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«НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ УНИВЕРСИТЕТ ИТМО»  
Факультет инфокоммуникационных технологий

**ОТЧЕТ**  
**О ЛАБОРАТОРНОЙ РАБОТЕ № 5.2**  
по теме: Работа с БД в СУБД MongoDB  
по дисциплине: Проектирование и реализация баз данных

Специальность:  
45.03.04 Интеллектуальные системы в гуманитарной сфере

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Санкт-Петербург 2021/2022

## 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.

### Задание 8.1.1.

Была создана база данных learn, заполнена коллекция unicorns и проверено содержимое коллекции.

```
> use learn
switched to db learn
> db.createCollection("unicorns")
{ "ok" : 1 }
> 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: 'Rooodoooodles', 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 })
> document={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(document)
WriteResult({ "nInserted" : 1 })
> db.unicorns.find()
{ "_id" : ObjectId("629332fea5b1190ec7c1fa85e"), "name" : "Horny", "loves" : [ "carrot", "papaya" ], "weight" : 600, "gender" : "m", "vampires" : 63 }
{ "_id" : ObjectId("62932fffd5b1190ec7c1fa85f"), "name" : "Aurora", "loves" : [ "carrot", "grape" ], "weight" : 450, "gender" : "f", "vampires" : 43 }
{ "_id" : ObjectId("6293300c5b1190ec7c1fa860"), "name" : "Unicrom", "loves" : [ "energon", "redbull" ], "weight" : 984, "gender" : "m", "vampires" : 182 }
{ "_id" : ObjectId("6293301a5b1190ec7c1fa861"), "name" : "Rooodoooodles", "loves" : [ "apple" ], "weight" : 575, "gender" : "m", "vampires" : 99 }
{ "_id" : ObjectId("6293308e5b1190ec7c1fa862"), "name" : "Solnara", "loves" : [ "apple", "carrot", "chocolate" ], "weight" : 550, "gender" : "f", "vampires" : 80 }
{ "_id" : ObjectId("629331735b1190ec7c1fa863"), "name" : "Ayna", "loves" : [ "strawberry", "lemon" ], "weight" : 733, "gender" : "f", "vampires" : 40 }
{ "_id" : ObjectId("629331da5b1190ec7c1fa864"), "name" : "Kenny", "loves" : [ "grape", "lemon" ], "weight" : 690, "gender" : "m", "vampires" : 39 }
{ "_id" : ObjectId("629332065b1190ec7c1fa865"), "name" : "Raleigh", "loves" : [ "apple", "sugar" ], "weight" : 421, "gender" : "m", "vampires" : 2 }
{ "_id" : ObjectId("629332345b1190ec7c1fa866"), "name" : "Leia", "loves" : [ "apple", "watermelon" ], "weight" : 601, "gender" : "f", "vampires" : 33 }
{ "_id" : ObjectId("629332505b1190ec7c1fa867"), "name" : "Pilot", "loves" : [ "apple", "watermelon" ], "weight" : 650, "gender" : "m", "vampires" : 54 }
{ "_id" : ObjectId("6293327d5b1190ec7c1fa868"), "name" : "Nimue", "loves" : [ "grape", "carrot" ], "weight" : 540, "gender" : "f" }
{ "_id" : ObjectId("62933295b1190ec7c1fa869"), "name" : "Dunx", "loves" : [ "grape", "watermelon" ], "weight" : 704, "gender" : "m", "vampires" : 165 }
>
```

### Задание 8.1.2

Вывод самцов, отсортированных по имени.

```
> db.unicorns.find({gender: 'm'}).sort({name: 1})
{ "_id" : ObjectId("62933295b1190ec7c1fa869"), "name" : "Dunx", "loves" : [ "grape", "watermelon" ], "weight" : 704, "gender" : "m", "vampires" : 165 }
{ "_id" : ObjectId("62932fea5b1190ec7c1fa85e"), "name" : "Horny", "loves" : [ "carrot", "papaya" ], "weight" : 600, "gender" : "m", "vampires" : 63 }
{ "_id" : ObjectId("629331da5b1190ec7c1fa864"), "name" : "Kenny", "loves" : [ "grape", "lemon" ], "weight" : 690, "gender" : "m", "vampires" : 39 }
{ "_id" : ObjectId("629332505b1190ec7c1fa867"), "name" : "Pilot", "loves" : [ "apple", "watermelon" ], "weight" : 650, "gender" : "m", "vampires" : 54 }
{ "_id" : ObjectId("629332065b1190ec7c1fa865"), "name" : "Raleigh", "loves" : [ "apple", "sugar" ], "weight" : 421, "gender" : "m", "vampires" : 2 }
{ "_id" : ObjectId("6293301a5b1190ec7c1fa861"), "name" : "Rooodoooodles", "loves" : [ "apple" ], "weight" : 575, "gender" : "m", "vampires" : 99 }
{ "_id" : ObjectId("6293300c5b1190ec7c1fa860"), "name" : "Unicrom", "loves" : [ "energon", "redbull" ], "weight" : 984, "gender" : "m", "vampires" : 182 }
```

Вывод первых трех самок, отсортированных по имени.

```
> db.unicorns.find({gender: 'f'}).sort({name: 1}).limit(3)
{ "_id" : ObjectId("62932ffd5b1190ec7c1fa85f"), "name" : "Aurora", "loves" : [ "carrot", "grape" ], "weight" : 450, "gender" : "f", "vampires" : 43 }
{ "_id" : ObjectId("629331735b1190ec7c1fa863"), "name" : "Ayna", "loves" : [ "strawberry", "lemon" ], "weight" : 733, "gender" : "f", "vampires" : 40 }
{ "_id" : ObjectId("629332345b1190ec7c1fa866"), "name" : "Leia", "loves" : [ "apple", "watermelon" ], "weight" : 601, "gender" : "f", "vampires" : 33 }
```

Вывод первой самки, которая любит морковь, используя findOne и limit.

```
> db.unicorns.findOne({gender: 'f', loves: 'carrot'})
{
  "_id" : ObjectId("62932ffd5b1190ec7c1fa85f"),
  "name" : "Aurora",
  "loves" : [
    "carrot",
    "grape"
  ],
  "weight" : 450,
  "gender" : "f",
  "vampires" : 43
}
> db.unicorns.find({gender: 'f', loves: 'carrot'}).limit(1)
{ "_id" : ObjectId("62932ffd5b1190ec7c1fa85f"), "name" : "Aurora", "loves" : [ "carrot", "grape" ], "weight" : 450, "gender" : "f", "vampires" : 43 }
```

Задание 8.1.3.

Модифицированный запрос самцов с исключенными полом и предпочтениями.

```
> db.unicorns.find({gender: 'm'}, {loves: 0, gender: 0})
{ "_id" : ObjectId("62932fea5b1190ec7c1fa85e"), "name" : "Horny", "weight" : 600, "vampires" : 63 }
{ "_id" : ObjectId("6293300c5b1190ec7c1fa860"), "name" : "Unicrom", "weight" : 984, "vampires" : 182 }
{ "_id" : ObjectId("6293301a5b1190ec7c1fa861"), "name" : "Rooodoodles", "weight" : 575, "vampires" : 99 }
{ "_id" : ObjectId("629331da5b1190ec7c1fa864"), "name" : "Kenny", "weight" : 690, "vampires" : 39 }
{ "_id" : ObjectId("629332065b1190ec7c1fa865"), "name" : "Raleigh", "weight" : 421, "vampires" : 2 }
{ "_id" : ObjectId("629332505b1190ec7c1fa867"), "name" : "Pilot", "weight" : 650, "vampires" : 54 }
{ "_id" : ObjectId("629333295b1190ec7c1fa869"), "name" : "Dunx", "weight" : 704, "vampires" : 165 }
```

Задание 8.1.4.

Выведен список единорогов в обратном порядке добавления.

```
> db.unicorns.find().sort({$natural: -1 })
{ "_id" : ObjectId("629333295b1190ec7c1fa869"), "name" : "Dunx", "loves" : [ "grape", "watermelon" ], "weight" : 704, "gender" : "m", "vampires" : 165 }
{ "_id" : ObjectId("6293327d5b1190ec7c1fa868"), "name" : "Nimue", "loves" : [ "grape", "carrot" ], "weight" : 540, "gender" : "f" }
{ "_id" : ObjectId("629332505b1190ec7c1fa867"), "name" : "Pilot", "loves" : [ "apple", "watermelon" ], "weight" : 650, "gender" : "f", "vampires" : 54 }
{ "_id" : ObjectId("629332345b1190ec7c1fa866"), "name" : "Leia", "loves" : [ "apple", "watermelon" ], "weight" : 601, "gender" : "f", "vampires" : 33 }
{ "_id" : ObjectId("629332065b1190ec7c1fa865"), "name" : "Raleigh", "loves" : [ "apple", "sugar" ], "weight" : 421, "gender" : "m", "vampires" : 2 }
{ "_id" : ObjectId("629331da5b1190ec7c1fa864"), "name" : "Kenny", "loves" : [ "grape", "lemon" ], "weight" : 690, "gender" : "m", "vampires" : 39 }
{ "_id" : ObjectId("6293301a5b1190ec7c1fa861"), "name" : "Ayna", "loves" : [ "strawberry", "lemon" ], "weight" : 733, "gender" : "f", "vampires" : 40 }
{ "_id" : ObjectId("6293300c5b1190ec7c1fa860"), "name" : "Solnara", "loves" : [ "apple", "carrot", "chocolate" ], "weight" : 550, "gender" : "f", "vampires" : 80 }
{ "_id" : ObjectId("6293300c5b1190ec7c1fa860"), "name" : "Rooodoodles", "loves" : [ "apple" ], "weight" : 575, "gender" : "m", "vampires" : 99 }
{ "_id" : ObjectId("6293300c5b1190ec7c1fa860"), "name" : "Unicrom", "loves" : [ "energon", "redbull" ], "weight" : 984, "gender" : "m", "vampires" : 182 }
{ "_id" : ObjectId("62932ffd5b1190ec7c1fa85f"), "name" : "Aurora", "loves" : [ "carrot", "grape" ], "weight" : 450, "gender" : "f", "vampires" : 43 }
{ "_id" : ObjectId("62932fea5b1190ec7c1fa85e"), "name" : "Horny", "loves" : [ "carrot", "papaya" ], "weight" : 600, "gender" : "m", "vampires" : 63 }
```

### Задание 8.1.5.

Выведен список единорогов с названием первого любимого предпочтения с исключенным идентификатором.

```
> db.unicorns.find({}, {_id: 0, loves: {$slice: 1}})
{ "name" : "Horny", "loves" : [ "carrot" ], "weight" : 600, "gender" : "m", "vampires" : 63 }
{ "name" : "Aurora", "loves" : [ "carrot" ], "weight" : 450, "gender" : "f", "vampires" : 43 }
{ "name" : "Unicrom", "loves" : [ "energon" ], "weight" : 984, "gender" : "m", "vampires" : 182 }
{ "name" : "Rooooooodles", "loves" : [ "apple" ], "weight" : 575, "gender" : "m", "vampires" : 99 }
{ "name" : "Solnara", "loves" : [ "apple" ], "weight" : 550, "gender" : "f", "vampires" : 80 }
{ "name" : "Ayna", "loves" : [ "strawberry" ], "weight" : 733, "gender" : "f", "vampires" : 40 }
{ "name" : "Kenny", "loves" : [ "grape" ], "weight" : 690, "gender" : "m", "vampires" : 39 }
{ "name" : "Raleigh", "loves" : [ "apple" ], "weight" : 421, "gender" : "m", "vampires" : 2 }
{ "name" : "Leia", "loves" : [ "apple" ], "weight" : 601, "gender" : "f", "vampires" : 33 }
{ "name" : "Pilot", "loves" : [ "apple" ], "weight" : 650, "gender" : "m", "vampires" : 54 }
{ "name" : "Nimue", "loves" : [ "grape" ], "weight" : 540, "gender" : "f" }
{ "name" : "Dunx", "loves" : [ "grape" ], "weight" : 704, "gender" : "m", "vampires" : 165 }
```

### Задание 8.1.6.

Выведен список самок единорогов весом от полутонны до 700 кг с исключенным идентификатором.

```
> 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" }
```

### Задание 8.1.7.

Выведен список самцов единорогов весом от полутонны и предпочитающих grape и lemon с исключенным идентификатором.

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

### Задание 8.1.8.

Вывод данных без ключа vampires.

```
> db.unicorns.find({vampires: {$exists: false}})
{ "_id" : ObjectId("6293327d5b1190ec7c1fa868"), "name" : "Nimue", "loves" : [ "grape", "carrot" ], "weight" : 540, "gender" : "f" }
```

## Задание 8.1.9.

Вывод упорядоченного списка имен самцов единорогов с информацией об их первом предпочтении.

```
> db.unicorns.find({}, {loves: {$slice: 1}}).sort({name: 1})
{ "_id" : ObjectId("62932ffd5b1190ec7c1fa85f"), "name" : "Aurora", "loves" : [ "carrot" ], "weight" : 450, "gender" : "f", "vampires" : 43 }
{ "_id" : ObjectId("629331735b1190ec7c1fa863"), "name" : "Ayna", "loves" : [ "strawberry" ], "weight" : 733, "gender" : "f", "vampires" : 40 }
{ "_id" : ObjectId("629333295b1190ec7c1fa869"), "name" : "Dunx", "loves" : [ "grape" ], "weight" : 704, "gender" : "m", "vampires" : 165 }
{ "_id" : ObjectId("62932fea5b1190ec7c1fa85e"), "name" : "Horny", "loves" : [ "carrot" ], "weight" : 600, "gender" : "m", "vampires" : 63 }
{ "_id" : ObjectId("629331da5b1190ec7c1fa864"), "name" : "Kenny", "loves" : [ "grape" ], "weight" : 690, "gender" : "m", "vampires" : 39 }
{ "_id" : ObjectId("629332345b1190ec7c1fa866"), "name" : "Leia", "loves" : [ "apple" ], "weight" : 601, "gender" : "f", "vampires" : 33 }
{ "_id" : ObjectId("6293327d5b1190ec7c1fa868"), "name" : "Nimue", "loves" : [ "grape" ], "weight" : 540, "gender" : "f" }
{ "_id" : ObjectId("629332505b1190ec7c1fa867"), "name" : "Pilot", "loves" : [ "apple" ], "weight" : 650, "gender" : "m", "vampires" : 54 }
{ "_id" : ObjectId("629332065b1190ec7c1fa865"), "name" : "Raleigh", "loves" : [ "apple" ], "weight" : 421, "gender" : "m", "vampires" : 2 }
{ "_id" : ObjectId("6293301a5b1190ec7c1fa861"), "name" : "Rooodooles", "loves" : [ "apple" ], "weight" : 575, "gender" : "m", "vampires" : 99 }
{ "_id" : ObjectId("6293308e5b1190ec7c1fa862"), "name" : "Solnara", "loves" : [ "apple" ], "weight" : 550, "gender" : "f", "vampires" : 80 }
{ "_id" : ObjectId("6293300c5b1190ec7c1fa860"), "name" : "Unicrom", "loves" : [ "energon" ], "weight" : 984, "gender" : "m", "vampires" : 182 }
```

## Задание 8.2.1.

Была создана коллекция towns и добавлены соответствующие данные.

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

Сформирован запрос, который возвращает список городов с независимыми мэрами (party="I"). Выведены только название города и информация о мэре.

```
> db.towns.find({'mayor.party' : 'I'}, {_id: 0, population: 0, last_sensus: 0, famous_for: 0})
{ "name" : "New York", "mayor" : { "name" : "Michael Bloomberg", "party" : "I" } }
```

Сформирован запрос, который возвращает список беспартийных мэров (party отсутствует). Выведены только название города и информация о мэре.

```
> db.towns.find({'mayor.party' : null}, {_id: 0, population: 0, last_sensus: 0, famous_for: 0})
{ "name" : "Punxsutawney", "mayor" : { "name" : "Jim Wehrle" } }
```

## Задание 8.2.2.

Была реализована функция для вывода списка самцов.

```
> fc = function() {return this.gender == 'm'}
function() {return this.gender == 'm'}
> db.unicorns.find(fc)
{ "_id" : ObjectId("62932fea5b1190ec7c1fa85e"), "name" : "Horny", "loves" : [ "carrot", "papaya" ], "weight" : 600, "gender" : "m", "vampires" : 63 }
{ "_id" : ObjectId("6293300c5b1190ec7c1fa860"), "name" : "Unicrom", "loves" : [ "energon", "redbull" ], "weight" : 984, "gender" : "m", "vampires" : 182 }
{ "_id" : ObjectId("6293301a5b1190ec7c1fa861"), "name" : "Rooodooles", "loves" : [ "apple" ], "weight" : 575, "gender" : "m", "vampires" : 99 }
{ "_id" : ObjectId("629331da5b1190ec7c1fa864"), "name" : "Kenny", "loves" : [ "grape", "lemon" ], "weight" : 690, "gender" : "m", "vampires" : 39 }
{ "_id" : ObjectId("629332065b1190ec7c1fa865"), "name" : "Raleigh", "loves" : [ "apple", "sugar" ], "weight" : 421, "gender" : "m", "vampires" : 2 }
{ "_id" : ObjectId("629332505b1190ec7c1fa867"), "name" : "Pilot", "loves" : [ "apple", "watermelon" ], "weight" : 650, "gender" : "m", "vampires" : 54 }
{ "_id" : ObjectId("629333295b1190ec7c1fa869"), "name" : "Dunx", "loves" : [ "grape", "watermelon" ], "weight" : 704, "gender" : "m", "vampires" : 165 }
```

Реализация курсора для первых двух особей, сортированный по имени.

```
> var cursor = db.unicorns.find();null;
null
> cursor.limit(2);null
null
> cursor.sort({name: 1});null
null
```

Вывод результата, используя forEach.

```
> cursor.forEach(function(obj) { print(obj.name); })
Aurora
Ayna
```

Задание 8.2.3.

Выведено количество самок единорогов весом от полутонны до 600 кг.

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

Задание 8.2.4.

Выведен список предпочтений.

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

Задание 8.2.5.

Посчитано количество особей единорогов обоих полов.

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

## Задание 8.2.6.

Была выполнена соответствующая команда из задания.

```
> db.unicorns.save({name: 'Barny', loves: ['grape'], weight: 340, gender: 'm'})
WriteResult({"nInserted" : 1 })
> db.unicorns.find()
{"_id" : ObjectId("62932fea5b1190ec7c1fa85e"), "name" : "Horny", "loves" : [ "carrot", "papaya" ], "weight" : 600, "gender" : "m", "vampires" : 63 }
{"_id" : ObjectId("62932fffd5b1190ec7c1fa85f"), "name" : "Aurora", "loves" : [ "carrot", "grape" ], "weight" : 450, "gender" : "f", "vampires" : 43 }
{"_id" : ObjectId("6293300c5b1190ec7c1fa860"), "name" : "Unicrom", "loves" : [ "energon", "redbull" ], "weight" : 984, "gender" : "m", "vampires" : 182 }
{"_id" : ObjectId("6293301a5b1190ec7c1fa861"), "name" : "Rooooooodles", "loves" : [ "apple" ], "weight" : 575, "gender" : "m", "vampires" : 99 }
{"_id" : ObjectId("6293308e5b1190ec7c1fa862"), "name" : "Solnara", "loves" : [ "apple", "carrot", "chocolate" ], "weight" : 550, "gender" : "f", "vampires" : 80 }
{"_id" : ObjectId("629331735b1190ec7c1fa863"), "name" : "Ayna", "loves" : [ "strawberry", "lemon" ], "weight" : 733, "gender" : "f", "vampires" : 40 }
{"_id" : ObjectId("629331da5b1190ec7c1fa864"), "name" : "Kenny", "loves" : [ "grape", "lemon" ], "weight" : 690, "gender" : "m", "vampires" : 39 }
{"_id" : ObjectId("629332065b1190ec7c1fa865"), "name" : "Raleigh", "loves" : [ "apple", "sugar" ], "weight" : 421, "gender" : "m", "vampires" : 2 }
{"_id" : ObjectId("629332345b1190ec7c1fa866"), "name" : "Leia", "loves" : [ "apple", "watermelon" ], "weight" : 601, "gender" : "f", "vampires" : 33 }
{"_id" : ObjectId("629332505b1190ec7c1fa867"), "name" : "Pilot", "loves" : [ "apple", "watermelon" ], "weight" : 650, "gender" : "m", "vampires" : 54 }
{"_id" : ObjectId("6293327d5b1190ec7c1fa868"), "name" : "Nimue", "loves" : [ "grape", "carrot" ], "weight" : 540, "gender" : "f" }
{"_id" : ObjectId("629333295b1190ec7c1fa869"), "name" : "Dunx", "loves" : [ "grape", "watermelon" ], "weight" : 704, "gender" : "m", "vampires" : 165 }
{"_id" : ObjectId("629345a45b1190ec7c1fa86d"), "name" : "Barny", "loves" : [ "grape" ], "weight" : 340, "gender" : "m" }
```

## Задание 8.2.7.

Для самки единорога Айна внесены изменения в БД: вес 800, убила 51 вампира.

```
> db.unicorns.update({name: 'Ayna'}, {name: 'Ayna', weight: 800, vampires: 51})
WriteResult({"nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.unicorns.find()
{"_id" : ObjectId("62932fea5b1190ec7c1fa85e"), "name" : "Horny", "loves" : [ "carrot", "papaya" ], "weight" : 600, "gender" : "m", "vampires" : 63 }
{"_id" : ObjectId("62932fffd5b1190ec7c1fa85f"), "name" : "Aurora", "loves" : [ "carrot", "grape" ], "weight" : 450, "gender" : "f", "vampires" : 43 }
{"_id" : ObjectId("6293300c5b1190ec7c1fa860"), "name" : "Unicrom", "loves" : [ "energon", "redbull" ], "weight" : 984, "gender" : "m", "vampires" : 182 }
{"_id" : ObjectId("6293301a5b1190ec7c1fa861"), "name" : "Rooooooodles", "loves" : [ "apple" ], "weight" : 575, "gender" : "m", "vampires" : 99 }
{"_id" : ObjectId("6293308e5b1190ec7c1fa862"), "name" : "Solnara", "loves" : [ "apple", "carrot", "chocolate" ], "weight" : 550, "gender" : "f", "vampires" : 80 }
{"_id" : ObjectId("629331735b1190ec7c1fa863"), "name" : "Ayna", "weight" : 800, "vampires" : 51 }
{"_id" : ObjectId("629331da5b1190ec7c1fa864"), "name" : "Kenny", "loves" : [ "grape", "lemon" ], "weight" : 690, "gender" : "m", "vampires" : 39 }
{"_id" : ObjectId("629332065b1190ec7c1fa865"), "name" : "Raleigh", "loves" : [ "apple", "sugar" ], "weight" : 421, "gender" : "m", "vampires" : 2 }
{"_id" : ObjectId("629332345b1190ec7c1fa866"), "name" : "Leia", "loves" : [ "apple", "watermelon" ], "weight" : 601, "gender" : "f", "vampires" : 33 }
{"_id" : ObjectId("629332505b1190ec7c1fa867"), "name" : "Pilot", "loves" : [ "apple", "watermelon" ], "weight" : 650, "gender" : "m", "vampires" : 54 }
{"_id" : ObjectId("6293327d5b1190ec7c1fa868"), "name" : "Nimue", "loves" : [ "grape", "carrot" ], "weight" : 540, "gender" : "f" }
{"_id" : ObjectId("629333295b1190ec7c1fa869"), "name" : "Dunx", "loves" : [ "grape", "watermelon" ], "weight" : 704, "gender" : "m", "vampires" : 165 }
{"_id" : ObjectId("629345a45b1190ec7c1fa86d"), "name" : "Barny", "loves" : [ "grape" ], "weight" : 340, "gender" : "m" }
```

## Задание 8.2.8.

Для самца единорога Raleigh внесены изменения в БД: любит рэдбул.

```
> db.unicorns.update({name: 'Raleigh'}, {$set: {loves: 'RedBull'}})
WriteResult({"nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.unicorns.find()
{"_id" : ObjectId("62932fea5b1190ec7c1fa85e"), "name" : "Horny", "loves" : [ "carrot", "papaya" ], "weight" : 600, "gender" : "m", "vampires" : 63 }
{"_id" : ObjectId("62932fffd5b1190ec7c1fa85f"), "name" : "Aurora", "loves" : [ "carrot", "grape" ], "weight" : 450, "gender" : "f", "vampires" : 43 }
{"_id" : ObjectId("6293300c5b1190ec7c1fa860"), "name" : "Unicrom", "loves" : [ "energon", "redbull" ], "weight" : 984, "gender" : "m", "vampires" : 182 }
{"_id" : ObjectId("6293301a5b1190ec7c1fa861"), "name" : "Rooooooodles", "loves" : [ "apple" ], "weight" : 575, "gender" : "m", "vampires" : 99 }
{"_id" : ObjectId("6293308e5b1190ec7c1fa862"), "name" : "Solnara", "loves" : [ "apple", "carrot", "chocolate" ], "weight" : 550, "gender" : "f", "vampires" : 80 }
{"_id" : ObjectId("629331735b1190ec7c1fa863"), "name" : "Ayna", "weight" : 800, "vampires" : 51 }
{"_id" : ObjectId("629331da5b1190ec7c1fa864"), "name" : "Kenny", "loves" : [ "grape", "lemon" ], "weight" : 690, "gender" : "m", "vampires" : 39 }
{"_id" : ObjectId("629332065b1190ec7c1fa865"), "name" : "Raleigh", "loves" : [ "RedBull", "weight" : 421, "gender" : "m", "vampires" : 2 }
{"_id" : ObjectId("629332345b1190ec7c1fa866"), "name" : "Leia", "loves" : [ "apple", "watermelon" ], "weight" : 601, "gender" : "f", "vampires" : 33 }
{"_id" : ObjectId("629332505b1190ec7c1fa867"), "name" : "Pilot", "loves" : [ "apple", "watermelon" ], "weight" : 650, "gender" : "m", "vampires" : 54 }
{"_id" : ObjectId("6293327d5b1190ec7c1fa868"), "name" : "Nimue", "loves" : [ "grape", "carrot" ], "weight" : 540, "gender" : "f" }
{"_id" : ObjectId("629333295b1190ec7c1fa869"), "name" : "Dunx", "loves" : [ "grape", "watermelon" ], "weight" : 704, "gender" : "m", "vampires" : 165 }
{"_id" : ObjectId("629345a45b1190ec7c1fa86d"), "name" : "Barny", "loves" : [ "grape" ], "weight" : 340, "gender" : "m" }
```



## Задание 8.2.9.

Увеличено кол-во убитых вампиров у самцов на 5.

```
> db.unicorns.update({gender: 'm'}, {$inc: {vampires: 5}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.unicorns.find()
{ "_id" : ObjectId("62932fea5b1190ec7c1fa85e"), "name" : "Horny", "loves" : [ "carrot", "papaya" ], "weight" : 600, "gender" : "m", "vampires" : 68 }
{ "_id" : ObjectId("62932fffd5b1190ec7c1fa85f"), "name" : "Aurora", "loves" : [ "carrot", "grape" ], "weight" : 450, "gender" : "f", "vampires" : 43 }
{ "_id" : ObjectId("6293300c5b1190ec7c1fa860"), "name" : "Unicrom", "loves" : [ "energon", "redbull" ], "weight" : 984, "gender" : "m", "vampires" : 182 }
{ "_id" : ObjectId("6293301a5b1190ec7c1fa861"), "name" : "Rooodooles", "loves" : [ "apple" ], "weight" : 575, "gender" : "m", "vampires" : 99 }
{ "_id" : ObjectId("6293308e5b1190ec7c1fa862"), "name" : "Solnara", "loves" : [ "apple", "carrot", "chocolate" ], "weight" : 550, "gender" : "f", "vampires" : 80 }
{ "_id" : ObjectId("629331735b1190ec7c1fa863"), "name" : "Ayna", "weight" : 800, "vampires" : 51 }
{ "_id" : ObjectId("629331da5b1190ec7c1fa864"), "name" : "Kenny", "loves" : [ "grape", "lemon" ], "weight" : 690, "gender" : "m", "vampires" : 39 }
{ "_id" : ObjectId("629332065b1190ec7c1fa865"), "name" : "Raleigh", "loves" : [ "RedBull", "weight" : 421, "gender" : "m", "vampires" : 2 }
{ "_id" : ObjectId("629332345b1190ec7c1fa866"), "name" : "Leia", "loves" : [ "apple", "watermelon" ], "weight" : 601, "gender" : "f", "vampires" : 33 }
{ "_id" : ObjectId("629332505b1190ec7c1fa867"), "name" : "Pilot", "loves" : [ "apple", "watermelon" ], "weight" : 650, "gender" : "m", "vampires" : 54 }
{ "_id" : ObjectId("6293327d5b1190ec7c1fa868"), "name" : "Nimue", "loves" : [ "grape", "carrot" ], "weight" : 540, "gender" : "f" }
{ "_id" : ObjectId("629333295b1190ec7c1fa869"), "name" : "Dunx", "loves" : [ "grape", "watermelon" ], "weight" : 704, "gender" : "m", "vampires" : 165 }
{ "_id" : ObjectId("629345a45b1190ec7c1fa86d"), "name" : "Barry", "loves" : [ "grape" ], "weight" : 340, "gender" : "m" }
```

## Задание 8.2.10.

Изменена информация о городе Портланд: мэр этого города теперь беспартийный.

```
> db.towns.update({name: 'Portland'}, {$unset: {mayor: 1}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.towns.find()
{ "_id" : ObjectId("6293403c5b1190ec7c1fa86a"), "name" : "Punksutameey", "population" : 6200, "last_sensus" : ISODate("2008-01-31T00:00:00Z"), "famous_for" : [ "" ], "mayor" : { "name" : "Jim Wehrle" } }
{ "_id" : ObjectId("6293409d5b1190ec7c1fa86b"), "name" : "New York", "population" : 22200000, "last_sensus" : ISODate("2009-07-31T00:00:00Z"), "famous_for" : [ "status of liberty", "food" ], "mayor" : { "name" : "Michael Bloomberg", "party" : "r" } }
{ "_id" : ObjectId("629340d65b1190ec7c1fa86c"), "name" : "Portland", "population" : 528000, "last_sensus" : ISODate("2009-07-20T00:00:00Z"), "famous_for" : [ "beer", "food" ] }
```

## Задание 8.2.11.

Изменена информация о самце единорога Pilot: теперь он любит и шоколад.

```
> db.unicorns.update({name: 'Pilot'}, {$push: {loves: 'chocolate'}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.unicorns.find()
{ "_id" : ObjectId("62932fea5b1190ec7c1fa85e"), "name" : "Horny", "loves" : [ "carrot", "papaya" ], "weight" : 600, "gender" : "m", "vampires" : 68 }
{ "_id" : ObjectId("62932fffd5b1190ec7c1fa85f"), "name" : "Aurora", "loves" : [ "carrot", "grape" ], "weight" : 450, "gender" : "f", "vampires" : 43 }
{ "_id" : ObjectId("6293300c5b1190ec7c1fa860"), "name" : "Unicrom", "loves" : [ "energon", "redbull" ], "weight" : 984, "gender" : "m", "vampires" : 182 }
{ "_id" : ObjectId("6293301a5b1190ec7c1fa861"), "name" : "Rooodooles", "loves" : [ "apple" ], "weight" : 575, "gender" : "m", "vampires" : 99 }
{ "_id" : ObjectId("6293308e5b1190ec7c1fa862"), "name" : "Solnara", "loves" : [ "apple", "carrot", "chocolate" ], "weight" : 550, "gender" : "f", "vampires" : 80 }
{ "_id" : ObjectId("629331735b1190ec7c1fa863"), "name" : "Ayna", "weight" : 800, "vampires" : 51 }
{ "_id" : ObjectId("629331da5b1190ec7c1fa864"), "name" : "Kenny", "loves" : [ "grape", "lemon" ], "weight" : 690, "gender" : "m", "vampires" : 39 }
{ "_id" : ObjectId("629332065b1190ec7c1fa865"), "name" : "Raleigh", "loves" : [ "RedBull", "weight" : 421, "gender" : "m", "vampires" : 2 }
{ "_id" : ObjectId("629332345b1190ec7c1fa866"), "name" : "Leia", "loves" : [ "apple", "watermelon" ], "weight" : 601, "gender" : "f", "vampires" : 33 }
{ "_id" : ObjectId("629332505b1190ec7c1fa867"), "name" : "Pilot", "loves" : [ "apple", "watermelon", "chocolate" ], "weight" : 650, "gender" : "m", "vampires" : 54 }
{ "_id" : ObjectId("6293327d5b1190ec7c1fa868"), "name" : "Nimue", "loves" : [ "grape", "carrot" ], "weight" : 540, "gender" : "f" }
{ "_id" : ObjectId("629333295b1190ec7c1fa869"), "name" : "Dunx", "loves" : [ "grape", "watermelon" ], "weight" : 704, "gender" : "m", "vampires" : 165 }
{ "_id" : ObjectId("629345a45b1190ec7c1fa86d"), "name" : "Barry", "loves" : [ "grape" ], "weight" : 340, "gender" : "m" }
```



## Задание 8.2.12.

Изменена информация о самке единорога Aurora: теперь она любит еще и сахар, и лимоны.

```
> db.unicorns.update({name: 'Aurora'}, {$addToSet: {loves: {$each: ['sugar', 'lemon']}}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.unicorns.find()
{ "_id" : ObjectId("629332fea5b1190ec7c1fa85e"), "name" : "Horny", "loves" : [ "carrot", "papaya" ], "weight" : 600, "gender" : "m", "vampires" : 68 }
{ "_id" : ObjectId("629332ffd5b1190ec7c1fa85f"), "name" : "Aurora", "loves" : [ "carrot", "grape", "sugar", "lemon" ], "weight" : 450, "gender" : "f", "vampires" : 43 }
{ "_id" : ObjectId("62933300c5b1190ec7c1fa860"), "name" : "Unicrom", "loves" : [ "energon", "redbull" ], "weight" : 984, "gender" : "m", "vampires" : 182 }
{ "_id" : ObjectId("62933301a5b1190ec7c1fa861"), "name" : "Roovoooodles", "loves" : [ "apple" ], "weight" : 575, "gender" : "m", "vampires" : 99 }
{ "_id" : ObjectId("62933308e5b1190ec7c1fa862"), "name" : "Solnara", "loves" : [ "apple", "carrot", "chocolate" ], "weight" : 550, "gender" : "f", "vampires" : 80 }
{ "_id" : ObjectId("6293331735b1190ec7c1fa863"), "name" : "Ayna", "weight" : 800, "vampires" : 51 }
{ "_id" : ObjectId("6293331da5b1190ec7c1fa864"), "name" : "Kenny", "loves" : [ "grape", "lemon" ], "weight" : 690, "gender" : "m", "vampires" : 39 }
{ "_id" : ObjectId("6293332065b1190ec7c1fa865"), "name" : "Raleigh", "loves" : [ "RedBull", "weight" : 421, "gender" : "m", "vampires" : 2 }
{ "_id" : ObjectId("6293332345b1190ec7c1fa866"), "name" : "Leia", "loves" : [ "apple", "watermelon" ], "weight" : 601, "gender" : "f", "vampires" : 33 }
{ "_id" : ObjectId("6293332505b1190ec7c1fa867"), "name" : "Pilot", "loves" : [ "apple", "watermelon", "chocolate" ], "weight" : 650, "gender" : "m", "vampires" : 54 }
{ "_id" : ObjectId("62933327d5b1190ec7c1fa868"), "name" : "Nimue", "loves" : [ "grape", "carrot" ], "weight" : 540, "gender" : "f" }
{ "_id" : ObjectId("629333295b1190ec7c1fa869"), "name" : "Dunx", "loves" : [ "grape", "watermelon" ], "weight" : 704, "gender" : "m", "vampires" : 165 }
{ "_id" : ObjectId("629345a45b1190ec7c1fa86d"), "name" : "Barney", "loves" : [ "grape" ], "weight" : 340, "gender" : "m" }
```

## Задание 8.2.13.

Были удалены документы с беспартийными мэрами.

```
> db.towns.remove({'mayor.party': null}, true)
WriteResult({ "nRemoved" : 1 })
> db.towns.find()
{ "_id" : ObjectId("6293409d5b1190ec7c1fa86b"), "name" : "New York", "population" : 22200000, "last_sensus" : ISODate("2009-07-31T00:00:00Z"), "famous_for" : [ "status of liberty", "food" ], "mayor" : { "name" : "Michael Bloomberg", "party" : "I" } }
{ "_id" : ObjectId("629340a65b1190ec7c1fa86c"), "name" : "Portland", "population" : 528000, "last_sensus" : ISODate("2009-07-20T00:00:00Z"), "famous_for" : [ "beer", "food" ] }
{ "_id" : ObjectId("629340bd5b1190ec7c1fa86e"), "name" : "Punxsutaney", "popujatiuon" : 6200, "last_sensus" : ISODate("2008-01-31T00:00:00Z"), "famous_for" : [ "phill the groundhog" ], "mayor" : { "name" : "Jim Wehrle" } }
{ "_id" : ObjectId("62934a135b1190ec7c1fa86f"), "name" : "New York", "popujatiuon" : 22200000, "last_sensus" : ISODate("2009-07-31T00:00:00Z"), "famous_for" : [ "status of liberty", "food" ], "mayor" : { "name" : "Michael Bloomberg", "party" : "I" } }
{ "_id" : ObjectId("62934a495b1190ec7c1fa870"), "name" : "Portland", "popujatiuon" : 528000, "last_sensus" : ISODate("2009-07-20T00:00:00Z"), "famous_for" : [ "beer", "food" ], "mayor" : { "name" : "Sam Adams", "party" : "D" } }
```

```
> db.towns.remove({})
WriteResult({ "nRemoved" : 5 })
> db.stats()
{
  "db" : "learn",
  "collections" : 2,
  "views" : 0,
  "objects" : 13,
  "avgObjSize" : 121,
  "dataSize" : 1573,
  "storageSize" : 73728,
  "indexes" : 2,
  "indexSize" : 73728,
  "totalSize" : 147456,
  "scaleFactor" : 1,
  "fsUsedSize" : 120371621888,
  "fsTotalSize" : 126696288256,
  "ok" : 1
}
> show collections
towns
unicorns
```

### Задание 8.3.1.

Создана коллекция зон обитания единорогов и указано в качестве идентификатора кратко название зоны, далее включены полное название и описание.

```
> db.home.insert({_id: 'wa', name: 'water'})
WriteResult({ "nInserted" : 1 })
> db.home.insert({_id: 'ea', name: 'earth'})
WriteResult({ "nInserted" : 1 })
> db.home.find()
{ "_id" : "wa", "name" : "water" }
{ "_id" : "ea", "name" : "earth" }
```

Включена для нескольких единорогов в документы ссылка на зону обитания, используя второй способ автоматического связывания.

-

### Задание 8.3.2.

```
> db.unicorns.ensureIndex({'name': 1}, {'unique': true});
uncaught exception: TypeError: db.unicorns.ensureIndex is not a function :
@(shell):1:1
```

### Задание 8.3.3.

```
> db.unicorns.getIndexes()
[ { "v" : 2, "key" : { "_id" : 1 }, "name" : "_id_" } ]
```

#### Задание 8.3.4.

```
> var cursor = db.numbers.find(); null;
null
> for(i = 0; i < 100000; i++){db.numbers.insert({value: i})}
WriteResult({ "nInserted" : 1 })
>
>
> var cursor = db.numbers.find(); null;
null
> db.numbers.find()
{ "_id" : ObjectId("62934dc05b1190ec7c1fa871"), "value" : 0 }
{ "_id" : ObjectId("62934dc05b1190ec7c1fa872"), "value" : 1 }
{ "_id" : ObjectId("62934dc05b1190ec7c1fa873"), "value" : 2 }
{ "_id" : ObjectId("62934dc05b1190ec7c1fa874"), "value" : 3 }
{ "_id" : ObjectId("62934dc05b1190ec7c1fa875"), "value" : 4 }
{ "_id" : ObjectId("62934dc05b1190ec7c1fa876"), "value" : 5 }
{ "_id" : ObjectId("62934dc05b1190ec7c1fa877"), "value" : 6 }
{ "_id" : ObjectId("62934dc05b1190ec7c1fa878"), "value" : 7 }
{ "_id" : ObjectId("62934dc05b1190ec7c1fa879"), "value" : 8 }
{ "_id" : ObjectId("62934dc05b1190ec7c1fa87a"), "value" : 9 }
{ "_id" : ObjectId("62934dc05b1190ec7c1fa87b"), "value" : 10 }
{ "_id" : ObjectId("62934dc05b1190ec7c1fa87c"), "value" : 11 }
{ "_id" : ObjectId("62934dc05b1190ec7c1fa87d"), "value" : 12 }
{ "_id" : ObjectId("62934dc05b1190ec7c1fa87e"), "value" : 13 }
{ "_id" : ObjectId("62934dc05b1190ec7c1fa87f"), "value" : 14 }
{ "_id" : ObjectId("62934dc05b1190ec7c1fa880"), "value" : 15 }
{ "_id" : ObjectId("62934dc05b1190ec7c1fa881"), "value" : 16 }
{ "_id" : ObjectId("62934dc05b1190ec7c1fa882"), "value" : 17 }
{ "_id" : ObjectId("62934dc05b1190ec7c1fa883"), "value" : 18 }
{ "_id" : ObjectId("62934dc05b1190ec7c1fa884"), "value" : 19 }
Type "it" for more
```

```
> db.numbers.find().sort({value: -1}).limit(4);
{ "_id" : ObjectId("62934def5b1190ec7c212f10"), "value" : 99999 }
{ "_id" : ObjectId("62934def5b1190ec7c212f0f"), "value" : 99998 }
{ "_id" : ObjectId("62934def5b1190ec7c212f0e"), "value" : 99997 }
{ "_id" : ObjectId("62934def5b1190ec7c212f0d"), "value" : 99996 }
```

```
"executionTimeMillis" : 78,
```

```
> db.numbers.createIndex({'value': 1})
{
  "numIndexesBefore" : 1,
  "numIndexesAfter" : 2,
  "createdCollectionAutomatically" : false,
  "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({value: -1}).limit(4)
```

```
"executionTimeMillis" : 46,
```

Вывод: изучены основные функции MongoDB.