

HW4 - Practice on Document NoSQL Database: Online Book Store

SJSU

CS157C Summer 2021

Instructor: Professor Wu

Lifan Zeng

25 July 2021

HW4. MongoDB for Book Store

Functions of the application and the screenshots.

1. Design a flexible schema/document model for this Books Order Management System using MongoDB. The MongoDB should have COLLECTIONS for AUTHOR, CUSTOMER, ORDER, and BOOK. (10%)

- Collection for author. An author can write multiple books.

The screenshot shows the MongoDB Compass interface with the following details:

- Left Sidebar:** Shows the connection information: HOST: localhost:27017, CLUSTER: Standalone, and EDITION: MongoDB 5.0.0 Community. A sidebar menu includes: admin, book_store (selected), author, book, customer, order, config, local, and sample_airbnb.
- Top Bar:** Shows the database name: book_store and collection name: author. It also shows DOCUMENTS 5, 1.1KB, 220B, and INDEXES.
- Header:** Includes FILTER, OPTIONS, and FIND buttons.
- Table Headers:** Documents, Aggregations, Schema, Explain Plan, Indexes, Validation.
- Table Content:** Displays 5 documents. Each document has fields: _id, firstname, lastname, country, and books (an array of book titles).
- Bottom:** Shows "Displaying documents 1 - 5 of 5".

```

_id: ObjectId("60f92aa03882126484c084eb")
firstname: "Eoin"
lastname: "Brazil"
country: "Ireland"
books: Array
  0: "MongoDB: The Definitive Guide: Powerful and Scalable Data Storage"

_id: ObjectId("60f92aa03882126484c084ec")
firstname: "Shannon"
lastname: "Bradshaw"
country: ""
books: Array
  0: "MongoDB: The Definitive Guide: Powerful and Scalable Data Storage"

_id: ObjectId("60f92aa03882126484c084ed")
firstname: "Kristina"
lastname: "Chodorow"
country: "USA"
books: Array
  0: "MongoDB: The Definitive Guide: Powerful and Scalable Data Storage"
  1: "Scaling MongoDB: Sharding, Cluster Setup, and Administration"
  2: "50 Tips and Tricks for MongoDB Developers: Get the Most Out of Your Da..."

```

- Collection for order. An order can have multiple books.

The screenshot shows the MongoDB Compass interface with the following details:

- Left Sidebar:** Shows the connection information: HOST: localhost:27017, CLUSTER: Standalone, and EDITION: MongoDB 5.0.0 Community. A sidebar menu includes: admin, book_store (selected), author, book, customer, order, config, local, and sample_airbnb.
- Top Bar:** Shows the database name: book_store and collection name: order. It also shows DOCUMENTS 6, 1.1KB, 220B, and INDEXES.
- Header:** Includes ADD DATA, VIEW, and other buttons.
- Table Content:** Displays 6 documents. Each document has fields: _id, book (an array of book objects), and order_date.
- Bottom:** Shows "Displaying documents 1 - 6 of 6".

```

_id: ObjectId("60f92aa03882126484c084fa")
book: Array
  0: Object
    title: "MongoDB: The Definitive Guide: Powerful and Scalable Data Storage"
    ISBN: "978-1491954461"
  1: Object
    title: "Java Garage"
    ISBN: "978-0321246233"
order_date: "2020-05-12"
delivery_date: "2020-05-15"

_id: ObjectId("60f92aa03882126484c084fb")
book: Array
order_date: "2020-06-13"
delivery_date: "2020-06-17"

```

- Collection for customer. A customer can have multiple addresses and multiple orders of books.

book_store.customer

DOCUMENTS 5 TOTAL SIZE 2.4KB AVG. SIZE 484B INDEXES

Documents Aggregations Schema Explain Plan Indexes Validation

FILTER { field: 'value' } **OPTIONS** **FIND**

ADD DATA **VIEW** **OPTIONS** **FIND**

Displaying documents 1 - 5 of 5

```

_id: ObjectId("60f92aa03882126484c084f1")
username: "Jack Chen"
password: "222222"
active: true
address: [
  {
    street: "2222 Century Blvd",
    city: "Los Angle",
    zip: 90304,
    state: "CA",
    country: "USA"
  }
]
date_of_creation: "2018-10-21"
orders: [
  {
    books: [
      {
        title: "MongoDB: The Definitive Guide: Powerful and Scalable Data Storage",
        ISBN: "978-1491954461"
      },
      {
        title: "Java Garage",
        ISBN: "978-0321246233"
      }
    ],
    order_date: "2020-06-13",
    delivery_date: "2020-06-17"
  },
  {
    books: [
      {
        title: "Cassandra: The Definitive Guide: Distributed Data at Web Scale",
        ISBN: "978-1098115166"
      }
    ],
    order_date: "2020-07-02",
    delivery_date: "2020-07-03"
  }
]
  
```

- Collection for book. A book can have multiple publishers, multiple categories, and many reviews. A publisher can have multiple addresses.

CLUSTER Standalone

EDITION MongoDB 5.0.0 Community

Filter your data

admin

book_store

author

book

customer

order

config

local

sample_airbnb

FILTER { field: 'value' } **OPTIONS** **FIND**

ADD DATA **VIEW** **OPTIONS** **FIND**

Displaying documents 1 - 5 of 5

```

_id: ObjectId("60f938323882aa23ca2a462a")
title: "MongoDB: The Definitive Guide: Powerful and Scalable Data Storage"
authors: [
  {
    0: "Shannon Bradshaw",
    1: "Eoin Brazil",
    2: "Kristina Chodorow"
  }
]
ISBN: "978-1491954461"
publisher: [
  {
    0: {
      name: "O'Reilly Media",
      date: "2019-12-31",
      city: "Sebastopol",
      address: [
        {
          0: {
            street: "1005 Gravenstein Highway North",
            city: "Sebastopol",
            zip: 95472,
            state: "CA",
            country: "USA"
          }
        }
      ],
      available: true,
      pages: 514,
      summary: "In six parts, this book shows you how to: Work with MongoDB, perform w..."
    }
  }
]
reviews: {
  ratingNumber: 104,
  grades_out_of_5: 4.6
}
review_body: [
  {
    0: {
      customer: "L. V. Smart",
      stars: 5,
      review: "An excellent book on MongoDB. Well thought out with good examples that..."
    }
  }
]
language: "English"
categories: [
  {
    0: "Data Mining",
    1: "Database Storage & Design",
    2: "Data Processing"
  }
]
  
```

2. Visit the Amazon's Online Book Store Website and select 5 books. Insert the data instances by your choice into your MongoDB database. Each entity must have at least 5 data instances for simulation/practice purposes. (10%)

- 5 data instances for collection author.

The screenshot shows the MongoDB Compass interface with the 'author' collection selected. There are five documents listed, each representing an author with their first name, last name, country, and a 'books' array. The documents are:

```

_id: ObjectId("60f938323882aa23ca2a4628")
firstname: "Eoin"
lastname: "Brailz"
country: "Ireland"
> books: Array

_id: ObjectId("60f938323882aa23ca2a4621")
firstname: "Shannon"
lastname: "Bradshaw"
country: ""
> books: Array

_id: ObjectId("60f938323882aa23ca2a4622")
firstname: "Krisztina"
lastname: "Chodrow"
country: "USA"
> books: Array

_id: ObjectId("60f938323882aa23ca2a4623")
firstname: "Jeff"
lastname: "Carpenter"
country: "USA"
> books: Array

_id: ObjectId("60f938323882aa23ca2a4624")
firstname: "Eben"
lastname: "Heuitt"
country: "USA"
> books: Array

```

- 5 data instances for collection book.

The screenshot shows the MongoDB Compass interface with the 'book' collection selected. There are five documents listed, each representing a book with its title, authors, ISBN, publisher, availability, pages, summary, reviews, language, and categories. The documents are:

```

_id: ObjectId("60f938323882aa23ca2a462b")
title: "MongoDB: The Definitive Guide: Powerful and Scalable Data Storage"
> authors: Array
ISBN: "978-1491954461"
> publisher: Array
available: true
pages: 514
summary: "In six parts, this book shows you how to: Work with MongoDB, perform w..."
> reviews: Object
language: "English"
> categories: Array

_id: ObjectId("60f938323882aa23ca2a462b")
title: "Scaling MongoDB: Sharding, Cluster Setup, and Administration"
> authors: Array
ISBN: "978-1449383211"
> publisher: Array
available: true
pages: 79
summary: "Scaling MongoDB will help you: Set up a MongoDB cluster through sharding..."
> reviews: Object
language: "English"
> categories: Array

_id: ObjectId("60f938323882aa23ca2a462c")
title: "50 Tips and Tricks for MongoDB Developers: Get the Most Out of Your Da..."
> authors: Array
ISBN: "978-1449384614"
> publisher: Array
available: true
pages: 66
summary: "You get specific guidance in five topic areas directly from engineers ..."
> reviews: Object
language: "English"
> categories: Array

```

- 5 data instances for collection customer.

The screenshot shows the MongoDB Compass interface with the 'customer' collection selected. It displays five documents, each representing a customer with fields like id, username, password, active, address, date_of_creation, and orders.

```

id: ObjectId("60f938323882aa23ca2a4625")
username: "Lifan Zeng"
password: "123456"
active: true
> address: Array
date_of_creation: "2016-01-08"
> orders: Array

id: ObjectId("60f938323882aa23ca2a4626")
username: "Jack Chen"
password: "222222"
active: true
> address: Array
date_of_creation: "2018-10-21"
> orders: Array

id: ObjectId("60f938323882aa23ca2a4627")
username: "Mike Tseng"
password: "333333"
active: true
> address: Array
date_of_creation: "2017-10-15"
> orders: Array

id: ObjectId("60f938323882aa23ca2a4628")
username: "Ming Lam"
password: "444444"
active: true
> address: Array
date_of_creation: "2012-10-15"
> orders: Array

id: ObjectId("60f938323882aa23ca2a4629")
username: "John Doe"
password: "555555"
active: true
> address: Array
date_of_creation: "2019-05-01"
> orders: Array

```

- 6 data instances for collection order.

The screenshot shows the MongoDB Compass interface with the 'order' collection selected. It displays six documents, each representing an order with fields like id, book, order_date, and delivery_date.

```

_id: ObjectId("60f938323882aa23ca2a462f")
book: Array
order_date: "2020-05-12"
delivery_date: "2020-05-15"

_id: ObjectId("60f938323882aa23ca2a4630")
book: Array
order_date: "2020-06-13"
delivery_date: "2020-06-17"

_id: ObjectId("60f938323882aa23ca2a4631")
book: Array
order_date: "2020-07-02"
delivery_date: "2020-07-03"

_id: ObjectId("60f938323882aa23ca2a4632")
book: Array
order_date: "2019-05-18"
delivery_date: "2019-05-18"

_id: ObjectId("60f938323882aa23ca2a4633")
book: Array
order_date: "2020-05-09"
delivery_date: "2020-05-18"

_id: ObjectId("60f938323882aa23ca2a4634")
book: Array
order_date: "2020-06-03"
delivery_date: "2020-06-06"

```

3. Write Java with JSON to implement the following functional requirements:

1) Insert books and users to the database. (10%)

- Inserted a book. Now the number of the books in the collection increase from 5 to 6.

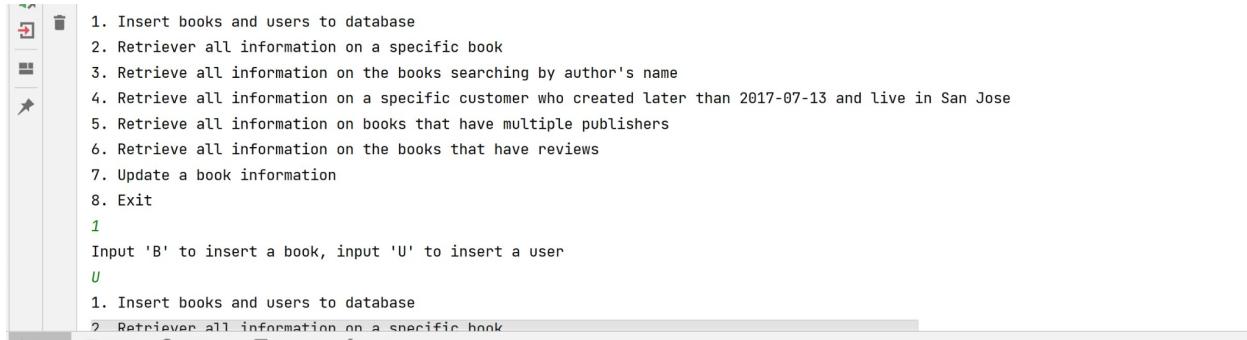
```
Run: Tester ×
C:\Users\Zengl\.jdks\openjdk-15.0.2\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.2.1\lib\idea_rt.jar" -Dfile.encoding=UTF-8
Connection to server successfully

Welcome to Book Store Application!
1. Insert books and users to database
2. Retriever all information on a specific book
3. Retrieve all information on the books searching by author's name
4. Retrieve all information on a specific customer who created later than 2017-07-13 and live in San Jose
5. Retrieve all information on books that have multiple publishers
6. Retrieve all information on the books that have reviews
7. Update a book information
8. Exit
1
Input 'B' to insert a book, input 'U' to insert a user
B
1. Insert books and users to database
2. Retriever all information on a specific book
3. Retrieve all information on the books searching by author's name
```

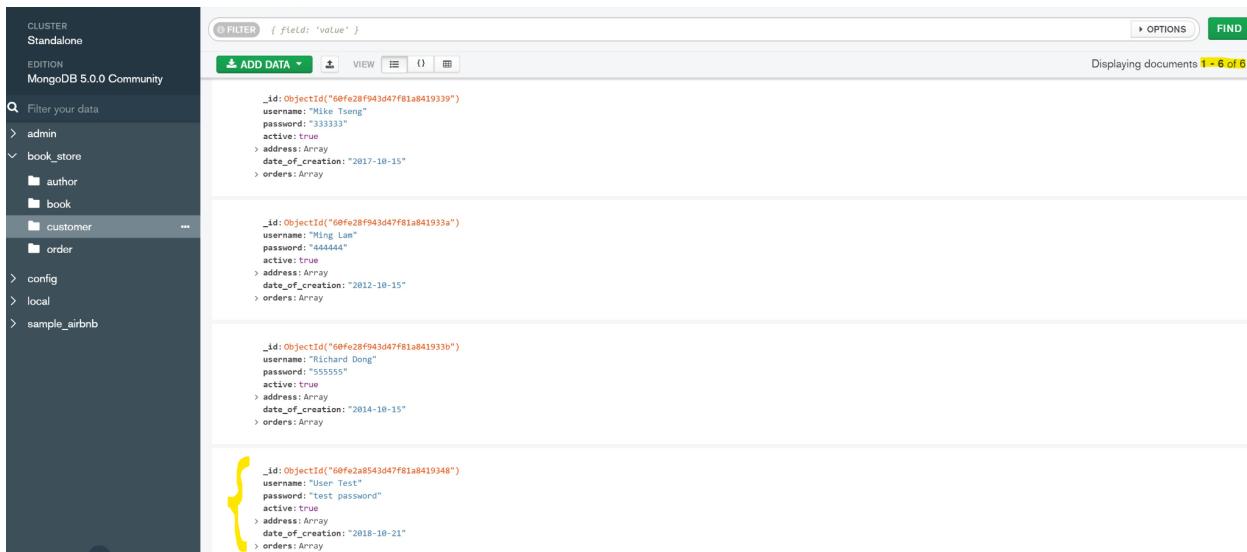
The screenshot shows the MongoDB Compass interface with the following details:

- Left Sidebar:** Shows the database structure with collections: admin, book_store, config, local, and sample_airbnb. The book_store collection is expanded, showing sub-collections author and book.
- Top Bar:** ADD DATA, VIEW, and other interface icons.
- Document View:** Three documents are displayed in a list.
 - book:** Contains fields like title, authors, ISBN, publisher, available, pages, summary, reviews, language, and categories.
 - sample_airbnb:** Contains fields like _id, title, authors, ISBN, publisher, available, pages, summary, reviews, language, and categories.
 - sample_airbnb (selected):** Contains fields like _id, title, authors, ISBN, publisher, available, pages, summary, reviews, language, and categories. This document has a yellow curly brace highlighting its entire structure.
- Top Right:** Displaying documents 1 - 6 of 6.

- Inserted a user. Now there are 6 customers in the collection



1. Insert books and users to database
 2. Retriever all information on a specific book
 3. Retrieve all information on the books searching by author's name
 4. Retrieve all information on a specific customer who created later than 2017-07-13 and live in San Jose
 5. Retrieve all information on books that have multiple publishers
 6. Retrieve all information on the books that have reviews
 7. Update a book information
 8. Exit
 1
 Input 'B' to insert a book, input 'U' to insert a user
 U
 1. Insert books and users to database
 2. Retriever all information on a specific book



CLUSTER Standalone
 EDITION MongoDB 5.0.0 Community
 Filter your data
 admin
 book_store
 author
 book
 customer
 order
 config
 local
 sample_airbnb

FILTER { field: 'value' } **OPTIONS** **FIND**
 Displaying documents 1 - 6 of 6

```

_id: ObjectId("60fe28f943d47f81a841933b")
username: "Mike Tseng"
password: "12333333"
active: true
> address: Array
  > date_of_creation: "2017-10-15"
  > orders: Array

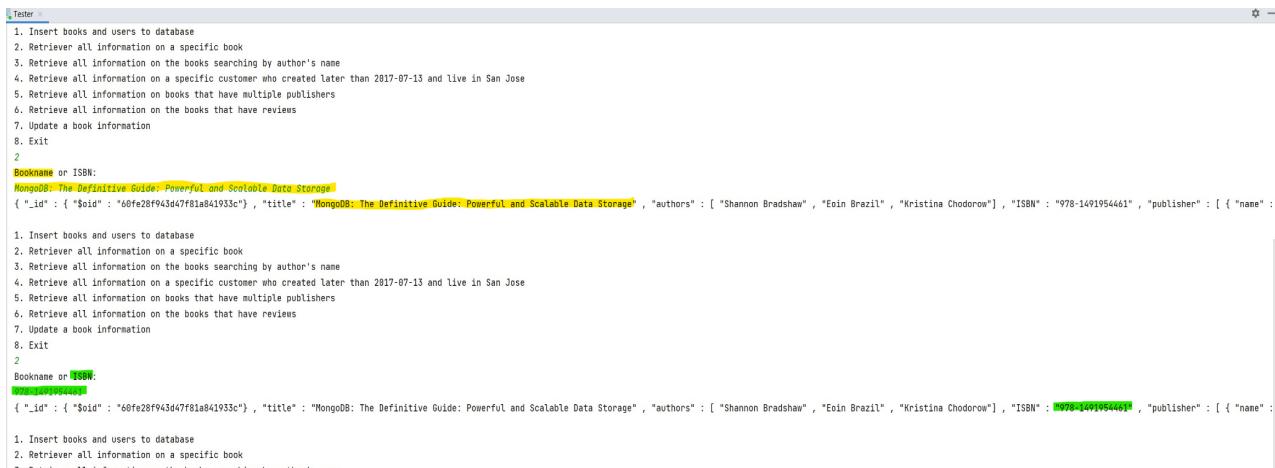
_id: ObjectId("60fe28f943d47f81a841933a")
username: "Ming Lam"
password: "4444444"
active: true
> address: Array
  > date_of_creation: "2012-10-15"
  > orders: Array

_id: ObjectId("60fe28f943d47f81a841933b")
username: "Richard Dong"
password: "555555"
active: true
> address: Array
  > date_of_creation: "2014-10-15"
  > orders: Array

_id: ObjectId("60fe2a8543d47f81a8419348")
username: "User Test"
password: "test password"
active: true
> address: Array
  > date_of_creation: "2018-10-21"
  > orders: Array
  
```

2) Retrieve all information on a specific book (Allow users to enter a book and query all data associated with the book) (10%)

- Insert a book name or ISBN to search a book



1. Insert books and users to database
 2. Retriever all information on a specific book
 3. Retrieve all information on the books searching by author's name
 4. Retrieve all information on a specific customer who created later than 2017-07-13 and live in San Jose
 5. Retrieve all information on books that have multiple publishers
 6. Retrieve all information on the books that have reviews
 7. Update a book information
 8. Exit
 2
Bookname or ISBN:
 MongoDB: The Definitive Guide: Powerful and Scalable Data Storage
 { "_id" : { "\$oid" : "60fe28f943d47f81a841933c" }, "title" : "MongoDB: The Definitive Guide: Powerful and Scalable Data Storage" , "authors" : ["Shannon Bradshaw" , "Eoin Brazil" , "Kristina Chodorow"] , "ISBN" : "978-1491954461" , "publisher" : [{ "name" : "O'Reilly Media" }] }
 1. Insert books and users to database
 2. Retriever all information on a specific book
 3. Retrieve all information on the books searching by author's name
 4. Retrieve all information on a specific customer who created later than 2017-07-13 and live in San Jose
 5. Retrieve all information on books that have multiple publishers
 6. Retrieve all information on the books that have reviews
 7. Update a book information
 8. Exit
 2
Bookname or ISBN:
 MongoDB: The Definitive Guide: Powerful and Scalable Data Storage
 { "_id" : { "\$oid" : "60fe28f943d47f81a841933c" }, "title" : "MongoDB: The Definitive Guide: Powerful and Scalable Data Storage" , "authors" : ["Shannon Bradshaw" , "Eoin Brazil" , "Kristina Chodorow"] , "ISBN" : "978-1491954461" , "publisher" : [{ "name" : "O'Reilly Media" }] }

3) Retrieve all information on the books where the author = “The name of user’s interest” (10%)

- Insert the author’s name to search his/her books

```

1. Insert books and users to database
2. Retriever all information on a specific book
3. Retrieve all information on the books searching by author's name
4. Retrieve all information on a specific customer who created later than 2017-07-13 and live in San Jose
5. Retrieve all information on books that have multiple publishers
6. Retrieve all information on the books that have reviews
7. Update a book information
8. Exit
3
Author's name:
Kristina Chodorow
{ "_id" : { "$oid" : "60fe28f943d47f81a841933c"} , "title" : "MongoDB: The Definitive Guide: Powerful and Scalable Data Storage" , "authors" : [ "Shannon Bradshaw" , "Eoin Brazil" , "Kristina Chodorow"] , "ISBN"
1. Insert books and users to database
2. Retriever all information on a specific book
3. Retrieve all information on the books searching by author's name
4. Retrieve all information on a specific customer who created later than 2017-07-13 and live in San Jose
5. Retrieve all information on books that have multiple publishers
6. Retrieve all information on the books that have reviews
7. Update a book information
8. Exit
3
Author's name:
Kristina Chodorow
{ "_id" : { "$oid" : "60fe28f943d47f81a841933d"} , "title" : "Scaling MongoDB: Sharding, Cluster Setup, and Administration" , "authors" : [ "Kristina Chodorow"] , "ISBN" : "978-1449303211" , "publisher" : [ { "name" : "O'Reilly Media" } ]
{ "_id" : { "$oid" : "60fe28f943d47f81a841933e"} , "title" : "50 Tips and Tricks for MongoDB Developers: Get the Most Out of Your Database" , "authors" : [ "Kristina Chodorow"] , "ISBN" : "978-1449304614" , "pub
1. Insert books and users to database
2. Retriever all information on a specific book

```

4) Retrieve all information on a specific customer where the user id creation is later than 13 July 2017 and the city = “San Jose” (10%)

```

1. Insert books and users to database
2. Retriever all information on a specific book
3. Retrieve all information on the books searching by author's name
4. Retrieve all information on a specific customer who created later than 2017-07-13 and live in San Jose
5. Retrieve all information on books that have multiple publishers
6. Retrieve all information on the books that have reviews
7. Update a book information
8. Exit
4
{ "_id" : { "$oid" : "60fe28f943d47f81a8419339"} , "username" : "Mike Tseng" , "password" : "333333" , "active" : true , "address" : [ { "street" : "3333 Century Blvd" , "city" : "San Jose" , "zip" : 95112 , "state" : "CA" , "country" : "USA"}]
1. Insert books and users to database
2. Retriever all information on a specific book

```

ian 2017-07-13 and live in San Jose

'seng" , "password" : "333333" , "active" : true , "address" : [{ "street" : "3333 Century Blvd" , "city" : "San Jose" , "zip" : 95112 , "state" : "CA" , "country" : "USA"}] , "date_of_creation" : "2017-06-13"

5) Retrieve all information on books that have multiple publishers. (10%)

- There are no publishers who have multiple publishers.

1. Insert books and users to database
 2. Retriever all information on a specific book
 3. Retrieve all information on the books searching by author's name
 4. Retrieve all information on a specific customer who created later than 2017-07-13 and live in San Jose
 5. Retrieve all information on books that have multiple publishers
 6. Retrieve all information on the books that have reviews
 7. Update a book information

8

There are no books that have multiple publishers.

6) Retrieve all information on the books that have reviews. (10%)

- ```
1. Insert books and users to database
2. Retrieve all information on a specific book
3. Retrieve all information on the books searching by author's name
4. Retrieve all information on a specific customer who created later than 2017-07-13 and live in San Jose
5. Retrieve all information on books that have multiple publishers
6. Retrieve all information on the books that have reviews
7. Update a book information
8. Exit
9

{"_id": {"$oid": "60fe28f943d47f81a841933c"}, "title": "MongoDB: The Definitive Guide: Powerful and Scalable Data Storage", "authors": ["Shannon Bradshaw", "Eoin Brazil", "Kristina Chodorow"], "ISBN": "978-149304614", "publisher": [{"name": "O'Reilly Media"}]}, {"_id": {"$oid": "60fe28f943d47f81a841933d"}, "title": "Scaling MongoDB: Sharding, Cluster Setup, and Administration", "authors": ["Kristina Chodorow"], "ISBN": "978-1493063211", "publisher": [{"name": "O'Reilly Media"}]}, {"_id": {"$oid": "60fe28f943d47f81a841933e"}, "title": "50 Tips and Tricks for MongoDB Developers: Get the Most Out of Your Database", "authors": ["Kristina Chodorow"], "ISBN": "978-149304614", "publisher": [{"name": "O'Reilly Media"}]}, {"_id": {"$oid": "60fe28f943d47f81a841933f"}, "title": "Cassandra: The Definitive Guide: Distributed Data at Web Scale", "authors": ["Jeff Carpenter", "Eben Hewitt"], "ISBN": "978-1098115166", "publisher": [{"name": "O'Reilly Media"}]}, {"_id": {"$oid": "60fe28f943d47f81a841933g"}, "title": "Java Garage", "authors": ["Prentice Hall Ptr"], "ISBN": "978-0321462333", "publisher": [{"name": "Prentice Hall Ptr"}]}, {"_id": {"$oid": "60fe28f943d47f81a841933h"}, "title": "Test Book Title", "authors": ["Author Test"], "ISBN": "978-0000000001", "publisher": [{"name": "O'Reilly Media"}]}, {"_id": {"$oid": "60fe28f943d47f81a841933i"}, "title": "Test Book Title", "authors": ["Author Test"], "ISBN": "978-0000000001", "publisher": [{"name": "O'Reilly Media"}]}]
```

ition administration and configure authentication and authorizationUse stats when monitoring, back up and restore deployments, and use system settings when deploying MongoDB", "reviews": {"ratingNumber": 3.84},  
it using it because you are ready for scale, meaning you are traveling the Mongo road; on the other hand, even then it was quite a difficult read. Eg. I never sussed out the difference between replica sets, shards, etc  
Administration Tips: How to configure MongoDB and keep it running smoothly", "reviews": {"ratingNumber": 3.3}, "grades out of 5": 3.1, "review\_body": [{"customer": "Kelly H", "stars": 1, "review": "I am not sure what I am doing wrong but I am getting errors when trying to run the command 'mongorestore' on my local machine. I have tried everything I can think of and nothing seems to work. I am using the latest version of MongoDB and have followed all the steps in the documentation. Any help would be greatly appreciated."}, {"customer": "Brick Mover", "stars": 4, "review": "I especially enjoy reading the chapter on data modeling."}, {"customer": "A. Walsh", "stars": 4, "review": "I have been writing java code on and off for years, but never studied in formally. I bought this book to learn more about mongo db and I am finding it very useful. The examples are clear and easy to understand. I highly recommend it for anyone who wants to learn mongo db."}, {"customer": "L. V. Smart", "stars": 5, "review": "I have been using mongo db for a few years now and I find it to be a great database. This book has helped me to understand the basics of mongo db and how to use it effectively. The examples are well explained and the exercises are helpful. I would recommend this book to anyone who wants to learn mongo db."}], "averageRating": 3.3, "totalReviews": 3}

is, aggregate data, and use transactions for your applicationConfigure a local replica set and learn how replication interacts with your applicationSet up cluster components and choose a shard key for a variety of applicationsExplore aspects of application administration and configure authentication and access control for your application.

7) Update a book information. Show the data instance before update and after update. (10%)

- Updated the publisher's address of the first book

1. Insert books and users to database
  2. Retriever all information on a specific book
  3. Retrieve all information on the books searching by author's name
  4. Retrieve all information on a specific customer who created later than 2017-07-13 and live in San Jose
  5. Retrieve all information on books that have multiple publishers
  6. Retrieve all information on the books that have reviews
  7. Update a book information
  8. Exit
- 7
1. Insert books and users to database
  2. Retriever all information on a specific book

```

CLUSTER
Standalone
EDITION
MongoDB 5.0.0 Community
Filter your data
admin
book_store
author
book ...
customer
order
config
local
sample_airbnb

FILTER { field: 'value' }
ADD DATA ▾
VIEW ▾
OPTIONS ▾
FIND ▾
Displaying documents 1 - 6 of 6

{
 "_id": "ObjectId(\"60fe28f943d47f81a841933c\")",
 "title": "MongoDB: The Definitive Guide: Powerful and Scalable Data Storage",
 "authors": [
 {
 "name": "Shannon Bradshaw"
 },
 {
 "name": "Eoin Brazill"
 },
 {
 "name": "Kristina Chodorow"
 }
],
 "ISBN": "978-1491954461",
 "publisher": [
 {
 "name": "O'Reilly Media"
 }
],
 "date": "2019-12-31",
 "city": "Sebastopol",
 "address": [
 {
 "street": "1005 Gravenstein Highway North",
 "city": "Sebastopol",
 "zip": 95472,
 "state": "CA",
 "country": "USA"
 }
],
 "available": true,
 "pages": 514,
 "summary": "In six parts, this book shows you how to: Work with MongoDB, perform w...",
 "reviews": [
 {
 "language": "English"
 }
],
 "categories": []
}

```

```

CLUSTER
Standalone
EDITION
MongoDB 5.0.0 Community
Filter your data
admin
book_store
author
book ...
customer
order
config
local
sample_airbnb

FILTER { field: 'value' }
ADD DATA ▾
VIEW ▾
OPTIONS ▾
FIND ▾
Displaying documents 1 - 6 of 6

{
 "_id": "ObjectId(\"60fe28f943d47f81a841933c\")",
 "title": "MongoDB: The Definitive Guide: Powerful and Scalable Data Storage",
 "authors": [
 {
 "name": "Shannon Bradshaw"
 },
 {
 "name": "Eoin Brazill"
 },
 {
 "name": "Kristina Chodorow"
 }
],
 "ISBN": "978-1491954461",
 "publisher": [
 {
 "name": "O'Reilly Media"
 }
],
 "date": "2019-12-31",
 "city": "Sebastopol",
 "address": [
 {
 "street": "[CS157C NoSQL Highway North]",
 "city": "Sebastopol",
 "zip": 95472,
 "state": "CA",
 "country": "USA"
 }
],
 "available": true,
 "pages": 514,
 "summary": "In six parts, this book shows you how to: Work with MongoDB, perform w...",
 "reviews": [
 {
 "language": "English"
 }
],
 "categories": []
}

```

## Problems encountered during the implementation

1, The first problem I encountered during my implementation is the requirements are not very clear. I solved these problems flexibly.

The implementations of the requirement “Insert books and users to database” can have several ways: the first way is inserting a fixed instance when implementing; the second way is to select one of five(or other number) fixed instances to implement the inserting function; the third way is to accept key input via Scanner for each attribute. Of course the third can implement the inserting function better, but the instance, especially the instance of a book, which has too many attributes. It will take lots of time to input data. All these three ways can implement the inserting function in the same way---just insert a json file to the Book-Collection. Like this:

```
DBObject dbObject_book_test = (DBObject) JSON.parse(json_Book_test);
collection_Book.insert(dbObject_book_test);
```

The difference among these three ways is just the process of getting the json file, json\_Book\_test. The time is too limited. So I just use the first way to implement the insert function.

2, The requirement “Update a book information” is also not very clear. To update some attributes is much easier than to update others. For example, updating ‘title’, ‘ISBN’, ‘available’, ‘pages’, ‘summary’ and ‘language’, is very easy. However, to update an element in the nested array is much more difficult, such as the street name in the address of the publisher of the book. I was very interested in this question. So I spent many hours on this question, but until now I am not satisfied with my implementation.

```
BasicDBObject newStreet = new BasicDBObject().append("$set", new
BasicDBObject().append("publisher.$[].address.$[].street", "CS157C NoSQL
Highway North"));
collection_Book.update(new BasicDBObject().append("title", "MongoDB: The
Definitive Guide: Powerful and Scalable Data Storage"), newStreet);
```

My implementation will update all the ‘street’ attributes of all ‘address’ of the publisher of the book.

Even though the implementation still fits the requirement “Update a book information,” I am not satisfied that the implementation cannot precisely update an attribute of an element inside a nested array. I hope you can tell me how to implement it. Thank you.

## Lessons Learned

1, JSON is a good tool to operate the MongoDB database.

There are several ways to insert a document into a collection, such as using BasicDBObject, BasicDBObjectBuilder, Map, and JSON. When the document is complex, JSON is the best way. If we use the three formers, there will be lots of key-value pairs. The program will be very hard to read and easy to make a mistake.

2, The way of implementing a complex query:

When we meet a complex query, such as to find “a specific customer who was created later than 2017-07-13 and live in San Jose”, we can separate the query into several simpler queries, such as query-1 “a specific customer who was created later than 2017-07-13” and query-2 “a specific customer who live in San Jose.”

The query-1 can be implemented as:

```
BasicDBObject query4 = new BasicDBObject();
query4.put("date_of_creation", new BasicDBObject("$gt", "2017-07-13"));
DBCursor cursor4 = collection_Customer.find(query4);
```

The query-2 can be implemented as :

```
BasicDBObject query4 = new BasicDBObject();
query4.put ("address", new BasicDBObject("$elemMatch", new
BasicDBObject("city", "San Jose")));
DBCursor cursor4 = collection_Customer.find(query4);
```

When the query-1 and query-2 can works well, then we can combine these two queries into the original query:

```
BasicDBObject query4 = new BasicDBObject();
query4.put ("address", new BasicDBObject("$elemMatch", new
BasicDBObject("city", "San Jose")));
query4.append("date_of_creation", new BasicDBObject("$gt", "2017-07-13"));
DBCursor cursor4 = collection_Customer.find(query4);
```