

**ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ АВТОНОМНОЕ ОБРАЗОВАТЕЛЬНОЕ  
УЧРЕЖДЕНИЕ ВЫСШЕГО ОБРАЗОВАНИЯ  
САНКТ-ПЕТЕРБУРГСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ  
УНИВЕРСИТЕТ  
ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ, МЕХАНИКИ И ОПТИКИ**

Факультет «Инфокоммуникационных технологий»  
Направление подготовки «45.03.04 Интеллектуальные системы в гуманитарной  
сфере»

**О Т Ч Е Т**

**Лабораторная работа №6,  
Базы данных**

**Тема**  
**задания:** Знакомство с MongoDB

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**Выполнил:**

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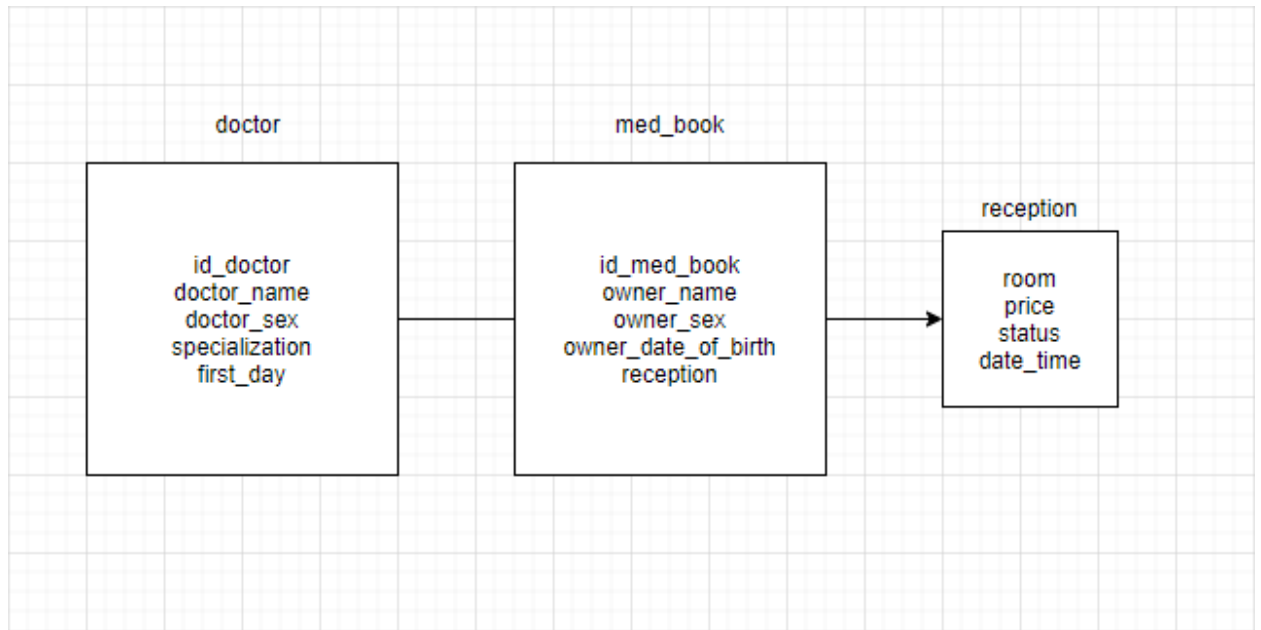
Фамилия И.О.

**Санкт-Петербург**

**Цель работы:** овладеть практическими навыками и умениями реализации баз данных в MongoDB

**Ход работы.**

**Модель:**



**Реализация модели в MongoDB:**

Создание базы данных:

```
> use lab
switched to db lab
```

Создание и заполнение таблицы «med\_book»:

```
> db.med_book.insert({"id_med_book": 1, "owner_name": "Alexander Gelevich Dugin", "owner_sex": "male", "owner_date_of_birth": "07-01-1962", "reception": {"room": 1, "price": 1000, "status": 1, "date_time": "12:00 19-07-2020"}})
WriteResult({"nInserted" : 1 })
>
> db.med_book.insert({"id_med_book": 2, "owner_name": "Ivanov Ivan Ivanovich", "owner_sex": "male", "owner_date_of_birth": "25-03-1974", "reception": {"room": 2, "price": 1500, "status": 0, "date_time": "19:00 17-07-2020"}})
WriteResult({"nInserted" : 1 })
> db.med_book.insert({"id_med_book": 3, "owner_name": "Ann Ahmatova", "owner_sex": "female", "owner_date_of_birth": "23-06-1989", "reception": {"room": 2, "price": 2500, "status": 1, "date_time": "10:00 12-07-2020"}})
WriteResult({"nInserted" : 1 })
> db.med_book.insert({"id_med_book": 4, "owner_name": "Lev Nikolaevich Tolstoy", "owner_sex": "male", "owner_date_of_birth": "09-09-1928", "reception": {"room": 3, "price": 500, "status": 1, "date_time": "16:00 15-07-2020"}})
WriteResult({"nInserted" : 1 })
> db.med_book.insert({"id_med_book": 5, "owner_name": "Fedor Mikhailowitch Dostoevskiy", "owner_sex": "male", "owner_date_of_birth": "11-11-1921", "reception": {"room": 4, "price": 1000, "status": 1, "date_time": "17:00 19-07-2020"}})
2020-07-08T10:07:20.665+0300 E QUERY [js] uncaught exception: SyntaxError: missing } after property list :
@(@shell):1:87
> db.med_book.insert({"id_med_book": 5, "owner_name": "Fedor Mikhailowitch Dostoevskiy", "owner_sex": "male", "owner_date_of_birth": "11-11-1921", "reception": {"room": 4, "price": 1000, "status": 1, "date_time": "17:00 19-07-2020"}})
WriteResult({"nInserted" : 1 })
```

Создание и заполнение таблицы «doctor»:

```
> db.doctor.find()
{ "_id" : ObjectId("5f057177bd2a790f888bf6d0"), "id_doctor" : 101, "doctor_name" : "Louis Ferdinand Céline", "doctor_sex" : "male", "specialization" : "Gynecologist", "first_day" : "01-09-2005" }
{ "_id" : ObjectId("5f057184bd2a790f888bf6d1"), "id_doctor" : 102, "doctor_name" : "Anton Pavlovich Chehov", "doctor_sex" : "male", "specialization" : "Neurologist", "first_day" : "24-11-1991" }
{ "_id" : ObjectId("5f057190bd2a790f888bf6d2"), "id_doctor" : 103, "doctor_name" : "Mikhail Afanasyewitch Bulgakov", "doctor_sex" : "male", "specialization" : "Narcologist", "first_day" : "15-07-2017" }
{ "_id" : ObjectId("5f05719dbd2a790f888bf6d3"), "id_doctor" : 104, "doctor_name" : "Mechnikov Ilya Ilyich", "doctor_sex" : "male", "specialization" : "Psychiatrist", "first_day" : "18-03-1991" }
{ "_id" : ObjectId("5f0571b0bd2a790f888bf6d4"), "id_doctor" : 105, "doctor_name" : "William Somerset Maugham", "doctor_sex" : "male", "specialization" : "Urologist", "first_day" : "05-01-2000" }
```

Проверка того, что таблицы заполнены верно:

«med\_book»:

```
> db.med_book.find()
{ "_id" : ObjectId("5f056f6abd2a790f888bf6cb"), "id_med_book" : 1, "owner_name" : "Alexander Gelevich Dugin", "owner_sex" : "male", "owner_date_of_birth" : "07-01-1962", "reception" : { "room" : 1, "price" : 1000, "status" : 1, "date_time" : "12:00 19-07-2020" } }
{ "_id" : ObjectId("5f057051bd2a790f888bf6cc"), "id_med_book" : 2, "owner_name" : "Ivanov Ivan Ivanovich", "owner_sex" : "male", "owner_date_of_birth" : "25-03-1974", "reception" : { "room" : 2, "price" : 1500, "status" : 0, "date_time" : "19:00 17-07-2020" } }
{ "_id" : ObjectId("5f057080bd2a790f888bf6cd"), "id_med_book" : 3, "owner_name" : "Ann Ahmatova", "owner_sex" : "female", "owner_date_of_birth" : "23-06-1989", "reception" : { "room" : 2, "price" : 2500, "status" : 1, "date_time" : "10:00 12-07-2020" } }
{ "_id" : ObjectId("5f05708fbd2a790f888bf6ce"), "id_med_book" : 4, "owner_name" : "Lev Nikolaevich Tolstoy", "owner_sex" : "male", "owner_date_of_birth" : "09-09-1928", "reception" : { "room" : 3, "price" : 500, "status" : 1, "date_time" : "16:00 15-07-2020" } }
{ "_id" : ObjectId("5f057123bd2a790f888bf6cf"), "id_med_book" : 5, "owner_name" : "Fedor Mikhailowitch Dostoevskiy", "owner_sex" : "male", "owner_date_of_birth" : "11-11-1921", "reception" : { "room" : 4, "price" : 1000, "status" : 1, "date_time" : "17:00 19-07-2020" } }
```

«doctor»:

```
> db.doctor.find();
{ "_id" : ObjectId("5f057177bd2a790f888bf6d0"), "id_doctor" : 101, "doctor_name" : "Louis Ferdinand Céline", "doctor_sex" : "male", "specialization" : "Gynecologist", "first_day" : "01-09-2005" }
{ "_id" : ObjectId("5f057184bd2a790f888bf6d1"), "id_doctor" : 102, "doctor_name" : "Anton Pavlovich Chehov", "doctor_sex" : "male", "specialization" : "Neurologist", "first_day" : "24-11-1991" }
{ "_id" : ObjectId("5f057190bd2a790f888bf6d2"), "id_doctor" : 103, "doctor_name" : "Mikhail Afanasyewitch Bulgakov", "doctor_sex" : "male", "specialization" : "Narcologist", "first_day" : "15-07-2017" }
{ "_id" : ObjectId("5f05719dbd2a790f888bf6d3"), "id_doctor" : 104, "doctor_name" : "Mechnikov Ilya Ilyich", "doctor_sex" : "male", "specialization" : "Psychiatrist", "first_day" : "18-03-1991" }
{ "_id" : ObjectId("5f0571b0bd2a790f888bf6d4"), "id_doctor" : 105, "doctor_name" : "William Somerset Maugham", "doctor_sex" : "male", "specialization" : "Urologist", "first_day" : "05-01-2000" }
```

Запросы:

Сколько приёмов забронировано в кабинетах?

```
> db.med_book.aggregate([{$unwind:"$reception"},{$group:{_id:"$reception.room", count:{$sum:1}}}] );
{ "_id" : 2, "count" : 2 }
{ "_id" : 1, "count" : 1 }
{ "_id" : 4, "count" : 1 }
{ "_id" : 3, "count" : 1 }
```

Вывести врачей-гинекологов мужского пола:

```
> db.doctor.find({"specialization":"Gynecologist", "doctor_sex":"male"},{"doctor_name":1,_id:0})
{ "doctor_name" : "Louis Ferdinand Céline" }
```

Вывести всех врачей и их специальности, отсортировав по алфавиту:

```
> db.doctor.find({}, {"doctor_name":1, "specialization":1}).sort({"doctor_name":1})
{ "_id" : ObjectId("5f057184bd2a790f888bf6d1"), "doctor_name" : "Anton Pavlovich Chehov", "specialization" : "Neurologist" }
{ "_id" : ObjectId("5f057177bd2a790f888bf6d0"), "doctor_name" : "Louis Ferdinand Céline", "specialization" : "Gynecologist" }
{ "_id" : ObjectId("5f05719dbd2a790f888bf6d3"), "doctor_name" : "Mechnikov Ilya Ilyich", "specialization" : "Psychiatrist" }
{ "_id" : ObjectId("5f057190bd2a790f888bf6d2"), "doctor_name" : "Mikhail Afanasyewitch Bulgakov", "specialization" : "Narcologist" }
{ "_id" : ObjectId("5f0571b0bd2a790f888bf6d4"), "doctor_name" : "William Somerset Maugham", "specialization" : "Urologist" }
```

Сколько врачей каждой специальности есть в клинике?

```
> db.doctor.aggregate([{$unwind:"$specialization"},{$group:{_id: "$specialization", count:{$sum:1}}]}])
{ "_id" : "Urologist", "count" : 1 }
{ "_id" : "Psychiatrist", "count" : 1 }
{ "_id" : "Narcologist", "count" : 1 }
{ "_id" : "Neurologist", "count" : 1 }
{ "_id" : "Gynecologist", "count" : 1 }
```

Посчитать количество пациентов женского пола, используя MapReduce

```
> map = function() {emit(1,1);}
function() {emit(1,1);}
> reduce = function(key,values) {var count = 0; values.forEach(function(v) {count += v;}); return count;}
function(key,values) {var count = 0; values.forEach(function(v) {count += v;}); return count;}
>
> db.med_book.mapReduce(map, reduce, {out:"query_1", query:{sex:"female"}});
{
  "result" : "query_1",
  "timeMillis" : 384,
  "counts" : {
    "input" : 0,
    "emit" : 0,
    "reduce" : 0,
    "output" : 0
  },
  "ok" : 1
}
```

## Вывод:

В результате выполнения лабораторной работы были изучены принципы проектирования нереляционных (а именно - документ-ориентированных) баз данных с помощью MongoDB.