NSQ1 S25 Course Assignment 3

# Question 1 – Model database

1. Design a graph model for the bookstore model. Make note of the choices you make and why. Document the model using either <https://arrows.app/> or screenshots from the browser.

**Graph Model Design Choices:**

* **Book-Copy**: Instead of embedding book copies as documents in MongoDB, in the graph model, book copies are nodes to allow better representation of relationships like orders containing book copies.
* **Categories and Genres**: as nodes for more flexibility in querying or visualizing the graph.

1. Enter data according to the model

# Question 2 – Work with data

Answer the following questions in Neo4j using your model from question 1.

## Modifying data

Use Cypher statements to execute the following scenarios. Transactions are not supported in the neo4j browser, so try to solve each exercise with a single statement.

If nothing else is stated, assume you know the object ids of the objects involved.

1. Sell a book to a customer.
2. Change the address of a customer.
3. Add an existing author to a book.
4. Retire the "Space Opera" category and assign all books from that category to the parent category. Don't assume you know the id of the parent category.
5. Sell 3 copies of one book and 2 of another in a single order

## Querying data

Write Cypher queries to return the following data

1. All books by an author
2. Total price of an order
3. Total sales (in £) to a customer
4. Books that are categorized as neither science fiction nor fantasy
5. Average page count by genre
6. Categories that have no sub-categories
7. ISBN numbers of books with more than one author
8. ISBN numbers of books that sold at least X copies (you decide the value for X)
9. Number of copies of each book sold – unsold books should show as 0 sold copies.
10. Best-selling books: The top 10 selling books ordered in descending order by number of sales.
11. Best-selling genres: The top 3 selling genres ordered in descending order by number of sales.
12. All science fiction books. Note: Books in science fiction subcategories like cyberpunk also count as science fiction.
13. Characters used in science fiction books. Note from (12) applies here as well.
14. Number of books in each category including books in subcategories.

# Question 3 – GraphQL

**Note: It’s difficult to come up with queries and mutations that aren’t possible to solve somehow with standard queries and mutations in the Neo4j driver for Apollo Server, but create your own for the exercise.**

1. Create a schema definition in GraphQL Definition Language for your data model
2. Add relationships (@relationship) to connect it to the data model
3. Define queries in the Query type:
   * Given a search term, all books that have the search term as part of the title *or* has the search term as part of the author names
   * Given the email of a customer and the name of a genre, all orders from the customer that contain any books from the genre
   * Given the name of a category, all books in the category, its subcategories and their subcategories and so on
4. Define mutations in the Mutation type:
   * Create an order for a single book and a customer (1-click)
   * Create an order for many books and one customer
   * Apply x% reduction on all books by an author

# Question 4 – Report

Write a report on the experience gained by completing the questions above. The report should contain answers to the questions

* What were the decisions taken in the modelling?
* Why were these decisions taken?
* What were the consequences of these decisions?
* What were the difficult and easy parts of the exercise?
* How does that compare to the other exercises?
* What are the advantages and disadvantages of graph databases compared to the other database types?

# Rules

* Make the exercise in groups of 2 – 4