CS 157C Final Report

1. Team Name

RKB

2. Team Members

Richard Ma
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3. Project Name

Business Review System

4. Project Description

The Business Reviews System is an application which features crowd-sourced reviews for businesses. Users can sign up to search for businesses ranging from restaurants to barbershops. They can view the specific services businesses offer as well as reviews of the business. Users can also leave their own reviews of businesses using a five star rating system.

5. Project Successes

- The large data set we used for our application was larger than any other data set we have worked with so far. To accomplish this, our data set was normalized by wrangling it into large documents based on id, name, and other fields.
- Over 15 functions were implemented successfully, with each function accessing the mongo shell using the PyMongo client in our application.
- An end-to-end connection was established between the Python application and the MongoDB database.
- Docker instance setup with mongos, config, and shard servers was set up correctly to connect with AWS.
- Obtained strong understanding of MongoDB queries and how it is translated to work with PyMongo client throughout application.

6. Unexpected Events

- When inserting data into our shard servers, we ran into some issues in regards to failure to load all the documents. This would often lead to our shard servers to time out on multiple occasions. To resolve this problem, we chose indexes and tried several wrangling techniques until all the data had been inserted.
- Because we had to work with around 15 functions, work was divided upon all three group members to set up queries to work with PyMongo. Because each member has their own interpretation on how specific queries should be implemented, this would lead to a program that looks inconsistent from a coding perspective. This was easily remedied by

using a Git repository to monitor changes made to the python application and monitoring those changes in order to make changes to it for testing purposes.

- Occasional crashes to the AWS node would occur at certain times. To fix this, readjustments to our shard servers and dataset were made as a way to improve connectivity between PyMongos and AWS.
- Minor issues involved FileZilla failing to transfer files into our instances.

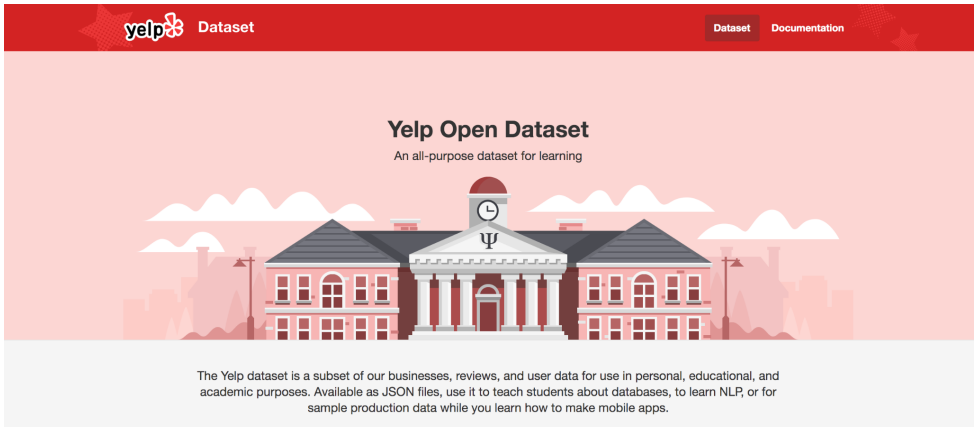
7. Lessons Learned

- AWS configuration of its instances was a component that was designed prior to populating the database with data. Knowing beforehand what was needed allowed the dataset to fit in without causing any failures.
- Inserting a larger dataset allowed us to test our abilities with even larger sizes of data. Whereas previous assignments worked with megabytes of data, larger documents used in this project is something that will be seen in real-world circumstances.
- Testing queries beforehand allowed our group to see whether our functions will react well with the dataset. Since importing and wrangling takes time, it was to our best interest to test them prior to deployment.
- Integrating MongoDB with Python using PyMongo was critical to developing this command line prompt application. Learning how to work with PyMongo has given us a better idea on how to work with other tools in the future.

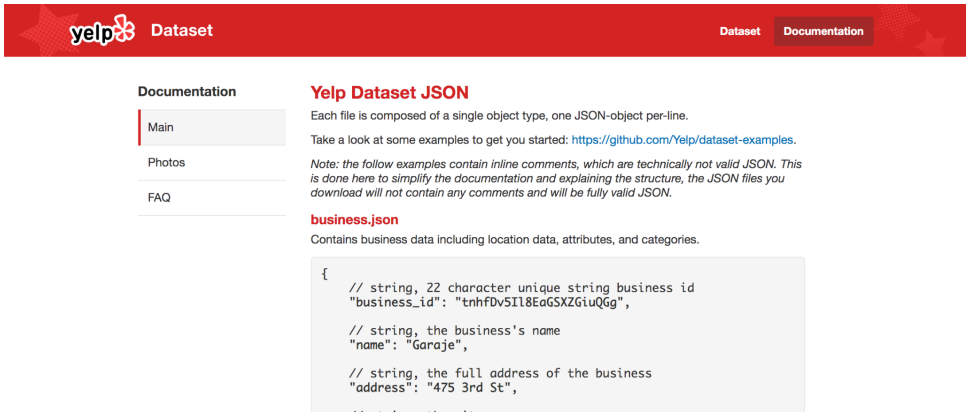
8. DataSet

URL of the data set

The data set we used was a public data set from Yelp. The following is the url is to the public dataset: https://www.yelp.com/dataset



The other link is about the documentation of the dataset, which includes details on the data's fields and other information: https://www.yelp.com/dataset/documentation/main



<u>One line of description of data set including its size</u>

The dataset is a subset of Yelp's business, user, and review data for use in educational and academic purposes. For the purpose of our application, we are only going to be choosing 3 particular datasets from Yelp. While the original size of the total files is around 10 GB, we will only be using a portion for this project. In total, the size of the modified dataset comes to around 1.5 GB of data to be inserted into MongoDB.

<u>Detailed description of data wrangling method</u>

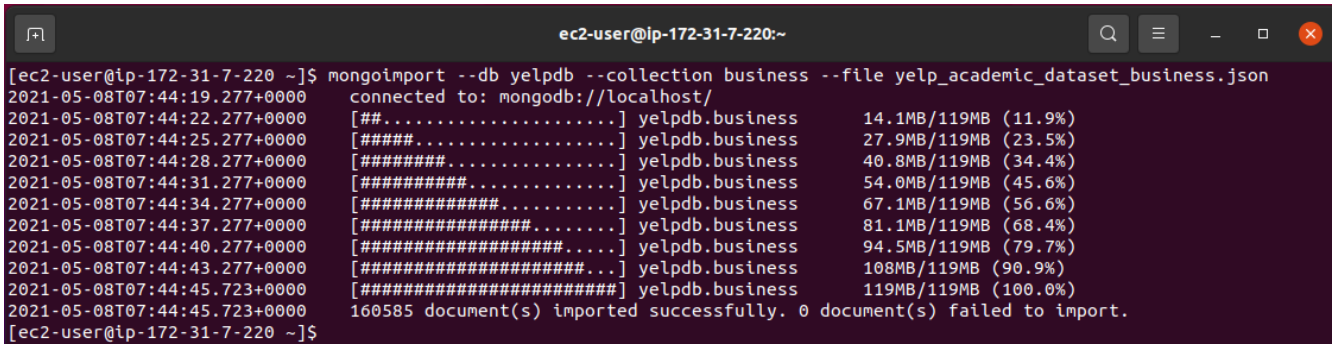
From the links, we downloaded the dataset onto our local machine. For our project's purpose, we picked three JSON files since the dataset would be too big if we were to use all of the files. The following three files are:

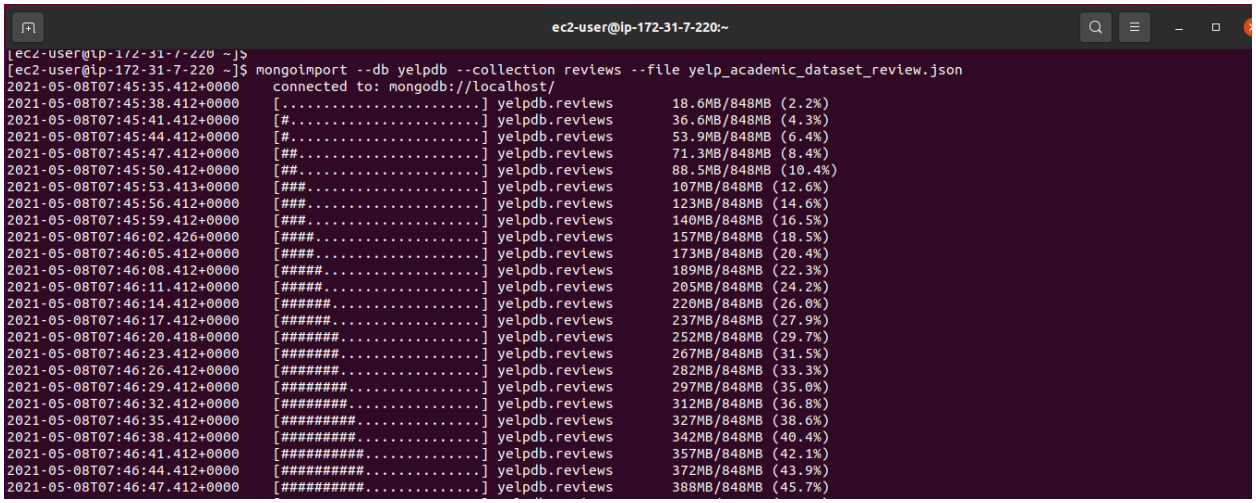
- yelp_academic_dataset_business.json
- yelp_academic_dataset_review.json
- yelp_academic_dataset_user.json

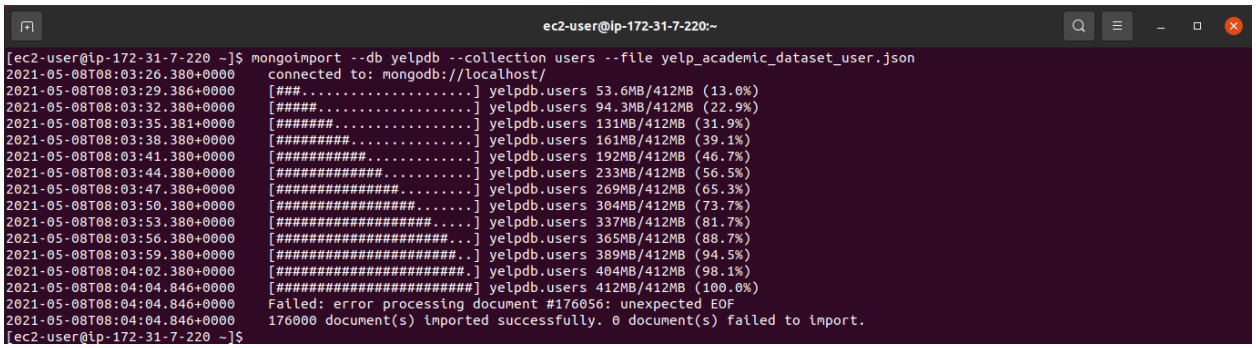
The three datasets did not have to go through any modification changes since we will be using most of the fields that they provide. For indexing, the businesses were grouped by business_id, the reviews were grouped by review_id, and the users were grouped by user_id.

Afterwards, we move the json files onto our mongos instance using Filezilla. Once the files have been transferred over, run the following command lines to import the dataset onto the shared cluster.

- mongoimport --db yelpdb --collection business --file yelp_academic_dataset_business.json
- mongoimport --db yelpdb --collection reviews --file yelp_academic_dataset_review.json
- mongoimport --db yelpdb --collection users --file yelp_academic_dataset_user.json

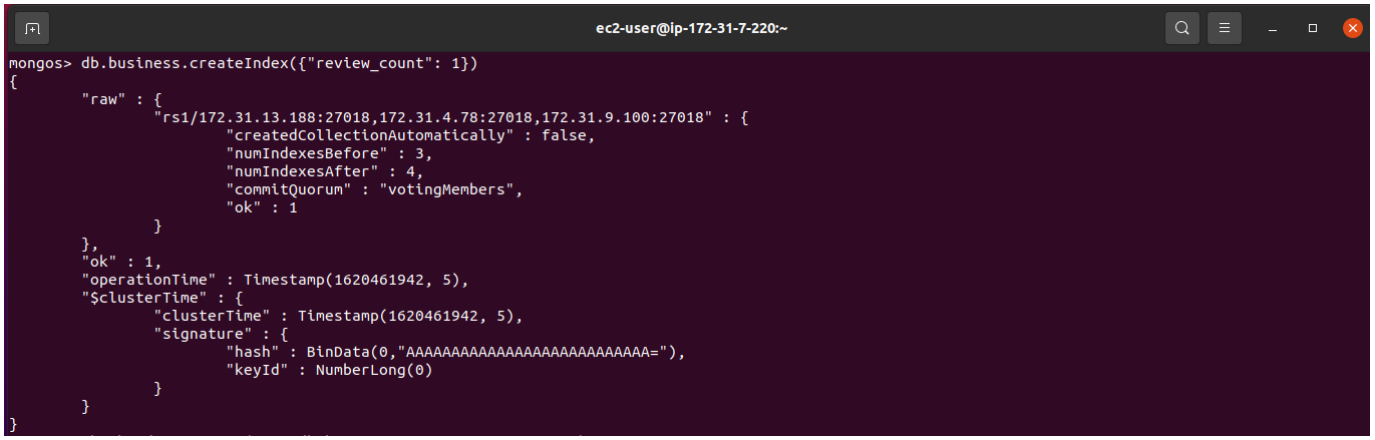




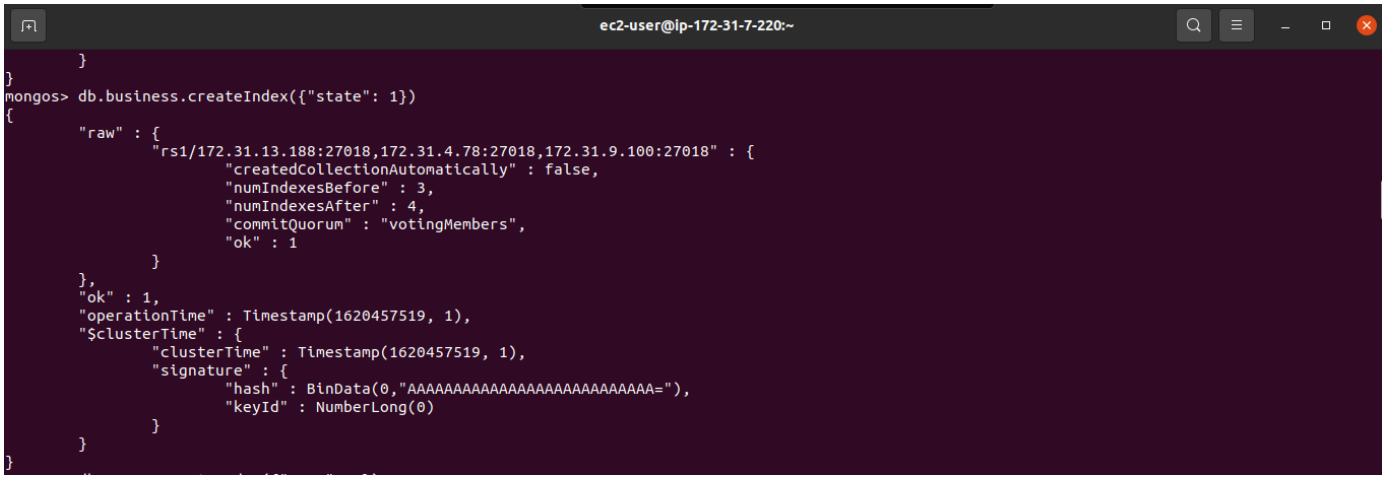


9. Database Schema description including what collections and indexes are created.

Since there are only three JSON files being used, we created three collections in the database: business, review, and user. For the business collection, we created indexes on, review_count, city, and state. For the review collection, we created an index on the review_id field only. And finally, for the user collection, we created an index of the name field only.


ec2-user@ip-172-31-7-220:~
mongos> db.business.createIndex({"review_count": 1})
{
"raw" : {
"rs1/172.31.13.188:27018,172.31.4.78:27018,172.31.9.100:27018" : {
"createdCollectionAutomatically" : false,
"numIndexesBefore" : 3,
"numIndexesAfter" : 4,
"commitQuorum" : "votingMembers",
"ok" : 1
}
},
"ok" : 1,
"operationTime" : Timestamp(1620461942, 5),
"$clusterTime" : {
"clusterTime" : Timestamp(1620461942, 5),
"signature" : {
"hash" : BinData(0,"AAAAAAAAAAAAAAAAAAAAAAAAAAA="),
"keyId" : NumberLong(0)
}
}
}


ec2-user@ip-172-31-7-220:~
}
mongos> db.business.createIndex({"city": 1})
{
"raw" : {
"rs1/172.31.13.188:27018,172.31.4.78:27018,172.31.9.100:27018" : {
"createdCollectionAutomatically" : false,
"numIndexesBefore" : 2,
"numIndexesAfter" : 3,
"commitQuorum" : "votingMembers",
"ok" : 1
}
},
"ok" : 1,
"operationTime" : Timestamp(1620457513, 1),
"$clusterTime" : {
"clusterTime" : Timestamp(1620457513, 1),
"signature" : {
"hash" : BinData(0,"AAAAAAAAAAAAAAAAAAAAAAAAAAA="),
"keyId" : NumberLong(0)
}
}
}

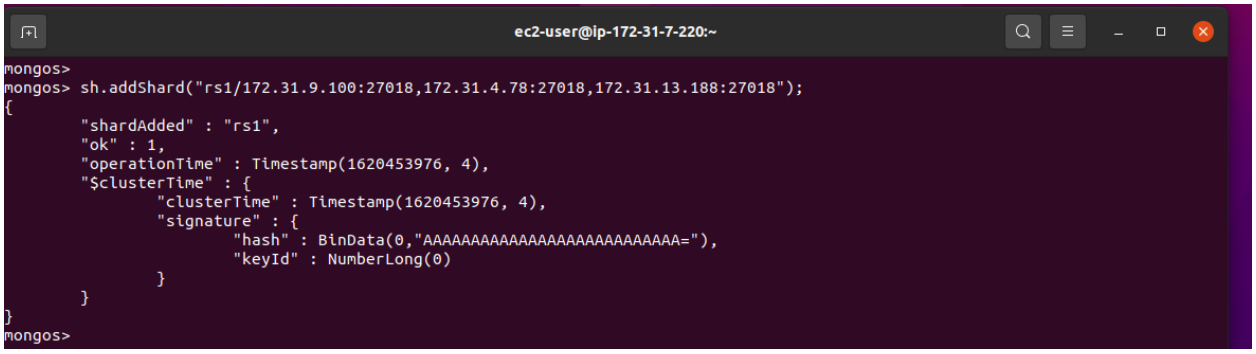

ec2-user@ip-172-31-7-220:~
}
}
mongos> db.business.createIndex({"state": 1})
{
"raw" : {
"rs1/172.31.13.188:27018,172.31.4.78:27018,172.31.9.100:27018" : {
"createdCollectionAutomatically" : false,
"numIndexesBefore" : 3,
"numIndexesAfter" : 4,
"commitQuorum" : "votingMembers",
"ok" : 1
}
},
"ok" : 1,
"operationTime" : Timestamp(1620457519, 1),
"$clusterTime" : {
"clusterTime" : Timestamp(1620457519, 1),
"signature" : {
"hash" : BinData(0,"AAAAAAAAAAAAAAAAAAAAAAAAAAA="),
"keyId" : NumberLong(0)
}
}
}

10. NoSQL configuration including virtual machines, replica set, and sharding configuration

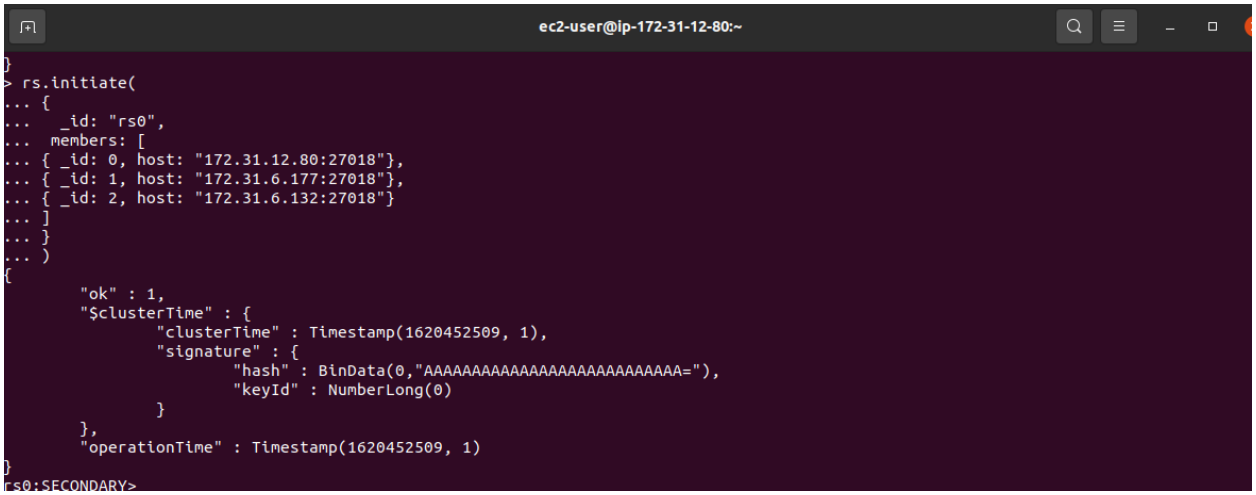
The setup uses the following instances as mongos, the config server, shard1, and shard2.

AWS ec2 instance	Public IP Address:	Private IP Address
mongos	184.169.216.239	172.31.7.220
Config PRIMARY	54.183.90.100	172.31.10.48
Config SECONDARY	54.183.8.143	172.31.1.147
Config SECONDARY	54.171.1.134	172.31.2.811
shard1 PRIMARY	13.57.182.57	172.31.12.80
shard1 SECONDARY	52.8.244.144	172.31.6.177
shard1 SECONDARY	54.151.14.216	172.31.6.132
shard2 PRIMARY	13.52.104.116	172.31.9.100
shard2 SECONDARY	13.52.235.94	172.31.4.78
shard2 SECONDARY	18.144.177.163	172.31.13.188

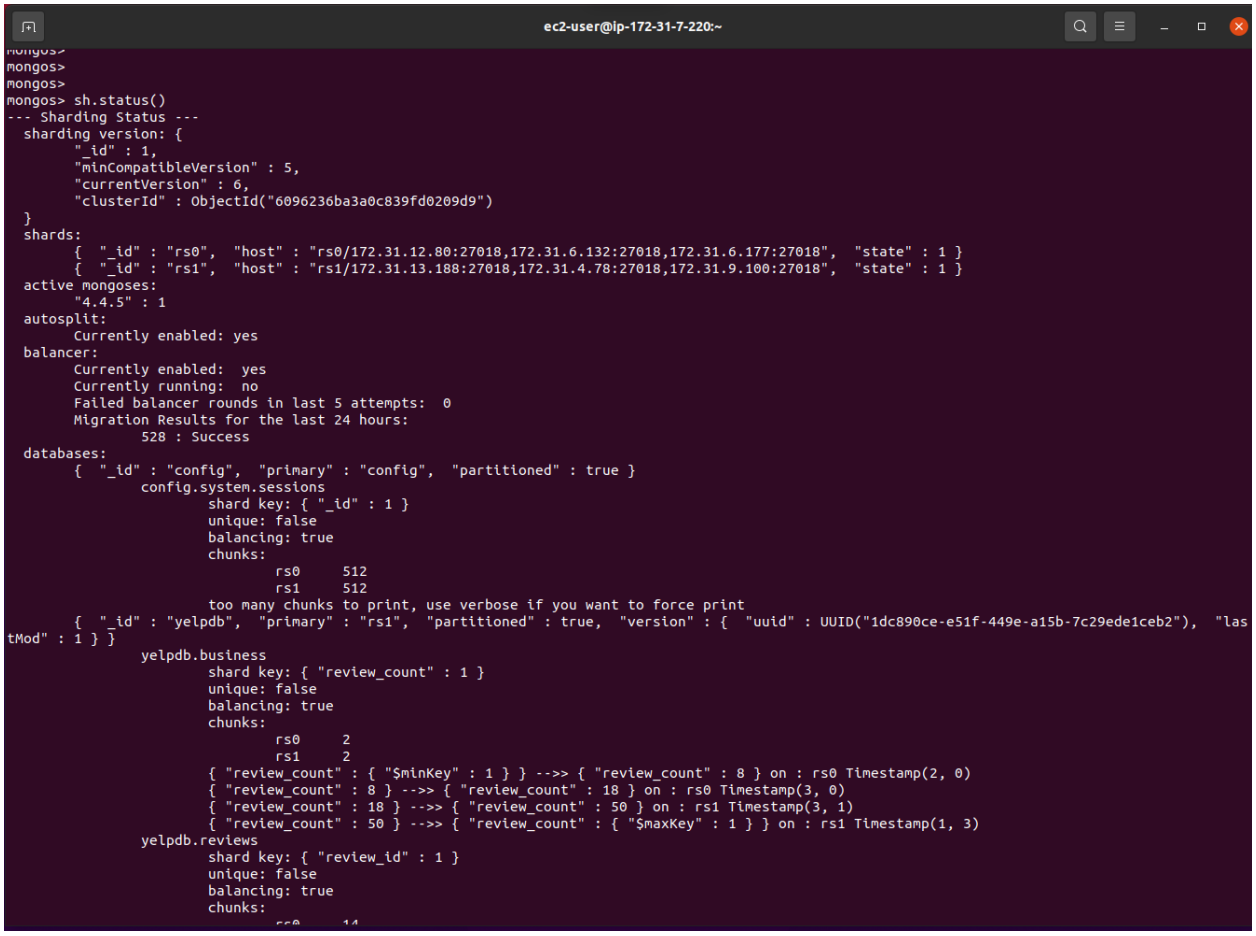
Add both shard1 and shard 2 to mongos:

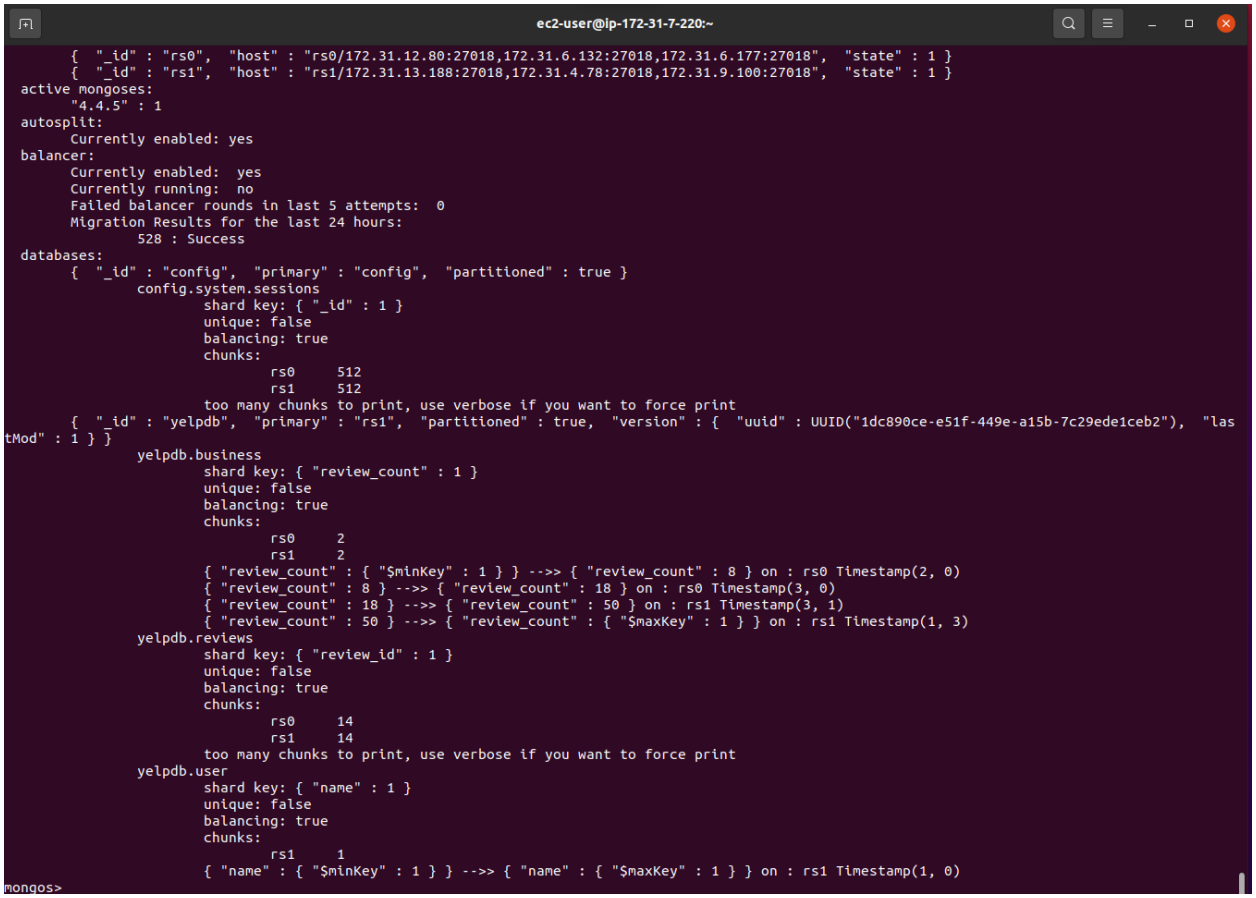


rs.initiate() both shards:



The output of sh.status() after adding all shards to replica sets:





11. Brief description on the NoSQL driver of your choice and detailed end-to-end description from your application to the database

The high level language used for the application is Python and the driver used is pymongo. We chose Pymongo since it's the official MongoDB driver for Python and has extensive documentation which will assist us in getting started and troubleshooting.

The application forms a connection with the database (mongod instance) through a created MongoClient object using Pymongo. The application sends commands to the database by first specifying which database to use like "db.users" and then running various Pymongo commands on the specified database like insert_one to insert a document or find_one to retrieve one document. When a document is returned, it comes in the form of a Python dictionary which makes it easy to access its fields. If multiple documents are returned, a Cursor object is returned which allows the application to iterate over the documents.

12. For each 15 function, include the following items

- One line of description for that function
- DDL and/or DML commands of your NoSQL choice to fulfill the function
- Screenshot(s) to CLEARLY show the function works.

1. How would you register yourself as a new user?

   db.user.insertOne({"user_id": user_id, "name": name, "password": password, "yelping_since": creation_date, "review_count": 0, "useful": 0, "funny": 0, "cool": 0, "fans": 0, "average_stars": 0})

```
========================= MAIN MENU =========================
Welcome to the Business Reviews System!
To begin, please login or create an account.
[1] = Login
[2] = Register
[0] = Exit
Enter your choice: 2

======================== REGISTER ========================
Enter a username: richardma20
Enter a password: ec2
Account successfully created! Please login...
```

2. How would you login as a new user? (might need to remove)

   db.user.findOne({"name": name, "password": password})

```
========================== LOGIN ==========================
Enter username: richardma20
Enter password: ec2
Hi richardma20, you are now logged in!
```

3. Find a business by city and state with a name attribute.

   db.business.find({"state": kwargs.get("state"), "city": kwargs.get("city"), "name": {"$regex": regex}})

```
========================== SEARCH ==========================
[1] = Search Businesses
[2] = Search Users
[0] = Return
Enter your choice: 1

====================== SEARCH BUSINESSES ======================
[1] = Search By City & State
[2] = Search By Zipcode
[0] = New Search
Enter your choice: 1

Enter a city: Winter Garden
Enter a state abbreviation: FL

====================== CHOOSE ATTRIBUTE ======================
[1] = Search By Name
[2] = Search By Category
[3] = Search By Rating
[0] = New Search
Enter your choice: 1

Enter a name: Sports Authority

Business: Sports Authority (ID: zKz7jZv6yxhFtug0WwJThA)
Address: 3373 Daniels Rd, Winter Garden, FL, 34787
Categories: Sports Wear, Shopping, Fashion, Outdoor Gear, Sporting Goods
Average Rating: 3.5
Number of Reviews: 7
```

4. Find multiple businesses by zip code with a name attribute.

   db.business.find({"postal_code": kwargs.get("zipcode"), "name": {"$regex": regex}})

```
==================== SEARCH BUSINESSES ====================
[1] = Search By City & State
[2] = Search By Zipcode
[0] = New Search
Enter your choice: 2

Enter a zipcode: 43228

==================== CHOOSE ATTRIBUTE ====================
[1] = Search By Name
[2] = Search By Category
[3] = Search By Rating
[0] = New Search
Enter your choice: 1

Enter a name: Taco Bell

Business: Taco Bell (ID: itIK1BxWCEdlIF7D9HpS8Q)
Address: 620 Georgesville Rd, Columbus, OH, 43228
Categories: Restaurants, Breakfast & Brunch, Fast Food, Mexican, Tacos
Average Rating: 4.0
Number of Reviews: 5

Business: Taco Bell (ID: bOY9ROf0hj2tkwoG42Ppag)
Address: 1536 Georgesville Road, Columbus, OH, 43228
Categories: Restaurants, Tex-Mex, Tacos, Fast Food, Breakfast & Brunch, Mexican
Average Rating: 2.5
Number of Reviews: 16

Business: Taco Bell (ID: C1lq5o-jVFEgZNggMSPQwg)
Address: 5449 West Broad Street, Columbus, OH, 43228
Categories: Restaurants, Tex-Mex, Breakfast & Brunch, Mexican, Fast Food, Tacos
Average Rating: 1.5
Number of Reviews: 21
```

5. Find multiple businesses by category.

   db.business.find({"state": kwargs.get("state"), "city": kwargs.get("city"), "categories": {"$regex": regex}})

   db.business.find({"postal_code": kwargs.get("zipcode"), "categories": {"$regex": regex}})

```
==================== CHOOSE ATTRIBUTE ======================
[1] = Search By Name
[2] = Search By Category
[3] = Search By Rating
[0] = New Search
Enter your choice: 2

Enter a category: Health & Medical

Business: Advanced Medical Supply (ID: tZAvyuQq4Nu4N4jDt2N3RQ)
Address: 4840 W Broad St, Columbus, OH, 43228
Categories: Doctors, Orthopedists, Automotive, Mobility Equipment Sales & Services, Shopping, Home Health Care, Health & Medical, Medical Supplies
Average Rating: 4.0
Number of Reviews: 6

Business: Bloom Medicinals - Columbus (ID: hk52TmNX4cRJpDtVnIJJyQ)
Address: 1361 Georgesville Rd, Columbus, OH, 43228
Categories: Cannabis Dispensaries, Shopping, Health & Medical, Cannabis Clinics
Average Rating: 5.0
Number of Reviews: 6

Business: Murray Hill Dental (ID: IoVNep2JBr5Ofq6hpxntFQ)
Address: 98 N Murray Hill Rd, Columbus, OH, 43228
Categories: Endodontists, Pediatric Dentists, Cosmetic Dentists, Health & Medical, General Dentistry, Dentists
Average Rating: 3.5
Number of Reviews: 7

Business: Alpha Dental - Columbus (ID: 8Bgz9WTvyuWDZdClscPBbA)
Address: 4770 W Broad St, Columbus, OH, 43228
Categories: General Dentistry, Cosmetic Dentists, Dentists, Prosthodontists, Oral Surgeons, Health & Medical
Average Rating: 2.0
Number of Reviews: 6

Business: Pearle Vision (ID: yhowXH-VeEMezyzqVSWwdw)
Address: 1595 Georgesville Square Dr, Columbus, OH, 43228
Categories: Shopping, Health & Medical, Eyewear & Opticians, Optometrists
Average Rating: 3.5
Number of Reviews: 6

Business: CVS Pharmacy (ID: D2xVK4Mje8EFMqFiyHxboQ)
Address: 4801 West Broad Street, Columbus, OH, 43228
Categories: Convenience Stores, Shopping, Drugstores, Health & Medical, Food, Pharmacy
Average Rating: 2.0
Number of Reviews: 9
```

6. Find multiple businesses by rating.

   db.business.find({"state": kwargs.get("state"), "city": kwargs.get("city"), "stars": rating})

   db.business.find({"postal_code": kwargs.get("zipcode"), "stars": rating})

```
==================== CHOOSE ATTRIBUTE ======================
[1] = Search By Name
[2] = Search By Category
[3] = Search By Rating
[0] = New Search
Enter your choice: 3

Enter a rating: 5

Business: Sunset International Shipping - Columbus (ID: SUQ5sirXOrNr8MmnJnJDTQ)
Address: , Columbus, OH, 43228
Categories: Packing Supplies, Home Services, Shipping Centers, Local Services, Self Storage, Packing Services, Shopping, Movers
Average Rating: 5.0
Number of Reviews: 5

Business: Subway (ID: nt5uRqHYB0R7SARMxpH2Ew)
Address: 1577 Holt Rd, Columbus, OH, 43228
Categories: Restaurants, Food, Fast Food, Sandwiches
Average Rating: 5.0
Number of Reviews: 5

Business: Don Deme Tacos (ID: 11NwEROXU1oj44tR8lvLAg)
Address: 75 S Murray Hill Rd, Columbus, OH, 43228
Categories: Restaurants, Mexican
Average Rating: 5.0
Number of Reviews: 5

Business: Bloom Medicinals - Columbus (ID: hk52TmNX4cRJpDtVnIJJyQ)
Address: 1361 Georgesville Rd, Columbus, OH, 43228
Categories: Cannabis Dispensaries, Shopping, Health & Medical, Cannabis Clinics
Average Rating: 5.0
Number of Reviews: 6

Business: ALDI (ID: 2NSB8SV9IRc4KKU-Ir-QKA)
Address: 5487 W Broad St, Columbus, OH, 43228
Categories: Discount Store, Fruits & Veggies, Meat Shops, Beer, Wine & Spirits, Grocery, Food, Organic Stores, Specialty Food, Shopping
Average Rating: 5.0
Number of Reviews: 7

Business: Performance Automotive (ID: 4hXnVcmnVCA5xGasJb_4ew)
Address: 4735 Roberts Rd, Columbus, OH, 43228
Categories: Towing, Oil Change Stations, Automotive, Auto Repair
Average Rating: 5.0
Number of Reviews: 5

Business: Columbus Granite (ID: S14Cfz0nCtRyQrjuHSx3oQ)
Address: 2276 Westbrooke Dr, Bldg K, Columbus, OH, 43228
Categories: Building Supplies, Shopping, Home & Garden, Kitchen & Bath, Contractors, Home Services
Average Rating: 5.0
Number of Reviews: 5
```

7. Write a review for a company by giving a business_id.

   db.review.insertOne({"review_id": review_id, "user_id": user_id, "business_id": business_id, "stars": stars, "date": review_date, "text": text})

   db.user.update_one({"user_id": user_id}, {"$inc": {"review_count": 1}})

8. Find users by name.

   db.user.find({"name": name})

```
====================== CHOOSE ATTRIBUTE ======================
[1] = Search By Name
[2] = Search By Category
[3] = Search By Rating
[0] = New Search
Enter your choice: 1

Enter a name: Gabi
```

9. Retrieve current user's information

db.user.findOne({"user_id": user_id})

```
========================== VIEW ==========================
[1] = View My Profile
[2] = View Top 10 Businesses
[3] = View Most Reviewed Businesses
[4] = View Most Prolific Reviewer
[5] = View Harshest Critic
[0] = Return
Enter your choice: 1

User: richardma20 (ID: jOBshFcToiVxXxflXPXGia)
User Since: 2021-05-08
Number of Reviews: 1
Number of Useful Reviews: 0
Number of Funny Reviews: 0
Number of Cool Reviews: 0
Number of Fans: 0
Average Rating of All Reviews: 4.0

========================== VIEW ==========================
[1] = View My Profile
[2] = View Top 10 Businesses
[3] = View Most Reviewed Businesses
[4] = View Most Prolific Reviewer
[5] = View Harshest Critic
[0] = Return
```

10. Find the top 10 businesses in the dataset.

    db.business.find({"stars": 5, "review_count": {"$gte": 100}}).sort("stars", -1).limit(10)

```
========================== VIEW ==========================
[1] = View My Profile
[2] = View Top 10 Businesses
[3] = View Most Reviewed Businesses
[4] = View Most Prolific Reviewer
[5] = View Harshest Critic
[0] = Return
Enter your choice: 2

#1
Business: Hit the Spot! (ID: bYzIhd_6RVI5Z4n-sZIWwg)
Address: 4835 NE Sandy Blvd, Portland, OR, 97213
Categories: Food Trucks, Food, Fast Food, Burgers, Restaurants, Ice Cream & Frozen Yogurt
Average Rating: 5.0
Number of Reviews: 101

#2
Business: Lovejoy's Tea Room (ID: dniQomQgXyJwkCYdwLhtPA)
Address: 3286 NE Killingsworth St, Portland, OR, 97211
Categories: British, Restaurants, Coffee & Tea, Tea Rooms, Food
Average Rating: 5.0
Number of Reviews: 101

#3
Business: New Life Nails & Organic Spa (ID: b23iDCRbRkkAhfIvs8_LRQ)
Address: 1240 E Burnside St, Portland, OR, 97214
Categories: Nail Salons, Skin Care, Beauty & Spas, Waxing, Hair Removal
Average Rating: 5.0
Number of Reviews: 100

#4
Business: Teal House Coffee and Bakery (ID: 2lfJnS98uTMvp6QBnHQo9Q)
Address: 1716 E Slaughter Ln, Austin, TX, 78747
Categories: Food, Bakeries, Food Trucks, Coffee & Tea
Average Rating: 5.0
Number of Reviews: 101

#5
Business: Las Abuelas (ID: d27P-HGCTjuBL3fWjWl7IA)
Address: 11444 Menchaca Rd, Austin, TX, 78748
Categories: Sandwiches, Mexican, Food Trucks, Restaurants, Food
Average Rating: 5.0
Number of Reviews: 100

#6
Business: Mantis Massage (ID: 0EpT8hjNC_OQIYg9TCvAZQ)
Address: 2700 S Congress Ave, Ste B, Austin, TX, 78704
Categories: Massage Therapy, Massage, Health & Medical, Beauty & Spas
Average Rating: 5.0
Number of Reviews: 100

#7
Business: Beware Coffee (ID: 1YFG_TcX0x5XmzlVyR8mnA)
Address: Spider House Village, 2908 Fruth St, Austin, TX, 78705
Categories: Food, Food Stands, Coffee & Tea, Restaurants
```

```
#5
Business: Las Abuelas (ID: d27P-HGCTjuBL3fWjWl7IA)
Address: 11444 Menchaca Rd, Austin, TX, 78748
Categories: Sandwiches, Mexican, Food Trucks, Restaurants, Food
Average Rating: 5.0
Number of Reviews: 100

#6
Business: Mantis Massage (ID: 0EpT8hjNC_OQIYg9TCvAZQ)
Address: 2700 S Congress Ave, Ste B, Austin, TX, 78704
Categories: Massage Therapy, Massage, Health & Medical, Beauty & Spas
Average Rating: 5.0
Number of Reviews: 100

#7
Business: Beware Coffee (ID: 1YFG_TcX0x5XmzlVyR8mnA)
Address: Spider House Village, 2908 Fruth St, Austin, TX, 78705
Categories: Food, Food Stands, Coffee & Tea, Restaurants
Average Rating: 5.0
Number of Reviews: 100

#8
Business: Arali Beauty (ID: J0_OxW7bhld5hFRCC_BwTA)
Address: , Austin, TX, 73301
Categories: Beauty & Spas, Permanent Makeup, Eyelash Service, Skin Care, Hair Salons, Hair Stylists
Average Rating: 5.0
Number of Reviews: 100

#9
Business: Bake on the Run (ID: 6qlWc-OVhTQfcyVi3j4onw)
Address: 1080 SE Madison Ave, Portland, OR, 97214
Categories: Food Trucks, Food
Average Rating: 5.0
Number of Reviews: 100

#10
Business: Blackbird Floral (ID: RgCI-o_wycpSZC7vX3xNmQ)
Address: , Austin, TX, 78701
Categories: Local Services, Florists, Wedding Planning, Event Planning & Services, Shopping, Flowers & Gifts, Floral Designers
Average Rating: 5.0
Number of Reviews: 101

========================= VIEW =========================
[1] = View My Profile
[2] = View Top 10 Businesses
[3] = View Most Reviewed Businesses
[4] = View Most Prolific Reviewer
[5] = View Harshest Critic
[0] = Return
Enter your choice:
```

11. Find the most reviewed business in the dataset.

    db.business.find().sort("review_count", -1).limit(1)

```
========================= VIEW =========================
[1] = View My Profile
[2] = View Top 10 Businesses
[3] = View Most Reviewed Businesses
[4] = View Most Prolific Reviewer
[5] = View Harshest Critic
[0] = Return
Enter your choice: 3

Business: Voodoo Doughnut - Old Town (ID: 4CxF8c3MB7VAdY8zFb2cZQ)
Address: 22 SW 3rd Ave, Portland, OR, 97204
Categories: Local Flavor, Food, Donuts, Wedding Chapels, Event Planning & Services, Bakeries, Restaurants, Breakfast & Brunch
Average Rating: 3.5
Number of Reviews: 9185
```

12. Update a review with new information.

    db.review.find_one({"review_id": review_id, "user_id": user_id})

    db.review.update_one({"review_id": review_id}, {"$set": {"stars": updated_stars, "date": updated_date, "text": updated_text}})

```
======================== MY REVIEWS ========================
[1] = View My Reviews
[2] = Make A Review
[3] = Update A Review
[4] = Delete A Review
[0] = Return
Enter your choice: 3

Enter a Review ID: WEPUlhQzxHKPZqmoHWpgSQ
Review ID: WEPUlhQzxHKPZqmoHWpgSQ
User: richardma20 (ID: jOBshFcToiVxXxflXPXGia)
Business: Julie Beaty - Fidelity Bank (ID: PlbQvHaTWCj7cwLQZeiq7Q)
Date: 2021-05-08
Rating: 4
Useful: 0 votes
Funny: 0 votes
Cool: 0 votes
Review: A great place to do business!

Enter a new rating (1 - 5): 3
Enter your updated review: A decent place to do business.

Review successfully updated!

======================== MY REVIEWS ========================
[1] = View My Reviews
[2] = Make A Review
[3] = Update A Review
[4] = Delete A Review
[0] = Return
Enter your choice:
```

13. Delete an existing review with review_id.

    db.review.findOne({"review_id": review_id, "user_id": user_id})

    db.review.deleteOne({"review_id": review_id})

    db.user.updateOne({"user_id": user_id}, {"$inc": {"review_count": -1}})

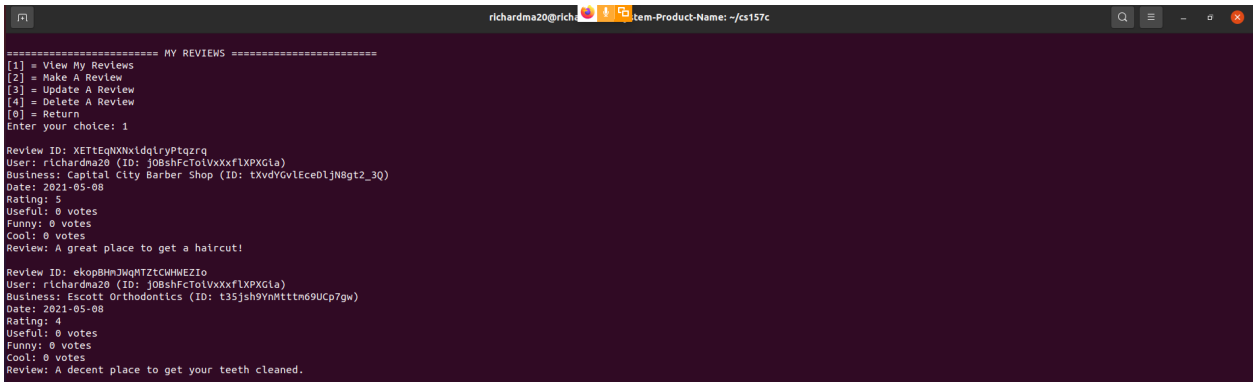
```
========================== MY REVIEWS ==========================
[1] = View My Reviews
[2] = Make A Review
[3] = Update A Review
[4] = Delete A Review
[0] = Return
Enter your choice: 4

Enter a Review ID: WEPUlhQzxHKPZqmoHWpgSQ

Review successfully deleted!
```

14. View your reviews.

    db.review.find({"user_id": user_id})



15. View user with the most reviews.

    db.business.find().sort("review_count", -1).limit(1)

```
========================== VIEW ==========================
[1] = View My Profile
[2] = View Top 10 Businesses
[3] = View Most Reviewed Businesses
[4] = View Most Prolific Reviewer
[5] = View Harshest Critic
[0] = Return
Enter your choice: 4

User: richardma20 (ID: jOBshFcToiVxXxflXPXGia)
User Since: 2021-05-08
Number of Reviews: 2
Number of Useful Reviews: 0
Number of Funny Reviews: 0
Number of Cool Reviews: 0
Number of Fans: 0
Average Rating of All Reviews: 4.5
```