FACULDADE DE ENGENHARIA DA UNIVERSIDADE DO PORTO
Mestrado Integrado em Engenharia Informática e Computação

Database Technology

Assignment nr. 3

Version 3 – Cultural facilities

NoSQL Assignment

Goals

Build a small DB using two distinct NoSQL approaches, a document database (MongoDB) and a graph database (Neo4j) and compare both approaches and with the relational approach.

Work groups

The assignment should be executed by a team of one or two elements.

Subject

The facilities where cultural activities take place are characterized by a name and a capacity, are of a certain room type and are located in an address in a municipality. An id number has been attributed, for identification purposes. The type is represented by a number with an associated description (theatre, cinema, …).

A municipality is described by an official code and a designation and is located in a district and in a region. The need to indicate the region of the municipality is due to the fact that some districts include municipalities from more than one region. The districts have also official codes and designation. There is also a region attribute, with the region code, for the cases of the districts completely integrated in a region. In the cases that some municipalities of a district are in a region and others in another, the attribute region is null. The regions also have a code and a designation, plus the attribute NUT1, which may be Continente, Açores or Madeira.

The activities take place in the cultural facilities. The recorded activity categories are cinema, circus, dance, music, bullfights and theatre. As in each place there may be activities of more than one category, each row in the Uses table indicates the id of the place and the ref of an activity occurring there.

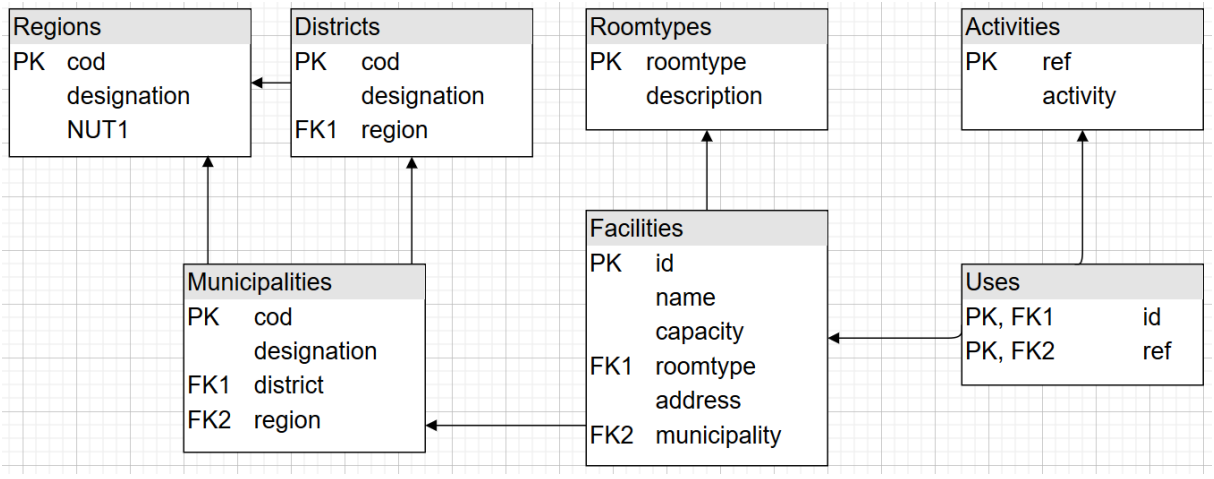

Figure 1 Database model for the Cultural Facilities case.

The tables of this database are available in the user GTD8 in the Oracle server (connection: BD, user: <user>, password: <pass>, host: oraalu.fe.up.pt, port: 1521, SID: ALU).

TASKS

The following tasks should be performed, described in a report and presented in a specific session:

1) Design a Mongo document model for the Cultural Facilities example, explaining the decisions made. The information available under this model should be equivalent to the information in the relational database.
2) Migrate the data from the Oracle user GTD8 into the NoSQL database. One possibility is to write a PL/SQL package able to extract the data using an appropriate SQL query and to produce the appropriate Mongo method calls to populate the NoSQL database designed in 1). Other methods may be used. Document the procedure in the report, anyway.
3) Design a Neo4j graph model for the Cultural Facilities example.
4) Migrate the data from the Oracle user GTD8 into the Neo4j database.
5) Prepare Mongo and Neo4j queries for the following questions:
    a. Which are the facilities where the room type description contains ‘touros’ and have ‘teatro’ as one of their activities? Show the id, name, description and activity.
    b. How many facilities with ‘touros’ in the room type description are there in each region?
    c. How many municipalities do not have any facility with an activity of ‘cinema’?
    d. Which is the municipality with more facilities engaged in each of the six kinds of activities? Show the activity, the municipality name and the corresponding number of facilities.
    e. Which are the codes and designations of the districts with facilities in all the municipalities?
    f. Ask the database a query you think is interesting.
6) Compare the Mongo, Neo4J and Oracle implementations from the viewpoints of data size, processing time, and query easiness.