

**Министерство науки и высшего образования Российской Федерации**  
федеральное государственное автономное образовательное учреждение высшего  
образования  
**«НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ УНИВЕРСИТЕТ ИТМО»**

**Отчет**

По лабораторной работе №8  
«Работа с БД в СУБД MongoDB»

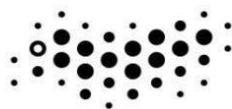
по дисциплине «Проектирование и реализация баз данных»

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**УНИВЕРСИТЕТ ИТМО**

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**Цель работы:** овладеть практическими навыками работы с CRUD-операциями, с вложенными объектами в коллекции базы данных MongoDB, агрегации и изменения данных, со ссылками и индексами в базе данных MongoDB.

## Операции из лабораторной работы №7

```
C:\Program Files\MongoDB\Server\4.4\bin\mongo.exe
@(>shell):1:14
> use itmodb
switched to db itmodb
> use learn
switched to db learn
> db.unicorns.insert({name: "Aurora", gender: "F", weight: 450})
WriteResult({"nInserted" : 1})
> show collections
unicorns
> db.unicorns.renameCollection("animals")
uncaught exception: SyntaxError: missing : after property id :
@(>shell):1:39
> db.animals.renameCollection({"unicorns"})
uncaught exception: SyntaxError: missing : after property id :
@(>shell):1:39
> db.unicorns.renameCollection("animals")
{"ok" : 1}
> show collections
animals
> db.animals.stats()
{
  "ns" : "learn.animals",
  "size" : 69,
  "count" : 1,
  "avgObjSize" : 69,
  "storageSize" : 20480,
  "freeStorageSize" : 0,
  "capped" : false,
  "wiredTiger" : {
    "metadata" : {
      "formatVersion" : 1
    },
    "creationString" : "access_pattern_hint=none,allocation_size=4KB,app_metadata=(formatVersion=1),assert=(commit_timestamp=none,durable_timestamp=none,read_timestamp=none,write_timestamp=off),block_allocation=best,block_compressor=snappy,cache_resident=false,checksumson,colgroups=,collators=,columns=,dictionary=,encryption=(key_id=,name=),exclusive=false,extractors=,format=btree,huffman_keys=huffman_values=,ignore_in_memory_cache_size=false,immutable=false,import=(enabled=false,file_metadata=,repair=false),internal_item_max=0,internal_key_max=0,internal_key_truncate=true,internal_page_max=4KB,key_format=,key_gap=10,leaf_item_max=0,leaf_key_max=0,leaf_page_max=32KB,leaf_value_max=64MB,logs=(enabled=true),lsm=(auto.throttle=true,bloom=true,bloom_bit_count=16,bloom_config=,bloom_hash_count=8,bloom_oldest=false,chunk_count_limit=0,chunk_max=5GB,chunk_size=10MB,merge_custom=(prefix=,start_generation=0,suffix=),merge_max=15,merge_min=0),memory_page_image_max=0,memory_page_max=10M,os_cache_dirty_max=0,os_cache_max=0,prefix_compression=false,prefix_compression_min=4,readonly=false,sources=,split_deepen_min_child=0,split_deepen_per_child=0,split_pct=90,tiered=(chunk_size=16B,tiers=),tiered_storage=(auth_tokens=,buckets=,local_retention=300,name=,object_target_size=10M),type=file,value_format=u,verbose=,write_timestamp_usage=none",
    "type" : "file",
  }
}
```

```
C:\Program Files\MongoDB\Server\4.4\bin\mongo.exe
"transaction" : {
  "race to read prepared update retry" : 0,
  "rollback to stable history store records with stop timestamps older than newer records" : 0,
  "rollback to stable inconsistent checkpoint" : 0,
  "rollback to stable keys removed" : 0,
  "rollback to stable keys restored" : 0,
  "rollback to stable restored tombstones from history store" : 0,
  "rollback to stable restored updates from history store" : 0,
  "rollback to stable sweeping history store keys" : 0,
  "rollback to stable updates removed from history store" : 0,
  "transaction checkpoints due to obsolete pages" : 0,
  "update conflicts" : 0
}
},
"nindexes" : 1,
"indexBuilds" : [ ],
"totalIndexSize" : 20480,
"totalSize" : 40960,
"indexSizes" : {
  "_id_" : 20480
},
"scaleFactor" : 1,
"ok" : 1
}
> db.animals.drop()
true
> show collections
> db.dropDatabase("learn")
uncaught exception: TypeError: db.dropDatabase is not a function :
@(>shell):1:1
> db.dropDatabase()
{"dropped" : "learn", "ok" : 1}
> show dbs
admin 0.000GB
config 0.000GB
itmodb 0.000GB
local 0.000GB
>
```

### 8.1.1 Вставка документов в коллекцию

```

> use learn
switched to db learn
> db.unicorns.insert({name: 'Horny', loves: ['carrot','papaya'], weight: 600, gender: 'm', vampires: 63});
WriteResult({"nInserted" : 1 })
> db.unicorns.insert({name: 'Aurora', loves: ['carrot', 'grape'], weight: 450, gender: 'f', vampires: 43});
WriteResult({"nInserted" : 1 })
> db.unicorns.insert({name: 'Unicrom', loves: ['energon', 'redbull'], weight: 984, gender: 'm', vampires: 182});
WriteResult({"nInserted" : 1 })
> db.unicorns.insert({name: 'Roooooodles', loves: ['apple'], weight: 575, gender: 'm', vampires: 99});
WriteResult({"nInserted" : 1 })
> db.unicorns.insert({name: 'Solnara', loves: ['apple', 'carrot', 'chocolate'], weight: 550, gender: 'f', vampires: 80});
WriteResult({"nInserted" : 1 })
> db.unicorns.insert({name: 'Ayna', loves: ['strawberry', 'lemon'], weight: 733, gender: 'f', vampires: 40});
WriteResult({"nInserted" : 1 })
> db.unicorns.insert({name: 'Kenny', loves: ['grape', 'lemon'], weight: 690, gender: 'm', vampires: 39});
WriteResult({"nInserted" : 1 })
> db.unicorns.insert({name: 'Raleigh', loves: ['apple', 'sugar'], weight: 421, gender: 'm', vampires: 2});
WriteResult({"nInserted" : 1 })
> db.unicorns.insert({name: 'Leia', loves: ['apple', 'watermelon'], weight: 601, gender: 'f', vampires: 33});
WriteResult({"nInserted" : 1 })
> db.unicorns.insert({name: 'Pilot', loves: ['apple', 'watermelon'], weight: 650, gender: 'm', vampires: 54});
WriteResult({"nInserted" : 1 })
> db.unicorns.insert({name: 'Nimue', loves: ['grape', 'carrot'], weight: 540, gender: 'f'});
WriteResult({"nInserted" : 1 })

> doc = {name: 'Dunx', loves: ['grape', 'watermelon'], weight: 704, gender: 'm', vampires: 165}
{
  "name" : "Dunx",
  "loves" : [
    "grape",
    "watermelon"
  ],
  "weight" : 704,
  "gender" : "m",
  "vampires" : 165
}
> db.unicorns.insert(doc)
WriteResult({"nInserted" : 1 })
> db.unicorns.find()
{ "_id" : ObjectId("60c1dc8b78bc60fa12bad0e3"), "name" : "Horny", "loves" : [ "carrot", "papaya" ], "weight" : 600, "gender" : "m", "vampires" : 63 }
{ "_id" : ObjectId("60c1dc9d78bc60fa12bad0e4"), "name" : "Aurora", "loves" : [ "carrot", "grape" ], "weight" : 450, "gender" : "f", "vampires" : 43 }
{ "_id" : ObjectId("60c1dcc078bc60fa12bad0e5"), "name" : "Unicrom", "loves" : [ "energon", "redbull" ], "weight" : 984, "gender" : "m", "vampires" : 182 }

```

## 8.1.2

```

> db.unicorns.find({gender: "m"}).sort({name: 1})
{ "_id" : ObjectId("60c1dda578bc60fa12bad0ee"), "name" : "Dunx", "loves" : [ "grape", "watermelon" ], "weight" : 704, "gender" : "m", "vampires" : 165 }
{ "_id" : ObjectId("60c1dc8b78bc60fa12bad0e3"), "name" : "Horny", "loves" : [ "carrot", "papaya" ], "weight" : 600, "gender" : "m", "vampires" : 63 }
{ "_id" : ObjectId("60c1dd2178bc60fa12bad0e9"), "name" : "Kenny", "loves" : [ "grape", "lemon" ], "weight" : 690, "gender" : "m", "vampires" : 39 }
{ "_id" : ObjectId("60c1dd4978bc60fa12bad0ec"), "name" : "Pilot", "loves" : [ "apple", "watermelon" ], "weight" : 650, "gender" : "m", "vampires" : 54 }
{ "_id" : ObjectId("60c1dd2b78bc60fa12bad0ea"), "name" : "Raleigh", "loves" : [ "apple", "sugar" ], "weight" : 421, "gender" : "m", "vampires" : 2 }
{ "_id" : ObjectId("60c1dccc78bc60fa12bad0e6"), "name" : "Roooooodles", "loves" : [ "apple" ], "weight" : 575, "gender" : "m", "vampires" : 99 }
{ "_id" : ObjectId("60c1dcc078bc60fa12bad0e5"), "name" : "Unicrom", "loves" : [ "energon", "redbull" ], "weight" : 984, "gender" : "m", "vampires" : 182 }
> db.unicorns.find({gender: "f"}).sort({name: 1}).limit(3)
{ "_id" : ObjectId("60c1dc9d78bc60fa12bad0e4"), "name" : "Aurora", "loves" : [ "carrot", "grape" ], "weight" : 450, "gender" : "f", "vampires" : 43 }
{ "_id" : ObjectId("60c1dd1878bc60fa12bad0e8"), "name" : "Ayna", "loves" : [ "strawberry", "lemon" ], "weight" : 733, "gender" : "f", "vampires" : 40 }
{ "_id" : ObjectId("60c1dd3f78bc60fa12bad0eb"), "name" : "Leia", "loves" : [ "apple", "watermelon" ], "weight" : 601, "gender" : "f", "vampires" : 33 }
> db.unicorns.find({gender: "m"}).sort({name: 1}).limit(3)
{ "_id" : ObjectId("60c1dda578bc60fa12bad0ee"), "name" : "Dunx", "loves" : [ "grape", "watermelon" ], "weight" : 704, "gender" : "m", "vampires" : 165 }
{ "_id" : ObjectId("60c1dc8b78bc60fa12bad0e3"), "name" : "Horny", "loves" : [ "carrot", "papaya" ], "weight" : 600, "gender" : "m", "vampires" : 63 }
{ "_id" : ObjectId("60c1dd2178bc60fa12bad0e9"), "name" : "Kenny", "loves" : [ "grape", "lemon" ], "weight" : 690, "gender" : "m", "vampires" : 39 }
> db.unicorns.find({gender: "f", loves: "carrot"}).sort({name: 1}).limit(1)
{ "_id" : ObjectId("60c1dc9d78bc60fa12bad0e4"), "name" : "Aurora", "loves" : [ "carrot", "grape" ], "weight" : 450, "gender" : "f", "vampires" : 43 }
> db.unicorns.findOne({gender: "f", loves: "carrot"}).sort({name: 1})
uncaught exception: TypeError: db.unicorns.findOne(...).sort is not a function :
@shell:1:1
> db.unicorns.findOne({gender: "f", loves: "carrot"})
{
  "_id" : ObjectId("60c1dc9d78bc60fa12bad0e4"),
  "name" : "Aurora",
  "loves" : [
    "carrot",
    "grape"
  ],
  "weight" : 450,
  "gender" : "f",
  "vampires" : 43
}

```

## 8.1.3

```
> db.unicorns.find({gender: "m"}, {loves: 0, gender: 0}).sort({name: 1})
> db.unicorns.find({gender: "m"}, {loves: 0, gender: 0}).sort({name: 1})
{ "_id" : ObjectId("60c1dda578bc60fa12bad0ee"), "name" : "Dunx", "weight" : 704, "vampires" : 165 }
{ "_id" : ObjectId("60c1dc8b78bc60fa12bad0e3"), "name" : "Horny", "weight" : 600, "vampires" : 63 }
{ "_id" : ObjectId("60c1dd2178bc60fa12bad0e9"), "name" : "Kenny", "weight" : 690, "vampires" : 39 }
{ "_id" : ObjectId("60c1dd4978bc60fa12bad0ec"), "name" : "Pilot", "weight" : 650, "vampires" : 54 }
{ "_id" : ObjectId("60c1dd2b78bc60fa12bad0ea"), "name" : "Raleigh", "weight" : 421, "vampires" : 2 }
{ "_id" : ObjectId("60c1dccc78bc60fa12bad0e6"), "name" : "Roooooodles", "weight" : 575, "vampires" : 99 }
{ "_id" : ObjectId("60c1dcc078bc60fa12bad0e5"), "name" : "Unicrom", "weight" : 984, "vampires" : 182 }
>
```

#### 8.1.4

```
> db.unicorns.find({gender: "m"}).sort({$natural: -1})
{ "_id" : ObjectId("60c1dda578bc60fa12bad0ee"), "name" : "Dunx", "loves" : [ "grape", "watermelon" ], "weight" : 704, "gender" : "m", "vampires" : 165 }
{ "_id" : ObjectId("60c1dd4978bc60fa12bad0ec"), "name" : "Pilot", "loves" : [ "apple", "watermelon" ], "weight" : 650, "gender" : "m", "vampires" : 54 }
{ "_id" : ObjectId("60c1dd2b78bc60fa12bad0ea"), "name" : "Raleigh", "loves" : [ "apple", "sugar" ], "weight" : 421, "gender" : "m", "vampires" : 2 }
{ "_id" : ObjectId("60c1dd2178bc60fa12bad0e9"), "name" : "Kenny", "loves" : [ "grape", "lemon" ], "weight" : 690, "gender" : "m", "vampires" : 39 }
{ "_id" : ObjectId("60c1dccc78bc60fa12bad0e6"), "name" : "Roooooodles", "loves" : [ "apple" ], "weight" : 575, "gender" : "m", "vampires" : 99 }
{ "_id" : ObjectId("60c1dcc078bc60fa12bad0e5"), "name" : "Unicrom", "loves" : [ "energon", "redbull" ], "weight" : 984, "gender" : "m", "vampires" : 182 }
{ "_id" : ObjectId("60c1dc8b78bc60fa12bad0e3"), "name" : "Horny", "loves" : [ "carrot", "papaya" ], "weight" : 600, "gender" : "m", "vampires" : 63 }
>
```

#### 8.1.5

```
> db.unicorns.find({gender: "m"}, {loves: {$slice:1}, _id: 0})
{ "name" : "Horny", "loves" : [ "carrot" ], "weight" : 600, "gender" : "m", "vampires" : 63 }
{ "name" : "Unicrom", "loves" : [ "energon" ], "weight" : 984, "gender" : "m", "vampires" : 182 }
{ "name" : "Roooooodles", "loves" : [ "apple" ], "weight" : 575, "gender" : "m", "vampires" : 99 }
{ "name" : "Kenny", "loves" : [ "grape" ], "weight" : 690, "gender" : "m", "vampires" : 39 }
{ "name" : "Raleigh", "loves" : [ "apple" ], "weight" : 421, "gender" : "m", "vampires" : 2 }
{ "name" : "Pilot", "loves" : [ "apple" ], "weight" : 650, "gender" : "m", "vampires" : 54 }
{ "name" : "Dunx", "loves" : [ "grape" ], "weight" : 704, "gender" : "m", "vampires" : 165 }
>
```

#### 8.1.6

```
> db.unicorns.find({gender: "f", weight: {$gte: 500, $lte: 700}}, {_id: 0})
{ "name" : "Solnara", "loves" : [ "apple", "carrot", "chocolate" ], "weight" : 550, "gender" : "f", "vampires" : 80 }
{ "name" : "Leia", "loves" : [ "apple", "watermelon" ], "weight" : 601, "gender" : "f", "vampires" : 33 }
{ "name" : "Nimue", "loves" : [ "grape", "carrot" ], "weight" : 540, "gender" : "f" }
>
```

#### 8.1.7

```
> db.unicorns.find({gender: "m", weight: {$gte: 500}, loves: {$all: ['grape', 'lemon']}}, {_id: 0})
{ "name" : "Kenny", "loves" : [ "grape", "lemon" ], "weight" : 690, "gender" : "m", "vampires" : 39 }
>
```

#### 8.1.8

```
{ "name" : "Kenny", "loves" : [ "grape", "lemon" ], "weight" : 690, "gender" : "m", "vampires" : 39 }
> db.unicorns.find({vampires: {$exists: false}})
{ "_id" : ObjectId("60c1dd5178bc60fa12bad0ed"), "name" : "Nimue", "loves" : [ "grape", "carrot" ], "weight" : 540, "gender" : "f" }
>
```

#### 8.1.9

```
> db.unicorns.find({gender: "m"}, {loves: {$slice: 1}}).sort({name: 1})
{ "_id" : ObjectId("60c1dda578bc60fa12bad0ee"), "name" : "Dunx", "loves" : [ "grape" ], "weight" : 704, "gender" : "m", "vampires" : 165 }
{ "_id" : ObjectId("60c1dc8b78bc60fa12bad0e3"), "name" : "Horny", "loves" : [ "carrot" ], "weight" : 600, "gender" : "m", "vampires" : 63 }
{ "_id" : ObjectId("60c1dd2178bc60fa12bad0e9"), "name" : "Kenny", "loves" : [ "grape" ], "weight" : 690, "gender" : "m", "vampires" : 39 }
{ "_id" : ObjectId("60c1dd4978bc60fa12bad0ec"), "name" : "Pilot", "loves" : [ "apple" ], "weight" : 650, "gender" : "m", "vampires" : 54 }
{ "_id" : ObjectId("60c1dd2b78bc60fa12bad0ea"), "name" : "Raleigh", "loves" : [ "apple" ], "weight" : 421, "gender" : "m", "vampires" : 2 }
{ "_id" : ObjectId("60c1dccc78bc60fa12bad0e6"), "name" : "Roooooodles", "loves" : [ "apple" ], "weight" : 575, "gender" : "m", "vampires" : 99 }
{ "_id" : ObjectId("60c1dcc078bc60fa12bad0e5"), "name" : "Unicrom", "loves" : [ "energon" ], "weight" : 984, "gender" : "m", "vampires" : 182 }
>
```

#### 8.2.1

```

> db.towns.insert({name: "Punxsutawney", population: 6200, last_sensus: ISODate("2008-01-31"), famous_for: [""], mayor: {name: "Jim Wehrle"}})
WriteResult({ "nInserted" : 1 })
> show collections
towns
unicorns
> db.towns.insert({name: "New York", population: 22200000, last_sensus: ISODate("2009-07-31"), famous_for: ["status of liberty", "food"], mayor: {name: "Michael Bloomberg"}})
WriteResult({ "nInserted" : 1 })
> db.towns.insert({name: "Portland", populatiuon: 528000, last_sensus: ISODate("2009-07-20"), famous_for: ["beer", "food"], mayor: {name: "Sam Adams", party: "D"}})
WriteResult({ "nInserted" : 1 })
> db.towns.find({"mayor.party": "D"}, {_id: 0, name: 1, mayor: 1})
{ "name" : "Portland", "mayor" : { "name" : "Sam Adams", "party" : "D" } }
> db.towns.find({"mayor.party": {"exists": false}}, {_id: 0, name: 1, mayor: 1})
{ "name" : "Punxsutawney", "mayor" : { "name" : "Jim Wehrle" } }
{ "name" : "New York", "mayor" : { "name" : "Michael Bloomberg" } }
>

```

## 8.2.2

```

> fn = function() {return this.gender == 'm'}
function() {return this.gender == 'm'}
> var cursor = db.unicorns.find(fn); null;
null
> cursor.limit(2).sort({name: 1}); null;
null
> cursor.forEach(function(obj) {print(obj.name); })
Dunx
Horny
>

```

## 8.2.3

```

Horny
> db.unicorns.find({gender: "f", weight: {$gte: 500, $lte: 600}}).count()
2
>

```

## 8.2.4

```

> db.unicorns.distinct('loves')
[
  "apple",
  "carrot",
  "chocolate",
  "energon",
  "grape",
  "lemon",
  "papaya",
  "redbull",
  "strawberry",
  "sugar",
  "watermelon"
]
>

```

```
> db.unicorns.aggregate([{"$group" : {_id:"$gender", count:{$sum: 1}}}])
{ "_id" : "m", "count" : 7 }
{ "_id" : "f", "count" : 5 }
>
```

```

> db.unicorns.find(
  { '_id' : ObjectId("60c1dc8b78bc60fa12bad0e3"), "name" : "Horny", "loves" : [ "carrot", "papaya" ], "weight" : 600, "gender" : "m", "vampires" : 63 }
  , { '_id' : ObjectId("60c1dc9d78bc60fa12bad0e4"), "name" : "Aurora", "loves" : [ "carrot", "grape" ], "weight" : 450, "gender" : "f", "vampires" : 43 }
  , { '_id' : ObjectId("60c1dccc078bc60fa12bad0e5"), "name" : "Unicorn", "loves" : [ "energon", "redbull" ], "weight" : 984, "gender" : "m", "vampires" : 182 }
  , { '_id' : ObjectId("60c1d9c078bc60fa12bad0e6"), "name" : "Roooonoodles", "loves" : [ "apple" ], "weight" : 575, "gender" : "m", "vampires" : 99 }
  , { '_id' : ObjectId("60c1cd9d78bc60fa12bad0e7"), "name" : "Solnara", "loves" : [ "apple", "carrot", "chocolate" ], "weight" : 550, "gender" : "f", "vampires" : 80 }
  , { '_id' : ObjectId("60c1dd1878bc60fa12bad0e8"), "name" : "Ayna", "loves" : [ "strawberry", "lemon" ], "weight" : 733, "gender" : "f", "vampires" : 40 }
  , { '_id' : ObjectId("60c1dd2178bc60fa12bad0e9"), "name" : "Kenny", "loves" : [ "grape", "lemon" ], "weight" : 690, "gender" : "m", "vampires" : 39 }
  , { '_id' : ObjectId("60c1dd3f78bc60fa12bad0ea"), "name" : "Raleigh", "loves" : [ "apple", "sugar" ], "weight" : 421, "gender" : "m", "vampires" : 2 }
  , { '_id' : ObjectId("60c1dd3f78bc60fa12bad0eb"), "name" : "Lia", "loves" : [ "apple", "watermelon" ], "weight" : 601, "gender" : "f", "vampires" : 33 }
  , { '_id' : ObjectId("60c1dd4978bc60fa12bad0ec"), "name" : "Pilot", "loves" : [ "apple", "watermelon" ], "weight" : 650, "gender" : "m", "vampires" : 54 }
  , { '_id' : ObjectId("60c1dd5178bc60fa12bad0ed"), "name" : "Nimue", "loves" : [ "grape", "carrot" ], "weight" : 540, "gender" : "f" }
  , { '_id' : ObjectId("60c1dda578bc60fa12bad0ee"), "name" : "Dunx", "loves" : [ "grape", "watermelon" ], "weight" : 704, "gender" : "m", "vampires" : 165 }
  , { '_id' : ObjectId("60c202d778bc60fa12bad0ef"), "name" : "Barny", "loves" : [ "grape" ], "weight" : 340, "gender" : "m" }
)

```

```
> db.unicorns.update({name: "Ayna", {name: "Ayna", loves: ['strawberry', 'lemon'], weight: 800, gender: 'f', vampires: 51})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.unicorns.find()
{ "_id" : ObjectId("60c1dc8b78bc60fa12bad0e3"), "name" : "Horny", "loves" : [ "carrot", "papaya" ], "weight" : 600, "gender" : "m", "vampires" : 63 }
{ "_id" : ObjectId("60c1dc9d78bc60fa12bad0e4"), "name" : "Aurora", "loves" : [ "carrot", "grape" ], "weight" : 450, "gender" : "f", "vampires" : 43 }
{ "_id" : ObjectId("60c1dc0d78bc60fa12bad0e5"), "name" : "Unicorn", "loves" : [ "energion", "redbull" ], "weight" : 984, "gender" : "m", "vampires" : 182 }
{ "_id" : ObjectId("60c1dcd78bc60fa12bad0e6"), "name" : "Roocooodles", "loves" : [ "apple" ], "weight" : 575, "gender" : "m", "vampires" : 99 }
{ "_id" : ObjectId("60c1dc4978bc60fa12bad0e7"), "name" : "Solnara", "loves" : [ "apple", "carrot", "chocolate" ], "weight" : 550, "gender" : "f", "vampires" : 80 }
{ "_id" : ObjectId("60c1dd1878bc60fa12bad0e8"), "name" : "Ayna", "loves" : [ "strawberry", "lemon" ], "weight" : 800, "gender" : "f", "vampires" : 51 }
{ "_id" : ObjectId("60c1dd2178bc60fa12bad0e9"), "name" : "Kenny", "loves" : [ "grape", "lemon" ], "weight" : 690, "gender" : "m", "vampires" : 39 }
{ "_id" : ObjectId("60c1dd2b78bc60fa12bad0ea"), "name" : "Raleigh", "loves" : [ "apple", "sugar" ], "weight" : 421, "gender" : "m", "vampires" : 2 }
{ "_id" : ObjectId("60c1dd3f78bc60fa12bad0eb"), "name" : "Leia", "loves" : [ "apple", "watermelon" ], "weight" : 601, "gender" : "f", "vampires" : 33 }
{ "_id" : ObjectId("60c1dd4978bc60fa12bad0ec"), "name" : "Pilot", "loves" : [ "apple", "watermelon" ], "weight" : 650, "gender" : "m", "vampires" : 54 }
{ "_id" : ObjectId("60c1dd5178bc60fa12bad0ed"), "name" : "Nimue", "loves" : [ "grape", "carrot" ], "weight" : 540, "gender" : "f" }
{ "_id" : ObjectId("60c1dd5478bc60fa12bad0ee"), "name" : "Dunx", "loves" : [ "grape", "watermelon" ], "weight" : 704, "gender" : "m", "vampires" : 165 }
{ "_id" : ObjectId("60c292e778bc60fa12bad0ef"), "name" : "Barney", "loves" : [ "grape" ], "weight" : 340, "gender" : "m" }
```

```
> db.unicorns.update({name: "Raleigh"}, {$set: {loves: ['Redbull']}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.unicorns.find()
{ "_id" : ObjectId("60c1dc8b78bc60fa12bad0e3"), "name" : "Horny", "loves" : [ "carrot", "papaya" ], "weight" : 600, "gender" : "m", "vampires" : 63 }
{ "_id" : ObjectId("60c1dc9d78bc60fa12bad0e4"), "name" : "Aurora", "loves" : [ "carrot", "grape" ], "weight" : 450, "gender" : "f", "vampires" : 43 }
{ "_id" : ObjectId("60c1dc078bc60fa12bad0e5"), "name" : "Unicorn", "loves" : [ "energon", "redbull" ], "weight" : 984, "gender" : "m", "vampires" : 182 }
{ "_id" : ObjectId("60c1dccd78bc60fa12bad0e6"), "name" : "Roocooodles", "loves" : [ "apple" ], "weight" : 575, "gender" : "m", "vampires" : 99 }
{ "_id" : ObjectId("60c1cd978bc60fa12bad0e7"), "name" : "Solnara", "loves" : [ "apple", "carrot", "chocolate" ], "weight" : 550, "gender" : "f", "vampires" : 80 }
{ "_id" : ObjectId("60c1dd1878bc60fa12bad0e8"), "name" : "Ayna", "loves" : [ "strawberry", "lemon" ], "weight" : 800, "gender" : "f", "vampires" : 51 }
{ "_id" : ObjectId("60c1dd2178bc60fa12bad0e9"), "name" : "Kenny", "loves" : [ "grape", "lemon" ], "weight" : 690, "gender" : "m", "vampires" : 39 }
{ "_id" : ObjectId("60c1dd2b78bc60fa12bad0ea"), "name" : "Raleigh", "loves" : [ "Redbull" ], "weight" : 421, "gender" : "m", "vampires" : 2 }
{ "_id" : ObjectId("60c1dd3f78bc60fa12bad0eb"), "name" : "Leia", "loves" : [ "apple", "watermelon" ], "weight" : 601, "gender" : "f", "vampires" : 33 }
{ "_id" : ObjectId("60c1dd4978bc60fa12bad0ec"), "name" : "Pilot", "loves" : [ "apple", "watermelon" ], "weight" : 650, "gender" : "m", "vampires" : 54 }
{ "_id" : ObjectId("60c1dd5178bc60fa12bad0ed"), "name" : "Nimue", "loves" : [ "grape", "carrot" ], "weight" : 540, "gender" : "f" }
{ "_id" : ObjectId("60c1dd578bc60fa12bad0ee"), "name" : "Dunx", "loves" : [ "grape", "watermelon" ], "weight" : 704, "gender" : "m", "vampires" : 165 }
{ "_id" : ObjectId("60c2d2778bc60fa12bad0ef"), "name" : "Barny", "loves" : [ "grape" ], "weight" : 340, "gender" : "m" }
```

```

> db.unicorns.update({gender: 'm'}, {$inc: {vampires: 5}}, {multi: true})
WriteResult({ "nMatched" : 8, "nUpserted" : 0, "nModified" : 8 })
> db.unicorns.find()
{ "_id" : ObjectId("60c1dc8b78bc0fa12bad0e3"), "name" : "Horny", "loves" : [ "carrot", "papaya" ], "weight" : 600, "gender" : "m", "vampires" : 68 }
{ "_id" : ObjectId("60c1dc9d78bc0fa12bad0e4"), "name" : "Aurora", "loves" : [ "carrot", "grape" ], "weight" : 450, "gender" : "f", "vampires" : 43 }
{ "_id" : ObjectId("60c1dc0e78bc0fa12bad0e5"), "name" : "Unicorn", "loves" : [ "energon", "redbull" ], "weight" : 984, "gender" : "m", "vampires" : 187 }
{ "_id" : ObjectId("60c1dcd78bc0fa12bad0e6"), "name" : "Rooomoodles", "loves" : [ "apple", " ", "weight" : 575, "gender" : "m", "vampires" : 184 }
{ "_id" : ObjectId("60c1cd978bc0fa12bad0e7"), "name" : "Solnara", "loves" : [ "apple", "carrot", "chocolate" ], "weight" : 550, "gender" : "f", "vampires" : 80 }
{ "_id" : ObjectId("60c1dd1878bc0fa12bad0e8"), "name" : "Ayna", "loves" : [ "strawberry", "lemon" ], "weight" : 800, "gender" : "f", "vampires" : 51 }
{ "_id" : ObjectId("60c1dd2178bc0fa12bad0e9"), "name" : "Kenny", "loves" : [ "grape", "lemon" ], "weight" : 690, "gender" : "m", "vampires" : 44 }
{ "_id" : ObjectId("60c1dd2b78bc0fa12bad0ea"), "name" : "Raleigh", "loves" : [ "Redbull" ], "weight" : 421, "gender" : "m", "vampires" : 7 }
{ "_id" : ObjectId("60c1dd3f78bc0fa12bad0eb"), "name" : "Leia", "loves" : [ "apple", "watermelon" ], "weight" : 601, "gender" : "f", "vampires" : 33 }
{ "_id" : ObjectId("60c1dd4978bc0fa12bad0ec"), "name" : "Pilot", "loves" : [ "apple", "watermelon" ], "weight" : 650, "gender" : "m", "vampires" : 59 }
{ "_id" : ObjectId("60c1dd5178bc0fa12bad0ed"), "name" : "Nimue", "loves" : [ "grape", "carrot" ], "weight" : 540, "gender" : "f" }
{ "_id" : ObjectId("60c1dd578bc0fa12bad0ee"), "name" : "Dunx", "loves" : [ "grape", "watermelon" ], "weight" : 704, "gender" : "m", "vampires" : 170 }
{ "_id" : ObjectId("60c292e778bc0fa12bad0ef"), "name" : "Barney", "loves" : [ "grape" ], "weight" : 340, "gender" : "m", "vampires" : 5 }

```



```

> db.towns.update({name: "Portland"}, {$set: {"mayor.party": "I"}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.towns.find()
{ "_id" : ObjectId("60c1ff8478bc60fa12bad0ef"), "name" : "Punxsutawney", "population" : 6200, "last_sensus" : ISODate("2008-01-31T00:00:00Z"), "famous_for" : [ "" ], "mayor" : { "name" : "Jim Wehrle" } }
{ "_id" : ObjectId("60c1ffee78bc60fa12bad0ef"), "name" : "New York", "population" : 22200000, "last_sensus" : ISODate("2009-07-31T00:00:00Z"), "famous_for" : [ "status of 1 liberty", "food" ], "mayor" : { "name" : "Michael Bloomberg" } }
{ "_id" : ObjectId("60c2003378bc60fa12bad0f1"), "name" : "Portland", "population" : 528000, "last_sensus" : ISODate("2009-07-20T00:00:00Z"), "famous_for" : [ "beer", "food" ], "mayor" : { "name" : "Sam Adams", "party" : "I" } }
>

```

## 8.2.11

```

> db.unicorns.update({name: "Pilot"}, {$push: {loves: 'chocolate'}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.unicorns.find()
{ "_id" : ObjectId("60c1dc8b78bc60fa12bad0e3"), "name" : "Horny", "loves" : [ "carrot", "papaya" ], "weight" : 600, "gender" : "m", "vampires" : 68 }
{ "_id" : ObjectId("60c1dc9d78bc60fa12bad0e4"), "name" : "Aurora", "loves" : [ "carrot", "grape" ], "weight" : 450, "gender" : "f", "vampires" : 43 }
{ "_id" : ObjectId("60c1dccc78bc60fa12bad0e5"), "name" : "Unicrom", "loves" : [ "energon", "redbull" ], "weight" : 984, "gender" : "m", "vampires" : 187 }
{ "_id" : ObjectId("60c1dccc78bc60fa12bad0e6"), "name" : "Rooooooodles", "loves" : [ "apple" ], "weight" : 575, "gender" : "m", "vampires" : 104 }
{ "_id" : ObjectId("60c1dc978bc60fa12bad0e7"), "name" : "Solnara", "loves" : [ "apple", "carrot", "chocolate" ], "weight" : 550, "gender" : "f", "vampires" : 80 }
{ "_id" : ObjectId("60c1dd1878bc60fa12bad0e8"), "name" : "Ayna", "loves" : [ "strawberry", "lemon", "chocolate" ], "weight" : 800, "gender" : "f", "vampires" : 51 }
{ "_id" : ObjectId("60c1dd2178bc60fa12bad0e9"), "name" : "Kenny", "loves" : [ "grape", "lemon" ], "weight" : 690, "gender" : "m", "vampires" : 44 }
{ "_id" : ObjectId("60c1dd3f78bc60fa12bad0ea"), "name" : "Raleigh", "loves" : [ "Redbull" ], "weight" : 421, "gender" : "m", "vampires" : 7 }
{ "_id" : ObjectId("60c1dd3f78bc60fa12bad0eb"), "name" : "Leia", "loves" : [ "apple", "watermelon" ], "weight" : 601, "gender" : "f", "vampires" : 33 }
{ "_id" : ObjectId("60c1dd4978bc60fa12bad0ec"), "name" : "Pilot", "loves" : [ "apple", "watermelon", "chocolate" ], "weight" : 650, "gender" : "m", "vampires" : 59 }
{ "_id" : ObjectId("60c1dd5178bc60fa12bad0ed"), "name" : "Nimue", "loves" : [ "grape", "carrot" ], "weight" : 540, "gender" : "f" }
{ "_id" : ObjectId("60c1dda578bc60fa12bad0ee"), "name" : "Dunx", "loves" : [ "grape", "watermelon" ], "weight" : 704, "gender" : "m", "vampires" : 170 }
{ "_id" : ObjectId("60c202e778bc60fa12bad0f2"), "name" : "Barney", "loves" : [ "grape" ], "weight" : 340, "gender" : "m", "vampires" : 5 }
>

```

## 8.2.12

```

{ "_id" : ObjectId("60c202e778bc60fa12bad0f2"), "name" : "Barney", "loves" : [ "grape" ], "weight" : 340, "gender" : "m", "vampires" : 5 }
> db.unicorns.update({name: "Aurora"}, {$addToSet: {loves: {$each: ['sugar', 'lemon']}}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.unicorns.find()
{ "_id" : ObjectId("60c1dc8b78bc60fa12bad0e3"), "name" : "Horny", "loves" : [ "carrot", "papaya" ], "weight" : 600, "gender" : "m", "vampires" : 68 }
{ "_id" : ObjectId("60c1dc9d78bc60fa12bad0e4"), "name" : "Aurora", "loves" : [ "carrot", "grape", "sugar", "lemon" ], "weight" : 450, "gender" : "f", "vampires" : 43 }
{ "_id" : ObjectId("60c1dccc78bc60fa12bad0e5"), "name" : "Unicrom", "loves" : [ "energon", "redbull" ], "weight" : 984, "gender" : "m", "vampires" : 187 }
{ "_id" : ObjectId("60c1dccc78bc60fa12bad0e6"), "name" : "Rooooooodles", "loves" : [ "apple" ], "weight" : 575, "gender" : "m", "vampires" : 104 }
{ "_id" : ObjectId("60c1dc978bc60fa12bad0e7"), "name" : "Solnara", "loves" : [ "apple", "carrot", "chocolate" ], "weight" : 550, "gender" : "f", "vampires" : 80 }
{ "_id" : ObjectId("60c1dd1878bc60fa12bad0e8"), "name" : "Ayna", "loves" : [ "strawberry", "lemon" ], "weight" : 800, "gender" : "f", "vampires" : 51 }
{ "_id" : ObjectId("60c1dd2178bc60fa12bad0e9"), "name" : "Kenny", "loves" : [ "grape", "lemon" ], "weight" : 690, "gender" : "m", "vampires" : 44 }
{ "_id" : ObjectId("60c1dd3f78bc60fa12bad0ea"), "name" : "Raleigh", "loves" : [ "Redbull" ], "weight" : 421, "gender" : "m", "vampires" : 7 }
{ "_id" : ObjectId("60c1dd3f78bc60fa12bad0eb"), "name" : "Leia", "loves" : [ "apple", "watermelon" ], "weight" : 601, "gender" : "f", "vampires" : 33 }
{ "_id" : ObjectId("60c1dd4978bc60fa12bad0ec"), "name" : "Pilot", "loves" : [ "apple", "watermelon", "chocolate" ], "weight" : 650, "gender" : "m", "vampires" : 59 }
{ "_id" : ObjectId("60c1dd5178bc60fa12bad0ed"), "name" : "Nimue", "loves" : [ "grape", "carrot" ], "weight" : 540, "gender" : "f" }
{ "_id" : ObjectId("60c1dda578bc60fa12bad0ee"), "name" : "Dunx", "loves" : [ "grape", "watermelon" ], "weight" : 704, "gender" : "m", "vampires" : 170 }
{ "_id" : ObjectId("60c202e778bc60fa12bad0f2"), "name" : "Barney", "loves" : [ "grape" ], "weight" : 340, "gender" : "m", "vampires" : 5 }
>

```

## 8.2.13

```

{ "_id" : ObjectId("60c202e778bc60fa12bad0f2"), "name" : "Barney", "loves" : [ "grape" ], "weight" : 340, "gender" : "m", "vampires" : 5 }
> db.towns.remove({"mayor.party": "I"}, true)
WriteResult({ "nRemoved" : 1 })
> db.towns.find()
{ "_id" : ObjectId("60c1ff8478bc60fa12bad0ef"), "name" : "Punxsutawney", "population" : 6200, "last_sensus" : ISODate("2008-01-31T00:00:00Z"), "famous_for" : [ "" ], "mayor" : { "name" : "Jim Wehrle" } }
{ "_id" : ObjectId("60c1ffee78bc60fa12bad0ef"), "name" : "New York", "population" : 22200000, "last_sensus" : ISODate("2009-07-31T00:00:00Z"), "famous_for" : [ "status of 1 liberty", "food" ], "mayor" : { "name" : "Michael Bloomberg" } }
> db.towns.remove({})
WriteResult({ "nRemoved" : 2 })
> db.towns.find()
> show collections
towns
unicorns
>

```

## 8.3.1

```

> db.habitats.insert({_id: 'cld', name: 'cloud', description: 'pink cloud'})
WriteResult({ "nInserted" : 1 })
> db.habitats.insert({_id: 'flwr', name: 'sunflower', description: 'yellow tulip'})
WriteResult({ "nInserted" : 1 })
> db.habitats.insert({_id: 'rvr', name: 'moon river', description: 'mighty milky river'})
WriteResult({ "nInserted" : 1 })
> db.habitats.find()
{ "_id" : "cld", "name" : "cloud", "description" : "pink cloud" }
{ "_id" : "flwr", "name" : "sunflower", "description" : "yellow tulip" }
{ "_id" : "rvr", "name" : "moon river", "description" : "mighty milky river" }
> db.unicorns.update({name: 'Solnara'}, {$set: {habitat: {$ref: 'habitats', $id: 'cld'}}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.unicorns.update({name: 'Kenny'}, {$set: {habitat: {$ref: 'habitats', $id: 'flwr'}}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.unicorns.update({name: 'Leia'}, {$set: {habitat: {$ref: 'habitats', $id: 'rvr'}}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.unicorns.find()
{ "_id" : ObjectId("60c1dc8b78bc60fa12bad0e3"), "name" : "Horny", "loves" : [ "carrot", "papaya" ], "weight" : 600, "gender" : "m", "vampires" : 60 }
{ "_id" : ObjectId("60c1dc9d78bc60fa12bad0e4"), "name" : "Aurora", "loves" : [ "carrot", "grape", "sugar", "lemon" ], "weight" : 450, "gender" : "f", "vampires" : 43 }
{ "_id" : ObjectId("60c1dc078bc60fa12bad0e5"), "name" : "Unicorn", "loves" : [ "energy", "redbull" ], "weight" : 984, "gender" : "m", "vampires" : 187 }
{ "_id" : ObjectId("60c1dcd78bc60fa12bad0e6"), "name" : "Roopoodles", "loves" : [ "apple" ], "weight" : 575, "gender" : "m", "vampires" : 104 }
{ "_id" : ObjectId("60c1dc978bc60fa12bad0e7"), "name" : "Solnara", "loves" : [ "apple", "carrot", "chocolate" ], "weight" : 550, "gender" : "f", "vampires" : 80, "habitat" : DBRef("habitats", "cld") }
{ "_id" : ObjectId("60c1dd1878bc60fa12bad0e8"), "name" : "Ayna", "loves" : [ "strawberry", "lemon" ], "weight" : 800, "gender" : "f", "vampires" : 51 }
{ "_id" : ObjectId("60c1dd2178bc60fa12bad0e9"), "name" : "Kenny", "loves" : [ "grape", "lemon" ], "weight" : 690, "gender" : "m", "vampires" : 44, "habitat" : DBRef("habitats", "flwr") }
{ "_id" : ObjectId("60c1dd2b78bc60fa12bad0ea"), "name" : "Raleigh", "loves" : [ "Redbull" ], "weight" : 421, "gender" : "m", "vampires" : 7 }
{ "_id" : ObjectId("60c1dd3f78bc60fa12bad0eb"), "name" : "Leia", "loves" : [ "apple", "watermelon" ], "weight" : 601, "gender" : "f", "vampires" : 33, "habitat" : DBRef("habitats", "rvr") }
{ "_id" : ObjectId("60c1dd4978bc60fa12bad0ec"), "name" : "Pilot", "loves" : [ "apple", "watermelon", "chocolate" ], "weight" : 650, "gender" : "m", "vampires" : 59 }
{ "_id" : ObjectId("60c1dd5178bc60fa12bad0ed"), "name" : "Nimue", "loves" : [ "grape", "carrot" ], "weight" : 540, "gender" : "f" }
{ "_id" : ObjectId("60c1dda578bc60fa12bad0ee"), "name" : "Dunx", "loves" : [ "grape", "watermelon" ], "weight" : 704, "gender" : "m", "vampires" : 170 }
{ "_id" : ObjectId("60c202e778bc60fa12bad0f2"), "name" : "Barny", "loves" : [ "grape" ], "weight" : 340, "gender" : "m", "vampires" : 5 }

```

### 8.3.2-3

```

> db.unicorns.ensureIndex({name: 1}, {unique: true})
{
  "createdCollectionAutomatically" : false,
  "numIndexesBefore" : 1,
  "numIndexesAfter" : 2,
  "ok" : 1
}
> db.system.indexes.find()
> db.unicorns.getIndexes()
[
  {
    "v" : 2,
    "key" : {
      "_id" : 1
    },
    "name" : "_id_"
  },
  {
    "v" : 2,
    "unique" : true,
    "key" : {
      "name" : 1
    },
    "name" : "name_1"
  }
]
> db.unicorns.dropIndex('name_1')
{ "nIndexesWas" : 2, "ok" : 1 }
> db.dropIndex('_id_')
uncaught exception: TypeError: db.dropIndex is not a function :
@ (shell):1:1
> db.unicorns.dropIndex('_id_')
{
  "ok" : 0,
  "errmsg" : "cannot drop _id index",
  "code" : 72,
  "codeName" : "InvalidOptions"
}
>

```

### 8.3.4



```
> use numbers
switched to db numbers
> for (i = 0; i < 10000; i++) {db.numbers.insert(value: i)}
uncaught exception: SyntaxError: missing ) after argument list :
@(shell):1:52
> for (i = 0; i < 10000; i++) {db.numbers.insert({value: i})}
WriteResult({ "nInserted" : 1 })
> db.numbers.find().limit(15)
{ "_id" : ObjectId("60c207f478bc60fa12bad0f3"), "value" : 0 }
{ "_id" : ObjectId("60c207f478bc60fa12bad0f4"), "value" : 1 }
{ "_id" : ObjectId("60c207f478bc60fa12bad0f5"), "value" : 2 }
{ "_id" : ObjectId("60c207f478bc60fa12bad0f6"), "value" : 3 }
{ "_id" : ObjectId("60c207f478bc60fa12bad0f7"), "value" : 4 }
{ "_id" : ObjectId("60c207f478bc60fa12bad0f8"), "value" : 5 }
{ "_id" : ObjectId("60c207f478bc60fa12bad0f9"), "value" : 6 }
{ "_id" : ObjectId("60c207f478bc60fa12bad0fa"), "value" : 7 }
{ "_id" : ObjectId("60c207f478bc60fa12bad0fb"), "value" : 8 }
{ "_id" : ObjectId("60c207f478bc60fa12bad0fc"), "value" : 9 }
{ "_id" : ObjectId("60c207f478bc60fa12bad0fd"), "value" : 10 }
{ "_id" : ObjectId("60c207f478bc60fa12bad0fe"), "value" : 11 }
{ "_id" : ObjectId("60c207f478bc60fa12bad0ff"), "value" : 12 }
{ "_id" : ObjectId("60c207f478bc60fa12bad100"), "value" : 13 }
{ "_id" : ObjectId("60c207f478bc60fa12bad101"), "value" : 14 }
>
```

```
> db.numbers.explain('executionStats').find().sort({$natural: -1}).limit(4)
{
  "queryPlanner" : {
    "plannerVersion" : 1,
    "namespace" : "numbers.numbers",
    "indexFilterSet" : false,
    "parsedQuery" : {
      },
    "winningPlan" : {
      "stage" : "LIMIT",
      "limitAmount" : 4,
      "inputStage" : {
        "stage" : "COLLSCAN",
        "direction" : "backward"
      }
    },
    "rejectedPlans" : [ ]
  },
  "executionStats" : {
    "executionSuccess" : true,
    "nReturned" : 4,
    "executionTimeMillis" : 3,
    "totalKeysExamined" : 0,
    "totalDocsExamined" : 4,
    "executionStages" : {
      "stage" : "LIMIT",
      "nReturned" : 4,
      "executionTimeMillisEstimate" : 0,
      "works" : 6,
      "advanced" : 4,
      "needTime" : 1,
      "needYield" : 0,
      "saveState" : 0,
      "restoreState" : 0,
      "isEOF" : 1,
      "limitAmount" : 4,
      "inputStage" : {
        "stage" : "COLLSCAN",
        "nReturned" : 4,
        "executionTimeMillisEstimate" : 0,

```

```

> db.numbers.ensureIndex({value: 1})
{
  "createdCollectionAutomatically" : false,
  "numIndexesBefore" : 1,
  "numIndexesAfter" : 2,
  "ok" : 1
}
> db.numbers.getIndexes()
[
  {
    "v" : 2,
    "key" : {
      "_id" : 1
    },
    "name" : "_id_"
  },
  {
    "v" : 2,
    "key" : {
      "value" : 1
    },
    "name" : "value_1"
  }
]
> db.numbers.explain('executionStats').find().sort({$natural: -1}).limit(4)
{
  "queryPlanner" : {
    "plannerVersion" : 1,
    "namespace" : "numbers.numbers",
    "indexFilterSet" : false,
    "parsedQuery" : {
    },
    "winningPlan" : {
      "stage" : "LIMIT",
      "limitAmount" : 4,
      "inputStage" : {
        "stage" : "COLLSCAN",
        "direction" : "backward"
      }
    }
  }
}

```

**Вывод:** овладел практическими навыками работы с CRUD операциями в СУБД MongoDB