**Министерство образования и науки Российской Федерации**

**федеральное государственное автономное образовательное учреждение высшего образования**

**“САНКТ-ПЕТЕРБУРГСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ**

**УНИВЕРСИТЕТ ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ,**

**МЕХАНИКИ И ОПТИКИ”**

**ФАКУЛЬТЕТ СРЕДНЕГО ПРОФЕССИОНАЛЬНОГО ОБРАЗОВАНИЯ**

**ОТЧЕТ**

**по Лабораторной работе № 7**

**«Знакомство с MongoDB»**

Специальность 09.02.07 «Информационные системы и программирование»

Дисциплина «Основы проектирования баз данных»

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Санкт-Петербург

2019/2020

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