**Spatial Databases (CS-615)  
Homework Assignment 1 (LAB)**

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**Question:   
This is an Oracle exercise involving Oracle object-relational features.**

**The basic task is to create an object-relational table about significant port. You are to place 10 ports in your table. One constraint is that they must be in 10 distinct countries. Another is that you must have at least one port in each of the five continents.**

**You should create a 'type' with three fields, for major cities that have the port, with these fields: name of city, and latitude, and longitude. Lat and long should be signed and numeric. In some cases, the port might be technically in a small city near a larger city. A nearby example is San Pedro, which serves to some extent both Long Beach and Los Angeles**

**Create a 'member function' to return the longitude but using E and W instead of a sign. E.g. -70 as input will return 70W.**

**Next create a field for maybe imports with two fields, e.g. product, and volume, where an example might be 'autos', and 100,000 if in the most recent year, 100,000 autos arrived at that port. Note that finding accurate data for a given port might not be easy. But try to find at least a few accurate pairs for some ports, and then make stuff up for the rest. If you want 3 fields, allow both import and export data. E.g. port of San Diego 3.22 million bananas imported, zero exported.**

**Finally, you should make a table, including as fields the two object fields mentioned above. Another field should be the population of the port. You should have some other fields, perhaps, number of visits by tankers, number of visits by dry good ships, or whatever seems good.**

**You should of course 'test' your creation with sample selects and be sure to include a call to the member function.**

**Solution:  
[HW1.sql]**

DROP TABLE port\_info;

DROP TYPE imports\_exports\_type;

DROP TYPE import\_export\_type;

DROP TYPE location\_type;

CREATE TYPE import\_export\_type AS OBJECT (

name varchar2(120),

volume\_export NUMBER,

volume\_import NUMBER);

/

CREATE TYPE location\_type AS OBJECT (

city VARCHAR2 (20),

latitude NUMBER,

longitude NUMBER,

member function longitude\_function RETURN VARCHAR2,

pragma restrict\_references(longitude\_function,WNDS)

);

/

CREATE TYPE imports\_exports\_type AS VARRAY (5) OF import\_export\_type;

/

CREATE TABLE port\_info

(

port\_name VARCHAR2(100),

location location\_type,

populaion NUMBER,

visits\_tanker NUMBER,

visits\_dry\_good\_ships NUMBER,

imports\_exports imports\_exports\_type);

/

CREATE OR REPLACE TYPE BODY location\_type AS

member function longitude\_function return VARCHAR2 IS

st port\_info.location.longitude%type;

result VARCHAR2(20);

BEGIN

SELECT p.location.longitude INTO st FROM port\_info p

WHERE p.location.longitude= self.longitude;

If (st < 0) then

result:= REPLACE(CONCAT(to\_char(st),'W'),'-','');

else

result:= CONCAT(to\_char(st),'E');

End if;

RETURN result;

END;

END;

/

INSERT INTO port\_info VALUES (

'Port of Los Angeles',

location\_type('Los Angeles', 33.729167,118.261944 ),

91000,200,100,

imports\_exports\_type (

import\_export\_type ('furniture',4,1))

);

INSERT INTO port\_info VALUES (

'Port of Hamburg',

location\_type('Hamburg',54.5461,9.9661 ),

33000,100,8,

imports\_exports\_type (

import\_export\_type ('automobile\_parts',0,0.9))

);

INSERT INTO port\_info VALUES (

'Port of Durban',

location\_type('Durban',29.8731,31.0245 ),

33400,500,8,

imports\_exports\_type (

import\_export\_type ('footwear',0,3.9))

);

INSERT INTO port\_info VALUES (

'Port of Shanghai',

location\_type('Shanghai',30.626539,122.064958),

13000,10,8,

imports\_exports\_type (

import\_export\_type ('electronics',0,8.6))

);

INSERT INTO port\_info VALUES (

'Port of Belize',

location\_type('Belize',17.483,-88.183 ),

83000,19,7,

imports\_exports\_type (

import\_export\_type ('cotton',0,8.4))

);

INSERT INTO port\_info VALUES (

'Port of Jackson',

location\_type('Sydney',-33.85833,151.23333 ),

73700,70,4,

imports\_exports\_type (

import\_export\_type ('scrap metal',6.9,0))

);

INSERT INTO port\_info VALUES (

'Port of London',

location\_type('London',51.5,0.05 ),

38000,76,8,

imports\_exports\_type (

import\_export\_type ('apparel',2.6,0))

);

INSERT INTO port\_info VALUES (

'Port of Laem Chabang',

location\_type('Laem Chabang',13.01041,100.9150 ),

35000,53,5,

imports\_exports\_type (

import\_export\_type ('wastepaper',2.5,0))

);

INSERT INTO port\_info VALUES (

'Port of Montreal',

location\_type('Montreal',45.547,-73.530 ),

36000,17,8,

imports\_exports\_type (

import\_export\_type ('apparel',0,7.3))

);

INSERT INTO port\_info VALUES (

'Port of Vishakapatnam',

location\_type('Vishakaptnam',17.69833,83.278611 ),

33078,60,3,

imports\_exports\_type (

import\_export\_type ('iron ore',0,5.5))

);