**Homework 2**

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**Q 3.2 :**

Universal Transverse Mercator (UTM): set theory

geodesic distance: metric space

direction (e.g. North, East): Graph Theory

shortest path (for driving on urban roads): Graph Theory

boundary: topology

space-filling curves (Fig. 6.8, pp. 234): Fractal Geometry

planar configurations such as polygons: Euclidean space

straight-line distance: metric space

convex polygon: Euclidean space

landslide probability (chapter 9.4, pp. 350): topology

interior: topology

symmetric relationship: set theory

complement: set theory

exterior: topology

**Q 3.4 :**

Cylindrical: Topological

Azimuthal (projection onto a plane): Projective

upside down (South up): Affine

**Q 4.2**

1 local

2 zonal

3 zonal

4 focal

5 focal

6 zonal

7 zonal

**Q4.4**

1. Austria **is inside** Europe
2. USA **meets** Canada
3. Europe **meets** Asia
4. Lake Superior **overlaps** USA
5. Turkey **overlaps** Europe
6. Lesotho **is inside** South Africa

**Trend 2**

From team 1’s narratives and presentations, we could know it talks about the time. At beginning, it introduces a brief history of time. Then, it explains two different information systems, one is temporal information system and the other one is spatiotemporal information system. At last, it talks about the index and queries.

The article mainly presents two types of database systems and their query languages for defining, modeling (representing) and operating the moving objects. Two abstractions are mentioned firstly, one is the moving point the other is moving region. A new concept call 'dynamic attributes' is used in the MOST Model to relate the time changing factors to queries. Then, the article discusses about the spatio-temporal data perspective.

Team 9 introduced eight concepts, which are National Spatial Data Infrastructure (NSDI), ISO 191xx Standards, OGC Web Services, Remote sensing, ArcGIS, Intergraph Applications, UMN Mapserver, and Mobile P2P database. For each concept, team 9 gave brief introductions about the application areas and advantages of the technique. For NSDI, they also introduced the core components.

From team 9’s summary, I can see there are mainly three categories of GIS data architectures. They are Hybrid systems, integrated systems, and composable systems. There are a couple different architecture types related to the locations of data storage and processing, such as the mainframe system, client-server architecture, and terminal architecture.

I would like to make one suggestion for team 9’s slide. If a list of title or a catalog added before the introduction, I will have a better understanding about the contents they are going to talk.

**Project 2**

We talked about UMN Parking App with Prof. Shekhar, and we found our biggest challenge is the data source. How could we motivate users to provide their location and information about the parking lots? This will make the application useless if no one willing to provide data. Prof. Shekhar encouraged us to think about something more related to our course and indicated doing some research on the basic concepts about geolocation will be much more fit in our project.

Since our interests are about web developments, we would like to change our project to Geolocation application in HTML5. Teacher assistant Michael Evans shared us an idea about Limited access to the websites with specified geolocation in order to improve the internet security. We starts to read a paper “Localizing the Internet: Implications of and Challenges in Geo-locating Everything Digital” wrote by Michael R. Evans and Chintan Patel. In the paper, it mainly introduced the idea of how a geo-coded Internet will increase the security of Internet and the current challenges threat our Internet. The paper first introduced three benefits which geo-coding Internet will bring to us. The first benefit is geo-coded Internet will facilitate local businesses’ prosperity. The second, geo-coded Internet will improve the network security. The last, geo-coded Internet will build up civility among people. Then, the major challenges are listed in order to realize a geo-coded Internet. This paper only introduced the basic concept about geo-coded Internet and the benefits the geo-coded Internet will bring to the cyber world. However, nothing implementation related details have been talk about. Also, some points made by the authors are not convincing due to not talk about the details, such as how geo-coded Internet could improve privacy and security when some part of Internet traffic was routed through China. When talked about building civility through geo-coded Internet, my biggest concern is what makes civilized communication sometimes difficult to achieve in cyber world? How can geo-coded Internet improve civility among people? The answer of those questions cannot be found in this paper, and the explanation for geo-coded Internet will build civility looks too short and simple in this paper. However, the advantages of geo-coded Internet are obvious. To realize geo-coded Internet is a complicated work and cannot be done in a short time.

In our project, we are not able to build a geo-coded Internet. We would like to implement a limited accessed website based on specified geolocation, which is a smaller concept than geo-coded Internet. This technique can be implemented in some top classified organizations which require the user’s location in order to reduce hacker’s attacks. We are going to use geolocation technique build-in HTML5 to determine users’ location as the geolocation is such an incredible functionality to the browser. “The Geolocation API defines a high-level interface to location information associated only with the device hosting the implementation, such as latitude and longitude. The API itself is agnostic of the underlying location information sources”. We can write geolocation application for the web directly in the browser.

Reference

Localizing the Internet: Implications of and Challenges in Geo-locating Everything Digital, Michael R. Evans, Chintan Patel

Geolocation API Specification, <http://dev.w3.org/geo/api/spec-source.html>

**Lab2**

Single Table Spatial Queries

1. List the area of each forest in the natural table. (Hint: [SDO\_GEOM.SDO\_AREA](http://download.oracle.com/docs/cd/B14117_01/appdev.101/b10826/sdo_objgeom.htm#sthref1035))

SELECT n.type, SDO\_GEOM.SDO\_AREA(n.geom, m.diminfo) as area

FROM F12C5980G20.NATURAL n, user\_sdo\_geom\_metadata m

WHERE m.table\_name = 'NATURAL' AND m.column\_name = 'GEOM' AND n.type = 'forest';

1553 rows selected.

1. What is the area of the largest park in the natural table?

select max(area) from (SELECT SDO\_GEOM.SDO\_AREA(n.geom, m.diminfo) as area

FROM F12C5980G20.NATURAL n, user\_sdo\_geom\_metadata m

WHERE m.table\_name = 'NATURAL' AND m.column\_name = 'GEOM' AND n.type = 'park');

MAX(AREA)

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.000116154

1. Provide an Minimum Orthogonal Bounding Rectangle (MBR) for "Rue Saint Vincent" in the roads\_major table (Hint:[SDO\_GEOM.SDO\_MBR](http://download.oracle.com/docs/cd/B14117_01/appdev.101/b10826/sdo_objgeom.htm#sthref1133))

select SDO\_GEOM.SDO\_MBR(c.geom, m.diminfo)

from F12C5980G20.ROADS\_MAJOR c,user\_sdo\_geom\_metadata m

where m.table\_name='ROADS\_MAJOR' and m.column\_name='GEOM' and c.name='Rue Saint Vincent';

SDO\_GEOM.SDO\_MBR(C.GEOM,M.DIMINFO)(SDO\_GTYPE, SDO\_SRID, SDO\_POINT(X, Y, Z), SDO\_

--------------------------------------------------------------------------------

SDO\_GEOMETRY(2003, NULL, NULL, SDO\_ELEM\_INFO\_ARRAY(1, 1003, 3), SDO\_ORDINATE\_ARR

AY(-72.835569, 19.9386124, -72.830725, 19.9397461))

1. What is the centroid of "Parque Central" in the natural table? (Hint: [SDO\_GEOM.SDO\_CENTROID](http://download.oracle.com/docs/cd/B14117_01/appdev.101/b10826/sdo_objgeom.htm#sthref1057))

select [n.name](http://n.name/), SDO\_GEOM.SDO\_CENTROID(n.geom,m.diminfo)

from F12C5980G20.NATURAL n,user\_sdo\_geom\_metadata m

where m.table\_name = 'NATURAL' AND m.column\_name = 'GEOM' AND [n.name](http://n.name/) = 'Parque Central';

NAME

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SDO\_GEOM.SDO\_CENTROID(N.GEOM,M.DIMINFO)(SDO\_GTYPE, SDO\_SRID, SDO\_POINT(X, Y, Z),

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Parque Central

SDO\_GEOMETRY(2001, NULL, SDO\_POINT\_TYPE(-70.693254, 19.7976302, NULL), NULL, NUL

L)

Parque Central

SDO\_GEOMETRY(2001, NULL, SDO\_POINT\_TYPE(-68.966363, 18.4227424, NULL), NULL, NUL

L)

1. What is the total length of each type of road? In other words, what is the total length of all primary roads, secondary roads, tertiary roads, etc. This result represents a summary report of total length of roads by road type.

SELECT [c.name](http://c.name/), SDO\_GEOM.SDO\_LENGTH(c.geom, m.diminfo)

FROM F12C5980G20.ROADS\_MAJOR c, user\_sdo\_geom\_metadata m

WHERE m.table\_name = 'ROADS\_MAJOR' AND m.column\_name = 'GEOM';

2599 rows selected.

#### Spatial Join Queries

1. List all close (within 1 unit distance of each other) pairs of parks and water-features that are named (name is not null). For each pair, provide the osm\_id of the park and osm\_id of the water feature. The result table would have two columns, namely park osm\_id and water osm\_id

SELECT a1.osm\_id as park\_osm\_id, a2.osm\_id as water\_osm\_id

FROM F12C5980G20.NATURAL a1, F12C5980G20.NATURAL a2, user\_sdo\_geom\_metadata m WHERE m.table\_name = 'NATURAL' AND m.column\_name = 'GEOM' AND a1.type = 'park' AND a2.type = 'water' AND SDO\_GEOM.WITHIN\_DISTANCE(a1.geom, m.diminfo, 1, a2.geom, m.diminfo) = 'TRUE';

11988 rows selected.

1. In looking at the data, we realize that there are two parks named 'Parque Central' in the natural table. Return a geometry that is the union of the geometries of each of these parks. (Hint: [SDO\_GEOM.SDO\_UNION](http://download.oracle.com/docs/cd/B14117_01/appdev.101/b10826/sdo_objgeom.htm#sthref1164))

SELECT SDO\_GEOM.SDO\_UNION(a1.geom, m.diminfo, a2.geom, m.diminfo)

FROM F12C5980G20.NATURAL a1, F12C5980G20.NATURAL a2, user\_sdo\_geom\_metadata m WHERE m.table\_name = 'NATURAL' and m.column\_name = 'GEOM' and [a1.name](http://a1.name/) = 'Parque Central' and [a2.name](http://a2.name/) = 'Parque Central';

SDO\_GEOM.SDO\_UNION(A1.GEOM,M.DIMINFO,A2.GEOM,M.DIMINFO)(SDO\_GTYPE, SDO\_SRID, SDO

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SDO\_GEOMETRY(2003, NULL, NULL, SDO\_ELEM\_INFO\_ARRAY(1, 1003, 1), SDO\_ORDINATE\_ARR

AY(-70.693371, 19.7979694, -70.693629, 19.7975172, -70.6932, 19.7972426, -70.692

865, 19.7977837, -70.692985, 19.7978483, -70.693371, 19.7979694))

SDO\_GEOMETRY(2007, NULL, NULL, SDO\_ELEM\_INFO\_ARRAY(1, 1003, 1, 13, 1003, 1), SDO

\_ORDINATE\_ARRAY(-70.692865, 19.7977837, -70.692985, 19.7978483, -70.693371, 19.7

979694, -70.693629, 19.7975172, -70.6932, 19.7972426, -70.692865, 19.7977837, -6

8.966625, 18.4232751, -68.966865, 18.4230063, -68.966873, 18.4224689, -68.966599

, 18.4222083, -68.966135, 18.4222002, -68.965861, 18.4224445, -68.965869, 18.423

0389, -68.966092, 18.4232751, -68.966625, 18.4232751))

SDO\_GEOM.SDO\_UNION(A1.GEOM,M.DIMINFO,A2.GEOM,M.DIMINFO)(SDO\_GTYPE, SDO\_SRID, SDO

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SDO\_GEOMETRY(2007, NULL, NULL, SDO\_ELEM\_INFO\_ARRAY(1, 1003, 1, 19, 1003, 1), SDO

\_ORDINATE\_ARRAY(-68.966625, 18.4232751, -68.966865, 18.4230063, -68.966873, 18.4

224689, -68.966599, 18.4222083, -68.966135, 18.4222002, -68.965861, 18.4224445,

-68.965869, 18.4230389, -68.966092, 18.4232751, -68.966625, 18.4232751, -70.6928

65, 19.7977837, -70.692985, 19.7978483, -70.693371, 19.7979694, -70.693629, 19.7

975172, -70.6932, 19.7972426, -70.692865, 19.7977837))

SDO\_GEOMETRY(2003, NULL, NULL, SDO\_ELEM\_INFO\_ARRAY(1, 1003, 1), SDO\_ORDINATE\_ARR

AY(-68.966865, 18.4230063, -68.966873, 18.4224689, -68.966599, 18.4222083, -68.9

66135, 18.4222002, -68.965861, 18.4224445, -68.965869, 18.4230389, -68.966092, 1

8.4232751, -68.966625, 18.4232751, -68.966865, 18.4230063))

SDO\_GEOM.SDO\_UNION(A1.GEOM,M.DIMINFO,A2.GEOM,M.DIMINFO)(SDO\_GTYPE, SDO\_SRID, SDO

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1. For each named park (name is not null), list the closeby (within 1 unit distance) verified activities (verified = 'YES'). The result table would have two columns, namely park osm\_id and activity id. Limit your results to parks with at least 10 nearby activities.(Hint: [SDO\_GEOM.WITHIN\_DISTANCE](http://download.oracle.com/docs/cd/B14117_01/appdev.101/b10826/sdo_objgeom.htm#sthref1227))

SELECT a1.osm\_id as park\_osm\_id, [a2.id](http://a2.id/) as activity\_id

FROM F12C5980G20.NATURAL a1, F12C5980G20.ACTIVITIES a2, user\_sdo\_geom\_metadata m WHERE m.table\_name = 'NATURAL' AND m.column\_name = 'GEOM' AND a1.type = 'park' and a2.verified = 'YES' and SDO\_GEOM.WITHIN\_DISTANCE(a1.geom, m.diminfo, 1, a2.geom, m.diminfo) = 'TRUE';

5708 rows selected.

1. *Extra Credit:* What is the name of the longest road in the roads\_major table? (Hint: [SDO\_GEOM.SDO\_LENGTH](http://download.oracle.com/docs/cd/B14117_01/appdev.101/b10826/sdo_objgeom.htm#sthref1112))

SELECT [c.name](http://c.name/), SDO\_GEOM.SDO\_LENGTH(c.geom, m.diminfo)

FROM F12C5980G20.ROADS\_MAJOR c, user\_sdo\_geom\_metadata m where m.table\_name = 'ROADS\_MAJOR' and m.column\_name = 'GEOM' and SDO\_GEOM.SDO\_LENGTH(c.geom, m.diminfo) =( SELECT max(SDO\_GEOM.SDO\_LENGTH(c.geom, m.diminfo))

FROM F12C5980G20.ROADS\_MAJOR c, user\_sdo\_geom\_metadata m

WHERE m.table\_name = 'ROADS\_MAJOR' and m.column\_name = 'GEOM');

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SDO\_GEOM.SDO\_LENGTH(C.GEOM,M.DIMINFO)

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cruce de rincon

1.07246478