

Основы работы с базой данных MongoDB. CRUD операции, фильтрация, сортировка и проекция данных.

Управление библиотекой книг в MongoDB. CRUD операции, сортировка, фильтрация и проекция данных.

Создание базы данных и коллекции

В командной строке выполняем **mongosh**:

```
C:\Users\user>mongosh
Current Mongosh Log ID: 670a1d698aa6c98a9cc73bf7
Connecting to:      mongodb://127.0.0.1:27017/?directConnection=true&serverSelectionTimeoutMS=2000&appName=mongosh+2
.3.1
Using MongoDB:      8.0.1
Using Mongosh:       2.3.1

For mongosh info see: https://www.mongodb.com/docs/mongodb-shell/

-----
  The server generated these startup warnings when booting
  2024-10-12T11:53:11.531+05:00: Access control is not enabled for the database. Read and write access to data and conf
  igation is unrestricted
  -----
test>
```

Создаем базу **libraryDB**:

```
test> use libraryDB
switched to db libraryDB
libraryDB>
```

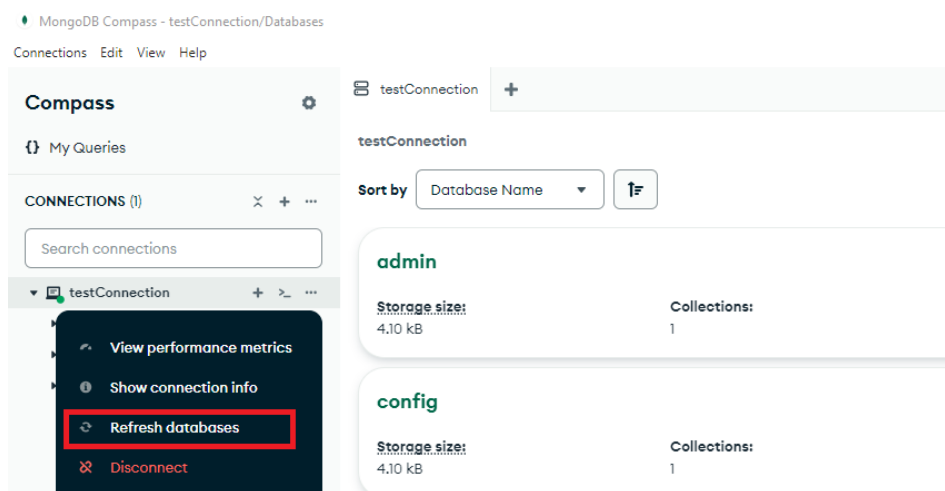
Создайте коллекцию **books** с помощью команды `createCollection()`:

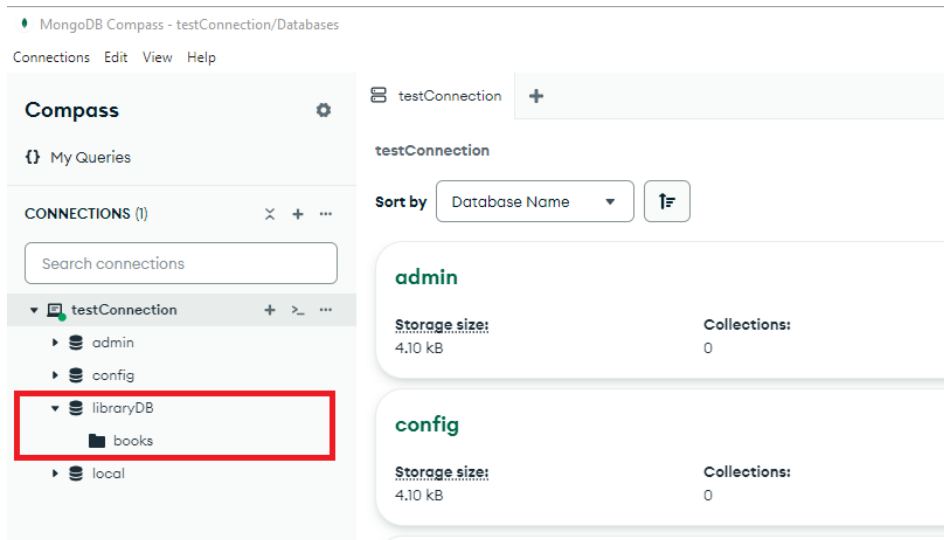
```
libraryDB> db.createCollection("books")
{ ok: 1 }
libraryDB>
```

убедимся, что коллекция создана

```
libraryDB> show collections
books
libraryDB>
```

И в Compass:





Вставка данных

Создадим документ с информацией о книге с помощью команды `insertOne()`:

```
libraryDB> db.books.insertOne({title: "War and Peace", author: "Leo Tolstoy", year: 1869, genres: ["Historical Fiction",  
"Classic"], available: true })  
{  
  acknowledged: true,  
  insertedId: ObjectId('670a221f8aa6c98a9cc73bf9')  
}  
libraryDB>
```

```
libraryDB> db.books.insertOne({  
...   title: "The Hobbit",  
...   author: "J.R.R. Tolkien",  
...   year: 1937,  
...   genres: ["Fantasy"],  
...   available: true  
... })  
{  
  acknowledged: true,  
  insertedId: ObjectId('670a216d8aa6c98a9cc73bf8')  
}  
libraryDB>
```

Используя `insertMany()` для добавим нескольких документов сразу:

```
libraryDB> db.books.insertMany([  
...   {  
...     title: "1984",  
...     author: "George Orwell",  
...     year: 1949,  
...     genres: ["Dystopian", "Political Fiction"],  
...     available: false  
...   },  
...   {  
...     title: "To Kill a Mockingbird",  
...     author: "Harper Lee",  
...     year: 1960,  
...     genres: ["Classic", "Historical"],  
...     available: true  
...   }  
... ])  
{  
  acknowledged: true,  
  insertedIds: {  
    '0': ObjectId('670a22618aa6c98a9cc73bfa'),  
    '1': ObjectId('670a22618aa6c98a9cc73bfb')  
  }  
}  
libraryDB>
```

```

libraryDB> db.books.insertMany([
...   {
...     title: "Brave New World",
...     author: "Aldous Huxley",
...     year: 1932,
...     genres: ["Dystopian", "Science Fiction"],
...     available: true
...   },
...   {
...     title: "Pride and Prejudice",
...     author: "Jane Austen",
...     year: 1813,
...     genres: ["Romance", "Classic"],
...     available: true
...   },
...   {
...     title: "The Catcher in the Rye",
...     author: "J.D. Salinger",
...     year: 1951,
...     genres: ["Classic", "Coming of Age"],
...     available: false
...   },
...   {
...     title: "The Great Gatsby",
...     author: "F. Scott Fitzgerald",
...     year: 1925,
...     genres: ["Classic", "Tragedy"],
...     available: true
...   },
...   {
...     title: "Moby-Dick",
...     author: "Herman Melville",
...     year: 1851,
...     genres: ["Adventure", "Classic"],
...     available: false
...   }
... ])

```

```

... 17
{
  acknowledged: true,
  insertedIds: {
    '0': ObjectId('670a22bd8aa6c98a9cc73bfc'),
    '1': ObjectId('670a22bd8aa6c98a9cc73bfd'),
    '2': ObjectId('670a22bd8aa6c98a9cc73bfe'),
    '3': ObjectId('670a22bd8aa6c98a9cc73bff'),
    '4': ObjectId('670a22bd8aa6c98a9cc73c00')
  }
}
libraryDB>

```

Чтение данных

убедимся, что данные добавлены:

```
libraryDB> db.books.find()
[
  {
    _id: ObjectId('670a216d8aa6c98a9cc73bf8'),
    title: 'The Hobbit',
    author: 'J.R.R. Tolkien',
    year: 1937,
    genres: [ 'Fantasy' ],
    available: true
  },
  {
    _id: ObjectId('670a221f8aa6c98a9cc73bf9'),
    title: 'War and Peace',
    author: 'Leo Tolstoy',
    year: 1869,
    genres: [ 'Historical Fiction', 'Classic' ],
    available: true
  },
  {
    _id: ObjectId('670a22618aa6c98a9cc73bfa'),
    title: '1984',
    author: 'George Orwell',
    year: 1949,
    genres: [ 'Dystopian', 'Political Fiction' ],
    available: false
  },
  {
    _id: ObjectId('670a22618aa6c98a9cc73bfb'),
    title: 'To Kill a Mockingbird',
    author: 'Harper Lee',
    year: 1960
  }
]
```

И в Compass:

MongoDB Compass - testConnection/libraryDB.books

Connections Edit View Collection Help

Compass

My Queries

CONNECTIONS (1)

Search connections

testConnection

- admin
- config
- libraryDB
 - books
- local

books

testConnection > libraryDB > books

Documents 9 Aggregations Schema Indexes 1 Validation

Type a query: { field: 'value' } or [Generate query](#)

ADD DATA EXPORT DATA UPDATE DELETE

Document 1:

```
{
  "_id": "670a216d8aa6c98a9cc73bf8",
  "title": "The Hobbit",
  "author": "J.R.R. Tolkien",
  "year": 1937,
  "genres": [ "Fantasy" ],
  "available": true
}
```

Document 2:

```
{
  "_id": "670a221f8aa6c98a9cc73bf9",
  "title": "War and Peace",
  "author": "Leo Tolstoy",
  "year": 1869,
  "genres": [ "Historical Fiction", "Classic" ],
  "available": true
}
```

Document 3:

```
{
  "_id": "670a22618aa6c98a9cc73bfa",
  "title": "1984",
  "author": "George Orwell",
  "year": 1949,
  "genres": [ "Dystopian", "Political Fiction" ],
  "available": false
}
```

Document 4:

```
{
  "_id": "670a22618aa6c98a9cc73bfb",
  "title": "To Kill a Mockingbird",
  "author": "Harper Lee",
  "year": 1960
}
```

Фильтрация данных

Найдем книгу по определённому автору, используя findOne():

```
libraryDB> db.books.findOne({ author: "George Orwell" })
{
  _id: ObjectId('670a22618aa6c98a9cc73bfa'),
  title: '1984',
  author: 'George Orwell',
  year: 1949,
  genres: [ 'Dystopian', 'Political Fiction' ],
  available: false
}
libraryDB>
```

Найдем все книги изданные после 1950г.:

```
libraryDB> db.books.find({ year: { $gt: 1950 } })
[
  {
    _id: ObjectId('670a22618aa6c98a9cc73bfb'),
    title: 'To Kill a Mockingbird',
    author: 'Harper Lee',
    year: 1960,
    genres: [ 'Classic', 'Historical' ],
    available: true
  },
  {
    _id: ObjectId('670a22bd8aa6c98a9cc73bfe'),
    title: 'The Catcher in the Rye',
    author: 'J.D. Salinger',
    year: 1951,
    genres: [ 'Classic', 'Coming of Age' ],
    available: false
  }
]
libraryDB>
```

все книги доступные и выпущенные после 1950 года:

```
libraryDB> db.books.find({ available: true, year: { $gt: 1950 } })
[
  {
    _id: ObjectId('670a22618aa6c98a9cc73bfb'),
    title: 'To Kill a Mockingbird',
    author: 'Harper Lee',
    year: 1960,
    genres: [ 'Classic', 'Historical' ],
    available: true
  }
]
libraryDB>
```

книги, содержащие жанр "Fantasy".

```
libraryDB> db.books.find({ genres: "Fantasy" })
[
  {
    _id: ObjectId('670a216d8aa6c98a9cc73bf8'),
    title: 'The Hobbit',
    author: 'J.R.R. Tolkien',
    year: 1937,
    genres: [ 'Fantasy' ],
    available: true
  }
]
libraryDB>
```

книги, выпущенные до 1900 года или недоступные для аренды (available: false).

```
libraryDB> db.books.find({ $or: [{ year: { $lt: 1900 } }, { available: false } ] })
[
  {
    _id: ObjectId('670a221f8aa6c98a9cc73bf9'),
    title: 'War and Peace',
    author: 'Leo Tolstoy',
    year: 1869,
    genres: [ 'Historical Fiction', 'Classic' ],
    available: true
  },
  {
    _id: ObjectId('670a22618aa6c98a9cc73bfa'),
    title: '1984',
    author: 'George Orwell',
    year: 1949,
    genres: [ 'Dystopian', 'Political Fiction' ],
    available: false
  },
  {
    _id: ObjectId('670a22bd8aa6c98a9cc73bfd'),
    title: 'Pride and Prejudice',
    author: 'Jane Austen',
    year: 1813,
    genres: [ 'Romance', 'Classic' ],
    available: true
  },
  {
    _id: ObjectId('670a22bd8aa6c98a9cc73bfe'),
    title: 'The Catcher in the Rye',
    author: 'J.D. Salinger',
    year: 1951,
    genres: [ 'Classic', 'Coming of Age' ],
    available: false
  },
  {
    _id: ObjectId('670a22bd8aa6c98a9cc73c00'),
    title: 'Moby-Dick',
    author: 'Herman Melville',
    year: 1851,
    genres: [ 'Adventure', 'Classic' ],
    available: false
  }
]
```

книги, у которых жанр "Classic" отсутствует в списке жанров:

```

libraryDB> db.books.find({ genres: { $ne: "Classic" } })
[
  {
    _id: ObjectId('670a216d8aa6c98a9cc73bf8'),
    title: 'The Hobbit',
    author: 'J.R.R. Tolkien',
    year: 1937,
    genres: [ 'Fantasy' ],
    available: true
  },
  {
    _id: ObjectId('670a22618aa6c98a9cc73bfa'),
    title: '1984',
    author: 'George Orwell',
    year: 1949,
    genres: [ 'Dystopian', 'Political Fiction' ],
    available: false
  },
  {
    _id: ObjectId('670a22bd8aa6c98a9cc73bfc'),
    title: 'Brave New World',
    author: 'Aldous Huxley',
    year: 1932,
    genres: [ 'Dystopian', 'Science Fiction' ],
    available: true
  }
]
libraryDB>

```

Сортировка данных

Отсортируем книги по году издания в порядке убывания:

```

libraryDB> db.books.find().sort({ year: -1 })
[
  {
    _id: ObjectId('670a22618aa6c98a9cc73bfb'),
    title: 'To Kill a Mockingbird',
    author: 'Harper Lee',
    year: 1960,
    genres: [ 'Classic', 'Historical' ],
    available: true
  },
  {
    _id: ObjectId('670a22bd8aa6c98a9cc73bfe'),
    title: 'The Catcher in the Rye',
    author: 'J.D. Salinger',
    year: 1951,
    genres: [ 'Classic', 'Coming of Age' ],
    available: false
  },
  {
    _id: ObjectId('670a22618aa6c98a9cc73bfa'),
    title: '1984',
    author: 'George Orwell',
    year: 1949,
    genres: [ 'Dystopian', 'Political Fiction' ],
    available: false
  },
  {
    _id: ObjectId('670a216d8aa6c98a9cc73bf8'),
    title: 'The Hobbit',
    author: 'J.R.R. Tolkien',
    year: 1937,

```

Отсортируем книги по названию в алфавитном порядке:

```
libraryDB> db.books.find().sort({ title: 1 })
[
  {
    _id: ObjectId('670a22618aa6c98a9cc73bfa'),
    title: '1984',
    author: 'George Orwell',
    year: 1949,
    genres: [ 'Dystopian', 'Political Fiction' ],
    available: false
  },
  {
    _id: ObjectId('670a22bd8aa6c98a9cc73bfc'),
    title: 'Brave New World',
    author: 'Aldous Huxley',
    year: 1932,
    genres: [ 'Dystopian', 'Science Fiction' ],
    available: true
  },
  {
    _id: ObjectId('670a22bd8aa6c98a9cc73c00'),
    title: 'Moby-Dick',
    author: 'Herman Melville',

```

Проекция данных

Отображение только полей title и author для всех книг:

```
libraryDB> db.books.find({}, { title: 1, author: 1, _id: 0 })
[
  { title: 'The Hobbit', author: 'J.R.R. Tolkien' },
  { title: 'War and Peace', author: 'Leo Tolstoy' },
  { title: '1984', author: 'George Orwell' },
  { title: 'To Kill a Mockingbird', author: 'Harper Lee' },
  { title: 'Brave New World', author: 'Aldous Huxley' },
  { title: 'Pride and Prejudice', author: 'Jane Austen' },
  { title: 'The Catcher in the Rye', author: 'J.D. Salinger' },
  { title: 'The Great Gatsby', author: 'F. Scott Fitzgerald' },
  { title: 'Moby-Dick', author: 'Herman Melville' }
]
libraryDB>
```

Пояснение:

db.books.find() – метод для получения документов из коллекции books.

{ } – первый аргумент в find() указывает, что мы не применяем фильтрацию и хотим получить все документы.

{ title: 1, author: 1, _id: 0 } – второй аргумент — это проекция:

title: 1 и author: 1 означают, что мы хотим отобразить поля title и author.

_id: 0 указывает, что мы не хотим отображать поле _id (по умолчанию оно отображается). Если вы хотите включить _id, просто уберите этот параметр или измените его на 1.

Пример запроса со скрытым полем _id:


```
libraryDB> db.books.find({}, { _id: 0 })
[
  {
    title: 'The Hobbit',
    author: 'J.R.R. Tolkien',
    year: 1937,
    genres: [ 'Fantasy' ],
    available: true
  },
  {
    title: 'War and Peace',
    author: 'Leo Tolstoy',
    year: 1869,
    genres: [ 'Historical Fiction', 'Classic' ],
    available: true
  },
  {
    title: '1984',
    author: 'George Orwell',
    year: 1949,
    genres: [ 'Dystopian', 'Political Fiction' ],
    available: false
  },
  {
    title: 'To Kill a Mockingbird',
    author: 'Harper Lee',

```

Обновление данных

Изменим статус книги “The Hobbit” на недоступно:

```
[
  {
    title: 'The Hobbit',
    author: 'J.R.R. Tolkien',
    year: 1937,
    genres: [ 'Fantasy' ],
    available: true
  },

```

```
libraryDB> db.books.updateOne(
...   { title: "The Hobbit" },
...   { $set: { available: false } }
... )
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}
```

Проверим:

```
libraryDB> db.books.find({ title: "The Hobbit" })
[
  {
    _id: ObjectId('670a216d8aa6c98a9cc73bf8'),
    title: 'The Hobbit',
    author: 'J.R.R. Tolkien',
    year: 1937,
    genres: [ 'Fantasy' ],
    available: false
  }
]
libraryDB>
```

Увеличим год выпуска всех книг, опубликованных после 1950 года, на 1 с помощью updateMany() и оператора \$inc. Таких книг две:

```
libraryDB> db.books.find({ year: { $gt: 1950 } })
[
  {
    _id: ObjectId('670a22618aa6c98a9cc73bfb'),
    title: 'To Kill a Mockingbird',
    author: 'Harper Lee',
    year: 1960,
    genres: [ 'Classic', 'Historical' ],
    available: true
  },
  {
    _id: ObjectId('670a22bd8aa6c98a9cc73bfe'),
    title: 'The Catcher in the Rye',
    author: 'J.D. Salinger',
    year: 1951,
    genres: [ 'Classic', 'Coming of Age' ],
    available: false
  }
]
libraryDB>
```

```
libraryDB> db.books.updateMany( { year: { $gt: 1950 } }, { $inc: { year: 1 } } )
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 2,
  modifiedCount: 2,
  upsertedCount: 0
}
libraryDB>
```

Проверим:

```
libraryDB> db.books.find({ year: { $gt: 1950 } })
[
  {
    _id: ObjectId('670a22618aa6c98a9cc73bfb'),
    title: 'To Kill a Mockingbird',
    author: 'Harper Lee',
    year: 1961,
    genres: [ 'Classic', 'Historical' ],
    available: true
  },
  {
    _id: ObjectId('670a22bd8aa6c98a9cc73bfe'),
    title: 'The Catcher in the Rye',
    author: 'J.D. Salinger',
    year: 1952,
    genres: [ 'Classic', 'Coming of Age' ],
    available: false
  }
]
libraryDB>
```

Удаление данных

Удалим книгу с автором " J.R.R. Tolkien " с помощью deleteOne().

```
libraryDB> db.books.deleteOne({ author: "J.R.R. Tolkien" })
{ acknowledged: true, deletedCount: 1 }
libraryDB>
```

Проверим:

```
libraryDB> db.books.find({}, { title: 1, author: 1, _id: 0 })
[
  { title: 'War and Peace', author: 'Leo Tolstoy' },
  { title: '1984', author: 'George Orwell' },
  { title: 'To Kill a Mockingbird', author: 'Harper Lee' },
  { title: 'Brave New World', author: 'Aldous Huxley' },
  { title: 'Pride and Prejudice', author: 'Jane Austen' },
  { title: 'The Catcher in the Rye', author: 'J.D. Salinger' },
  { title: 'The Great Gatsby', author: 'F. Scott Fitzgerald' },
  { title: 'Moby-Dick', author: 'Herman Melville' }
]
libraryDB>
```

Удалим все книги изданные до 1869 года, таких две:

```
libraryDB> db.books.find({ year: { $lt: 1869 } })
[
  {
    _id: ObjectId('670a2f2d8aa6c98a9cc73c04'),
    title: 'Pride and Prejudice',
    author: 'Jane Austen',
    year: 1813,
    genres: [ 'Romance', 'Classic' ],
    available: true
  },
  {
    _id: ObjectId('670a2f2d8aa6c98a9cc73c07'),
    title: 'Moby-Dick',
    author: 'Herman Melville',
    year: 1851,
    genres: [ 'Adventure', 'Classic' ],
    available: false
  }
]
libraryDB>
```

```
libraryDB> db.books.deleteMany({ year: { $lt: 1869 } })  
{ acknowledged: true, deletedCount: 2 }
```

Проверим:

```
libraryDB> db.books.find({}, { title: 1, year: 1, _id: 0 })  
[  
  { title: '1984', year: 1949 },  
  { title: 'To Kill a Mockingbird', year: 1960 },  
  { title: 'Brave New World', year: 1932 },  
  { title: 'The Catcher in the Rye', year: 1951 },  
  { title: 'The Great Gatsby', year: 1925 },  
  { title: 'War and Peace', year: 1869 },  
  { title: 'The Hobbit', year: 1937 }  
]  
libraryDB>
```