Advanced Databases & noSQL (INFDEV03-5) Assignment 3

Instructions

- The assignment must be submitted on Friday of week 7 at 23:59.
- The assignment must be implemented using Neo4j.
- Deliver the cypher queries into a <u>text</u> file (not word!).
- Deliver also the database folder of Neo4j (your database_name.graphdb).

You can do either assignment A or B

Assignment A

Consider the Entity-Relationship diagram in Figure 1 representing the model for an airport database.

- Give a graph database implementation in Neo4j. Fill in the database with data satisfying the following constraints:
 - At least 6 airports, two of which must be name 'Schiphol', and 'Venezia Marco Polo', two must be located in 'London', and one in 'Rome'.
 - The values of size in airports must be 'Small', 'Medium', or 'Large'.
 - At least one airport must be 'Large'.
 - Each airport must have at least 5 terminals.
 - 'Venezia Marco Polo' must have a terminal 'B'.
 - At least 5 companies, two of which must be 'Lufthansa' and 'KLM'.
 - At least 5 flights, one of which must be scheduled before 15:00.
 - At least 3 gates per terminal.
 - The values for state in gates must be either 'Boarding' or 'Closed'.
 - There must be a 'Boarding' gate for terminal 'B' in 'Venezia Marco Polo'.
- Implement the following queries in cypher:
 - 1. Find the name and the capacity of all 'Large' airports.
 - 2. Find the total capacity of the airports in the same city. Output the name of the city and the total capacity.
 - 3. Find the name of the airport with the highest capacity. Output the name and the capacity.

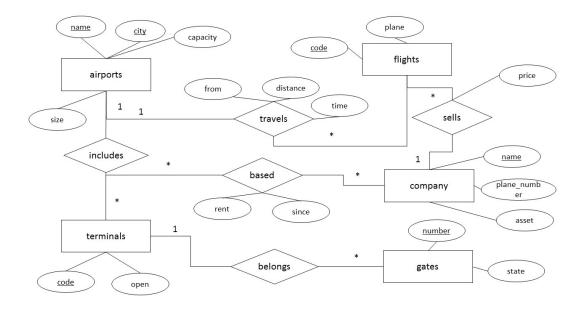


Figure 1: ER Diagram for the assignment

- 4. Find all the opened terminals in 'Schiphol'. Output the code.
- 5. Find all the terminals of the airports in 'London'. Output the code.
- 6. Find all the gates that are boarding in 'Venezia Marco Polo' for terminal 'B'. Print the number and the state.
- 7. Find all the flights landing in 'Rome' for 'Lufthansa' and 'KLM'. Print the code and the plane.
- 8. For each company find the amount of flights going to 'Rome' leaving before 15:00. Print the company name and the total of flights.

Assignment B

Consider the normalized table structure you have created for assignment 1 about the multinational company application. Your tasks are:

- Re-factor the application in order to use it with the graph database (Neo4j)
- Re-implement the CRUD operations for each table to get work with the graph database
- Map 5 entity sets and their relationships from your relational database to the equivalent structure in graph database
- Reimplement the queries from assignment 2 using cypher queries and show the results in your application
 - 1. An employee is underworking if he is working less than 5 hours on his projects, he is working normally if he is working between 5 and

- 20 hours, and he is overworking if he is working more than 20 hours. Output the number of employees that are overworking per project.
- $2.\ \,$ Find the total working hours of all employees and average working hours per employee.
- 3. Find the total fee of an employee. This number is obtained by multiplying the working hours on all the projects by the hour fee of his position.