BIG DATA MANAGEMENT

POST GRADUATE DIPLOMA IN DATA ENGINEERING

ASSIGNMENT 7

SUBMITTED BY:

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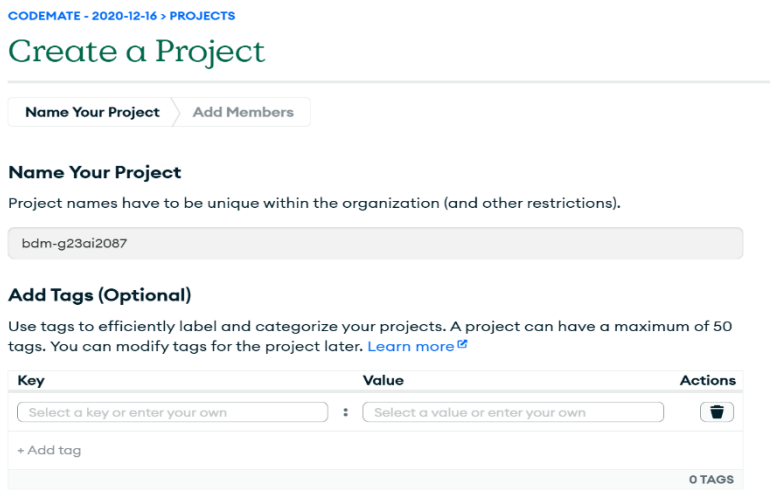
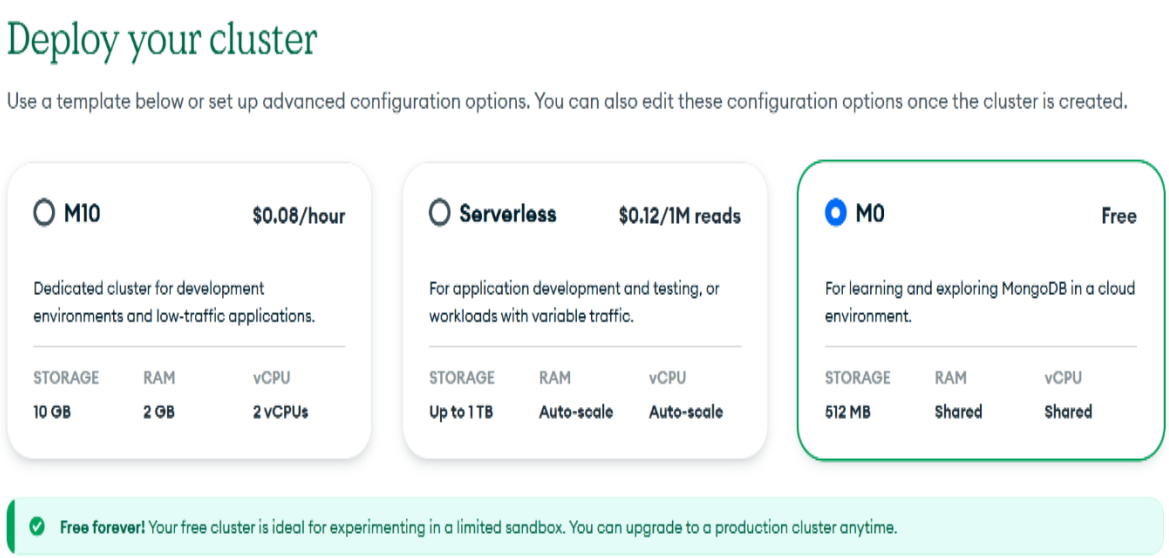
SUBMISSION DATE: 15th December, 2024

DEPARTMENT OF AIDE
INDIAN INSTITUTE OF TECHNOLOGY, JODHPUR

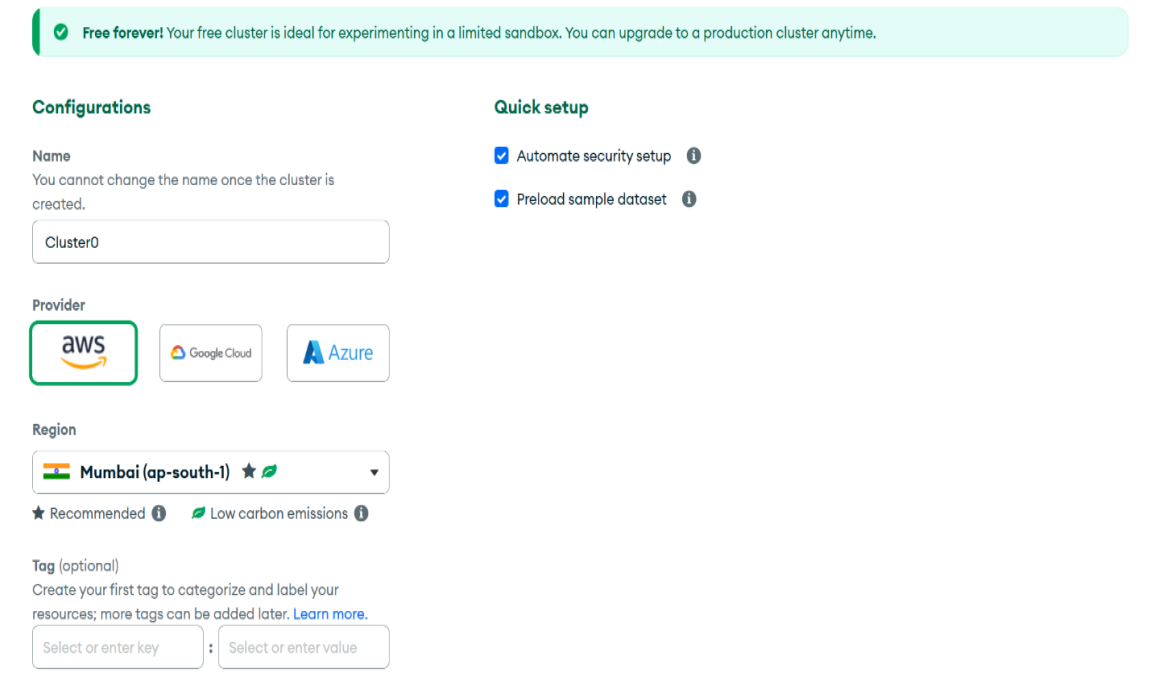
Step 1: Name your project and optionally add tags to categorize it.



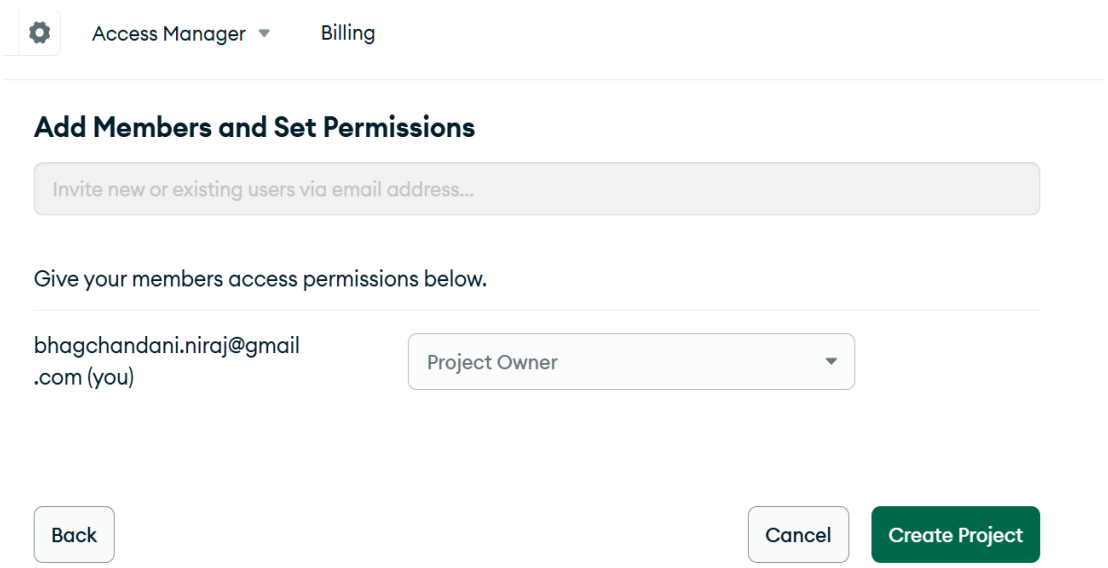
Step 2: Select a cluster type based on your requirements, such as free, serverless, or dedicated options.



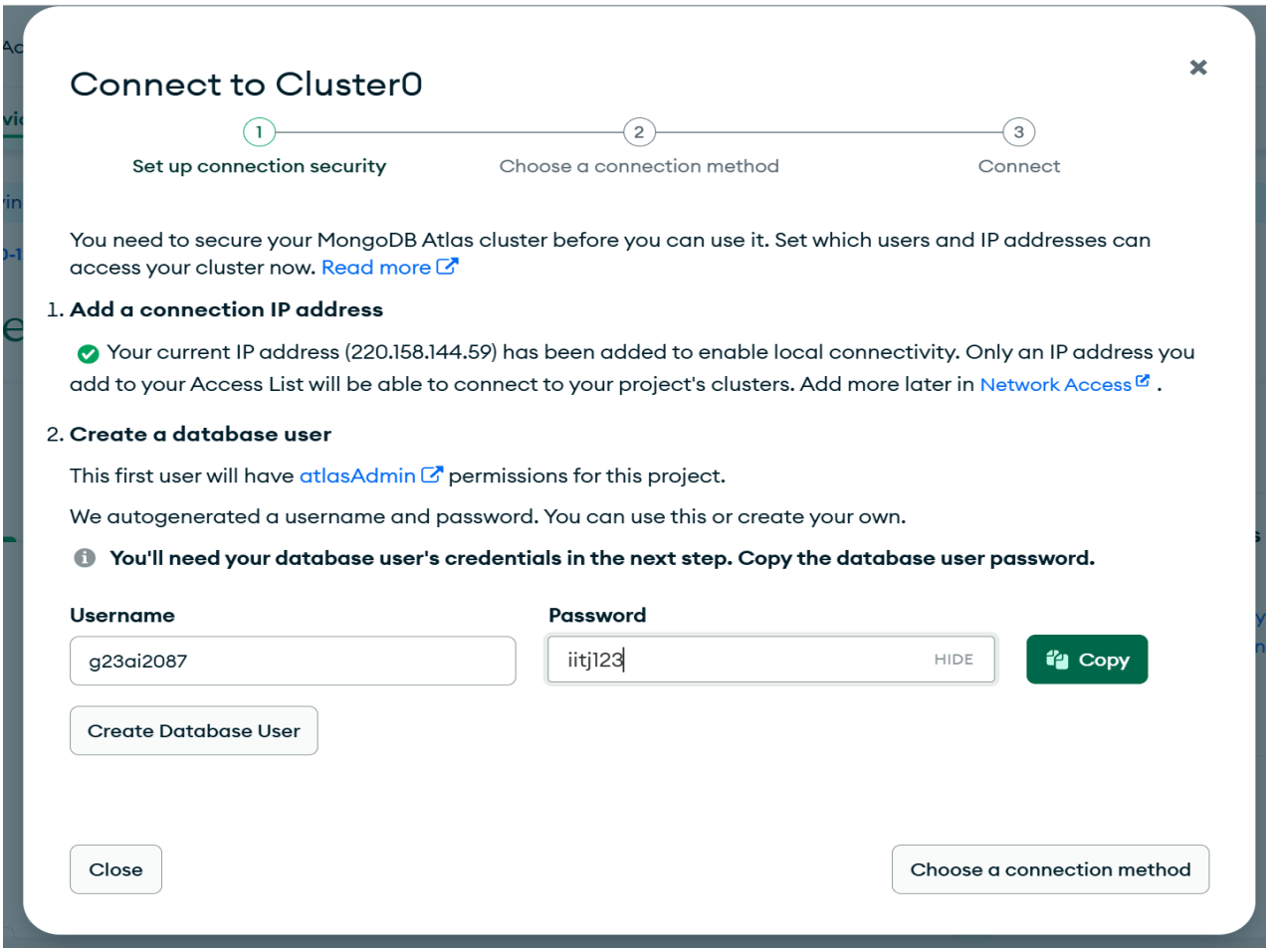
Step 3: Configure your cluster by selecting the provider, region, and optional settings like security setup and sample dataset preloading.



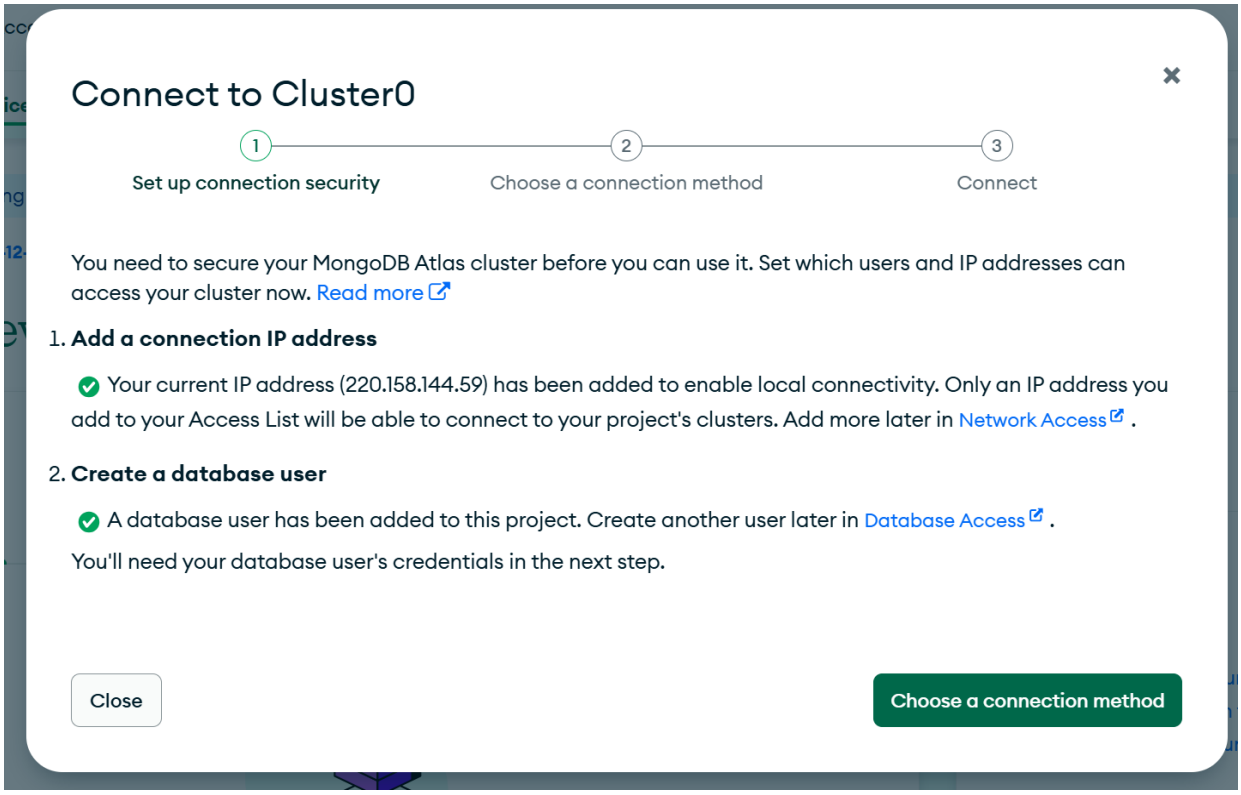
Step 4: Add members to your project, assign their permissions, and finalize by creating the project.



Step 5: Secure your cluster by adding a connection IP address and creating a database user with credentials.



Step 6: Verify connection security by ensuring an IP address is added and a database user is created for accessing the cluster.



1. Write the method load() to load the TPC-H customer and orders data into separate collections (like how it would be stored in a relational model). The data files are in the data folder.

Code:

```
public void load() {
        try (BufferedReader customerReader = new BufferedReader(new
FileReader("data/customer.tbl"));
             BufferedReader ordersReader = new BufferedReader(new
FileReader("data/order.tbl"))) {

            MongoCollection<Document> cc = database.getCollection("customer");
            customerReader.lines().forEach(line -> {
                String[] parts = line.split("\\|");
                Document cd = new Document("custkey", Integer.parseInt(parts[0]))
                        .append("name", parts[1])
                        .append("address", parts[2])
                        .append("nationkey", Integer.parseInt(parts[3]))
                        .append("phone", parts[4])
                        .append("acctbal", Double.parseDouble(parts[5]))
                        .append("mktsegment", parts[6])
                        .append("comment", parts[7]);
                cc.insertOne(cd);
            });

            MongoCollection<Document> oc = database.getCollection("orders");
            ordersReader.lines().forEach(line -> {
                String[] parts = line.split("\\|");
                Document orderDoc = new Document("orderkey", Integer.parseInt(parts[0]))
                        .append("custkey", Integer.parseInt(parts[1]))
                        .append("orderstatus", parts[2])
                        .append("totalprice", Double.parseDouble(parts[3]))
                        .append("orderdate", parts[4])
                        .append("orderpriority", parts[5])
                        .append("clerk", parts[6])
                        .append("shippriority", Integer.parseInt(parts[7]))
                        .append("comment", parts[8]);
                oc.insertOne(orderDoc);
            });

            System.out.println("Data loaded successfully.");
        } catch (Exception e) {
            System.out.println("Error while loading data: " + e.getMessage());
        }
    }
```

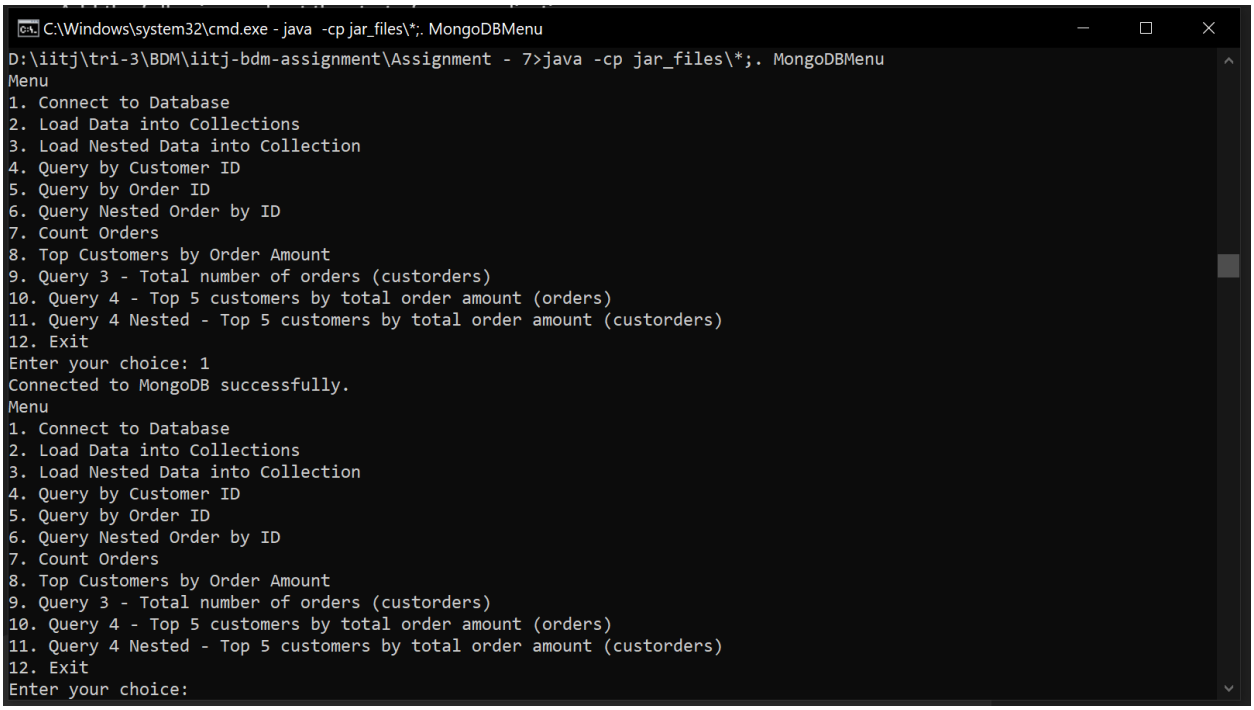


Fig. 7.1: Command-line interface demonstrating MongoDB menu operations, including database connection, data loading, and query execution options.

2. Write the method loadNest() to load the TPC-H customer and order data into a nested collection called custorders where each document contains the customer information and all orders for that customer.

```
public void loadNestedData() throws Exception {
        try {
            List<Document> customers = loadDataFromFile("data/customer.tbl", true);
            List<Document> orders = loadDataFromFile("data/order.tbl", false);
            Map<Integer, List<Document>> customerOrdersMap = mapOrdCust(orders);

            List<Document> col = combineCustomerOrders(customers, customerOrdersMap);

            MongoCollection<Document> collection = database.getCollection("custorders");
            collection.insertMany(col);
            System.out.println("Nested data loaded successfully.");
        } catch (Exception e) {
            System.out.println("Error while loading nested data: " + e.getMessage());
            throw new Exception("Error loading nested customer and order data", e);
        }
    }
```

```
C:\Windows\system32\cmd.exe - java  -cp jar_files\*;. MongoDBMenu
Connected to MongoDB successfully.
Menu
1. Connect to Database
2. Load Data into Collections
3. Load Nested Data into Collection
4. Query by Customer ID
5. Query by Order ID
6. Query Nested Order by ID
7. Count Orders
8. Top Customers by Order Amount
9. Query 3 - Total number of orders (custorders)
10. Query 4 - Top 5 customers by total order amount (orders)
11. Query 4 Nested - Top 5 customers by total order amount (custorders)
12. Exit
Enter your choice: 2
Data loaded successfully.
Menu
1. Connect to Database
2. Load Data into Collections
3. Load Nested Data into Collection
4. Query by Customer ID
5. Query by Order ID
6. Query Nested Order by ID
7. Count Orders
8. Top Customers by Order Amount
9. Query 3 - Total number of orders (custorders)
10. Query 4 - Top 5 customers by total order amount (orders)
11. Query 4 Nested - Top 5 customers by total order amount (custorders)
12. Exit
Enter your choice:
```

Fig. 7.2: Command-line interface showing successful data loading into MongoDB collections and available menu options for executing various database queries.

Fig. 7.3: MongoDB cluster structure displaying databases and collections, including "db-g23ai2087" with collections "customer" and "orders."

customer

	_id ObjectId	custkey Int32	name String	address String	nationkey Int32
1	ObjectId('675d4a97791b565…	1	"Customer#000000001"	"ANhzAAh6R3 glS4Sx"	15
2	ObjectId('675d4a9d791b565…	2	"Customer#000000002"	"MN0L3OzNgylx2"	13
3	ObjectId('675d4a9d791b565…	3	"Customer#000000003"	"PSL74SNCwwN2ON66lxgnw7mR…	1
4	ObjectId('675d4a9d791b565…	4	"Customer#000000004"	"mknn1Sh0NPMz1k5Lw2OB mO"	4
5	ObjectId('675d4a9e791b565…	5	"Customer#000000005"	"yOww5znhPNi5OlQNPChkLx2B…	3
6	ObjectId('675d4a9e791b565…	6	"Customer#000000006"	"nS70ykL4n k51ik3R5wlNzjn…	20
7	ObjectId('675d4a9e791b565…	7	"Customer#000000007"	" ChljB04OgAizN6kQhRi7Ljj…	18
8	ObjectId('675d4a9e791b565…	8	"Customer#000000008"	"kCRz0CknMw7mh4P50QjBnxSL…	17
9	ObjectId('675d4a9e791b565…	9	"Customer#000000009"	"L4z65g2RNgN6PxM5kRjnPB7k…	8
10	ObjectId('675d4a9f791b565…	10	"Customer#000000010"	"L3jg3xAwi6A0B103B0Aymm"	5
11	ObjectId('675d4a9f791b565…	11	"Customer#000000011"	"BCP1yzB0x4"	23
12	ObjectId('675d4a9f791b565…	12	"Customer#000000012"	"l52BNB2QxNxCiAyLjMkCmx76…	13
13	ObjectId('675d4a9f791b565…	13	"Customer#000000013"	"wM1A1C75Qi6Ljx2N6C"	3
14	ObjectId('675d4a9f791b565…	14	"Customer#000000014"	"l2AjL Q3jizLz4L1 n2y lyB…	1

Fig. 7.4: Sample data from the "customer" collection in MongoDB, displaying fields such as _id, custkey, name, address, and nationkey.

ADD DATA | EXPORT DATA | UPDATE | DELETE | 100 | 1 - 100 of 15000

orders

	_id ObjectId	orderkey Int32	custkey Int32	orderstatus String	totalprice Double
1	ObjectId('675d4b50791b565…	1	781	"O"	172799.49
2	ObjectId('675d4b50791b565…	2	1234	"O"	41048.98
3	ObjectId('675d4b50791b565…	3	445	"F"	250870.73
4	ObjectId('675d4b50791b565…	4	557	"O"	6705.3
5	ObjectId('675d4b50791b565…	5	392	"F"	120227.38
6	ObjectId('675d4b50791b565…	6	1301	"F"	2506.57
7	ObjectId('675d4b50791b565…	7	670	"O"	235483.33
8	ObjectId('675d4b50791b565…	32	611	"O"	197403.12
9	ObjectId('675d4b50791b565…	33	1276	"F"	72247.39
10	ObjectId('675d4b50791b565…	34	1153	"O"	131039.87
11	ObjectId('675d4b50791b565…	35	862	"O"	171884.36
12	ObjectId('675d4b50791b565…	36	1249	"O"	81904.33
13	ObjectId('675d4b50791b565…	37	818	"F"	150846.36
14	ObjectId('675d4b51791b565…	38	322	"O"	7219.48

Fig. 7.5: Sample data from the "orders" collection in MongoDB, displaying fields such as _id, orderkey, custkey, orderstatus, and totalprice.

3. Write the method query1() that returns the customer name given a customer id using the customer collection.

Code:

```
public String query1(int customerKey) {
        MongoCollection<Document> collection = database.getCollection("customer");
        Document customer = collection.find(eq("custkey", customerKey)).first();
        return customer != null ? customer.getString("name") : "Customer not found";
    }
```

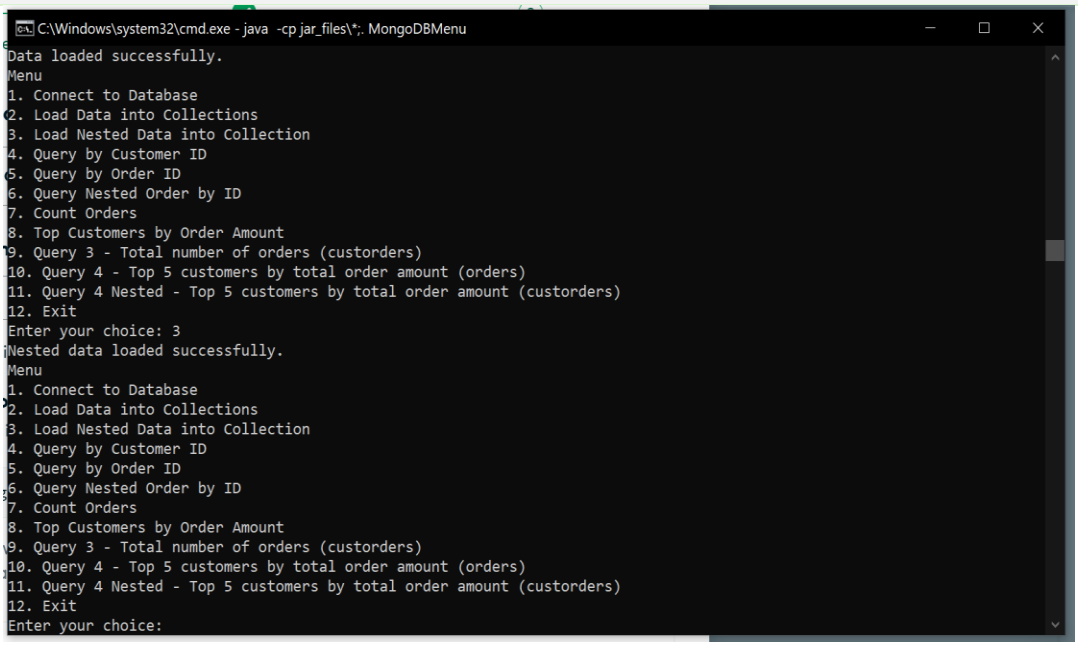


Fig.7.6: Command-line interface illustrating the successful loading of nested data into MongoDB collections, with menu options available for further database queries and operations.

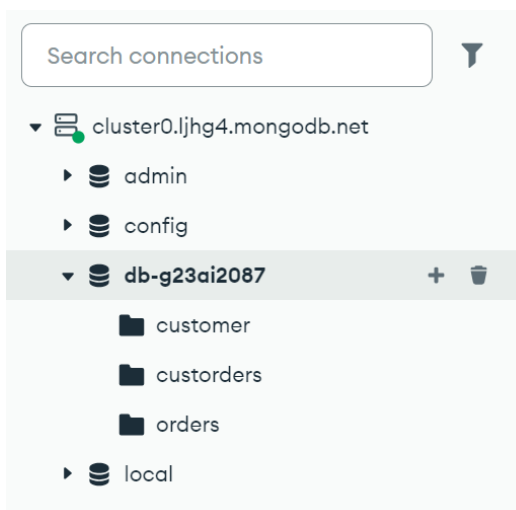


Fig. 7.7: MongoDB cluster structure displaying the database "db-g23ai2087" with collections including "customer," "custorders," and "orders," alongside administrative databases like "admin" and "config."

ADD DATA | EXPORT DATA | UPDATE | DELETE | 100 | 1 - 100 of 1500

custorders

	_id ObjectId	custkey Int32	name String	address String	nationkey Int32
1	ObjectId('675d55e4791b565…	1	"Customer#000000001"	"ANhzAAh6R3 glS4Sx"	15
2	ObjectId('675d55e4791b565…	2	"Customer#000000002"	"MN0L3OzNgylx2"	13
3	ObjectId('675d55e4791b565…	3	"Customer#000000003"	"PSL74SNCwwN2ON66lxgnw7mR…	1
4	ObjectId('675d55e4791b565…	4	"Customer#000000004"	"mknn1Sh0NPMz1k5Lw2OB mO"	4
5	ObjectId('675d55e4791b565…	5	"Customer#000000005"	"yOww5znhPNi5OlQNPChkLx2B…	3
6	ObjectId('675d55e4791b565…	6	"Customer#000000006"	"nS70ykL4n k51ik3R5wlNzjn…	20
7	ObjectId('675d55e4791b565…	7	"Customer#000000007"	" ChljB04OgAizN6kQhRi7Ljj…	18
8	ObjectId('675d55e4791b565…	8	"Customer#000000008"	"kCRz0CknMw7mh4P50QjBnxSL…	17
9	ObjectId('675d55e4791b565…	9	"Customer#000000009"	"L4z65g2RNgN6PxM5kRjnPB7k…	8
10	ObjectId('675d55e4791b565…	10	"Customer#000000010"	"L3jg3xAwi6A0B103B0Aymm"	5
11	ObjectId('675d55e4791b565…	11	"Customer#000000011"	"BCP1yzB0x4"	23
12	ObjectId('675d55e4791b565…	12	"Customer#000000012"	"l52BNB2QxNxCiAyLjMkCmx76…	13
13	ObjectId('675d55e4791b565…	13	"Customer#000000013"	"wM1A1C75Qi6Ljx2N6C"	3
14	ObjectId('675d55e4791b565…	14	"Customer#000000014"	"l2AjL Q3jizLz4L1 n2y lyB…	1

Fig.7.8: Sample data from the "custorders" collection in MongoDB, showcasing fields such as _id, custkey, name, address, and nationkey.

4. Write the method query2() that returns the order date for a given order id using the orders collection.

Code:

```
public String query2(int orderId) {
        MongoCollection<Document> collection = database.getCollection("orders");
        Document order = collection.find(eq("orderkey", orderId)).first();
        return order != null ? order.getString("orderdate") : "Order not found";
    }
```

```
C:\Windows\system32\cmd.exe - java  -cp jar_files\*;. MongoDBMenu
Menu
1. Connect to Database
2. Load Data into Collections
3. Load Nested Data into Collection
4. Query by Customer ID
5. Query by Order ID
6. Query Nested Order by ID
7. Count Orders
8. Top Customers by Order Amount
9. Query 3 - Total number of orders (custorders)
10. Query 4 - Top 5 customers by total order amount (orders)
11. Query 4 Nested - Top 5 customers by total order amount (custorders)
12. Exit
Enter your choice: 4
Enter Customer ID: 12
```

Fig. 7.9: Command-line interface executing Query 4 to retrieve the top 5 customers by total order amount from the "custorders" collection, with input for a specific customer ID.

5. Write the method query2Nest() that returns order date for a given order id using the custorders collection.

Code:

```
public String query2Nest(int orderId) {
        MongoCollection<Document> collection = database.getCollection("custorders");
        List<Bson> pipeline = Arrays.asList(
                Aggregates.unwind("$orders"),
                Aggregates.match(Filters.eq("orders.orderkey", orderId)),
                Aggregates.project(Projections.fields(Projections.excludeId(),
Projections.include("orders.orderdate")))
        );
        AggregateIterable<Document> result = collection.aggregate(pipeline);
        Document doc = result.first();
        return doc != null ? doc.get("orders", Document.class).getString("orderdate") :
"Order not found";
    }
```

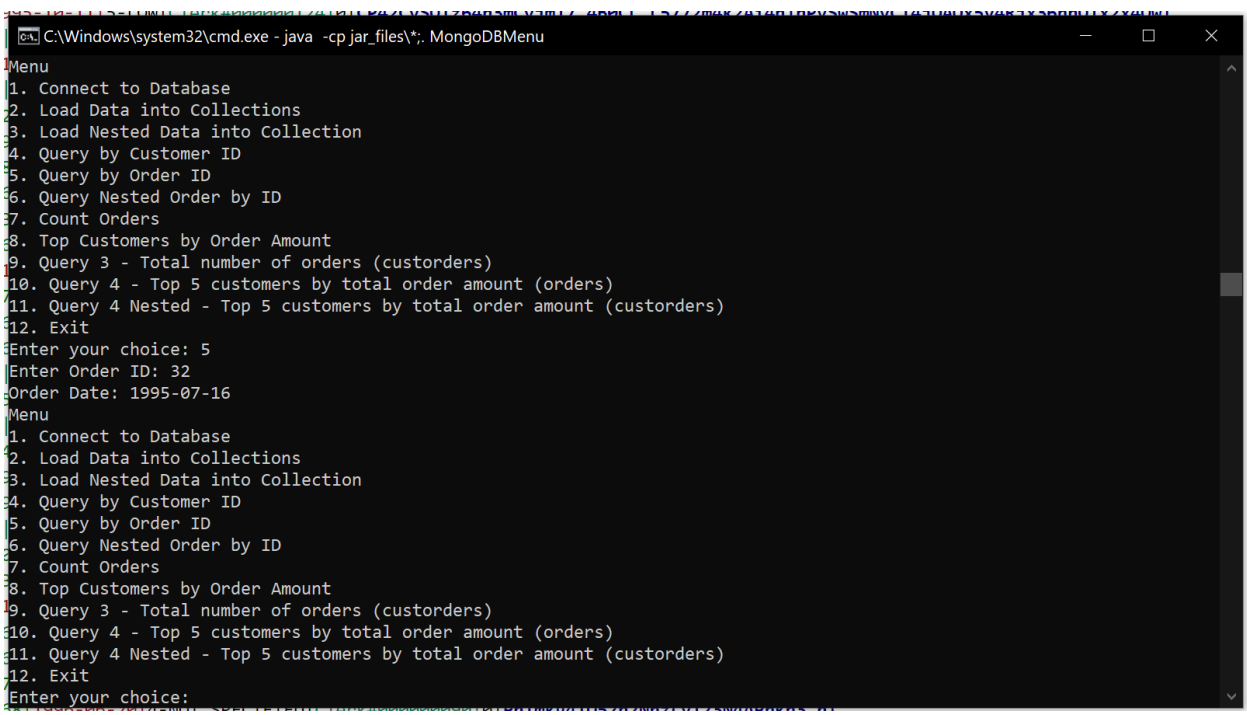


Fig. 7.10: Command-line interface executing Query 5 to retrieve nested order details by a specific Order ID, displaying the order date and returning to the menu for further operations.

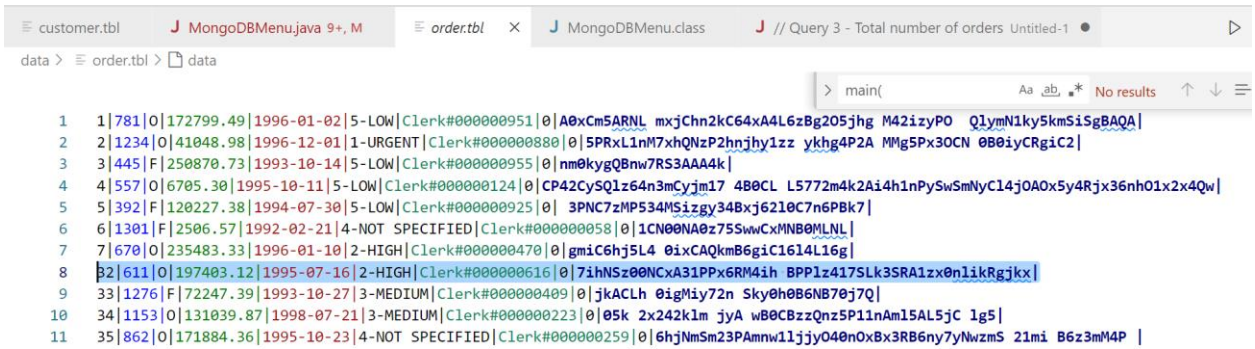


Fig.7.11: Query results displaying detailed order information from the "orders" collection, including fields such as orderkey, totalprice, orderdate, and clerk, highlighting specific records based on query conditions.

6. Write the method query3() that returns the total number of orders using the orders collection.

Code:

```
public long countOrders() {
        MongoCollection<Document> collection = database.getCollection("orders");
        return collection.countDocuments();
    }
```

Fig. 7.12: Command-line interface executing Query 6 to fetch nested order details for a specific Order ID, displaying the corresponding order date and returning to the menu for additional operations.

7. Write the method query3Nest() that returns the total number of orders using the custorders collection.

Code:

```
public long query3Nest() {
        MongoCollection<Document> collection = database.getCollection("custorders");
        return collection.countDocuments(); // Returns the total number of documents in
the custorders collection
```

```
    }
```

Fig. 7.13: Command-line interface executing Query 7 to count the total number of orders in the database, displaying the result as "Total Orders: 15000."

8. Write the method query4() that returns the top 5 customers based on total order amount using the customer and orders collections.

Code:

```
public List<Document> query4() {
        MongoCollection<Document> collection = database.getCollection("orders");
        List<Bson> pipeline = Arrays.asList(
            Aggregates.group("$custkey", Accumulators.sum("total_order_amount",
"$totalprice")), // Sum total order amounts
            Aggregates.sort(Sorts.descending("total_order_amount")),
       // Sort by total_order_amount
            Aggregates.limit(5)
       // Limit to top 5 customers
        );

        AggregateIterable<Document> result = collection.aggregate(pipeline);
        return result.into(new ArrayList<>());
    }
```

```
C:\Windows\system32\cmd.exe - java  -cp jar_files\*;. MongoDBMenu
4. Query by Customer ID
5. Query by Order ID
6. Query Nested Order by ID
7. Count Orders
8. Top Customers by Order Amount
9. Query 3 - Total number of orders (custorders)
10. Query 4 - Top 5 customers by total order amount (orders)
11. Query 4 Nested - Top 5 customers by total order amount (custorders)
12. Exit
Enter your choice: 8
Top Customers by Order Amount:
Document{{_id=413, total_order_amount=4452196.73}}
Document{{_id=686, total_order_amount=4130676.48}}
Document{{_id=1202, total_order_amount=4018729.78}}
Document{{_id=464, total_order_amount=3986153.08}}
Document{{_id=98, total_order_amount=3980984.34}}
```

Fig.7.14: Command-line interface executing Query 8 to retrieve the top customers by total order amount, displaying the customer IDs and their corresponding total order amounts.

9. Write the method query4Nest() that returns the top 5 customers based on total order amount using the custorders collection.

Code:

```
public List<Document> query4Nest() {
        MongoCollection<Document> collection = database.getCollection("custorders");
        List<Bson> pipeline = Arrays.asList(
            Aggregates.unwind("$orders"),
      // Unwind orders array
            Aggregates.group("$custkey", Accumulators.sum("total_order_amount",
"$orders.totalprice")), // Sum total price in orders array
            Aggregates.sort(Sorts.descending("total_order_amount")),
     // Sort by total_order_amount
            Aggregates.limit(5)
     // Limit to top 5 customers
        );
```

```
C:\Windows\system32\cmd.exe - java  -cp jar_files\*;. MongoDBMenu
Menu
1. Connect to Database
2. Load Data into Collections
3. Load Nested Data into Collection
4. Query by Customer ID
5. Query by Order ID
6. Query Nested Order by ID
7. Count Orders
8. Top Customers by Order Amount
9. Query 3 - Total number of orders (custorders)
10. Query 4 - Top 5 customers by total order amount (orders)
11. Query 4 Nested - Top 5 customers by total order amount (custorders)
12. Exit
Enter your choice: 11
Top 5 customers by total order amount (Nested):
Document{{_id=413, total_order_amount=4452196.73}}
Document{{_id=686, total_order_amount=4130676.48}}
Document{{_id=1202, total_order_amount=4018729.78}}
Document{{_id=464, total_order_amount=3986153.08}}
Document{{_id=98, total_order_amount=3980984.34}}
```

Fig.7.15: Command-line interface executing Query 11 to retrieve the top 5 customers by total order amount using nested query logic, displaying customer IDs along with their total order amounts.

Full Code:

```
import com.mongodb.client.MongoClient;
import com.mongodb.client.MongoClients;
import com.mongodb.client.MongoCollection;
import com.mongodb.client.MongoDatabase;
import org.bson.Document;
import static com.mongodb.client.model.Filters.eq;
import com.mongodb.client.AggregateIterable;
import org.bson.conversions.Bson;
import com.mongodb.client.model.Aggregates;
import com.mongodb.client.model.Filters;
import com.mongodb.client.model.Projections;
import java.util.Arrays;
import java.util.List;
import java.util.ArrayList;
import java.util.HashMap;
import java.util.Map;
import java.util.Scanner;
import java.io.BufferedReader;
import java.io.FileReader;
import com.mongodb.client.model.Sorts;
import static com.mongodb.client.model.Accumulators.*;
import static com.mongodb.client.model.Accumulators.sum;
import com.mongodb.client.model.Accumulators;
import java.util.logging.Level;
import java.util.logging.Logger;

public class MongoDBMenu {
    private MongoClient client;
    private MongoDatabase database;

    public void MongoDB() {
        this.database = database;
    }

    public void connect() {
        try {
            String cs = "mongodb+srv://db-
g23ai2087:iitj123@cluster0.ljhg4.mongodb.net/?retryWrites=true&w=majority&appName=Cluster0
";
            this.client = MongoClients.create(cs);
            this.database = client.getDatabase("db-g23ai2087");
            System.out.println("Connected to MongoDB successfully.");
```

```
        } catch (Exception e) {
            System.out.println("Error while connecting: " + e.getMessage());
        }
    }

    public void load() {
        try (BufferedReader customerReader = new BufferedReader(new
FileReader("data/customer.tbl"));
             BufferedReader ordersReader = new BufferedReader(new
FileReader("data/order.tbl"))) {

            MongoCollection<Document> cc = database.getCollection("customer");
            customerReader.lines().forEach(line -> {
                String[] parts = line.split("\\|");
                Document cd = new Document("custkey", Integer.parseInt(parts[0]))
                        .append("name", parts[1])
                        .append("address", parts[2])
                        .append("nationkey", Integer.parseInt(parts[3]))
                        .append("phone", parts[4])
                        .append("acctbal", Double.parseDouble(parts[5]))
                        .append("mktsegment", parts[6])
                        .append("comment", parts[7]);
                cc.insertOne(cd);
            });

            MongoCollection<Document> oc = database.getCollection("orders");
            ordersReader.lines().forEach(line -> {
                String[] parts = line.split("\\|");
                Document orderDoc = new Document("orderkey", Integer.parseInt(parts[0]))
                        .append("custkey", Integer.parseInt(parts[1]))
                        .append("orderstatus", parts[2])
                        .append("totalprice", Double.parseDouble(parts[3]))
                        .append("orderdate", parts[4])
                        .append("orderpriority", parts[5])
                        .append("clerk", parts[6])
                        .append("shippriority", Integer.parseInt(parts[7]))
                        .append("comment", parts[8]);
                oc.insertOne(orderDoc);
            });

            System.out.println("Data loaded successfully.");
        } catch (Exception e) {
            System.out.println("Error while loading data: " + e.getMessage());
        }
    }
```

```
    public void loadNestedData() throws Exception {
        try {
            List<Document> customers = loadDataFromFile("data/customer.tbl", true);
            List<Document> orders = loadDataFromFile("data/order.tbl", false);
            Map<Integer, List<Document>> customerOrdersMap = mapOrdCust(orders);

            List<Document> col = combineCustomerOrders(customers, customerOrdersMap);

            MongoCollection<Document> collection = database.getCollection("custorders");
            collection.insertMany(col);
            System.out.println("Nested data loaded successfully.");
        } catch (Exception e) {
            System.out.println("Error while loading nested data: " + e.getMessage());
            throw new Exception("Error loading nested customer and order data", e);
        }
    }

    private List<Document> loadDataFromFile(String fileName, boolean isCustomerData)
throws Exception {
        List<Document> dl = new ArrayList<>();
        try (BufferedReader reader = new BufferedReader(new FileReader(fileName))) {
            String line;
            while ((line = reader.readLine()) != null) {
                String[] data = line.split("\\|");
                try {
                    Document document = isCustomerData ? createCustomerDocument(data) :
createOrderDocument(data);
                    dl.add(document);
                } catch (Exception e) {
                    System.out.println("Skipping invalid record: " + line);
                }
            }
        }
        return dl;
    }

    private Document createCustomerDocument(String[] data) {
        return new Document()
                .append("custkey", parseIntSafe(data[0]))
                .append("name", data[1])
                .append("address", data[2])
                .append("nationkey", parseIntSafe(data[3]))
                .append("phone", data[4])
                .append("acctbal", parseDoubleSafe(data[5]))
                .append("mktsegment", data[6])
                .append("comment", data[7]);
```

```
    }

    private Document createOrderDocument(String[] data) {
        return new Document()
                .append("orderkey", parseIntSafe(data[0]))
                .append("custkey", parseIntSafe(data[1]))
                .append("orderstatus", data[2])
                .append("totalprice", parseDoubleSafe(data[3]))
                .append("orderdate", data[4])
                .append("orderpriority", data[5])
                .append("clerk", data[6])
                .append("shippriority", parseIntSafe(data[7]))
                .append("comment", data[8]);
    }

    private Map<Integer, List<Document>> mapOrdCust(List<Document> orders) {
        Map<Integer, List<Document>> map = new HashMap<>();
        for (Document order : orders) {
            int custKey = order.getInteger("custkey");
            map.computeIfAbsent(custKey, k -> new ArrayList<>()).add(order);
        }
        return map;
    }

    private List<Document> combineCustomerOrders(List<Document> customers, Map<Integer,
List<Document>> customerOrdersMap) {
        List<Document> combinedList = new ArrayList<>();
        for (Document customer : customers) {
            int custKey = customer.getInteger("custkey");
            List<Document> orders = customerOrdersMap.get(custKey);
            if (orders != null) {
                customer.append("orders", orders);
            }
            combinedList.add(customer);
        }
        return combinedList;
    }

    private int parseIntSafe(String value) {
        try {
            return Integer.parseInt(value);
        } catch (NumberFormatException e) {
            System.out.println("Invalid integer: " + value);
            return 0;
        }
    }
```

```
    private double parseDoubleSafe(String value) {
        try {
            return Double.parseDouble(value);
        } catch (NumberFormatException e) {
            System.out.println("Invalid double: " + value);
            return 0.0;
        }
    }

    public String query1(int customerKey) {
        MongoCollection<Document> collection = database.getCollection("customer");
        Document customer = collection.find(eq("custkey", customerKey)).first();
        return customer != null ? customer.getString("name") : "Customer not found";
    }

    public String query2(int orderId) {
        MongoCollection<Document> collection = database.getCollection("orders");
        Document order = collection.find(eq("orderkey", orderId)).first();
        return order != null ? order.getString("orderdate") : "Order not found";
    }

    public String query2Nest(int orderId) {
        MongoCollection<Document> collection = database.getCollection("custorders");
        List<Bson> pipeline = Arrays.asList(
                Aggregates.unwind("$orders"),
                Aggregates.match(Filters.eq("orders.orderkey", orderId)),
                Aggregates.project(Projections.fields(Projections.excludeId(),
Projections.include("orders.orderdate")))
        );
        AggregateIterable<Document> result = collection.aggregate(pipeline);
        Document doc = result.first();
        return doc != null ? doc.get("orders", Document.class).getString("orderdate") :
"Order not found";
    }

    public long query3() {
        MongoCollection<Document> collection = database.getCollection("orders");
        return collection.countDocuments();
    }

    public long countNestedOrders() {
        MongoCollection<Document> collection = database.getCollection("custorders");
        List<Bson> pipeline = Arrays.asList(
                Aggregates.unwind("$orders"),
                Aggregates.count("totalOrders")
```

```
        );
        AggregateIterable<Document> result = collection.aggregate(pipeline);
        Document doc = result.first();
        return doc != null ? doc.getLong("totalOrders") : 0;
    }


    public List<Document> topCustomersByOrderAmount() {
        MongoCollection<Document> collection = database.getCollection("orders");

        List<Bson> pipeline = Arrays.asList(
            Aggregates.group("$custkey", sum("total_order_amount", "$totalprice")),
            Aggregates.sort(Sorts.descending("total_order_amount")),
            Aggregates.limit(5)
        );

        AggregateIterable<Document> result = collection.aggregate(pipeline);
        return result.into(new ArrayList<>());
    }


    public List<Document> topNestedCustomersByOrderAmount() {
        MongoCollection<Document> collection = database.getCollection("custorders");

        List<Bson> pipeline = Arrays.asList(
            Aggregates.unwind("$orders"),
            Aggregates.group("$custkey", sum("total_order_amount", "$orders.totalprice")),
            Aggregates.sort(Sorts.descending("total_order_amount")),
            Aggregates.limit(5)
        );

        AggregateIterable<Document> result = collection.aggregate(pipeline);
        return result.into(new ArrayList<>());
    }
    public long query3Nest() {
        MongoCollection<Document> collection = database.getCollection("custorders");
        return collection.countDocuments();
    }

    // 8. Query 4 - Top 5 customers by total order amount using customer and orders
collections
    public List<Document> query4() {
        MongoCollection<Document> collection = database.getCollection("orders");
        List<Bson> pipeline = Arrays.asList(
            Aggregates.group("$custkey", Accumulators.sum("total_order_amount",
"$totalprice")),
```

```
            Aggregates.sort(Sorts.descending("total_order_amount")),

            Aggregates.limit(5)

        );

        AggregateIterable<Document> result = collection.aggregate(pipeline);
        return result.into(new ArrayList<>());
    }

    // 9. Query 4 Nested - Top 5 customers by total order amount using custorders
collection
    public List<Document> query4Nest() {
        MongoCollection<Document> collection = database.getCollection("custorders");
        List<Bson> pipeline = Arrays.asList(
            Aggregates.unwind("$orders"),

            Aggregates.group("$custkey", Accumulators.sum("total_order_amount",
"$orders.totalprice")),
            Aggregates.sort(Sorts.descending("total_order_amount")),

            Aggregates.limit(5)

        );

        AggregateIterable<Document> result = collection.aggregate(pipeline);
        return result.into(new ArrayList<>());
    }

    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        MongoDBMenu app = new MongoDBMenu();
        Logger mongoLogger = Logger.getLogger("org.mongodb.driver");
        mongoLogger.setLevel(Level.OFF);
        int choice = 0;
        while (choice != 9) {
            System.out.println("Menu");
            System.out.println("1. Connect to Database");
            System.out.println("2. Load Data into Collections");
            System.out.println("3. Load Nested Data into Collection");
            System.out.println("4. Query by Customer ID");
            System.out.println("5. Query by Order ID");
            System.out.println("6. Query Nested Order by ID");
            System.out.println("7. Count Orders");
            System.out.println("8. Top Customers by Order Amount");
            System.out.println("9. Query 3 - Total number of orders (custorders)");
```

```
            System.out.println("10. Query 4 - Top 5 customers by total order amount
(orders)");
            System.out.println("11. Query 4 Nested - Top 5 customers by total order amount
(custorders)");
            System.out.println("12. Exit");
            System.out.print("Enter your choice: ");
            choice = scanner.nextInt();
            switch (choice) {
                case 1:
                    app.connect();
                    break;
                case 2:
                    app.load();
                    break;
                case 3:
                    try {
                        app.loadNestedData();
                    } catch (Exception e) {
                        System.out.println(e.getMessage());
                    }
                    break;
                case 4:
                    System.out.print("Enter Customer ID: ");
                    int customerId = scanner.nextInt();
                    System.out.println("Customer Name: " + app.query1(customerId));
                    break;
                case 5:
                    System.out.print("Enter Order ID: ");
                    int orderId = scanner.nextInt();
                    System.out.println("Order Date: " + app.query2(orderId));
                    break;
                case 6:
                    System.out.print("Enter Order ID: ");
                    int orderIdNested = scanner.nextInt();
                    System.out.println("Order Date: " + app.query2Nest(orderIdNested));
                    break;
                case 7:
                    System.out.println("Total Orders: " + app.query3());
                    break;
                case 8:
                    System.out.println("Top Customers by Order Amount: ");
                    List<Document> topCustomers = app.topCustomersByOrderAmount();
                    topCustomers.forEach(System.out::println);
                    break;
                case 9:
                    long totalOrders = app.query3Nest();
```

```
                    System.out.println("Total number of orders: " + totalOrders);
                    break;
                case 10:
                    topCustomers = app.query4();
                    System.out.println("Top 5 customers by total order amount:");
                    topCustomers.forEach(System.out::println);
                    break;
                case 11:
                    List<Document> topNestedCustomers = app.query4Nest();
                    System.out.println("Top 5 customers by total order amount (Nested):");
                    topNestedCustomers.forEach(System.out::println);
                    break;
                case 12:
                    System.out.println("Exiting... Goodbye!");
                    break;
                default:
                    System.out.println("Invalid choice. Please try again.");
            }
        }
        scanner.close();
    }
}
```