CS 327E Project 7, due Thursday, 11/02.

This assignment uses the sample dataset BBC Good Foods. Please make sure that all your work for this project is done with this dataset. No credit will be given if you construct your queries using a different dataset.

- Create a new instance in Neo4j Aura. Instead of choosing the smallest instance, choose a medium size instance, like the one with 4GB of RAM. This is because the BBC Good Foods graph is substantially larger than the Movie graph (with 16,075 nodes as opposed to 171) and we don't want to run out of memory. This also means that we need to be vigilant about pausing our instances as soon as we're done with our work.

- Once the instance is running, open the Neo4j Browser and connect to it.

- Run the `:play recipes` in the Neo4j cell. This brings up an interactive guide. The second page creates indexes to speed up the queries, but it has some syntax errors. You can skip this page. Import the **recipe** data from the third page, the **authors** and **ingredients** on the fourth page, and the **diet types** from the fifth page. You can skip importing the keywords from the fifth page as it takes over 30 minutes. On the sixth page, import the **collections**. The rest of the guide shows some sample queries. Feel free to refer to them, but don't submit queries that look too similar. You really need to come up with your own.

- Once the data has loaded, explore the graph in the browser.

- Create a `project7.ipynb` notebook.

- Create a `CONNECT` variable to your Neo4j instance and register the Cypher cell magic. See `neo4j.ipynb` for details.

- Add a Markdown comment on the last cell with the heading "begin project 7 work".

- Implement 10 Cypher queries in your notebook. All queries must use the MATCH keyword. Precede each query with a short Markdown comment that describes its function. Altogether, the queries must satisfy the minimum criteria specified below:

Number of queries	**Operation**
1	Return the unique node labels and the number of nodes for each
1	Return the unique relationship types and the number of relationships for each

2+	Query containing a logical AND Hint: An example of a logical AND query is: *who are the people who directed a movie and also acted in the same movie*.
2+	Query containing a logical OR Hint: An example of a logical OR query is: *who are the people who directed a movie or acted in the same movie*.
2+	Query containing a negation Hint: An example of a negation is: who are the people who didn't act in any movie
2+	Write a query that contains at least three relationship types
1+	Query containing DISTINCT
1+	Return properties of nodes
1+	Return properties of relationships
1+	Order results in ascending order
1+	Order results in descending order

- Feel free to use the LIMIT clause.
- Feel free to experiment with CASE statements, subqueries, and other more advanced constructs. Refer to the Cypher Refcard for details.

Part 2: Optional Extra Credit

This portion of the assignment is optional and worth 5 extra points. The extra points add on to your exam grade for Midterm 1. **No late submissions will be accepted for extra credit.**

- Add a Markdown comment on the last cell with the heading "begin extra credit work".

- Implement 10 mutating operations using CREATE, MERGE, SET, DELETE, and MATCH. Precede each operation with a Markdown comment that describes its function. Altogether, the 10 mutations must meet these minimum criteria:

Number of mutations	Operation
1	Create a new node for each existing node label with at least one property
1	Create a relationship for each existing relationship type with at least one property
1	Update the properties of one or more nodes
1	Update the properties of one or more relationships
1	Add a new node label to an existing node
1	Update the relationship type of at least one relationship
1	Delete at least one relationship based on some criteria
1	Delete at least one node based on some criteria
1	Create a unique constraint on a node property
1	Create a unique constraint on a relationship property

CS 327E Project 7 Rubric
Due Date: 11/02/23

Implement the 10 queries as specified in the table of minimum criteria: **-9** for each missing query or query which wasn’t run or query which produced an error **-5** for each required criteria that is not met by the 10 queries **-1** for each query that is missing or incorrect a Markdown comment	100
Implement the 10 mutating operations as specified in the table of minimum criteria: **-.5** for each missing operation or operation which produced an error **-.5** for each required criteria that is not met by the 10 operation **-.1** for each query missing or incorrect a Markdown comment	5 exam points
`project7.ipynb` pushed to your group’s private repo on GitHub. Your project **will not** be graded without this submission.	**Required**

`submission.json` submitted into Canvas. Your project **will not** be graded without this submission. The file should have the following schema:
`{`
`    "commit-id": "your most recent commit ID from GitHub",`
`    "project-id": "your project ID from GCP"`
`}`
Example:
`{`
`    "commit-id": "dab96492ac7d906368ac9c7a17cb0dbd670923d9",`
`    "project-id": "some-project-id"`
`}`
	Required

Total Credit:	**100**