Департамент образования города Москвы

Государственное автономное образовательное учреждение высшего образования города Москвы

«Московский городской педагогический университет»

Институт цифрового образования

Департамент информатики, управления и технологий

Инструменты для хранения и обработки больших данных

Лабораторная работа 2.1

Изучение методов хранения данных на основе NoSQL

Выполнила: студентка группы АДЭУ-221

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Москва

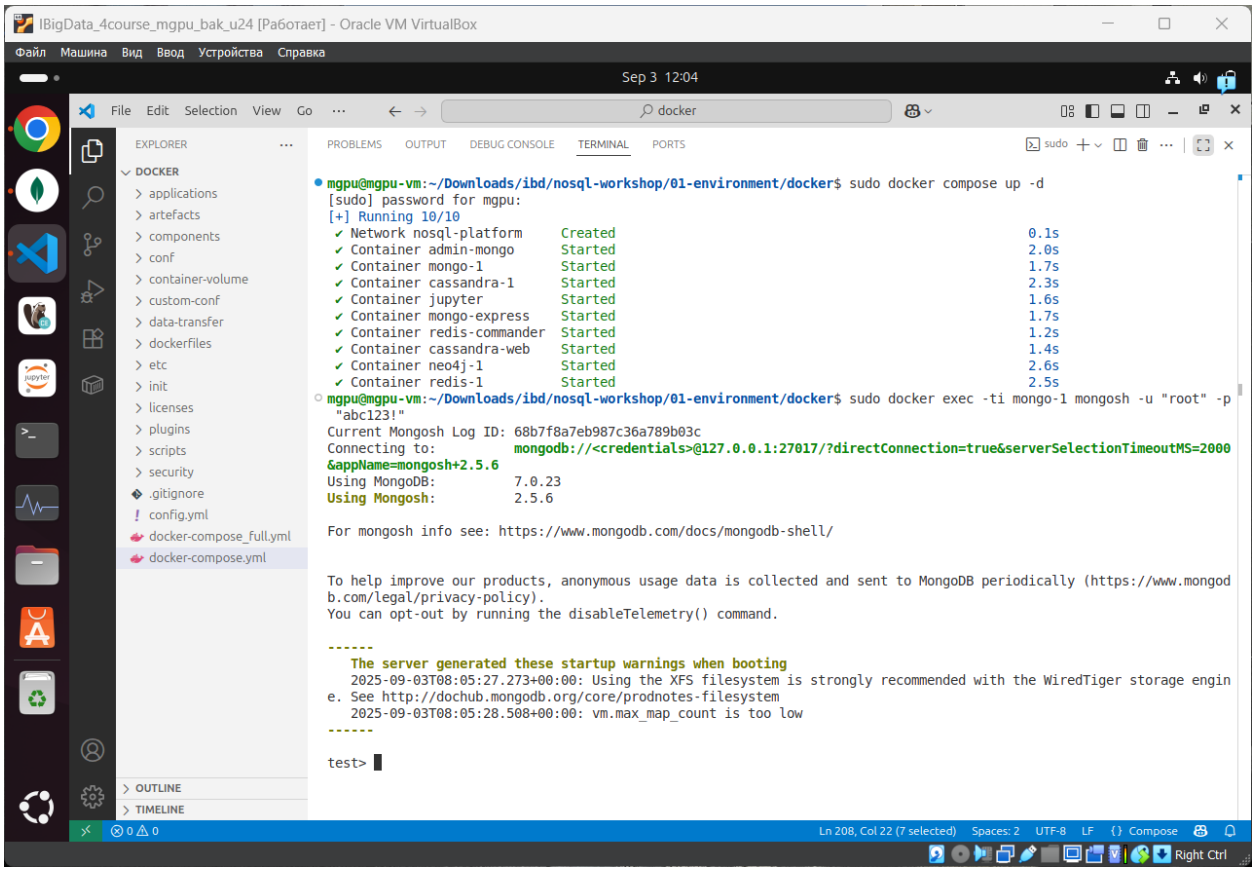
2025

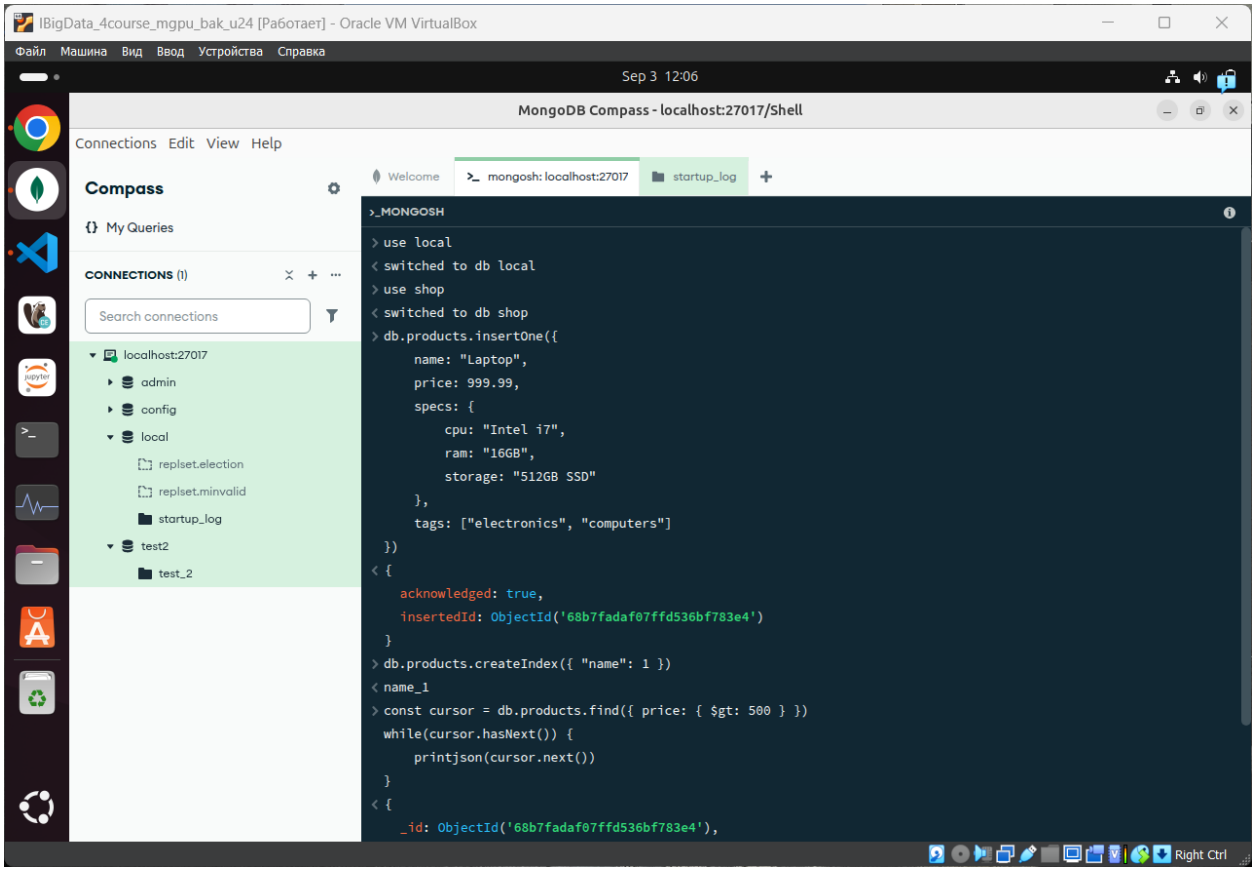
Цель работы: изучить и практически применить MongoDB — документоориентированную базу данных NoSQL; научиться создавать и заполнять структуры данных в MongoDB, а также выполнять запросы для получения необходимой информации, развивая навыки работы с нереляционной моделью данных, не требующей жесткой схемы и позволяющей гибко хранить данные в формате документов

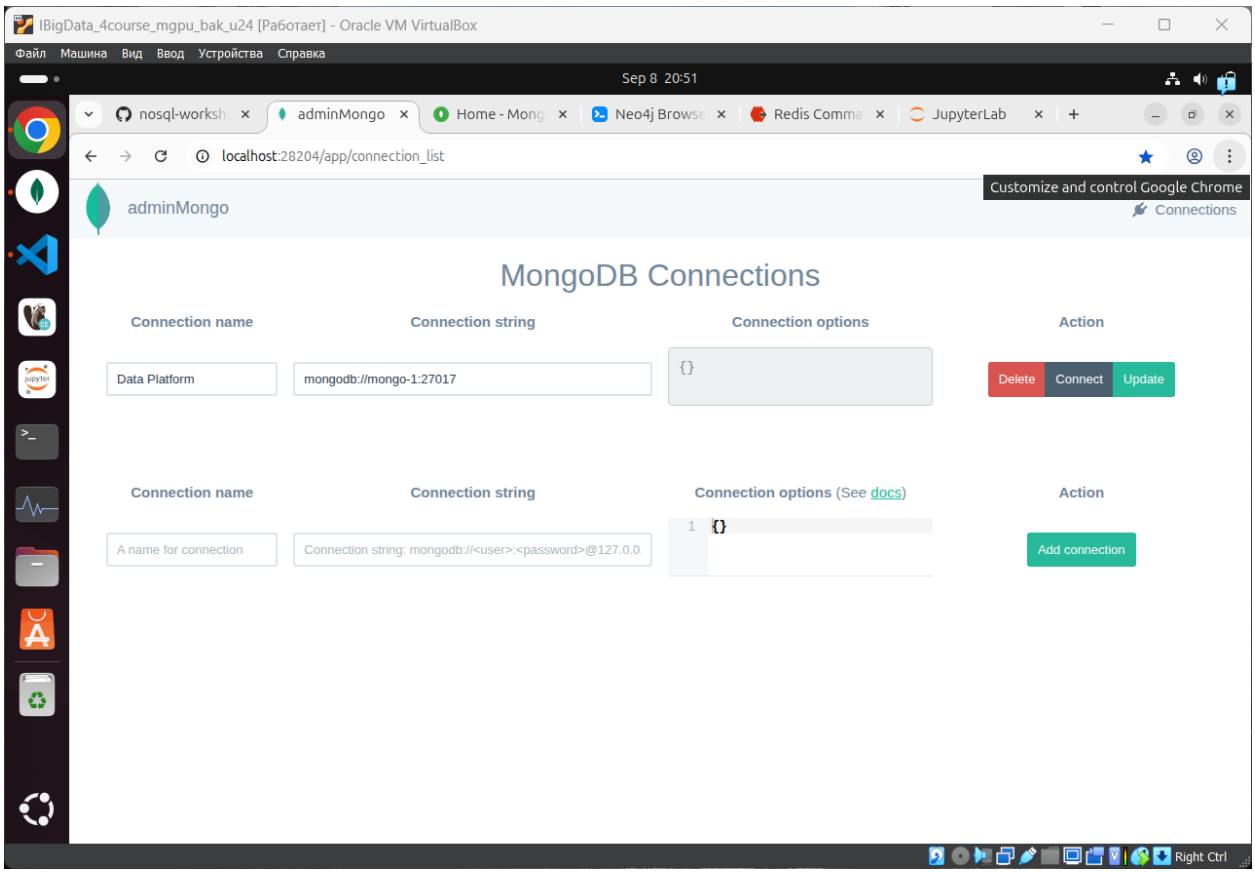
Краткое описание проекта: подключение к базе данных MongoDB, создание коллекций, документов, заполнение документов, работа с документами, их изменение и удаление.

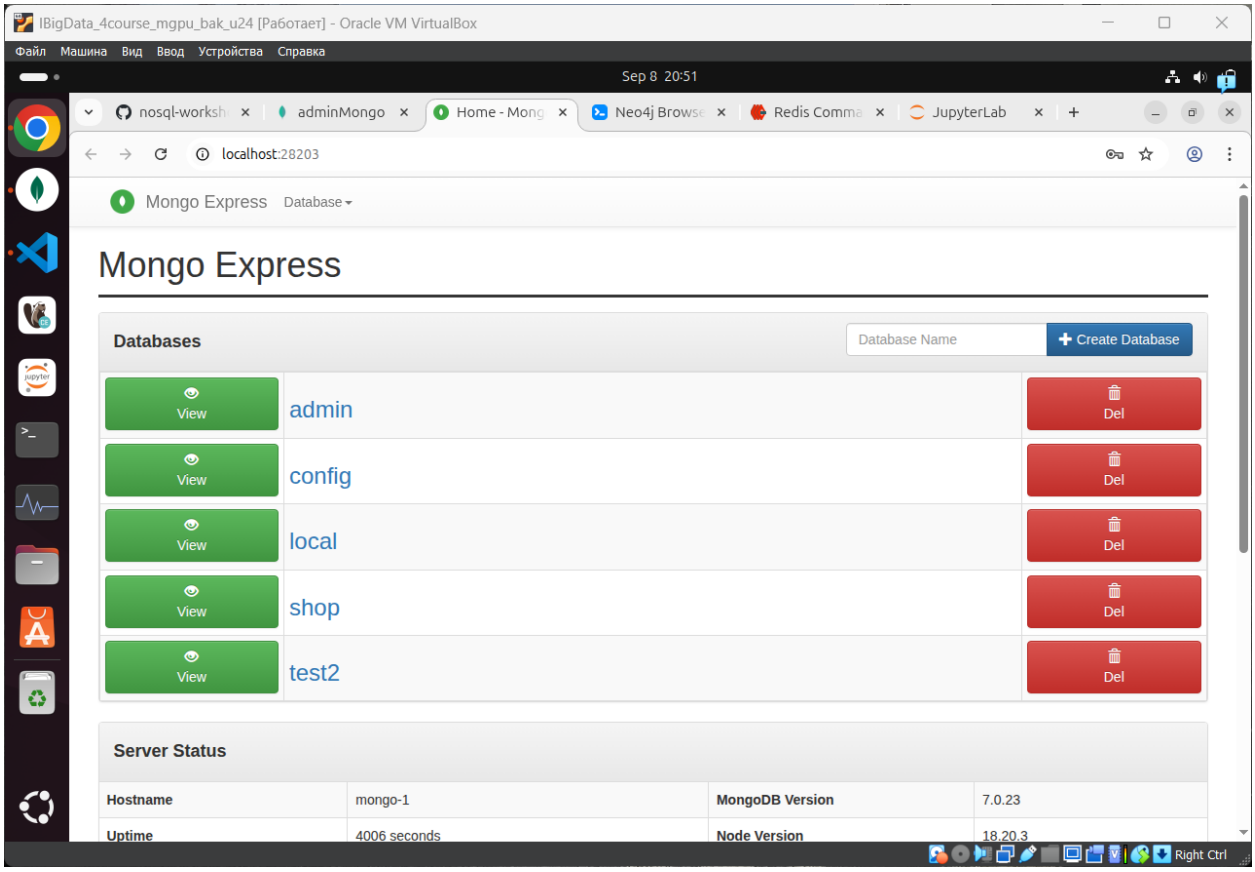
Вариант 11.

Подготовка окружения

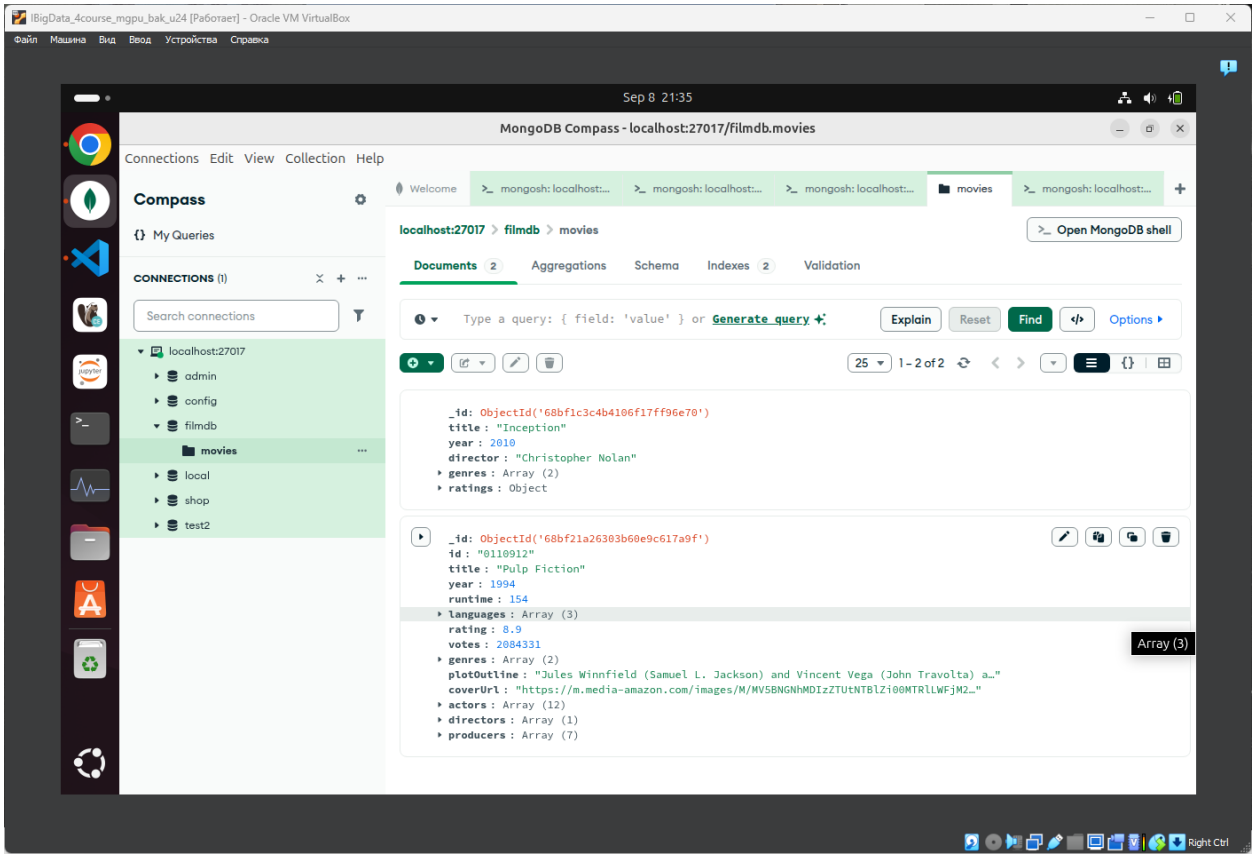


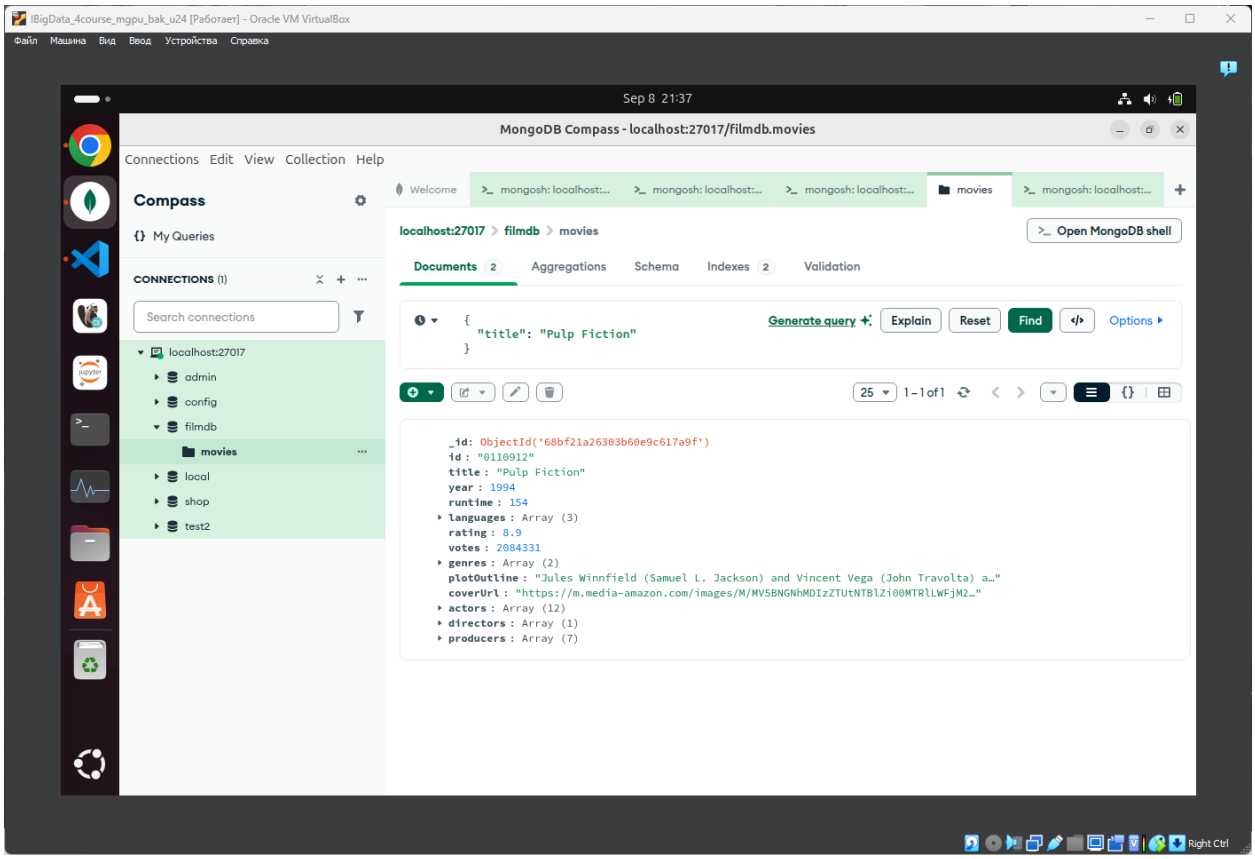

IBigData_4course_mgpu_bak_u24 [Работает] - Oracle VM VirtualBox
Файл Машина Вид Ввод Устройства Справка
Sep 3 12:06
MongoDB Compass - localhost:27017/Shell
Connections Edit View Help
Compass
My Queries
CONNECTIONS (1)
Search connections
localhost:27017
admin
config
local
replset.election
replset.minvalid
startup_log
test2
test_2
Welcome
mongosh: localhost:27017
startup_log
>_MONGOSH
> use local
< switched to db local
> use shop
< switched to db shop
> db.products.insertOne({
name: "Laptop",
price: 999.99,
specs: {
cpu: "Intel i7",
ram: "16GB",
storage: "512GB SSD"
},
tags: ["electronics", "computers"]
})
< {
acknowledged: true,
insertedId: ObjectId('68b7fadaf07ffd536bf783e4')
}
> db.products.createIndex({ "name": 1 })
< name_1
> const cursor = db.products.find({ price: { $gt: 500 } })
while(cursor.hasNext()) {
printjson(cursor.next())
}
< {
_id: ObjectId('68b7fadaf07ffd536bf783e4'),
Right Ctrl

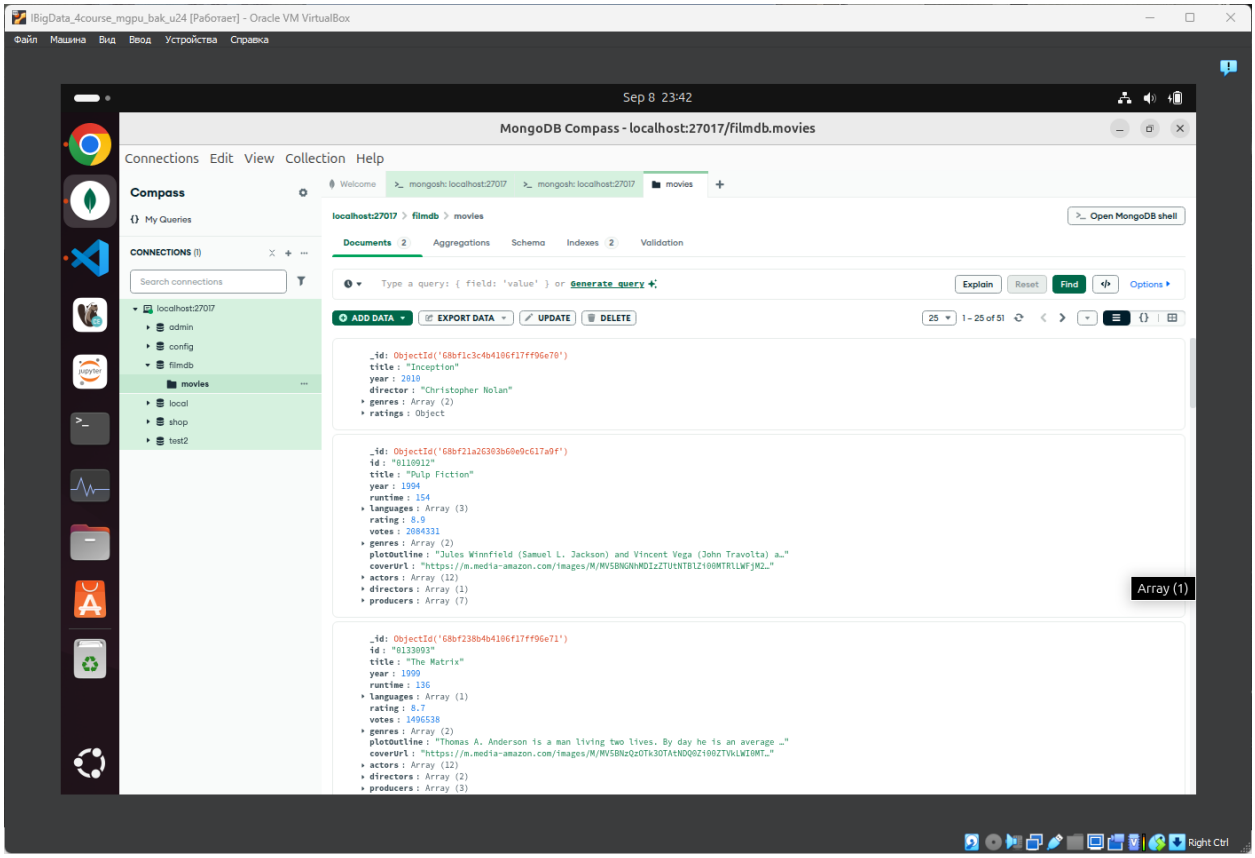

IBigData_4course_mgpu_bak_u24 [Работает] - Oracle VM VirtualBox
Файл Машина Вид Ввод Устройства Справка
Sep 8 20:51
nosql-worksh
adminMongo
Home - Mong
Neo4j Browse
Redis Comma
JupyterLab
localhost:28204/app/connection_list
Customize and control Google Chrome
adminMongo
Connections
MongoDB Connections
Connection name
Connection string
Connection options
Action
Data Platform
mongodb://mongo-1:27017
{}
Delete
Connect
Update
Connection name
Connection string
Connection options (See docs)
Action
A name for connection
Connection string: mongodb://<user>:<password>@127.0.0
1 {}
Add connection
Right Ctrl



Практическая работа 1. Создание документов в MongoDB


IBigData_4course_mgpu_bak_u24 [Работает] - Oracle VM VirtualBox
Файл Машина Вид Ввод Устройства Справка
Sep 8 21:35
MongoDB Compass - localhost:27017/filmdb.movies
Connections Edit View Collection Help
Compass
My Queries
CONNECTIONS (1)
Search connections
localhost:27017
admin
config
filmdb
movies
local
shop
test2
Welcome
mongosh: localhost:...
movies
localhost:27017 > filmdb > movies
Open MongoDB shell
Documents 2
Aggregations
Schema
Indexes 2
Validation
Type a query: { field: 'value' } or Generate query
Explain
Reset
Find
Options
25
1 - 2 of 2
_id: ObjectId('68bf1c3c4b4106f17ff96e70')
title : "Inception"
year : 2010
director : "Christopher Nolan"
genres : Array (2)
ratings : Object
_id: ObjectId('68bf21a26303b60e9c617a9f')
id : "0110912"
title : "Pulp Fiction"
year : 1994
runtime : 154
languages : Array (3)
rating : 8.9
votes : 2084331
genres : Array (2)
plotOutline : "Jules Winnfield (Samuel L. Jackson) and Vincent Vega (John Travolta) a…"
coverUrl : "https://m.media-amazon.com/images/M/MV5BNGNhMDIzZTUtNTBlZi00MTRlLWFjM2…"
actors : Array (12)
directors : Array (1)
producers : Array (7)
Array (3)
Right Ctrl


IBigData_4course_mgpu_bak_u24 [Работает] - Oracle VM VirtualBox
Файл Машина Вид Ввод Устройства Справка
Sep 8 21:37
MongoDB Compass - localhost:27017/filmdb.movies
Connections Edit View Collection Help
Compass
My Queries
CONNECTIONS (1)
Search connections
localhost:27017
admin
config
filmdb
movies
local
shop
test2
Welcome
mongosh: localhost:...
movies
localhost:27017 > filmdb > movies
Open MongoDB shell
Documents 2
Aggregations
Schema
Indexes 2
Validation
{
"title": "Pulp Fiction"
}
Generate query
Explain
Reset
Find
Options
25
1 - 1 of 1
_id: ObjectId('68bf21a26303b60e9c617a9f')
id : "0110912"
title : "Pulp Fiction"
year : 1994
runtime : 154
languages : Array (3)
rating : 8.9
votes : 2084331
genres : Array (2)
plotOutline : "Jules Winnfield (Samuel L. Jackson) and Vincent Vega (John Travolta) a…"
coverUrl : "https://m.media-amazon.com/images/M/MV5BNGNhMDIzZTUtNTBlZi00MTRlLWFjM2…"
actors : Array (12)
directors : Array (1)
producers : Array (7)
Right Ctrl


IBigData_4course_mgpu_bak_u24 [Работает] - Oracle VM VirtualBox
Файл Машина Вид Ввод Устройства Справка
Sep 8 23:42
MongoDB Compass - localhost:27017/filmdb.movies
Connections Edit View Collection Help
Compass
My Queries
CONNECTIONS (1)
Search connections
localhost:27017
admin
config
filmdb
movies
local
shop
test2
Welcome
mongosh: localhost:27017
mongosh: localhost:27017
movies
localhost:27017 > filmdb > movies
Open MongoDB shell
Documents 2
Aggregations
Schema
Indexes 2
Validation
Type a query: { field: 'value' } or Generate query
Explain
Reset
Find
Options
ADD DATA
EXPORT DATA
UPDATE
DELETE
25
1 - 25 of 51
_id: ObjectId('68bf1c3c4b4106f17ff96e70')
title : "Inception"
year : 2010
director : "Christopher Nolan"
genres : Array (2)
ratings : Object
_id: ObjectId('68bf21a26303b60e9c617a9f')
id : "0110912"
title : "Pulp Fiction"
year : 1994
runtime : 154
languages : Array (3)
rating : 8.9
votes : 2084331
genres : Array (2)
plotOutline : "Jules Winnfield (Samuel L. Jackson) and Vincent Vega (John Travolta) a…"
coverUrl : "https://m.media-amazon.com/images/M/MV5BNGNhMDIzZTUtNTBlZi00MTRlLWFjM2…"
actors : Array (12)
directors : Array (1)
producers : Array (7)
Array (1)
_id: ObjectId('68bf238b4b4106f17ff96e71')
id : "0133093"
title : "The Matrix"
year : 1999
runtime : 136
languages : Array (1)
rating : 8.7
votes : 1496538
genres : Array (2)
plotOutline : "Thomas A. Anderson is a man living two lives. By day he is an average …"
coverUrl : "https://m.media-amazon.com/images/M/MV5BNzQzOTk3OTAtNDQ0Zi00ZTVkLWI0MT…"
actors : Array (12)
directors : Array (2)
producers : Array (3)
Right Ctrl

Задания для работы с MongoDB на Python

Вариант 11. Социальная сеть

Создайте базовую социальную сеть с коллекцией users

Функционал:

- Создание пользователя

```
> use users
< switched to db users
```

```
> db.users.insertOne({
    username: "username1",
    email: "mongouser1@gmaol.com",
    profile: {
      full_name: "Michael Lewia",
      bio: "Love travel and sports",
      avatar: "avatar1.png",
      location: "Moscow"
    },
    friends: ["username2", "username3", "username4"],
    posts: [
      {
        content: "Visited Sochi, incredibly beautiful!",
        timestamp: "2025-09-01T15:00:00",
        likes: ["username3"],
        comments: [
          {
            author: "username3",
            text: "Cool pictures!",
            timestamp: "2025-09-01T15:15:00"
          }
        ]
      }
    ],
    preferences: {
      privacy: "friends_only",
      notifications: true
    }
  })
< {
    acknowledged: true,
    insertedId: ObjectId('68bf52977bab4d85f40925a0')
  }
users>
```

- Добавление друга

```
>_MONGOSH
> db.users.updateOne(
    {username: "username1" },
    { $addToSet: { friends: "username5" } }
  );
< {
    acknowledged: true,
    insertedId: null,
    matchedCount: 1,
    modifiedCount: 1,
    upsertedCount: 0
  }
> db.users.find({username: "username1"})
< {
    _id: ObjectId('68bf52977bab4d85f40925a0'),
    username: 'username1',
    email: 'mongouser1@gmaol.com',
    profile: {
      full_name: 'Michael Lewia',
      bio: 'Love travel and sports',
      avatar: 'avatar1.png',
      location: 'Moscow'
    },
    friends: [
      'username2',
      'username3',
      'username4',
      'username5'
    ],
```

- Создание поста

```
>_MONGOSH
> db.users.updateOne(
    { username: "username1" },
    {
      $push: {
        posts: {
          content: "Visited Kazakhstan. Intresting.",
          timestamp: new Date(),
          likes: [],
          comments: []
        }
      }
    }
  )
< {
    acknowledged: true,
    insertedId: null,
    matchedCount: 1,
    modifiedCount: 1,
    upsertedCount: 0
  }
> db.users.find({username: "username1"})
< {
    _id: ObjectId('68bf52977bab4d85f40925a0'),
    username: 'username1',
    email: 'mongouser1@gmaol.com',
    profile: {
      full_name: 'Michael Lewia',
      bio: 'Love travel and sports',
      avatar: 'avatar1.png',
      location: 'Moscow'
    },
    friends: [
      'username2',
      'username3',
      'username4',
```

```
>_MONGOSH
    },
    friends: [
      'username2',
      'username3',
      'username4',
      'username5'
    ],
    posts: [
      {
        content: 'Visited Sochi, incredibly beautiful!',
        timestamp: '2025-09-01T15:00:00',
        likes: [
          'username3'
        ],
        comments: [
          {
            author: 'username3',
            text: 'Cool pictures!',
            timestamp: '2025-09-01T15:15:00'
          }
        ]
      },
      {
        content: 'Visited Kazakhstan. Intresting.',
        timestamp: 2025-09-08T22:28:37.609Z,
        likes: [],
        comments: []
      }
    ],
    preferences: {
      privacy: 'friends_only',
      notifications: true
    }
  }
users>
```

- Лайк поста

```
>_MONGOSH
  }
> db.users.updateOne(
    { username: "username1", "posts.0": { $exists: true } },
    { $addToSet: { "posts.0.likes": "username5"}}
  )
< {
    acknowledged: true,
    insertedId: null,
    matchedCount: 1,
    modifiedCount: 1,
    upsertedCount: 0
  }
```

```
> db.users.find({username: "username1"})
< {
    _id: ObjectId('68bf52977bab4d85f40925a0'),
    username: 'username1',
    email: 'mongouser1@gmaol.com',
    profile: {
      full_name: 'Michael Lewia',
      bio: 'Love travel and sports',
      avatar: 'avatar1.png',
      location: 'Moscow'
    },
    friends: [
      'username2',
      'username3',
      'username4',
      'username5'
    ],
    posts: [
      {
        content: 'Visited Sochi, incredibly beautiful!',
        timestamp: '2025-09-01T15:00:00',
        likes: [
          'username3',
          'username5'
        ],
```

- Комментирование поста

```
> db.users.updateOne(
    { username: "username1", "posts.1": { $exists: true } },
    {
      $push: {
        "posts.1.comments": {
          author: "username5",
          text: "Wonderful!",
          timestamp: new Date()
        }
      }
    }
  )
< {
    acknowledged: true,
    insertedId: null,
    matchedCount: 1,
    modifiedCount: 1,
    upsertedCount: 0
  }
```

```
> db.users.find({username: "username1"})
< {
```

- Поиск пользователей по интересам

  (создаем сначала еще одного пользователя)

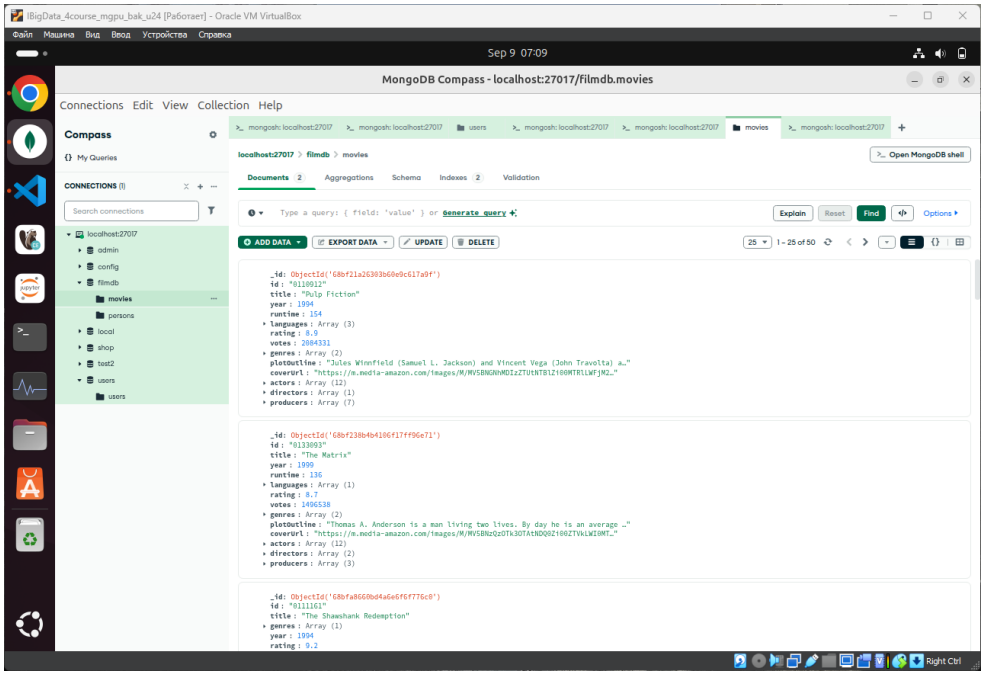
```
>_MONGOSH

> db.users.find({ "profile.bio": /sport/i}).toArray()
< [
    {
      _id: ObjectId('68bf52977bab4d85f40925a0'),
      username: 'username1',
      email: 'mongouser1@gmaol.com',
      profile: {
        full_name: 'Michael Lewia',
        bio: 'Love travel and sports',
        avatar: 'avatar1.png',
        location: 'Moscow'
      },
      friends: [ 'username2', 'username3', 'username4', 'username5' ],
      posts: [ [Object], [Object] ],
      preferences: { privacy: 'friends_only', notifications: true },
      psts: { '0': [Object] }
    },
    {
      _id: ObjectId('68bfa3ceed6db41e62197c0d'),
      username: 'username2',
      email: 'mongouser2@gmail.com',
      profile: {
        full_name: 'Terry McDonald',
        bio: 'sport is life',
        avatar: 'avatar2.png',
        location: 'Los Angeles'
      },
      friends: [ 'username5', 'username1' ]
    }
  ]
users>
```

Задание для самостоятельной работы

№1 Задание 1 (MongoDB)

Найти все фильмы, где в массиве genres есть и "Action", и "Thriller" ($all).




>_MONGOSH
rating: 8.5,
rank: 49
}
db.movies.find({"genres": { $all: ["Action", "Thriller"] } })
{
_id: ObjectId('68bfa8660bd4a6e6f6f776c3'),
id: '0468569',
title: 'The Dark Knight',
genres: [
'Action',
'Crime',
'Drama',
'Thriller'
],
year: 2008,
rating: 9,
rank: 4
}
{
_id: ObjectId('68bfa8660bd4a6e6f6f776cd'),
id: '1375666',
title: 'Inception',
genres: [
'Action',
'Adventure',
'Sci-Fi',
'Thriller'
],
year: 2010,
rating: 8.7,
rank: 15
}
{
_id: ObjectId('68bfa8660bd4a6e6f6f776db'),
id: '0110413',
title: 'Léon: The Professional',
genres: [
'Action',
'Crime',
'Drama',
'Thriller'
],
year: 1994,
rating: 8.5,
rank: 30
}
filmdb>