CSCI 3287 Design and Analysis of Database Systems

Homework # 6 -- MongoDB Lab
November 16, 2020

Overview

This Project is worth 100 points (out of 1000) toward your final grade. It is due on Sunday, November 29 at 11:59 p.m. Your assignment submission should be a document saved and submitted as a PDF file via the link found in the assignment section of "Week 13" in Canvas which is the same place where you found this file.

This assignment will give you hands-on practice in working with the MongoDB "NoSQL" database software.

Objectives

1. Download and install MongoDB
2. Create a MongoDB database to store a collection of documents
3. Load a large amount of document-based data into the collection
4. Query the document collection to research a topic and answer questions

Introduction:

The following links are helpful for an introduction MongoDB concepts and learning the basics of the MongoDB query language.

1. https://www.tutorialspoint.com/mongodb/mongodb_overview.htm : This link provides a basic overview of MongoDB and the basic queries for inserting documents, updating documents, query documents etc.

2. https://www.guru99.com/mongodb-tutorials.html#1 : This is a beginner tutorial and also has links for installing and running mongoDB with images which may be helpful for students.

3. https://docs.mongodb.com/manual/introduction/ : The official MongoDB documentation page.

Installation:

The following links are helpful for completing the installation of mongoDB:

Mac System:

1. https://docs.mongodb.com/manual/tutorial/install-mongodb-on-os-x/ : I have personally tried the installation and it works without issues. Hint: the **.bashrc** file in mac is /Users/apple/.bash_profile.

Windows System:

2. https://www.mongodb.com/download-center/community?tck=docs_server This is the official download site and documentation for windows installation.

Linux System:

3. https://docs.mongodb.com/manual/administration/install-on-linux/ : The official installation for linux installation.

https://docs.mongodb.com/manual/installation/ : This link provides greater detail about the operating systems supported by mongoDB.

Students should install the free community edition of mongoDB.

In the following 8 questions in Section 1, you will have the opportunity to play with different basic operations in MongoDB. You can then use these tools to learn with a real-world data set, and answer the questions below based on the data set in Section 2.

Section 1: Basic operations in MongoDB

1. **Create a database:** `use DATABASE_NAME`

   Ex:
   ```
   >use new_mongo_db
   ```

   The above command will create a database if it does not exist and/or use the database if it already exists.

   Replace `DATABASE_NAME` with the name of the database you want to create.

2. **Drop a database:** `db.dropDatabase()`

   Ex:
   ```
   >use new_mongo_db
          switched to db new_mongo_db
   >db.dropDatabase()
   ```

   i. First you need to switch (with a "`USE`") to the database to be dropped. Then the above command will drop that database.

3. **Creating a collection:** `db.createCollection(name, options)`

Ex:

```
>use new_mongo_db
switched to db new_mongo_db
>db.createCollection("test_collection")
{ "ok" : 1 }
```

i. The above command creates the collection. But providing some initial additional options could be useful in certain circumstances.

ii.

1.
```
>db.createCollection("mycol", { capped : true, autoIndexId : true, size :
   6142800, max : 10000 } )
{ "ok" : 1 }
```

2. For more information on the options, please check the following link.
https://docs.mongodb.com/manual/reference/method/db.createCollection/

iii. In mongoDB, it is not necessary to create a collection. When a new document is inserted, mongoDB creates a collection automatically.

4. **Dropping a collection:** `db.COLLECTION_NAME.drop()`

Ex:

```
>use new_mongo_db
switched to db new_mongo_db
>db.test_collection.drop()
True
```

i.

ii. First you need to switch (with a "USE") to the database, and then use the above command to delete the collection.

iii.

5. **Insert a document:** `db.COLLECTION_NAME.insert(document)`

Ex:

```
> db.test_collection.insert({
    title: "Mongo Db practice",
    description: "this is my first MongoDB document"
        })
```

Replace the COLLECTION_NAME with the name of the collection into which you wish to insert documents.

6. **Query a document:** `db.COLLECTION_NAME.find()`

i.

Ex:

```
>db.test_collection.find().pretty()
```

ii. The above query will display the documents present in the collection.

iii. Try it with and without the “`.pretty()`” option.

7. **Update a document:** db.test_collection.update(SELECTION_CRITERIA, UPDATED_DATA)

Ex:

```
>db.test_collection.update({'title':'MongoDB
practice'},{$set:{ 'title':'Updated MongoDB practice'}})
```

i.

ii. The above example is used to update the documents that contain ‘title’ as 'MongoDB practice’ to 'Updated MongoDB practice’

8. **Delete a Document:** db.COLLECTION_NAME.remove(DELLETION_CRITERIA)

i. Remove only one record:

1. db.test_collection.remove({ status : "P" },1)
2. Here the first document which has this key value pair will be deleted.

ii. Remove all records matching a condition:

1. db.test_collection.remove({ status : "P" })
2. Here all the documents which have this key value pair will be deleted.

Section 2: Use a real-world data set to answer the following questions

1. Download the "primer-data.json" JSON dataset from the file posted in the READINGS section of the Week 13 Module.

2. From your ***terminal***, type the following command:

```
mongoimport --db test --collection restaurants --drop --file
~/Desktop/primer-data.json
```

The above command converts the json file and stores it as a set of documents with the collection name of "restaurants". **NOTE**: this command is run in the OS Terminal Shell, not within the Mongo interface.

Answer the following questions by writing queries and displaying the results.

(1) How many restaurants are there in this collection?

(2) List in alphabetical order each different (distinct) cuisine represented in this collection.

(3) Return the name of all restaurants within the zipcode 10025 which serve Chinese cuisine. Return only the names of the restaurants.

(4) Return the count of restaurants in Brooklyn that serve either Greek or Armenian Food.

(5) Return a list of restaurants (names) which have the string "Cheese" in their name.

(6) Return a list of boroughs ranked by the number of French restaurants in the borough. That is, for each borough, find how many restaurants serve French cuisine and print the borough and the number of such restaurants sorted descending by this number. (HINT: use the aggregate method, and use a $group and a $sum.)

(7) Find the top 5 Italian restaurants in Manhattan that have the highest total score. Return for each restaurant the restaurant's name and the total score. (HINT: use the aggregate method with $unwind to parse out the scores array, followed by a $group and a $sum.)

Submission Requirement:

Capture screen shots to show evidence of having completed Section 1 described above. Number each screen shot with the number of the assigned operation/task (1 – 8). Assemble (Copy & Paste) all screen shots into a document.

For Section 2, screenshot or write down your MongoDB command and output for each question.

Save your document as a PDF and upload to Canvas.

> NOTES:
>
> You may work with a partner on completing this assignment. However, this is an **individual** assignment; each one must submit your own final deliverable for this assignment.
>
> If you did work with a partner, be sure to specify your partner's name on the document you submit.