ОТЧЕТ
ПО ЛАБОРАТОРНОЙ РАБОТЕ № 7
«Знакомство с MongoDB»

Специальность 09.02.07 «Информационные системы и программирование»

Дисциплина «Основы проектирования баз данных»

Преподаватель:

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«__» _____ 2020 г.

Оценка _____

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

Индивидуальное задание: создать программную систему, ориентированную на администрацию птицефабрики и позволяющую работать с информацией о работниках фабрики и об имеющихся на ней курах. О каждой курице должна храниться следующая информация: вес, возраст, порода, количество ежемесячно получаемых от курицы яиц, а также информация о местонахождении курицы. Сведения о породе включают в себя: название породы, среднее количество яиц в месяц (производительность) и средний вес, и содержание диеты. Птицефабрика имеет несколько цехов. В каждой клетке может находиться несколько куриц.

БД:

```
> use lab7
> db.getCollectionNames()
[ "chicken", "dieta", "farm", "poroda", "worker" ]
> db.worker.find()
{ "_id" : ObjectId("5f7369563c4ca4a9cbcd8b96"), "id" : 1, "passport_data" : "Ivan A.S", "farm_name" : ObjectId("5f73655a3c4ca4a9cbcd8b8d"), "Z_P" : 29000 }
{ "_id" : ObjectId("5f73696e3c4ca4a9cbcd8b97"), "id" : 2, "passport_data" : "Dmitry H.K", "farm_name" : ObjectId("5f73655a3c4ca4a9cbcd8b8d"), "Z_P" : 29000 }
{ "_id" : ObjectId("5f73698c3c4ca4a9cbcd8b98"), "id" : 3, "passport_data" : "Artem A.A", "farm_name" : ObjectId("5f73657b3c4ca4a9cbcd8b8e"), "Z_P" : 29000 }
{ "_id" : ObjectId("5f7369a53c4ca4a9cbcd8b99"), "id" : 4, "passport_data" : "Artem V.V", "farm_name" : ObjectId("5f7365c03c4ca4a9cbcd8b8f"), "Z_P" : 29000 }
{ "_id" : ObjectId("5f7369c13c4ca4a9cbcd8b9a"), "id" : 5, "passport_data" : "Vladimir K.V", "farm_name" : ObjectId("5f7365c03c4ca4a9cbcd8b8f"), "Z_P" : 38000 }
> db.farm.find()
{ "_id" : ObjectId("5f73655a3c4ca4a9cbcd8b8d"), "farm_name" : "Petrovskaya", "workers" : 36, "chickens" : 386, "factorys" : 3 }
{ "_id" : ObjectId("5f73657b3c4ca4a9cbcd8b8e"), "farm_name" : "Belooserskaya", "workers" : 18, "chickens" : 157, "factorys" : 1 }
```

{ "_id" : ObjectId("5f7365c03c4ca4a9cbcd8b8f"), "farm_name" : "Krupitskaya", "workers" : 21, "chickens" : 205, "factorys" : 2 }

{ "_id" : ObjectId("5f73666c3c4ca4a9cbcd8b90"), "factory_number" : 13, "farm_name" : ObjectId("5f73655a3c4ca4a9cbcd8b8d"), "cells" : 27 }

{ "_id" : ObjectId("5f7367ae3c4ca4a9cbcd8b91"), "factory_number" : 11, "farm_name" : ObjectId("5f73655a3c4ca4a9cbcd8b8d"), "cells" : 22 }

{ "_id" : ObjectId("5f7367b93c4ca4a9cbcd8b92"), "factory_number" : 14, "farm_name" : ObjectId("5f73655a3c4ca4a9cbcd8b8d"), "cells" : 23 }

{ "_id" : ObjectId("5f7367e13c4ca4a9cbcd8b93"), "factory_number" : 5, "farm_name" : ObjectId("5f73657b3c4ca4a9cbcd8b8e"), "cells" : 31 }

{ "_id" : ObjectId("5f73680c3c4ca4a9cbcd8b94"), "factory_number" : 8, "farm_name" : ObjectId("5f7365c03c4ca4a9cbcd8b8f"), "cells" : 12 }

{ "_id" : ObjectId("5f7368203c4ca4a9cbcd8b95"), "factory_number" : 3, "farm_name" : ObjectId("5f7365c03c4ca4a9cbcd8b8f"), "cells" : 22 }

> db.poroda.find()

{ "_id" : ObjectId("5f73604a3c4ca4a9cbcd8b8a"), "nazvanie_porodi" : "Avikolor", "dieta" : ObjectId("5f735c353c4ca4a9cbcd8b85"), "productivity_in_year" : 250, "average_weight" : 2.5 }

{ "_id" : ObjectId("5f7360b53c4ca4a9cbcd8b8b"), "nazvanie_porodi" : "Avstralorp", "dieta" : ObjectId("5f735c353c4ca4a9cbcd8b86"), "productivity_in_year" : 250, "average_weight" : 2.5 }

{ "_id" : ObjectId("5f7360d03c4ca4a9cbcd8b8c"), "nazvanie_porodi" : "Azil", "dieta" : ObjectId("5f735c353c4ca4a9cbcd8b87"), "productivity_in_year" : 150, "average_weight" : 2.5 }

> db.chicken.find()

{ "_id" : ObjectId("5f736bbb3c4ca4a9cbcd8b9b"), "id" : 1, "nazvanie_porodi" : ObjectId("5f73604a3c4ca4a9cbcd8b8a"), "nomer_dieti" : ObjectId("5f735c353c4ca4a9cbcd8b85"), "farm_name" : bjectId("5f73655a3c4ca4a9cbcd8b8d"), "weight" : 2.1, "year" : 5 }

{ "_id" : ObjectId("5f736bcc3c4ca4a9cbcd8b9c"), "id" : 1, "nazvanie_porodi" : ObjectId("5f73604a3c4ca4a9cbcd8b8a"), "nomer_dieti" : ObjectId("5f735c353c4ca4a9cbcd8b85"), "farm_name" : ObjectId("5f73655a3c4ca4a9cbcd8b8d"), "weight" : 2.3, "year" : 6 }

{ "_id" : ObjectId("5f736bd43c4ca4a9cbcd8b9d"), "id" : 1, "nazvanie_porodi" : ObjectId("5f73604a3c4ca4a9cbcd8b8a"), "nomer_dieti" : ObjectId("5f735c353c4ca4a9cbcd8b85"), "farm_name" : ObjectId("5f73655a3c4ca4a9cbcd8b8d"), "weight" : 1.4, "year" : 1 }
{ "_id" : ObjectId("5f736c033c4ca4a9cbcd8b9e"), "id" : 1, "nazvanie_porodi" : ObjectId("5f73604a3c4ca4a9cbcd8b8a"), "nomer_dieti" : ObjectId("5f735c353c4ca4a9cbcd8b85"), "farm_name" : ObjectId("5f73655a3c4ca4a9cbcd8b8d"), "weight" : 2.4, "year" : 7 }
{ "_id" : ObjectId("5f736c3c3c4ca4a9cbcd8b9f"), "id" : 1, "nazvanie_porodi" : ObjectId("5f73604a3c4ca4a9cbcd8b8a"), "nomer_dieti" : ObjectId("5f735c353c4ca4a9cbcd8b85"), "farm_name" : ObjectId("5f73657b3c4ca4a9cbcd8b8e"), "weight" : 2.4, "year" : 4 }
{ "_id" : ObjectId("5f736ca93c4ca4a9cbcd8ba0"), "id" : 1, "nazvanie_porodi" : ObjectId("5f7360b53c4ca4a9cbcd8b8b"), "nomer_dieti" : ObjectId("5f735c353c4ca4a9cbcd8b85"), "farm_name" : ObjectId("5f73657b3c4ca4a9cbcd8b8e"), "weight" : 2.4, "year" : 4 }
{ "_id" : ObjectId("5f736cb73c4ca4a9cbcd8ba1"), "id" : 1, "nazvanie_porodi" : ObjectId("5f7360b53c4ca4a9cbcd8b8b"), "nomer_dieti" : ObjectId("5f735c353c4ca4a9cbcd8b85"), "farm_name" : ObjectId("5f73657b3c4ca4a9cbcd8b8e"), "weight" : 1.9, "year" : 2 }

```
> db.dieta.find()
```
{ "_id" : ObjectId("5f735c353c4ca4a9cbcd8b85"), "nomer_dieti" : 1, "soderjanie_dieti" : "120g mixed fodder, 40g greenery" }
{ "_id" : ObjectId("5f735c4d3c4ca4a9cbcd8b86"), "nomer_dieti" : 2, "soderjanie_dieti" : "140g mixed fodder, 50g greenery" }
{ "_id" : ObjectId("5f735c5a3c4ca4a9cbcd8b87"), "nomer_dieti" : 3, "soderjanie_dieti" : "160g mixed fodder, 50g greenery" }

Запросы:

2:

```
>db.poroda.find({productivity_in_year:250,average_weight:2.5},{nazvanie_porodi: 1})
```

{ "_id" : ObjectId("5f73604a3c4ca4a9cbcd8b8a"), "nazvanie_porodi" : "Avikolor" }

{ "_id" : ObjectId("5f7360b53c4ca4a9cbcd8b8b"), "nazvanie_porodi" : "Avstralorp" }

Выводит название породы которая имеет продуктивность в несении яиц в 250 и средний вес в 2.5 кг

3:

```
> db.eat.find({time: {$gte:new Date("2020-08"), $lte:new Date("2020-10")}})
```

{ "_id" : ObjectId("5f737b0d3c4ca4a9cbcd8ba2"), "chicken" : ObjectId("5f736bbb3c4ca4a9cbcd8b9b"), "worker" : ObjectId("5f73696e3c4ca4a9cbcd8b97"), "nomer_dieti" : ObjectId("5f735c353c4ca4a9cbcd8b85"), "time" : ISODate("2020-09-04T11:30:00Z") }

{ "_id" : ObjectId("5f737b4d3c4ca4a9cbcd8ba3"), "chicken" : ObjectId("5f736bd43c4ca4a9cbcd8b9d"), "worker" : ObjectId("5f73696e3c4ca4a9cbcd8b97"), "nomer_dieti" : ObjectId("5f735c353c4ca4a9cbcd8b85"), "time" : ISODate("2020-09-04T11:30:00Z") }

{ "_id" : ObjectId("5f737b613c4ca4a9cbcd8ba4"), "chicken" : ObjectId("5f736ca93c4ca4a9cbcd8ba0"), "worker" : ObjectId("5f73696e3c4ca4a9cbcd8b97"), "nomer_dieti" : ObjectId("5f735c353c4ca4a9cbcd8b85"), "time" : ISODate("2020-09-04T11:30:00Z") }

{ "_id" : ObjectId("5f737b783c4ca4a9cbcd8ba5"), "chicken" : ObjectId("5f736cb73c4ca4a9cbcd8ba1"), "worker" : ObjectId("5f73696e3c4ca4a9cbcd8b97"),

"nomer_dieti" : ObjectId("5f735c353c4ca4a9cbcd8b85"), "time" : ISODate("2020-09-04T11:30:00Z") }

{ "_id" : ObjectId("5f737bab3c4ca4a9cbcd8ba6"), "chicken" : ObjectId("5f736cb73c4ca4a9cbcd8ba1"), "worker" : ObjectId("5f7369c13c4ca4a9cbcd8b9a"), "nomer_dieti" : ObjectId("5f735c4d3c4ca4a9cbcd8b86"), "time" : ISODate("2020-09-04T13:00:00Z") }

{ "_id" : ObjectId("5f737bc13c4ca4a9cbcd8ba7"), "chicken" : ObjectId("5f736c033c4ca4a9cbcd8b9e"), "worker" : ObjectId("5f7369c13c4ca4a9cbcd8b9a"), "nomer_dieti" : ObjectId("5f735c4d3c4ca4a9cbcd8b86"), "time" : ISODate("2020-09-04T13:00:00Z") }

Выводит все кормежки где даты находятся в диапазоне от 2020-08 до 2020-10

4:
>db.worker.find({passport_data:/.*A.*/},{passport_data:1})

{ "_id" : ObjectId("5f7369563c4ca4a9cbcd8b96"), "passport_data" : "Ivan A.S" }

{ "_id" : ObjectId("5f73698c3c4ca4a9cbcd8b98"), "passport_data" : "Artem A.A" }

{ "_id" : ObjectId("5f7369a53c4ca4a9cbcd8b99"), "passport_data" : "Artem V.V" }

Выводит все имена рабочих у которых в ФИО имеется хотябы 1 буква A

8:
> db.worker.find({passport_data:{$exists:true}})

{ "_id" : ObjectId("5f7369563c4ca4a9cbcd8b96"), "id" : 1, "passport_data" : "Ivan A.S", "farm_name" : ObjectId("5f73655a3c4ca4a9cbcd8b8d"), "Z_P" : 29000 }

{ "_id" : ObjectId("5f73696e3c4ca4a9cbcd8b97"), "id" : 2, "passport_data" : "Dmitry H.K", "farm_name" : ObjectId("5f73655a3c4ca4a9cbcd8b8d"), "Z_P" : 29000 }

{ "_id" : ObjectId("5f73698c3c4ca4a9cbcd8b98"), "id" : 3, "passport_data" : "Artem A.A", "farm_name" : ObjectId("5f73657b3c4ca4a9cbcd8b8e"), "Z_P" : 29000 }

{ "_id" : ObjectId("5f7369a53c4ca4a9cbcd8b99"), "id" : 4, "passport_data" : "Artem V.V", "farm_name" : ObjectId("5f7365c03c4ca4a9cbcd8b8f"), "Z_P" : 29000 }

{ "_id" : ObjectId("5f7369c13c4ca4a9cbcd8b9a"), "id" : 5, "passport_data" : "Vladimir K.V", "farm_name" : ObjectId("5f7365c03c4ca4a9cbcd8b8f"), "Z_P" : 38000 }

Выводит всех рабочих у которых существуют паспортные данные

$lookup

```
db.dieta.aggregate([{ $lookup: { from: "poroda", localField: "nomer_dieti", foreignField: "nazvanie_porodi", as: "dieta+poroda"} } ])
```

{ "_id" : ObjectId("5f735c353c4ca4a9cbcd8b85"), "nomer_dieti" : 1, "soderjanie_dieti" : "120g mixed fodder, 40g greenery", "dieta+poroda" : [ ] }
{ "_id" : ObjectId("5f735c4d3c4ca4a9cbcd8b86"), "nomer_dieti" : 2, "soderjanie_dieti" : "140g mixed fodder, 50g greenery", "dieta+poroda" : [ ] }
{ "_id" : ObjectId("5f735c5a3c4ca4a9cbcd8b87"), "nomer_dieti" : 3, "soderjanie_dieti" : "160g mixed fodder, 50g greenery", "dieta+poroda" : [ ] }

соединение документов диета и порода

```
> var mapfunction1 = function() { emit(this.nazvanie_porodi, this.productivity_in_year); };
> var reducefunction1 = function(nazv,prod){ return Array.sum(prod); };
```

```
> db.poroda.mapReduce(mapfunction1, reducefunction1, {out:"result"})
> db.result.find()


{ "_id" : "Avstralorp", "value" : 250 }
{ "_id" : "Azil", "value" : 150 }
{ "_id" : "Avikolor", "value" : 250 }
```

Сначала задаем значения, затем пишем исполняемую функцию, после результат записываем в отдельный документ и выводим его