

**ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ АВТОНОМНОЕ ОБРАЗОВАТЕЛЬНОЕ  
УЧРЕЖДЕНИЕ ВЫСШЕГО ОБРАЗОВАНИЯ**

**САНКТ-ПЕТЕРБУРГСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ  
УНИВЕРСИТЕТ**

**ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ, МЕХАНИКИ И ОПТИКИ**

Факультет «Инфокоммуникационных технологий»  
Кафедра «Интеллектуальных технологий в гуманитарной сфере»  
Направление подготовки «09.03.03 Прикладная информатика»

## **ОТЧЕТ**

### **По лабораторной работе №6**

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Тема задания Знакомство с MongoDB

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## Цель работы

Овладеть практическими навыками и умениями реализации баз данных в MongoDB.

## Модель базы данных



## Создание базы в MongoDB

База данных создается командой: `use exchange`.

Заполнение таблицы необходимыми данными.

```
db.exchange.insertMany([
... {
...   "amount": 12,
...   "price": 2390,
...   "manufacturer": "Severstal",
...   "product": {
...     "product_name": "nickel",
...     "date_of_manufacture": "20.01.2020",
...     "unit_of_measurement": "ton"
...   },
...   "deal": {
...     "sum": 28680,
...     "date": "23.02.2020",
```

```
...   "exchange": "SPb"
... }
... },
... {
...   "amount": 22,
...   "price": 390,
...   "manufacturer": "Losevo",
...   "product": {
...     "product_name": "cheese",
...     "date_of_manufacture": "21.03.2020",
...     "unit_of_measurement": "ton"
...   },
...   "deal":{
...     "sum": 8580,
...     "date": "03.04.2020",
...     "exchange": "PTC"
...   }
... },
... {
...   "amount": 102,
...   "price": 28,
...   "manufacturer": "Losevo",
...   "product": {
...     "product_name": "milk",
...     "date_of_manufacture": "02.02.2020",
...     "unit_of_measurement": "ton"
...   },
...   "deal":{
...     "sum": 2856,
...     "date": "23.02.2020",
...     "exchange": "SPb"
...   }
... },
... {
```

```

...   "amount": 18,
...   "price": 5370,
...   "manufacturer": "Severstal",
...   "product": {
...     "product_name": "олово",
...     "date_of_manufacture": "24.03.2020",
...     "unit_of_measurement": "ton"
...   },
...   "deal":{
...     "sum": 96660,
...     "date": "06.06.2020",
...     "exchange": "PTC"
...   }
... },
... {
...   "amount": 122,
...   "price": 239,
...   "manufacturer": "Cacaocup",
...   "product": {
...     "product_name": "cacao",
...     "date_of_manufacture": "19.05.2020",
...     "unit_of_measurement": "ton"
...   },
...   "deal":{
...     "sum": 29158,
...     "date": "23.02.2020",
...     "exchange": "SPb"
...   }
... }
... ])

```

Результат заполнения таблицы.

```
{
  "acknowledged" : true,
  "insertedIds" : [
    ObjectId("5f03b3bc01de594df8710ff2"),
    ObjectId("5f03b3bc01de594df8710ff3"),
    ObjectId("5f03b3bc01de594df8710ff4"),
    ObjectId("5f03b3bc01de594df8710ff5"),
    ObjectId("5f03b3bc01de594df8710ff6")
  ]
}
```

## Запросы к базе данных

Получение записей, связанных с конкретным производителем

db.exchange.find({"manufacturer":"Losevo"})

```
[> db.exchange.find({"manufacturer":"Losevo"})
{ "_id" : ObjectId("5f03b3bc01de594df8710ff3"), "amount" : 22, "price" : 390, "manufacturer" : "Losevo"
, "product" : { "product_name" : "cheese", "date_of_manufacture" : "21.03.2020", "unit_of_measurement"
: "ton" }, "deal" : { "sum" : 8580, "date" : "03.04.2020", "exchange" : "PTC" } }
{ "_id" : ObjectId("5f03b3bc01de594df8710ff4"), "amount" : 102, "price" : 28, "manufacturer" : "Losevo"
, "product" : { "product_name" : "milk", "date_of_manufacture" : "02.02.2020", "unit_of_measurement" :
"ton" }, "deal" : { "sum" : 2856, "date" : "23.02.2020", "exchange" : "SPb" } }
```

Получение записей, в которых сделка была на сумму больше 10000.

db.exchange.find({"deal.sum":{\$gt: 10000}})

```
[> db.exchange.find({"deal.sum":{$gt: 10000}})
{ "_id" : ObjectId("5f03b3bc01de594df8710ff2"), "amount" : 12, "price" : 2390, "manufacturer" : "Severs
tal", "product" : { "product_name" : "nickel", "date_of_manufacture" : "20.01.2020", "unit_of_measureme
nt" : "ton" }, "deal" : { "sum" : 28680, "date" : "23.02.2020", "exchange" : "SPb" } }
{ "_id" : ObjectId("5f03b3bc01de594df8710ff5"), "amount" : 18, "price" : 5370, "manufacturer" : "Severs
tal", "product" : { "product_name" : "olovo", "date_of_manufacture" : "24.03.2020", "unit_of_measuremen
t" : "ton" }, "deal" : { "sum" : 96660, "date" : "06.06.2020", "exchange" : "PTC" } }
{ "_id" : ObjectId("5f03b3bc01de594df8710ff6"), "amount" : 122, "price" : 239, "manufacturer" : "Cacaoc
up", "product" : { "product_name" : "cacao", "date_of_manufacture" : "19.05.2020", "unit_of_measurement
" : "ton" }, "deal" : { "sum" : 29158, "date" : "23.02.2020", "exchange" : "SPb" } }
```

Получение записей о сделках, продуктом которых было какао.

db.exchange.find({"product.product\_name":"cacao"})

```
> db.dog_show.find({"registration.show.Place": "Saint Petersburg" })
{ "_id" : ObjectId("5ede190c46920bb001a5ba72"), "score" : 25, "registration" : { "reg_number" : 1, "ring" : 3, "show" :
{ "Name" : "Champion", "Place" : "Saint Petersburg", "Date" : "04/28/2020" }, "dog" : { "Document_num" : 129588, "Name
": "Bella", "Dog_age" : 7, "Breed" : "Spaniel", "Club" : "Friend", "Owner_name" : "Igor" } } }
{ "_id" : ObjectId("5ede190c46920bb001a5ba73"), "score" : 18, "registration" : { "reg_number" : 2, "ring" : 1, "show" :
{ "Name" : "Champion", "Place" : "Saint Petersburg", "Date" : "04/28/2020" }, "dog" : { "Document_num" : 938726, "Name
": "Scooby", "Dog_age" : 7, "Breed" : "Pudel", "Club" : "Cornuel", "Owner_name" : "Elena" } } }
{ "_id" : ObjectId("5ede190c46920bb001a5ba74"), "score" : 24, "registration" : { "reg_number" : 3, "ring" : 2, "show" :
{ "Name" : "Champion", "Place" : "Saint Petersburg", "Date" : "04/28/2020" }, "dog" : { "Document_num" : 209483, "Name
": "Molly", "Dog_age" : 7, "Breed" : "Dalmatian", "Club" : "Friend", "Owner_name" : "Sergei" } } }
{ "_id" : ObjectId("5ede190c46920bb001a5ba75"), "score" : 15, "registration" : { "reg_number" : 4, "ring" : 3, "show" :
{ "Name" : "Fantom", "Place" : "Saint Petersburg", "Date" : "12/28/2020" }, "dog" : { "Document_num" : 839420, "Name
": "Lucky", "Dog_age" : 7, "Breed" : "Spaniel", "Club" : "Friend", "Owner_name" : "Sofia" } } }
{ "_id" : ObjectId("5ede190c46920bb001a5ba76"), "score" : 15, "registration" : { "reg_number" : 5, "ring" : 2, "show" :
{ "Name" : "Fantom", "Place" : "Saint Petersburg", "Date" : "12/28/2020" }, "dog" : { "Document_num" : 938726, "Name
": "Scooby", "Dog_age" : 8, "Breed" : "Pudel", "Club" : "Cornuel", "Owner_name" : "Elena" } } }
```

Получение записей о сделках на бирже Санкт-Петербурга.

db.exchange.find({"deal.exchange":"SPb"})

```
> db.exchange.find({"deal.exchange":"SPb"})
{ "_id" : ObjectId("5f03b3bc01de594df8710ff2"), "amount" : 12, "price" : 2390, "manufacturer" : "Severs
tal", "product" : { "product_name" : "nickel", "date_of_manufacture" : "20.01.2020", "unit_of_measureme
nt" : "ton" }, "deal" : { "sum" : 28680, "date" : "23.02.2020", "exchange" : "SPb" } }
{ "_id" : ObjectId("5f03b3bc01de594df8710ff4"), "amount" : 102, "price" : 28, "manufacturer" : "Losevo"
, "product" : { "product_name" : "milk", "date_of_manufacture" : "02.02.2020", "unit_of_measurement" :
"ton" }, "deal" : { "sum" : 2856, "date" : "23.02.2020", "exchange" : "SPb" } }
{ "_id" : ObjectId("5f03b3bc01de594df8710ff6"), "amount" : 122, "price" : 239, "manufacturer" : "Cacaoc
up", "product" : { "product_name" : "cacao", "date_of_manufacture" : "19.05.2020", "unit_of_measurement
" : "ton" }, "deal" : { "sum" : 29158, "date" : "23.02.2020", "exchange" : "SPb" } }
```

Получение записей, в которых цена товара больше 1000.

db.exchange.find({"price":{\$gt: 1000}})

```
[> db.exchange.find({"price":{$gt: 1000}})
{ "_id" : ObjectId("5f03b3bc01de594df8710ff2"), "amount" : 12, "price" : 2390, "manufacturer" : "Severs
tal", "product" : { "product_name" : "nickel", "date_of_manufacture" : "20.01.2020", "unit_of_measureme
nt" : "ton" }, "deal" : { "sum" : 28680, "date" : "23.02.2020", "exchange" : "SPb" } }
{ "_id" : ObjectId("5f03b3bc01de594df8710ff5"), "amount" : 18, "price" : 5370, "manufacturer" : "Severs
tal", "product" : { "product_name" : "olovo", "date_of_manufacture" : "24.03.2020", "unit_of_measuremen
t" : "ton" }, "deal" : { "sum" : 96660, "date" : "06.06.2020", "exchange" : "PTC" } }
```

Получение общей суммы сделок каждой компании производителя.

```
> var F1 = function() {  
... emit(this.manufacturer, this.deal.sum);  
... };  
  
> var F2 = function(name, dealsum) {  
... return Array.sum(dealsum);  
... };  
  
> db.exchange.mapReduce(  
...   F1,  
...   F2,  
...   { out: "total_sum" }  
... )  
{  
  "result" : "total_sum",  
  "timeMillis" : 175,  
  "counts" : {  
    "input" : 5,  
    "emit" : 5,  
    "reduce" : 2,  
    "output" : 3  
  },  
  "ok" : 1  
}  
  
[> db.total_sum.find()  
{ "_id" : "Cacaocup", "value" : 29158 }  
{ "_id" : "Losevo", "value" : 11436 }  
{ "_id" : "Severstal", "value" : 125340 }
```

## Вывод

В ходе работы были получены навыки написания запросов к базе данных средствами MongoDB, а также освоены принципы создания бд средствами MongoDB.