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CSE 4410
Database Management Systems II
Lab 9

Problem Statement

- Let's assume you want to build a recommendation engine for your online bookshop. Your online bookshop sells a variety of books and you want to improve the customer's buying experience by recommending books that they are likely to purchase by analyzing shared personal details and monitoring which books go together in one's purchase list.

  This type of scenario generally includes four types of nodes-

  - Customer: Contains information about customers such as customer ID, name, phone_no, and demographic information like age, gender, country etc.
  - Genre: It helps to filter different books according to the genre.
  - Author: Contains information about authors such as name, country, date_of_birth etc.
  - Book: Contains information like title, published_year, language, page_count, price etc.

  And the relations are the following-

  - Customers purchase or rate books. The purchase information also includes purchasing_date and amount.
  - Customer can also rate authors(this is different from rating a book).
  - Books can be of different genres.
  - Books can have multiple volumes.
  - Authors write books. And this includes the writing_year.

Task 1

Create necessary nodes and relations with properties.

Code

Creating nodes

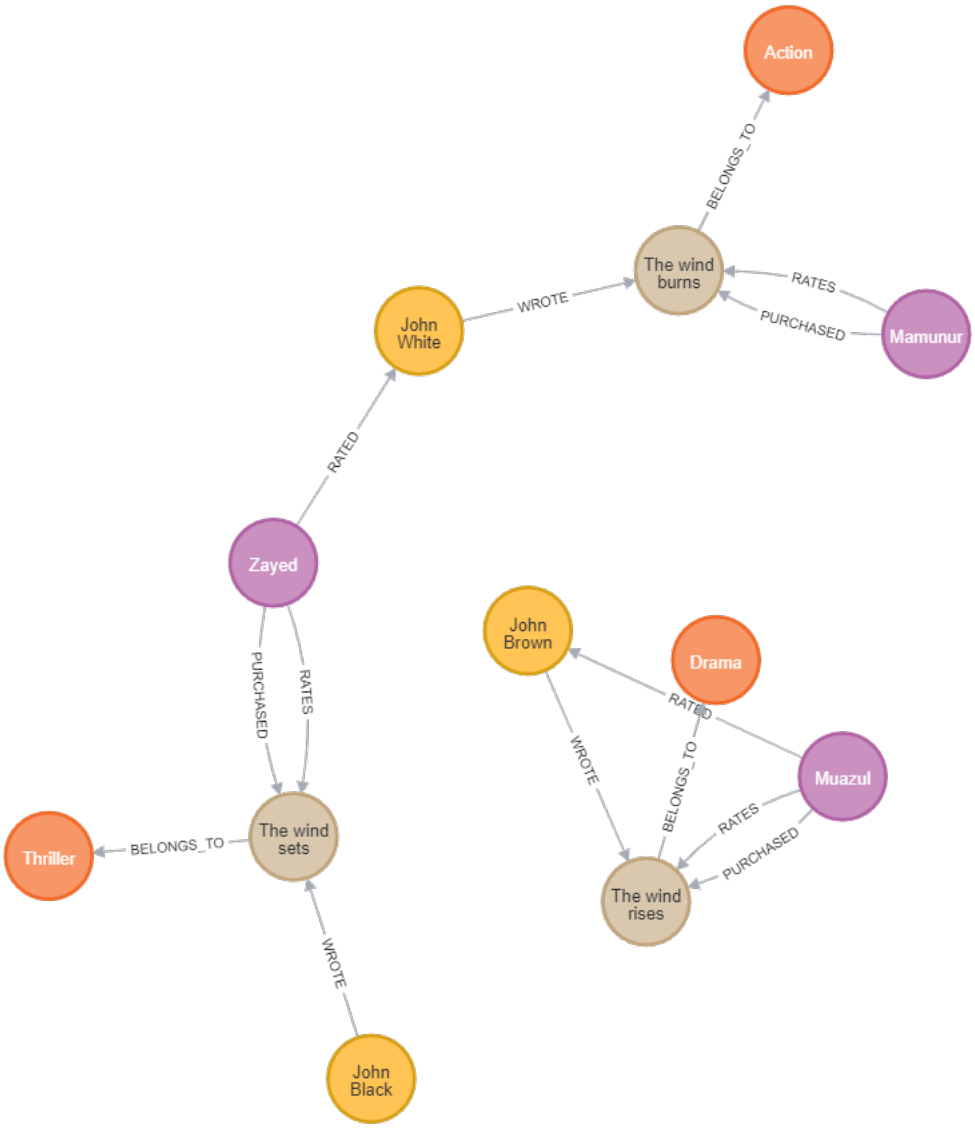
```
create (:Customer{ID:'32', name:"Muazul", phone:'0171', age:"22", gender:"male", country:"Bangladesh"})
create (:Customer{ID:'16', name:"Mamunur", phone:'0171', age:"22", gender:"male", country:"Bangladesh"})
create (:Customer{ID:'53', name:"Zayed", phone:'0171', age:"22", gender:"male", country:"Bangladesh"})

create (:Genre{name:"Drama"})
create (:Genre{name:"Thriller"})
create (:Genre{name:"Action"})

create (:Book{title:"The wind rises", published_year:date("2020-05-06"), page_count:"1200", price:"150"})
create (:Book{title:"The wind sets", published_year:date("2018-05-06"), page_count:"1000", price:"40"})
create (:Book{title:"The wind burns", published_year:date("2019-05-06"), page_count:"1600", price:"50"})

create (:Authors{name:'John Brown', country:"USA", dateOfBirth:date("1969-03-28")})
create (:Authors{name:'John Black', country:"UK", dateOfBirth:date("1969-11-8")})
create (:Authors{name:'John White', country:"Bangladesh", dateOfBirth:date("1969-03-8")})
```

Creating Relationships

```
--PURCHASING
MATCH (c:Customer), (b:Book)
WHERE c.ID = '32' AND b.title = 'The wind rises'
CREATE (c)-[:PURCHASED {purchasing_date: date('2022-01-01'), amount: 100}]->(b)

MATCH (c:Customer), (b:Book)
WHERE c.ID = '53' AND b.title = 'The wind sets'
CREATE (c)-[:PURCHASED {purchasing_date: date('2022-01-02'), amount: 50}]->(b)

MATCH (c:Customer), (b:Book)
WHERE c.ID = '16' AND b.title = 'The wind burns'
CREATE (c)-[:PURCHASED {purchasing_date: date('2022-01-03'), amount: 75}]->(b)


--RATING
MATCH (c:Customer), (b:Book)
WHERE c.ID = '32' AND b.title = 'The wind rises'
CREATE (c)-[:RATES {rate:5.0}]->(b)

MATCH (c:Customer), (b:Book)
WHERE c.ID = '53' AND b.title = 'The wind sets'
CREATE (c)-[:RATES {rate:4.2}]->(b)

MATCH (c:Customer), (b:Book)
WHERE c.ID = '16' AND b.title = 'The wind burns'
```

```
CREATE (c)-[:RATES {rate:3.8}]->(b)


--AUTHOR RATING
MATCH (c:Customer), (a:Authors)
WHERE c.ID = '32' AND a.name = 'John Brown'
CREATE (c)-[:RATED {score: 8}]->(a)

MATCH (c:Customer), (a:Authors)
WHERE c.ID = '53' AND a.name = 'John White'
CREATE (c)-[:RATED {score: 9}]->(a)

--GENRE
MATCH (b:Book), (g:Genre)
WHERE b.title = 'The wind rises' AND g.name = 'Drama'
CREATE (b)-[:BELONGS_TO]->(g)

MATCH (b:Book), (g:Genre)
WHERE b.title = 'The wind sets' AND g.name = 'Thriller'
CREATE (b)-[:BELONGS_TO]->(g)

MATCH (b:Book), (g:Genre)
WHERE b.title = 'The wind burns' AND g.name = 'Action'
CREATE (b)-[:BELONGS_TO]->(g)


--WRITES
MATCH (a:Authors), (b:Book)
WHERE a.name = 'John Brown' AND b.title = 'The wind rises'
CREATE (a)-[:WROTE {writing_year: 2018}]->(b)

MATCH (a:Authors), (b:Book)
WHERE a.name = 'John Black' AND b.title = 'The wind sets'
CREATE (a)-[:WROTE {writing_year: 2017}]->(b)

MATCH (a:Authors), (b:Book)
WHERE a.name = 'John White' AND b.title = 'The wind burns'
CREATE (a)-[:WROTE {writing_year: 2019}]->(b)
```

Snippet of the Graph



Task 2

2. Cypher Query

   (a) Find the total revenue generated by each book.

   (b) Find the average rating for each genre.

   (c) Find books purchased by a customer 'N' within a specific time range.

   (d) Find the customer who buys the maximum number of books.

   (e) Find the best-seller books by the number of purchases.

   (f) Find the customer who bought or rated a certain book. for example 'A'

   (g) Find the customer who bought the books of a certain author. for example 'X'

   (h) Find books frequently purchased together.

Code

a

```
MATCH (b:Book)<-[p:PURCHASED]-()
RETURN b.title, sum(p.amount) as total_revenue
```

b

```
MATCH (g:Genre)<-[b:BELONGS_TO]-(book)<-[r:RATES]-()
RETURN g.name, avg(r.rate) as average_rating
```

c

```
MATCH (c:Customer {name: 'Muazul'})-[p:PURCHASED]->(b:Book)
WHERE p.purchasing_date >= date('2022-01-01') AND p.purchasing_date <= date('2022-12-31')
RETURN b.title, p.purchasing_date, p.amount
```

d

```
MATCH (c:Customer)-[p:PURCHASED]->(b:Book)
RETURN c.name, count(p) as total_books
ORDER BY total_books DESC
LIMIT 1
```

e

```
MATCH (b:Book)<-[p:PURCHASED]-()
RETURN b.title, count(p) as total_purchases
ORDER BY total_purchases DESC
```

f

```
MATCH (c:Customer)-[r:RATED|PURCHASED]->(b:Book)
WHERE b.title = 'The wind sets'
RETURN c.name
```

g

```
MATCH (a:Authors{name:"John Brown"})-[:WROTE]->(b:Book)<-[:PURCHASED]-(c:Customer)
RETURN c.name
```