



DALHOUSIE
UNIVERSITY

Master of Applied Computer Science
MACS

CSCI 5408

Data Management, Warehousing and Analytics

ASSIGNMENT 3

PROBLEM 2

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Neo4j Graph Database

Neo4j is NoSql graph database that is used to store data in a graphical format using Nodes and Relationships. Nodes and relationships can contain variables, labels and properties.

Neo4j has flexibility in terms of relationship between nodes. Existing relational databases makes use of expensive join operation to traverse relationship between nodes whereas Neo4j stores relationship across every data or node making it flexible.

Elements of Neo4j Graph

Node

A node represents data or holds data within a graph.

Relationship

Relationship defines how each node in a graph are related to each other. Relationship can be unidirectional or bidirectional.

Variables

Variables are optional in graph variables are used to uniquely identify the data or the relationship while running a cypher query.

Labels

Labels identify a particular type to which the node belongs to. For eg. it can be a place, person, etc.

Properties

Properties are data that is being stored with in a node. A node can have multiple properties.

Cypher Query language

Similar to Structured Query Language(SQL) graph makes use of Cypher Query Language(CQL) to perform operations on data that is stored within a graph.

CQL matches a particular pattern and performs operation and return result as per the requirement.

Creating a node with node variable, label and property

```
CREATE( s : Subject {name : "DBMS"} )  
CREATE( c : Masters {name : "MACS"} )
```

Creating a relationship between nodes

```
Create (c) -[ r : CONSIST_OF ]-> (s)
```

Consider an application which keeps track of the important tourist places province wise in Canada. As the capital of Canada belongs to Ontario Province in the graph it is considered as the central point that connects other provinces.

Step 1: Creating nodes for each province

```
CREATE (p:province {name:"Ontario"})
CREATE (p:province {name:"Alberta"})
CREATE (p:province {name:"Nova Scotia"})
CREATE (p:province {name:"Quebec"})
CREATE (p:province {name:"British Columbia"})
```

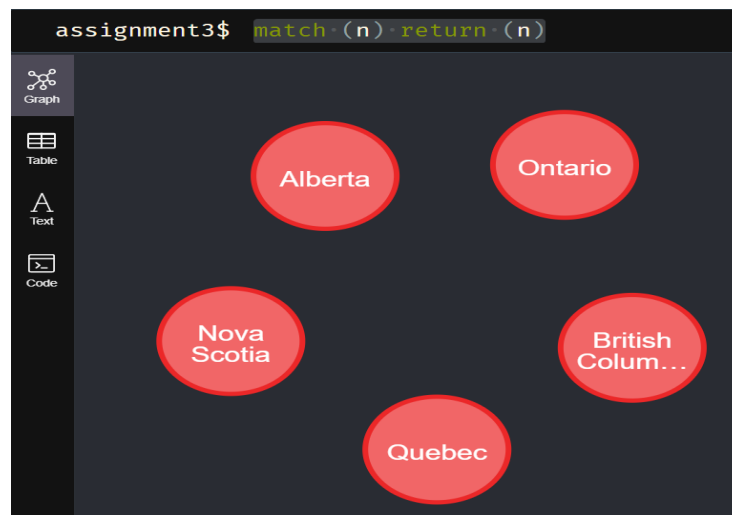


Fig. Province Nodes

Step 2: Creating nodes for tourist places province wise

```
CREATE (l:location {name:"CN Tower"})
CREATE (l:location {name:"Niagara Falls"})
CREATE (l:location {name:"Wonderland"})
```

```
CREATE (l:location {name:"Banff National Park"})
CREATE (l:location {name:"Lake Louise"})
CREATE (l:location {name:"Calgary Stampede"})
```

```
CREATE (l:location {name:"Peggys Cove"})
CREATE (l:location {name:"Shubie Park"})
CREATE (l:location {name:"Cape Breton Island"})
```

```
CREATE (l:location {name:"Mont Tremblant"})
CREATE (l:location {name:"Hudson bay"})
```

```
CREATE (l:location {name:"Sunset Beach"})
CREATE (l:location {name:"Nelson"})
CREATE (l:location {name:"Takakkaw Falls"})
```

Step 3: Creating Relationship between tourist places and the province they belong

```
MATCH (p:province), (l:location)
WHERE l.name = "Niagara Falls" AND p.name = "Ontario"
CREATE (l)-[r:LOCATED_IN]->(p)
```

```
MATCH (p:province), (l:location)
WHERE l.name = "CN Tower" AND p.name = "Ontario"
CREATE (l)-[r:LOCATED_IN]->(p)
```

```
MATCH (p:province), (l:location)
WHERE l.name = "Wonderland" AND p.name = "Ontario"
CREATE (l)-[r:LOCATED_IN]->(p)
```

Similarly created relationship between every place and province.

Step 4: Developing relationship among provinces.

```
MATCH (p:province), (l:province)
WHERE l.name = "Ontario" AND p.name = "Nova Scotia"
CREATE (l)-[r:LINKED_TO]->(p)
```

```
MATCH (p:province), (l:province)
WHERE l.name = "Nova Scotia" AND p.name = "Ontario"
CREATE (l)-[r:LINKED_TO]->(p)
```

Similarly created relationship for all provinces.

Step 5: Output

The graph contains all the created nodes and relationship developed between nodes. Using CQL, DML operations can be performed as per the requirement.

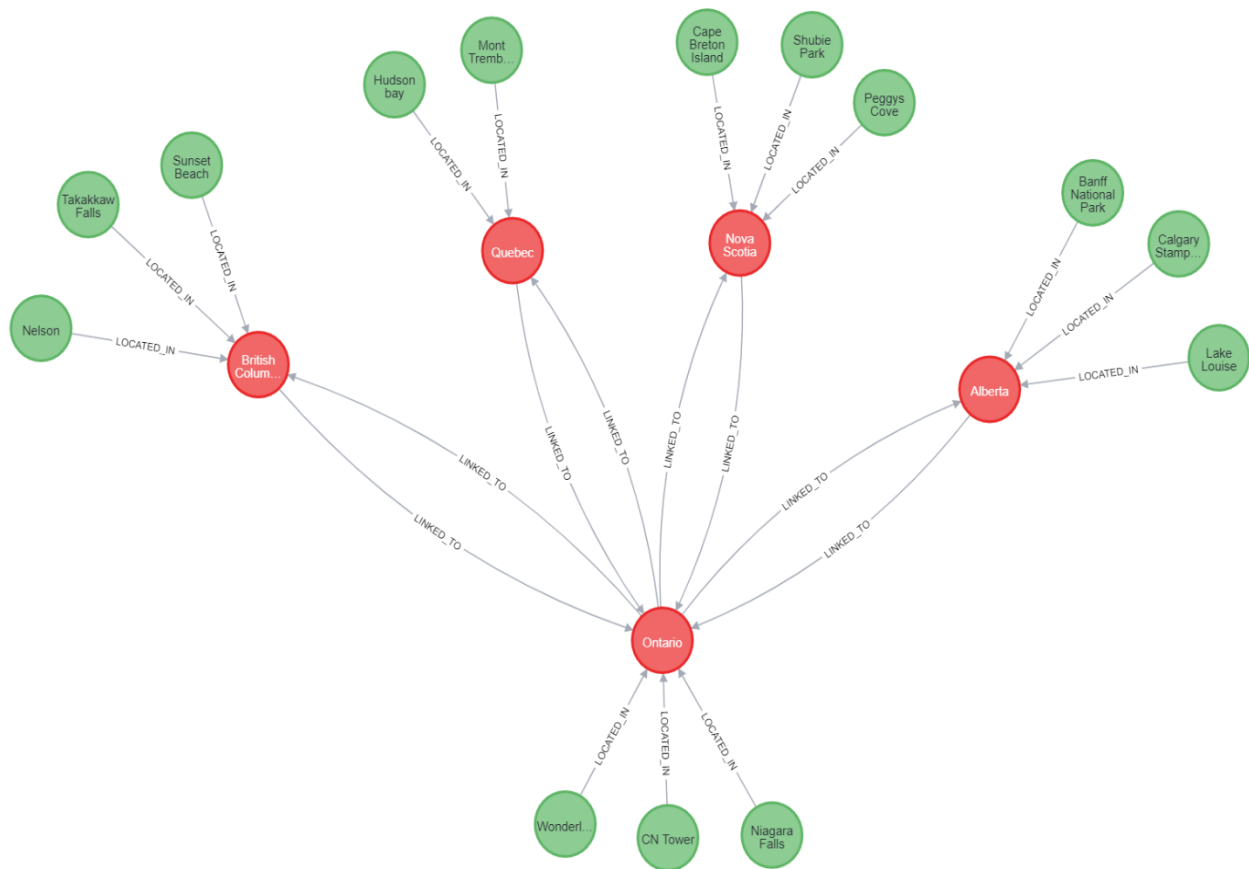


Fig. Final Graph

Citations

[1] “Getting Started Guide for Neo4j version 5,” *Neo4j Graph Data Platform*, 2021. <https://neo4j.com/docs/getting-started/current/> (accessed Nov. 12, 2022).

[2] “Neo4j Create Nodes - javatpoint,” *www.javatpoint.com*, 2021. <https://www.javatpoint.com/neo4j-create-nodes> (accessed Nov. 12, 2022).

[3] “Neo4j Tutorial,” *Tutorialspoint.com*, 2022. <https://www.tutorialspoint.com/neo4j/index.htm> (accessed Nov. 12, 2022).