## Нереляционные базы данных

## Лабораторная работа 3

## Курсоры

## Задания к лабораторной работе

1. Проведите 4 выборки данных, используя включение, исключение полей и индексов. Убедитесь, что только индекс может быть исключен при включении полей.

```
db.unicorns.find(null, {name: 1,
                                                                                                                              id: 0, gender: 1});
       "name" : "Horny", "gender" : "m" }
                                                                            "gender" : "f" }
        "name"
                                       "Aurora", "gender" : "f" ]
"Unicrom", "gender" : "m"
                                       "Aurora"
       "name" :
       "name" : "Roooooodles", "gender" : "m" }
       "name" : "Solnara", "gender" : "f" }
       "name" : "Ayna", "gender" : "f" }
"name" : "Kenny", "gender" : "m" }
                                       "Raleigh", "gender" : "m" }
       "name" :
        "name" :
                                       "Leia", "gender" : "f"
                                      "Pilot", "gender" : "m"
"Nimue", "gender" : "f"
       "name" :
                                       "Nimue",
       "name"
       <u>"name" : "Dunx", "gender" : "m" }</u>
> db.unicorns.find(null, {name: 1, _id: 0, gender: 0});
error: {
    "$err" : "Can't canonicalize query: BadValue Projection cannot have a mix of inclusion and exclusion.",
    "code" : 17287
    db.unicorns.find(null, {name: 1, gender: 1});
    db.unicorns.find(null, {name: 1, gender: 1});
"_id": ObjectId("5f7840ea043431fa489cd821"), "name": "Horny", "gender": "m" }
"_id": ObjectId("5f7840ea043431fa489cd822"), "name": "Aurora", "gender": "f" }
"_id": ObjectId("5f7840ea043431fa489cd823"), "name": "Unicrom", "gender": "m" }
"_id": ObjectId("5f7840ea043431fa489cd824"), "name": "Roooooodles", "gender": "m" }
"_id": ObjectId("5f7840ea043431fa489cd825"), "name": "Solnara", "gender": "f" }
"_id": ObjectId("5f7840ea043431fa489cd826"), "name": "Ayna", "gender": "f" }
"_id": ObjectId("5f7840ea043431fa489cd827"), "name": "Kenny", "gender": "m" }
"_id": ObjectId("5f7840ea043431fa489cd828"), "name": "Raleigh", "gender": "m" }
"_id": ObjectId("5f7840ea043431fa489cd829"), "name": "Leia", "gender": "f" }
"_id": ObjectId("5f7840ea043431fa489cd82b"), "name": "Pilot", "gender": "m" }
"_id": ObjectId("5f7840ea043431fa489cd82b"), "name": "Nimue", "gender": "f" }
"_id": ObjectId("5f7840ea043431fa489cd82b"), "name": "Dunx", "gender": "f" }
"_id": ObjectId("5f7840ea043431fa489cd82c"), "name": "Dunx", "gender": "m" }
     db.unicorns.find(null, {name: 1, gender: 1, weight: 1, _id: 0});
"name" : "Horny", "weight" : 600, "gender" : "m" }
"name" : "Aurora", "weight" : 450, "gender" : "f" }
"name" : "Unicrom", "weight" : 984, "gender" : "m" }
"name" : "Roooooodles", "weight" : 575, "gender" : "m" }
"name" : "Solnara", "weight" : 550, "gender" : "f" }
"name" : "Ayna", "weight" : 733, "gender" : "f" }
"name" : "Kenny", "weight" : 690, "gender" : "m" }
"name" : "Raleigh", "weight" : 421, "gender" : "m" }
"name" : "Leia". "weight" : 601. "gender" : "f" }
```

"name": "Leia", "weight": 601, "gender": "f" }
"name": "Pilot", "weight": 650, "gender": "m"
"name": "Nimue", "weight": 540, "gender": "f"
"name": "Dunx", "weight": 704, "gender": "m" }

2. Проведите 2 выборки данных, используя сортировку по убыванию и по возрастанию

```
rns.find().sort({weight: -1})
bjectId("5f7840ea043431fa489cd823"), "name" : "Unicrom", "dob" : ISODate("1973-02-09T19:10:00Z"), "loves" : [ "energon", "redbull" ], "weight" : 984, "gende
           -ubjectIo("57/840ea043431Ta489cd823"), "name" : "Unicrom", "dob" : ISODate("1973-02-09T19:10:002"), "loves" : [ "energon", "redbull" ], "weight" : 984, "gende"
"Vampires" : 182 }
ObjectId("5f7840ea043431fa489cd826"), "name" : "Ayna", "dob" : ISODate("1998-03-07T05:30:00Z"), "loves" : [ "strawberry", "lemon" ], "weight" : 733, "gender
ampires" : 40 }
                     s" : 40 }
tId("5f7840ec043431fa489cd82c"), "name" : "Dunx", "dob" : ISODate("1976-07-18T15:18:00Z"), "loves" : [ "grape", "watermelon" ], "weight" : 704, "gender"
        : 00jettld : 3439406093931144950026 ; Home : Own, "Wampires" : 165 }
"Wampires" : 165 }
: Objectid "5f7849ea043431fa489cd827"), "name" : "Kenny", "dob" : ISODate("1997-07-01T06:42:002"), "loves" : [ "grape", "lemon" ], "weight" : 690, "ge
             es" : 39 }
ObjectId("517840ea043431fa489cd82a"), "name" : "Pilot", "dob" : ISOOate("1997-03-01T02:03:06Z"), "loves" : [ "apple", "watermelon" ], "weight" : 650, "gender
         . objectId("5f7840ea043431fa489cd829"), "name": "Leia", "dob": ISODate("2001-10-08T10:53:00Z"), "loves": [ "apple", "watermelon" ], "weight": 601, "gender" "vampires": 33 }
: ObjectId("5f7840ea043431fa489cd821"), "name": "Horny", "dob": ISODate("1992-03-13T04:47:00Z"), "loves": [ "carrot", "papaya" ], "weight": 600, "gender" :
              lres": 63 }
DjectId("5f7840ea043431fa489cd824"), "name": "Roooooodles", "dob": ISOOate("1979-08-18T15:44:00Z"), "loves": [ "apple" ], "weight": 575, "gender": "m",
: 99 }
        res" : 99 }
: ObjectId("5f7840ea043431fa489cd825"), "name" : "Solnara", "dob" : ISODate("1985-07-03T22:01:00Z"), "loves" : [ "apple", "carrot", "chocolate" ], "weight" : 55
der" : ff, "vampires" : 80 }
: ObjectId("5f7840ea043431fa489cd82b"), "name" : "Nimue", "dob" : ISODate("1999-12-20T13:15:00Z"), "loves" : [ "grape", "carrot" ], "weight" : 540, "gender" : "
", "vampirés": 43 }
"_id": ObjectId("5f7840ea043431fa489cd828"), "name": "Raleigh", "dob": ISODate("2005-05-02T20:57:00Z"), "loves": [ "apple", "sugar" ], "weight": 421, "gender"
", "vampires": 2 }
db.unicorns.find().sort({weight: -1})
   .unicorns.find().sort({weight: 1})
id": ObjectId("5f7840ea043431fa489cd828"), "name": "Raleigh", "dob": ISODate("2005-05-02T20:57:00Z"), "loves": [ "apple", "sugar" ], "weight": 421, "gender"
"vampires": 2 }
id": ObjectId("5f7840ea043431fa489cd822"), "name": "Aurora", "dob": ISODate("1991-01-24T10:00:00Z"), "loves": [ "carrot", "grape" ], "weight": 450, "gender"
              ires" : 43 }
ObjectId("5f7840ea043431fa489cd82b"), "name" : "Nimue", "dob" : ISODate("1999-12-20T13:15:00Z"), "loves" : [ "grape", "carrot" ], "weight" : 540, "gender" :
           r" : "f", "vampires" : 80 }
ObjectId("5f7840ea043431fa489cd824"), "name" : "Roooooodles", "dob" : ISODate("1979-08-18T15:44:00Z"), "loves" : [ "apple" ], "weight" : 575, "gender" : "m",
           " : 99 }
ObjectId("5f7840ea043431fa489cd821"), "name" : "Horny", "dob" : ISODate("1992-03-13T04:47*00Z"), "loves" : [ "carrot", "papaya" ], "weight" : 600, "gender"
          mpires": 63 }
: ObjectId("5f7840ea043431fa489cd829"), "name" : "Leia", "dob" : ISODate("2001-10-08T10:53:00Z"), "loves" : [ "apple", "watermelon" ], "weight" : 601, "gender"
vampires" : 33 }
          . ObjectId("5f7840ea04343f1a489cd823"), name : Lera , uou : 1300ate(2001-10-001633.002"), loves : [ apple , watermeton ], weight : 001, gender vampires" : 33 }
: ObjectId("5f7840ea04343f1a489cd82a"), "name" : "Pilot", "dob" : ISODate("1997-03-01T02:03:002"), "loves" : [ "apple", "watermeton" ], "weight" : 650, "gender "vampires" : 54 }
: ObjectId("5f7840ea043431fa489cd827"), "name" : "Kenny", "dob" : ISODate("1997-07-01T06:42:002"), "loves" : [ "grape", "lemon" ], "weight" : 690, "gender" : "l
        pires" : 39 }
: ObjectId("5f7840ec043431fa489cd82c"), "name" : "Dunx", "dob" : ISODate("1976-07-18T15:18:00Z"), "loves" : [ "grape", "watermelon" ], "weight" : 704, "gender"
"vampires" : 165 }
: ObjectId("5f7840ea043431fa489cd826"), "name" : "Ayna", "dob" : ISODate("1998-03-07T05:30:00Z"), "loves" : [ "strawberry", "lemon" ], "weight" : 733, "gender"
          vampires" : 40 }
: ObjectId("5f7840ea043431fa489cd823"), "name" : "Unicrom", "dob" : ISODate("1973-02-09T19:10:00Z"), "loves" : [ "energon", "redbull" ], "weight" : 984, "gel
"vampires" : 182 }
```

3. Проведите 3 выборки данных, используя различные комбинации сортировки по полям.

```
> db.unicorns.find(null, {name: 1, gender: 1, weight: 1, _id: 0}).sort({weight:-1})
{ "name" : "Unicrom", "weight" : 984, "gender" : "m" }
{ "name" : "Ayna", "weight" : 733, "gender" : "f" }
{ "name" : "Dunx", "weight" : 704, "gender" : "m" }
{ "name" : "Kenny", "weight" : 690, "gender" : "m" }
{ "name" : "Pilot", "weight" : 650, "gender" : "f" }
{ "name" : "Leia", "weight" : 601, "gender" : "f" }
{ "name" : "Roooooodles", "weight" : 575, "gender" : "m" }
{ "name" : "Solnara", "weight" : 550, "gender" : "f" }
{ "name" : "Nimue", "weight" : 540, "gender" : "f" }
{ "name" : "Aurora", "weight" : 450, "gender" : "f" }
{ "name" : "Raleigh", "weight" : 421, "gender" : "m" }
```

```
> db.unicorns.find(null, {name: 1, gender: 1, weight: 1, _id: 0, dob: 1}).sort({dob: 1,weight: -1})
{ "name": "Unicrom", "dob": ISODate("1973-02-09T19:10:00Z"), "weight": 984, "gender": "m" }
{ "name": "Dunx", "dob": ISODate("1976-07-18T15:18:00Z"), "weight": 704, "gender": "m" }
{ "name": "Roooooodles", "dob": ISODate("1979-08-18T15:44:00Z"), "weight": 575, "gender": "m" }
{ "name": "Solnara", "dob": ISODate("1985-07-03T22:01:00Z"), "weight": 550, "gender": "f" }
{ "name": "Aurora", "dob": ISODate("1991-01-24T10:00:00Z"), "weight": 450, "gender": "f" }
{ "name": "Horny", "dob": ISODate("1992-03-13T04:47:00Z"), "weight": 600, "gender": "m" }
{ "name": "Pilot", "dob": ISODate("1997-03-01T02:03:00Z"), "weight": 650, "gender": "m" }
{ "name": "Kenny", "dob": ISODate("1997-07-01T06:42:00Z"), "weight": 690, "gender": "m" }
{ "name": "Nimue", "dob": ISODate("1998-03-07T05:30:00Z"), "weight": 540, "gender": "f" }
{ "name": "Nimue", "dob": ISODate("2001-10-08T10:53:00Z"), "weight": 601, "gender": "f" }
{ "name": "Raleigh", "dob": ISODate("2001-10-08T10:53:00Z"), "weight": 611, "gender": "f" }
}
```

```
db.unicorns.find(null, {name: 1, gender: 1, weight: 1, _id: (
"name" : "Unicrom", "dob" : ISODate("1973-02-09T19:10:00Z"),
                                                                                                                                                                                                                                                                                                                                                                  _id: 0, dob: 1}).sort({dob: 1})
00Z"), "weight" : 984, "gender"
                                                         "Unicrom", "dob" : ISODate("1973-02-09T19:10:00Z"), "weight" : 984, gender . . ..."
"Dunx", "dob" : ISODate("1976-07-18T15:18:00Z"), "weight" : 704, "gender" : "m" }
"Roooooodles", "dob" : ISODate("1979-08-18T15:44:00Z"), "weight" : 575, "gender"
"Roooooodles", "dob" : ISODate("1979-08-18T15:44:00Z"), "weight" : 550, "gender" : "f
   "name"
                                                        "Dunx", "dob" : ISODate("1979-08-18T15:44:002 ), weight "Roooooodles", "dob" : ISODate("1985-07-03T22:01:002"), "weight" : 550 "Solnara", "dob" : ISODate("1985-07-03T22:01:002"), "weight" : 450, "Aurora", "dob" : ISODate("1991-01-24T10:00:00Z"), "weight" : 600, "FOODate("1992-03-13T04:47:00Z"), "weight" : 600, "FOODate("1992-03-13T04:47:00Z")
    "name"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             der":
: "f"
: "f" }
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     : 550, "gender"
: 450, "gender"
   "name"
                                                                                                                                                                                                                                                                                                                                                                                                                                                              : 450, "gender" :
- 600, "gender" :
                                                       "Aurora", "dob" : ISODate("1991-01-24|10:00.002 ), "elght" :
"Horny", "dob" : ISODate("1992-03-13T04:47:00Z"), "weight" :
"Pilot", "dob" : ISODate("1997-03-01T02:03:00Z"), "weight" :
" "dob" : ISODate("1997-07-01T06:42:00Z"), "weight" :
                                                                                                                  "dob" : ISODate("1997-03-01102.03.002 ), "weight "dob" : ISODate("1997-07-01T06:42:00Z"), "weight"
                                                       "Pilot", "dob : ISODate("1997-07-01706:42:002 ),
"Kenny", "dob" : ISODate("1998-03-07T05:30:00Z"), "weight" :
"Ayna", "dob" : ISODate("1999-12-20T13:15:00Z"), "weight" :
"Nimue", "dob" : ISODate("2001-10-08T10:53:00Z"), "weight" :
"Leia", "dob" : ISODate("2005-05-02T20:57:00Z"), "weight
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       "gender" :
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      540, "gender"
541. "gender"
"gend
                                                                                                                                                                                                                                                                                                                                                                                                              "weight"
```

4. Проведите следующие выборки для коллекции из ка минимум шести элементов: первые пять элементов; все элементы, начиная с четвертого; элементы с третьего по пятый.

```
> db.unicorns.find(null, {name: 1, gender: 1, weight: 1, _id: 0, dob: 1}).sort({weight: -1}).limit(5)
{    "name" : "Unicrom", "dob" : ISODate("1973-02-09T19:10:00Z"), "weight" : 984, "gender" : "m" }
{    "name" : "Ayna", "dob" : ISODate("1976-07-18T15:18:00Z"), "weight" : 733, "gender" : "f" }
{    "name" : "Dunx", "dob" : ISODate("1976-07-18T15:18:00Z"), "weight" : 704, "gender" : "m" }
{    "name" : "Kenny", "dob" : ISODate("1977-07-01T06:42:00Z"), "weight" : 690, "gender" : "m" }
{    "name" : "Pilot", "dob" : ISODate("1997-03-01T02:03:00Z"), "weight" : 690, "gender" : "m" }
}    *
> db.unicorns.find(null, {name: 1, gender: 1, weight: 1, _id: 0, dob: 1}).sort({weight: -1}).skip(3) {    "name" : "Kenny", "dob" : ISODate("1997-03-01T02:03:00Z"), "weight" : 690, "gender" : "m" }
{    "name" : "Pilot", "dob" : ISODate("1997-03-01T02:03:00Z"), "weight" : 650, "gender" : "m" }
{    "name" : "Leia", "dob" : ISODate("1997-03-18T102:03:00Z"), "weight" : 600, "gender" : "f" }
{    "name" : "Roooooodles", "dob" : ISODate("1992-03-18T04:47:00Z"), "weight" : 600, "gender" : "m" }
{    "name" : "Nimue", "dob" : ISODate("1999-08-18T15:44:00Z"), "weight" : 550, "gender" : "m" }
{    "name" : "Nimue", "dob" : ISODate("1999-12-20T13:15:00Z"), "weight" : 540, "gender" : "f" }
{    "name" : "Nimue", "dob" : ISODate("1991-01-24T10:00:00Z"), "weight" : 540, "gender" : "f" }
{    "name" : "Raleigh", "dob" : ISODate("1991-01-24T10:00:00Z"), "weight" : 421, "gender" : "m" }
}    "name" : "Raleigh", "dob" : ISODate("1997-07-18T15:18:00Z"), "weight" : 704, "gender" : "m" }
}    "name" : "Raleigh", "dob" : ISODate("1976-07-18T15:18:00Z"), "weight" : 704, "gender" : "m" }
{    "name" : "Raleigh", "dob" : ISODate("1997-07-01T06:42:00Z"), "weight" : 704, "gender" : "m" }
{    "name" : "Rony", "dob" : ISODate("1997-07-01T06:42:00Z"), "weight" : 600, "gender" : "m" }
}    "name" : "Pilot", "dob" : ISODate("1997-07-01T06:42:00Z"), "weight" : 600, "gender" : "m" }
}    "name" : "Pilot", "dob" : ISODate("1997-07-01T06:42:00Z"), "weight"
```

5. Посчитайте число элементов в каждой выборке задания 4. Убедитесь, что записи count(условие) и find(условие).count() равнозначны.

```
> db.unicorns.count({weight: {$gt:600}})
6
> db.unicorns.find({weight: {$gt:600}}).count()
6
>
```

6. Создайте коллекцию с 5-10 документами вида {number: <положительное, отрицательное число или ноль>}, с помощью функции forEach посчитайте сумму положительных элементов, количество четных элементов и произведение ненулевых элементов.

```
db.nums.find()
" id"
      : ObjectId("5f784b002105127a8b7f2524"),
                                                "numbers"
        ObjectId("5f784b072105127a8b7f2525"),
                                                "numbers"
      : ObjectId("5f784b0c2105127a8b7f2526")
                                                "numbers"
      : ObjectId("5f784b112105127a8b7f2527")
                                                "numbers"
  id" : ObjectId("5f784b192105127a8b7f2528")
                                                "numbers"
                                                            -20
  id"
      : ObjectId("5f784b212105127a8b7f2529"),
                                                "numbers"
                                                            -7
        ObjectId("5f784b292105127a8b7f252a"),
  id"
                                                "numbers"
                                                            29
```

```
> var a=0
> var b=0
> var c=0
> db.nums.find().forEach(function(doc) {if(doc.numbers>0) a+=doc.numbers;})
> a
51
>
```

```
> c=1
1
> db.nums.find().forEach(function(doc) {if(doc.numbers!=0) c*=doc.numbers;})
> c
-5176500
> ■
```