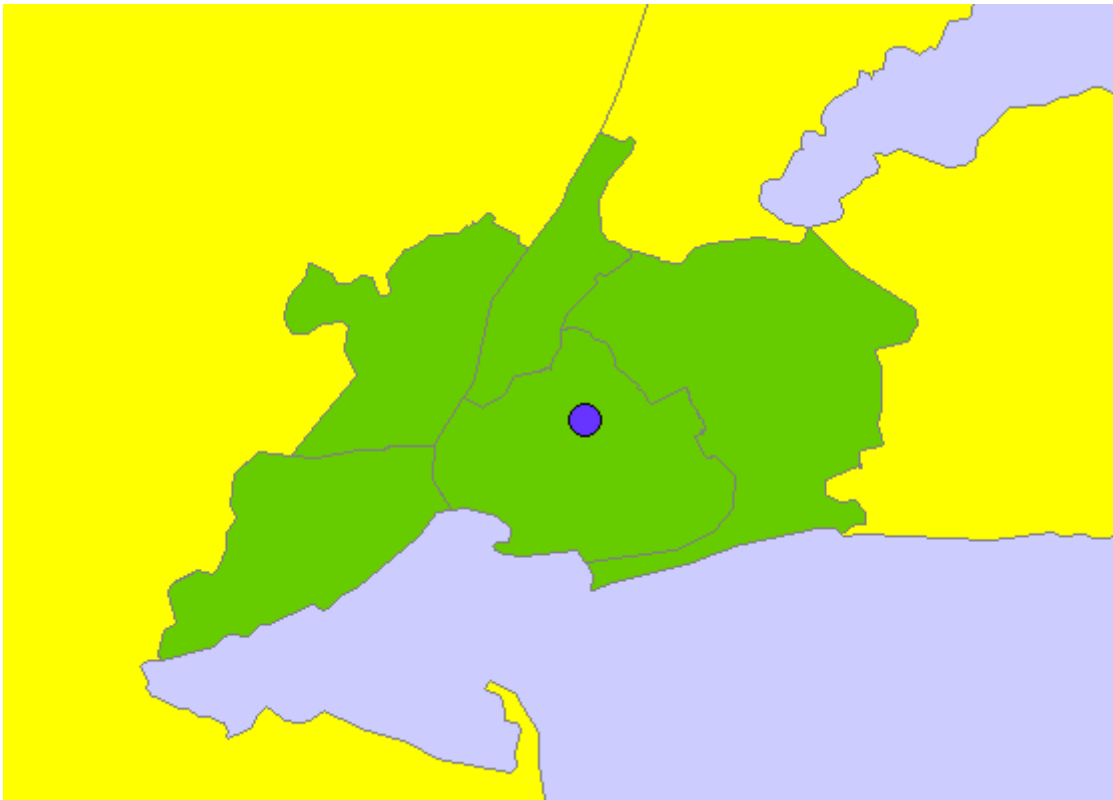
- znajdź 3 miasta najbliższe Nowego Jorku

```
SELECT c.city, c.state_abrv, c.location
FROM us_cities c
WHERE c.city IN (
    SELECT c.city
    FROM us_cities c
    WHERE sdo_nn(
        c.location,
        (
            SELECT c.location
            FROM us_cities c
            WHERE c.city = 'New York'
        ),
        'sdo_num_res=4'
    ) = 'TRUE'
)
AND c.city != 'New York';
```



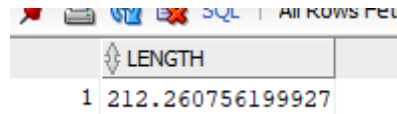
- znajdź kilka jednostek administracyjnych, z których jest najbliżej do Nowego Jorku kwerenda

```
SELECT *
FROM us_counties co
WHERE co.id IN (
    SELECT co.id
    FROM us_counties co, us_cities c
    WHERE sdo_nn(
        co.geom,
        (
            SELECT c.location
            FROM us_cities c
            WHERE c.city = 'New York'
        ),
        'sdo_num_res=5'
    ) = 'TRUE'
);
```



Zadanie 7 - Oblicz długość drogi I4

```
SELECT SDO_GEOM.SDO_LENGTH (geom, 0.5, 'unit=kilometer') length
FROM us_interstates
WHERE interstate = 'I4';
```



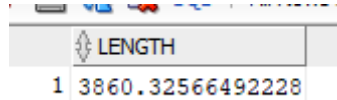
A screenshot of a SQL query result window. The window title is "SQL | All Rows Fetched". The result is displayed in a table with one column labeled "LENGTH". The first row contains the value "212.260756199927".

| | LENGTH |
|---|------------------|
| 1 | 212.260756199927 |

Zadanie 7 - Dodatkowo

- oblicz długość rzeki Mississippi

```
SELECT SDO_GEOM.SDO_LENGTH (geom, 0.5, 'unit=kilometer') length
FROM us_rivers
WHERE name = 'Mississippi';
```



A screenshot of a SQL query result window. The window title is "SQL | All Rows Fetched". The result is displayed in a table with one column labeled "LENGTH". The first row contains the value "3860.32566492228".

| | LENGTH |
|---|------------------|
| 1 | 3860.32566492228 |

- która droga jest najdłuższa / najkrótsza

```
SELECT *  
FROM (  
    SELECT SDO_GEOM.SDO_LENGTH (i.geom, 0.5,'unit=kilometer') length,  
           i.interstate interstate  
    FROM us_interstates i  
    ORDER BY length DESC  
)  
WHERE rownum <= 1;
```

| | LENGTH | INTERSTATE |
|---|-----------------|------------|
| 1 | 4290.6462617249 | I90 |

```
SELECT *  
FROM (  
    SELECT SDO_GEOM.SDO_LENGTH (i.geom, 0.5,'unit=kilometer') length,  
           i.interstate interstate  
    FROM us_interstates i  
    ORDER BY length ASC  
)  
WHERE rownum <= 1;
```

| | LENGTH | INTERSTATE |
|---|-------------------|------------|
| 1 | 0.462140186764249 | I564 |

- która rzeka jest najdłuższa / najkrótsza

```
SELECT *
FROM (
    SELECT SDO_GEOM.SDO_LENGTH (r.geom, 0.5,'unit=kilometer') length,
           r.name name
    FROM us_rivers r
    ORDER BY length DESC
)
WHERE rownum <= 1;
```

| All Rows Fetched: 1 in 1 | | |
|--------------------------|------------------|-----------|
| | LENGTH | NAME |
| 1 | 6950.91937515048 | St. Clair |

```
SELECT *
FROM (
    SELECT SDO_GEOM.SDO_LENGTH (r.geom, 0.5,'unit=kilometer') length,
           r.name name
    FROM us_rivers r
    ORDER BY length ASC
)
WHERE rownum <= 1;
```

| All Rows Fetched: 1 in 1 | | |
|--------------------------|------------------|-----------|
| | LENGTH | NAME |
| 1 | 1.16169766454518 | Richelieu |

- które stany mają najdłuższą granicę

```
SELECT *
FROM (
    SELECT SDO_GEOM.SDO_LENGTH (s.geom, 0.5,'unit=kilometer') length,
           s.state state
    FROM us_states s
    ORDER BY length DESC
)
WHERE rownum <= 3;
```

| All Rows Fetched: 3 in 3 | | |
|--------------------------|------------------|------------|
| | LENGTH | STATE |
| 1 | 26138.3745019651 | Alaska |
| 2 | 6779.84795094551 | Texas |
| 3 | 4145.76647746918 | California |

- oblicz odległość między stanami Buffalo i Syracuse

```
SELECT SDO_GEOM.SDO_DISTANCE ( c1.location, c2.location, 0.5) distance
FROM us_cities c1, us_cities c2
WHERE c1.city = 'Buffalo'
AND c2.city = 'Syracuse';
```

| DISTANCE | |
|----------|------------------|
| 1 | 222184.610363969 |

- oblicz odległość między miastem Tampa, a drogą I4

```
SELECT SDO_GEOM.SDO_DISTANCE ( c1.location, i.geom, 0.5) distance
FROM us_cities c1, us_interstates i
WHERE c1.city = 'Buffalo'
AND i.interstate = 'I4';
```

| DISTANCE | |
|----------|-----------------|
| 1 | 1540030.9330979 |

- jaka jest odległość między stanem Nowy Jork a Florydą

```
SELECT SDO_GEOM.SDO_DISTANCE ( s1.geom, s2.geom, 0.5) distance
FROM us_states s1, us_states s2
WHERE s1.state = 'New York'
AND s2.state = 'Florida';
```

| DISTANCE | |
|----------|------------------|
| 1 | 1256583.87785727 |

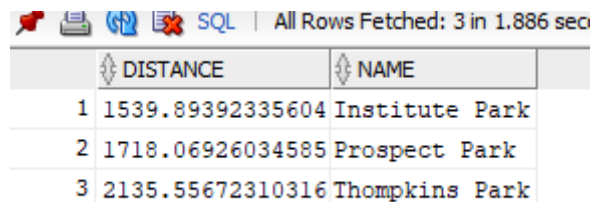
- jaka jest odległość między miastem Nowy Jork a Florydą

```
SELECT SDO_GEOM.SDO_DISTANCE ( c1.location, s2.geom, 0.5) distance
FROM us_cities c1, us_states s2
WHERE c1.city = 'New York'
AND s2.state = 'Florida';
```

| DISTANCE | |
|----------|------------------|
| 1 | 1296590.76150732 |

- podaj 3 parki narodowe, do których jest najbliżej z Nowego Jorku, oblicz odległości do tych parków

```
SELECT *  
FROM (  
    SELECT SDO_GEOM.SDO_DISTANCE ( c.location, p.geom, 0.5) distance,  
           p.name  
    FROM us_cities c, us_parks p  
    WHERE c.city = 'New York'  
    ORDER BY distance ASC  
)  
WHERE rownum <= 3;
```



| | DISTANCE | NAME |
|---|------------------|----------------|
| 1 | 1539.89392335604 | Institute Park |
| 2 | 1718.06926034585 | Prospect Park |
| 3 | 2135.55672310316 | Thompkins Park |