**Spatial Data Bases**

1. **Create tables for layers**

create table FIELD (

F\_ID number primary key,

geometry mdsys.sdo\_geometry,

F\_NAME varchar(30));

create table BUILDINGS (

B\_ID number primary key,

geometry mdsys.sdo\_geometry,

B\_NAME varchar(30));

create table TREES (

T\_ID number primary key,

geometry mdsys.sdo\_geometry,

T\_NAME varchar(30));

create table POOL (

P\_ID number primary key,

geometry mdsys.sdo\_geometry,

P\_NAME varchar(30));

create table ROADS (

R\_ID number primary key,

geometry mdsys.sdo\_geometry,

R\_NAME varchar(30));

1. **Create tables for attributes of each layer**

create table BUILDING\_FLOORS (

BUILD\_ID number not null constraint FK\_BUILD\_FLOORS references BUILDINGS (B\_ID) on delete cascade,

FLOOR\_NUM number not null,

constraint PK\_FLOORS primary key (BUILD\_ID, FLOOR\_NUM));

create table POOL\_TYPE (

TYPE\_ID number not null constraint TY\_ID references POOL (P\_ID) on delete cascade,

TYPE\_NAME varchar(30),

constraint POOL\_TYPE primary key (TYPE\_ID, TYPE\_NAME));

create table TREE\_AGE (

TREE\_ID number not null constraint TR\_ID references TREES (T\_ID) on delete cascade,

TREE\_AGE number not null,

constraint TREE\_A primary key (TREE\_ID, TREE\_AGE));

create table road\_type (

ROAD\_ID number not null constraint ROADT\_ID references ROADS (R\_ID) on delete cascade,

ROAD\_TYPE varchar(30),

constraint ROAD\_T primary key (ROAD\_ID, ROAD\_TYPE));

1. **Insert geometrical data**

insert into TREES values (1, MDSYS.SDO\_GEOMETRY(2003, NULL, NULL,

MDSYS.SDO\_ELEM\_INFO\_ARRAY(1,3,4),

MDSYS.SDO\_ORDINATE\_ARRAY(22,5,20,3,22,1)), 'TREE1');

insert into TREES values (2, MDSYS.SDO\_GEOMETRY(2003,NULL,NULL,

MDSYS.SDO\_ELEM\_INFO\_ARRAY(1,3,4),

MDSYS.SDO\_ORDINATE\_ARRAY(18,3,17,2,18,1)), 'TREE2');

insert into TREES values (3, MDSYS.SDO\_GEOMETRY(2003,NULL,NULL,

MDSYS.SDO\_ELEM\_INFO\_ARRAY(1,3,4),

MDSYS.SDO\_ORDINATE\_ARRAY(15,3,14,2,15,1)), 'TREE3');

insert into BUILDINGS values (1, mdsys.sdo\_geometry(2003, null, null,

mdsys.sdo\_elem\_info\_array(1,3,1),

mdsys.sdo\_ordinate\_array(1,20, 1,10, 16,10, 16,20, 1,20)), 'livinghouse');

insert into BUILDINGS values (2, mdsys.sdo\_geometry(2003, null, null,

mdsys.sdo\_elem\_info\_array(1,3,1),

mdsys.sdo\_ordinate\_array(1,8, 1,1, 6,1, 6,8, 1,8)), 'garage');

insert into POOL values (1, mdsys.sdo\_geometry(2003, null, null,

mdsys.sdo\_elem\_info\_array(1,3,1),

mdsys.sdo\_ordinate\_array(20,20, 20,13, 24,13, 24,20, 20,20)), 'swimming pool');

insert into FIELD values (1, mdsys.sdo\_geometry(2003, null, null,

mdsys.sdo\_elem\_info\_array(1,3,1),

mdsys.sdo\_ordinate\_array(0,20, 0,0, 25,0, 25,20, 0,20)), 'garden');

insert into ROADS values (1, mdsys.sdo\_geometry(2003, null, null,

mdsys.sdo\_elem\_info\_array(1,3,1),

mdsys.sdo\_ordinate\_array(10,10, 10,6, 6,6, 6,4, 12,4, 12,10, 10,10)),

'road1');

1. **Insert attributive data**

insert into TREE\_AGE(TREE\_ID, TREE\_AGE) values (1, 5);

insert into TREE\_AGE(TREE\_ID, TREE\_AGE) values (2, 6);

insert into TREE\_AGE(TREE\_ID, TREE\_AGE) values (3, 10);

insert into POOL\_TYPE(TYPE\_ID, TYPE\_NAME) values (1, 'peldbaseins');

insert into BUILDING\_FLOORS(BUILD\_ID, FLOOR\_NUM) values (1, 1);

insert into BUILDING\_FLOORS(BUILD\_ID, FLOOR\_NUM) values (2, 1);

insert into ROAD\_TYPE(ROAD\_ID, ROAD\_TYPE) values (1, 'taciņa');

1. **Insert metadata**

begin

INSERT INTO USER\_SDO\_GEOM\_METADATA(TABLE\_NAME, COLUMN\_NAME, DIMINFO, SRID)

VALUES ('FIELD', 'GEOMETRY', MDSYS.SDO\_DIM\_ARRAY(

MDSYS.SDO\_DIM\_ELEMENT('X', 0, 25, 1),

MDSYS.SDO\_DIM\_ELEMENT('Y', 0, 20, 1)), NULL);

INSERT INTO USER\_SDO\_GEOM\_METADATA(TABLE\_NAME, COLUMN\_NAME, DIMINFO, SRID)

VALUES ('BUILDINGS', 'GEOMETRY', MDSYS.SDO\_DIM\_ARRAY(

MDSYS.SDO\_DIM\_ELEMENT('X', 1, 16, 1),

MDSYS.SDO\_DIM\_ELEMENT('Y', 1, 20, 1)), NULL);

insert into user\_sdo\_geom\_metadata(table\_name, column\_name, diminfo, srid)

values ('TREES', 'GEOMETRY', mdsys.sdo\_dim\_array(

MDSYS.SDO\_DIM\_ELEMENT('X', 14, 24, 1),

MDSYS.SDO\_DIM\_ELEMENT('Y', 1, 5, 1)), NULL);

INSERT INTO USER\_SDO\_GEOM\_METADATA(TABLE\_NAME, COLUMN\_NAME, DIMINFO, SRID)

VALUES ('ROADS', 'GEOMETRY', MDSYS.SDO\_DIM\_ARRAY(

MDSYS.SDO\_DIM\_ELEMENT('X', 6, 12, 1),

MDSYS.SDO\_DIM\_ELEMENT('Y', 4, 10, 1)), NULL);

INSERT INTO USER\_SDO\_GEOM\_METADATA(TABLE\_NAME, COLUMN\_NAME, DIMINFO, SRID)

VALUES ('POOL', 'GEOMETRY', MDSYS.SDO\_DIM\_ARRAY(

MDSYS.SDO\_DIM\_ELEMENT('X', 20, 24, 1),

MDSYS.SDO\_DIM\_ELEMENT('Y', 13, 20, 1)), NULL);

end;

1. **Create indexes**

**(Created by using GeoRaptor instead of using CREATE INDEX command, e.g.:**

**CREATE INDEX trees\_spix ON TREES(geometry)**

**INDEXTYPE IS MDSYS.SPATIAL\_INDEX;)**

CREATE INDEX "DB\_112RDM002"."TREES\_GEOMETRY\_SPIX" ON "DB\_112RDM002"."TREES"

("GEOMETRY")

INDEXTYPE IS "MDSYS"."SPATIAL\_INDEX" PARAMETERS

('sdo\_indx\_dims=2');

CREATE INDEX "DB\_112RDM002"."BUILDINGS\_GEOMETRY\_SPIX" ON "DB\_112RDM002"."BUILDINGS"

("GEOMETRY")

INDEXTYPE IS "MDSYS"."SPATIAL\_INDEX" PARAMETERS

('sdo\_indx\_dims=2');

CREATE INDEX "DB\_112RDM002"."FIELD\_GEOMETRY\_SPIX" ON "DB\_112RDM002"."FIELD"

("GEOMETRY")

INDEXTYPE IS "MDSYS"."SPATIAL\_INDEX" PARAMETERS

('sdo\_indx\_dims=2');

CREATE INDEX "DB\_112RDM002"."POOL\_GEOMETRY\_SPIX" ON "DB\_112RDM002"."POOL"

("GEOMETRY")

INDEXTYPE IS "MDSYS"."SPATIAL\_INDEX" PARAMETERS

('sdo\_indx\_dims=2');

CREATE INDEX "DB\_112RDM002"."ROADS\_GEOMETRY\_SPIX" ON "DB\_112RDM002"."ROADS"

("GEOMETRY")

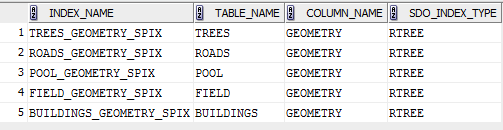
INDEXTYPE IS "MDSYS"."SPATIAL\_INDEX" PARAMETERS

('sdo\_indx\_dims=2');

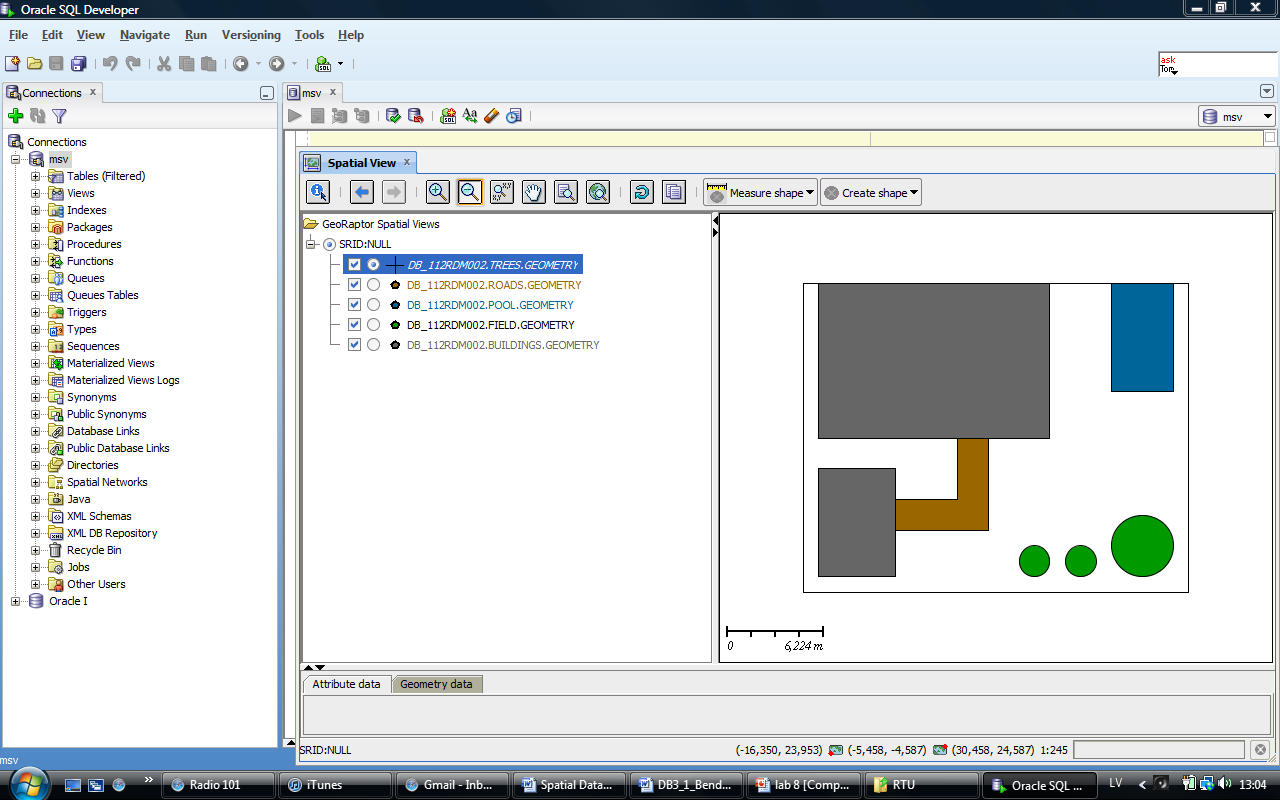
* **View created indexes metadata**

select index\_name, table\_name, column\_name, sdo\_index\_type

from all\_sdo\_index\_info;



1. **Visualize data (using GeoRaptor 3.0)**



1. **Queries**
   * **1 query with SDO\_FILTER**

SELECT b\_name, b\_id FROM BUILDINGS b, ROADS r WHERE b.b\_name = 'garage' AND SDO\_FILTER(b.GEOMETRY, r.GEOMETRY) = 'TRUE';

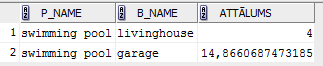


* + **2 queries working with distance**
    - **finding the closest neighbors**

SELECT p.p\_name, b.b\_name, mdsys.sdo\_nn\_distance(1) as attālums FROM POOL p, BUILDINGS b

WHERE p.p\_id = 1 and b.b\_name in ('garage', 'livinghouse')

and mdsys.sdo\_nn(b.geometry, p.geometry, 'sdo\_num\_res=2',1) = 'TRUE';



SELECT r.r\_name, t.t\_name, mdsys.sdo\_nn\_distance(1) as attālums

from ROADS r, TREES t

where r.r\_id = 1 and t.t\_name in ('TREE1', 'TREE2')

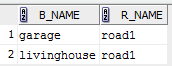
and mdsys.sdo\_nn(t.geometry, r.geometry, 'sdo\_num\_res=2',1) = 'TRUE';



* + - **finding objects within distance**

SELECT b.b\_name, r.r\_name FROM BUILDINGS b, ROADS r

WHERE MDSYS.SDO\_WITHIN\_DISTANCE(b.GEOMETRY, r.GEOMETRY, 'distance = 10') = 'TRUE';



* + - **finding distance to the objects that are within the distance**

select b.b\_name, r.r\_name, sdo\_geom.sdo\_distance(r.geometry, b.geometry, 1) as distance

from ROADS r, BUILDINGS b

where b.b\_id = 1 and mdsys.sdo\_within\_distance(b.geometry, r.geometry, 'distance=10') = 'TRUE';

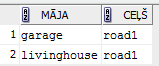


* + **2 queries finding objects with certain type of interactions**

SELECT b.b\_name AS māja, r.r\_name AS ceļš FROM buildings b, roads r

WHERE SDO\_RELATE(b.geometry, r.geometry, 'mask=anyinteract')='TRUE'

ORDER BY b.b\_name;



select b.b\_name

from buildings b, field f

where mdsys.sdo\_touch(b.geometry, f.geometry) = 'TRUE';

