Homework 8

Consider a relation of cities: cities(Id, City, Region, Lat, Lon), where Lat a Lon are GPS coordinates. Segments of a network serviced by multiple carriers are in the relation net(F, T, W, C), where F is an Id of the beginning city, T is an Id of the destination city, W is an Id of the carrier, C is a cost.
Extract the attachment hw8.zip and run
psql -q –f db.sql
in order to accommodate these relations in your PostgreSQL database.

A built-in function haversine(LatX, LonX, LatY, LonY) computes the length of a segment in km. For example, select haversine(0, 0, 0, 1); (1 degree of latitude on the equator) returns 111.226342571095.

A path between cities X a Y is a sequence of segments. The first segment begins in X, the last segments ends in Y. A path cost is the sum of costs of its segments.

Insert the following SQL queries into the attached file queries.sql:
1. Find whether the database contains a cyclic path (a cyclic path begins and ends in the same city).
2. For each path between cities ‘kaau’ (Id=28588) and ‘onteora park’ (Id=83147), find tuples [Hops, Length, Cost], where Hops is the path’s length in the number of segments, Length is the path’s length in km, Cost is the path’s cost.
3. Optimise the query from task 2 using an ordinary magic transformation.
4. Finds segments
[Id1, City1, Region1, Lat1, Lon1, Id2, City2, Region2, Lat2, Lon2, Dist],
which lie on a path between cities ‘kaau’ (Id=28588) and ‘onteora park’ (Id=83147).
5. Optimise the query from task 4 using an ordinary magic transformation.

Run
psql -q -f go.sql > out.txt

Hand out queries.sql, out.txt, report.pdf. Include the Datalog queries in report.pdf (hint: begin with Datalog).