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## 主流文档型数据库：MongoDB

- 最新版本： v1.0
- 更新时间： 20200525

### 鸣谢

感谢我的老婆陈雪雪的包容理解和悉心照料，才使得我 `crifan` 有更多精力去专注技术专研和整理归纳出这些电子书和技术教程，特此鸣谢。

### 简介

介绍主流文档型关系数据库MongoDB的起源；如何安装；基本的使用方法，包括如何启动服务端和如何用shell、GUI图形界面工具、代码调用API接口等方式去Client端的使用；以及部分高级用法，包括IP限制、用户和权限等；总结各种心得，包括pymongo的各种方面，备份和回复，如何新建空数据库和集合，如何更新已有数据，如何进行正则、列表、嵌套等高级搜索查询，如何使用GridFS保存二进制文件，以及一些常用教程和文档；总结出常见的各种坑及解决办法。

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## MongoDB简介

下面针对MongoDB做一下简要介绍：

- MongoDB
  - Logo



- - 一句话描述：一种主流的文档数据库
    - 一种：还有其他的
      - 其他文档型数据库：CouchDB、Amazon DynamoDB、Couchbase、MarkLogic
    - 文档数据库：
      - = 面向文档的数据库 = Document-Oriented Database
      - 范畴：属于非关系型数据库
        - 常称为：NoSQL
      - 与之对应：
        - (传统的)关系型数据库：MySQL
        - 其他的NoSQL
          - 键值对(K/V)数据库：redis、Cassandra、LevelDB
          - 图数据库：Neo4j
          - 时序数据库：InfluxDB
          - (全文)搜索(数据库)引擎：ElasticSearch、Solr
          - 列式数据库：HBase
      - 数据格式
        - 主要：JSON
          - 引申：BSON
          - 其他：XML
      - 优势
        - 修改数据和结构很方便
          - 直接修改JSON数据本身
          - 对比：传统MySQL需要改表结构
          - 引申出：容易兼容历史数据
            - 字段不存在只是空值不会报错
          - 复杂JSON可以描述复杂(嵌套)的数据结构
      - 适用场景
        - 数据量很大或者未来会变得很大
        - 表结构不明确，且字段在不断增加
      - 不适用场景

- 在不同的文档上需要添加事务支持
  - 文档数据库不支持文档间的事务
- 多个文档直接需要复杂查询
  - 例如join
- 起源
  - 移动互联网兴起
    - 不仅：数据量大（高并发），架构复杂
    - 还要：快速响应
  - 结论：传统MySQL类关系型数据库无法满足
  - 出现：关系型数据库
    - 其中最流行：MongoDB
    - 胜出关键：易用、架构良好、功能丰富
- 概述
  - 底层实现：`C++`
  - 支持平台：`Windows`、`Mac`、`Linux`、`Solaris` 等
  - 编程接口API：常见语言都支持
    - `C`、`C++`、`C#`、`Go`、`Java`、`Node.js`、`Perl`、`PHP`、`Python`、`Ruby`、`Rust`、`Scala`、`Swift`
- 优势
  - 高性能
  - 富查询语言（支持CRUD、数据聚合、文本搜索和地理空间查询）
  - 高可靠性
  - 自动伸缩架构
  - 支持多存储引擎

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## 安装

MongoDB有2个版本：

- `Community Edition` = 社区版 = 免费版
- `Enterprise Edition` = 企业版 = 收费版

下面主要介绍免费的社区版本：

MongoDB支持多种操作系统和平台，对应安装方式可参考：

- Linux
  - 各种发行版
    - [Red Hat / CentOS](#)
    - [Ubuntu](#)
    - [Debian](#)
    - [SUSE](#)
    - [Amazon Linux](#)
- [macOS](#)
- [Windows](#)

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# Mac中安装MongoDB

接下来详细介绍Mac中如何安装MongoDB

目前免费的Community社区版MongoDB最新版是：v4.2

Mac中安装最新版MongoDB 4.2 community社区版方式：

```
brew install mongodb-community  
brew install mongodb-community-shell
```

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# 基本使用

安装好了MongoDB后，接着就是去搞清楚如何去操作MongoDB。

使用MongoDB的基本逻辑都是：

- 启动MongoDB的服务端
- 使用某个Client去操作MongoDB
  - 根据类型分，常见Client有3种方式
    - 命令行
      - MongoDB自带：`mongo shell`
      - 提供了一个最基础的操作数据库的方式
    - GUI图形界面工具
      - 通过图形界面工具去查看和操作数据会更加直观和方便
      - 如 `MongoDB Compass`、`Robot 3T` 等
    - API
      - 用各种语言的代码，通过API操作数据库
      - 如 `Python`、`Java` 等

接下来分别去介绍MongoDB的服务器和客户端。

## 基本概念

MongoDB中的一些概念和术语的含义，可以通过和SQL对比去理解：

SQL术语和概念	MongoDB术语概念	解释和说明
database	database	数据库
table	collection	数据库表 / 集合
row	document	数据记录行 / 文档
column	field	数据字段 / 域
index	index	索引
table joins		表连接，MongoDB不支持
primary key	primary key	主键，MongoDB自动将 <code>_id</code> 作为主键

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## MongoDB的Server端

### 启动本地MongoDB服务

- 对于普通安装的MongoDB

直接在终端中运行：

```
mongod
```

- 对于安装的是mongodb-community

如果Mac中安装的MongoDB是 `mongodb-community`，那么用：

```
brew services start mongodb-community
```

以及，关于MongoDB服务端的其他常见管理方式有：

- 启动：`brew services start mongodb-community`
- 停止：`brew services stop mongodb-community`
- 重启：`brew services restart mongodb-community`
- 查看状态：
  - `brew services list`
    - 如何确定已运行：看到 `mongodb-community` 是 `started`
  - 用 `ps`
    - `ps -ef | grep mongod`
    - `ps aux | grep mongod`
      - 》有输出 `mongod`

## 配置

典型的MongoDB的服务端文件是：

```
/etc/rc.d/init.d/mongod
```

而其中核心配置是：

```
CONFIGFILE="/etc/mongod.conf"
OPTIONS=" -f $CONFIGFILE"
mongod=${MONGOD-/usr/bin/mongod}
MONGO_USER mongod
MONGO_GROUP mongod
```

对应配置文件是：

```
/etc/mongod.conf
```

内部核心参数是：

```
# Where and how to store data.  
storage:  
  dbPath: /var/lib/mongo
```

表示数据库存放位置是： /var/lib/mongo

## 启动远程服务器中的MongoDB服务

- 方案1：切换到mongo用户再去启动

如果是通过SSH连接的远程服务器中：

mongod的服务，是作为mongod的组和用户，去在开机时启动的，可以正常启动的话

那么自己用ssh作为root用户登录进来后，是root用户，是无法启动属于 mongod:mongod 的服务mongod

在当前登录用户root的情况下，换用mongd的用户去，启动mongod：

```
sudo -u mongod mongod -f /etc/mongod.conf
```

才可以。

- 方案2：用systemctl或service去管理mongod

如果本身已有服务可以管理mongod，则可以通过服务管理去启动：

```
systemctl restart mongod
```

等价于：

```
service mongod restart
```

## MongoDB的Client端

下面介绍，在启动了MongoDB的服务端之后，如何通过客户端，主要指的是各种语言和工具，去使用MongoDB。

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## 命令行shell

### 数据库和用户

切换到想要进入的数据库

```
use dbToSwitch
```

举例：

```
> use log  
switched to db log
```

确认当前所在是哪个数据库

语法：

```
db
```

举例：

```
> db  
admin
```

和

```
> db  
log
```

### 新建用户

在创建新用户之前，先要用有权限的用户，比如 `admin` 登录进去，才能有权限创建新用户

注：此处之前已创建过 `admin` 超级用户，所以先去登录进入

```
mongo --host localhost --port 32018 -u root -p P@w --authenticationDatabase admin
```

然后再去给还没创建的新数据库去创建新用户

需要先去切换到对应的（虽然此时还不存在的）新的数据库：

```
use newDbName
```

然后才能（在当前数据库下）创建新用户：

```
db.createUser({  
  user: "newUserName",  
  pwd: "yourPassword",  
  roles: [ { role: "dbOwner", db: "newDbName" } ]  
})
```

然后可以确认一下是否创建成功：

```
show users
```

即可看到新创建的用户。

举例：想要给新的暂时还不存在的数据库log中创建用户log

具体过程是：

```
> use log  
switched to db log  
> db.createUser({  
...   user: "log",  
...   pwd: "NL2@18Log",  
...   roles: [ { role: "dbOwner", db: "log" } ]  
... })  
Successfully added user: {  
  "user" : "log",  
  "roles" : [  
    {  
      "role" : "dbOwner",  
      "db" : "log"  
    }  
  ]  
}  
> show users  
{  
  "_id" : "log.log",  
  "user" : "log",  
  "db" : "log",  
  "roles" : [  
    {  
      "role" : "dbOwner",  
      "db" : "log"  
    }  
  ]  
}
```

举例：清空旧用户创建新用户

查看（当前数据库的）用户：

```
show users;
```

## 举例

```
> use admin
switched to db admin
> show users
{
    "_id" : "admin.root",
    "user" : "root",
    "db" : "admin",
    "roles" : [
        {
            "role" : "root",
            "db" : "admin"
        }
    ]
}
> use gridfs
```

创建用户：

- 切换到amind数据库
- 清除掉admin的之前其他用户
- 创建一个叫root的，角色是root的用户（拥有超级管理员，操作任意其他数据库的权限）

```
> use admin
switched to db admin
> db.runCommand({dropAllUsersFromDatabase: 1})
{
    "n" : 1,
    "ok" : 1
}
> db.createUser({
    ...
    user: "root",
    ...
    pwd: "pwd",
    ...
    roles: [ { role: "root", db: "admin" } ]
    ...
})
Successfully added user: {
    "user" : "root",
    "roles" : [
        {
            "role" : "root",
            "db" : "admin"
        }
    ]
}
> show users
{
    "_id" : "admin.root",
    "user" : "root",
    "db" : "admin",
    "roles" : [
        {
            "role" : "root",
            "db" : "admin"
        }
    ]
}
```

```
        "role" : "root",
        "db" : "admin"
    }
]
}
```

坑：创建用户时注意不要在admin数据库中创建

如果不小心是在最开始的admin中去用db.createUser新建用户，则实际上新建的用户只是属于admin数据的。

可以用admin账号登录后，通过如下命令看到：

```
> use admin
switched to db admin
> show users
{
  "_id" : "admin.root",
  "user" : "root",
  "db" : "admin",
  "roles" : [
    {
      "role" : "root",
      "db" : "admin"
    }
  ]
}
{
  "_id" : "admin.log",
  "user" : "log",
  "db" : "admin",
  "roles" : [
    {
      "role" : "dbOwner",
      "db" : "log"
    }
  ]
}
```

所以要切换到对应新数据库中，再去创建才可以。

## 查看当前用户

```
show users
```

举例：

```
> show users
{
  "_id" : "admin.root",
```

```
        "user" : "root",
        "db" : "admin",
        "roles" : [
            {
                "role" : "root",
                "db" : "admin"
            }
        ]
    }
```

## 删除用户

语法:

```
db.dropUser("userToDelete")
```

举例:

```
> db.dropUser("log")
true
```

## 基本使用

### 查找数据

举例：从GridFS中找歌曲类型的文件

```
> db.fs.files.find({"metadata.resourceType": "song"}).limit(2).pretty()
{
    "_id" : ObjectId("5b21d3787f4d384d04543f6e"),
    "contentType" : "audio/x-ms-wma",
    "chunkSize" : 261120,
    "metadata" : {
        "song" : {
            "singers" : [ ],
            "fitAgeStart" : 2,
            "topics" : [
                "Fingerplay",
                "Animal",
                "Weather"
            ],
            "storybook" : {
                "publisher" : "",
                "isFiction" : "",
                "lexileIndex" : "",
                "awards" : "",
                "authors" : [ ],
                "titles" : [
                    "The Cat in the Hat"
                ]
            }
        }
    }
}
```

```

        "foreignCountry" : "",
    },
    "keywords" : {
        "fromName" : [
            "animal animal",
            "animal"
        ],
        "other" : [
            "Sun",
            "Rain",
            "water spout"
        ],
        "fromContent" : [ ]
    },
    "name" : "Animals, Animals",
    "resourceType" : "song",
    "mainActors" : [
        "Spider"
    ],
    "contentAbstract" : "",
    "isSeries" : true,
    "series" : {
        "number" : 1,
        "name" : "Wee Sing-Animals, Animals, Animals"
    },
    "fitAgeEnd" : 6,
    "fileInfo" : {
        "isAudio" : true,
        "contentType" : "audio/x-ms-wma",
        "name" : "Animals, Animals.wma",
        "suffix" : "wma"
    }
},
"filename" : "Animals, Animals.wma",
"length" : 2277430,
"uploadDate" : ISODate("2018-06-14T02:31:20.767Z"),
"md5" : "b334806c280cc37c4b873a8e2a2086cd"
}
{
    "_id" : ObjectId("5b21d3787f4d384d04543f78"),
    "contentType" : "audio/x-ms-wma",
    "chunkSize" : 261120,
    "metadata" : {
        "song" : {
            "singers" : [ ]
        },
        "fitAgeStart" : 2,
        "topics" : [
            "Fingerplay",
            "Family",
            "Others"
        ],
        "storybook" : {

```

```

        "publisher" : "",
        "isFiction" : "",
        "lexileIndex" : "",
        "awards" : "",
        "authors" : [ ],
        "foreignCountry" : ""
    },
    "keywords" : {
        "fromName" : [
            "old macdonald",
            "old Macdonald farm"
        ],
        "other" : [
            "knives",
            "forks",
            "mirror",
            "table",
            "looking glass",
            "cradle"
        ],
        "fromContent" : [ ]
    },
    "name" : "Old Macdonald Had a Farm",
    "resourceType" : "song",
    "mainActors" : [
        "mother",
        "baby"
    ],
    "contentAbstract" : "",
    "isSeries" : true,
    "series" : {
        "number" : 2,
        "name" : "Wee Sing-Animals, Animals, Animals"
    },
    "fitAgeEnd" : 6,
    "fileInfo" : {
        "isAudio" : true,
        "contentType" : "audio/x-ms-wma",
        "name" : "Old Macdonald Had a Farm.wma",
        "suffix" : "wma"
    }
},
"filename" : "Old Macdonald Had a Farm.wma",
"length" : 1924864,
"uploadDate" : ISODate("2018-06-14T02:31:21.192Z"),
"md5" : "a2b65c25d117d428beaa346b0b7e232f"
}

```

### 举例：统计歌曲类型文件总数

```
> db.fs.files.find({ "metadata.resourceType": "song", "metadata.fileInfo.suffix": "mp3" }).count()
```

```
378
> db.fs.files.find({"metadata.resourceType": "song", "metadata fileInfo.suffix": "wma"}).c
ount()
523
> db.fs.files.find({"metadata.resourceType": "song"}).count()
901
```

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## GUI工具

- MongoDB Compass

- Logo



- 特点

- 官方出品
    - 免费
    - 颜值高
    - 功能够用

- 截图

A screenshot of the MongoDB Compass application window. The left sidebar shows a tree view of a 'My Cluster' database with several databases listed: admin, temproles, tempusers, config, settings, local, and startup\_log. The main pane displays the 'Databases' tab with a table of database statistics. The table has columns: Database Name, Storage Size, Collections, and Indexes. The data is as follows:

Database Name	Storage Size	Collections	Indexes
admin	72.0KB	2	3
config	24.0KB	1	2
local	36.0KB	1	1
	805.5MB	7	7

- 官网

- [MongoDB Compass — MongoDB Compass stable](#)

- Robot 3T

- 旧称: Robomongo
  - Logo

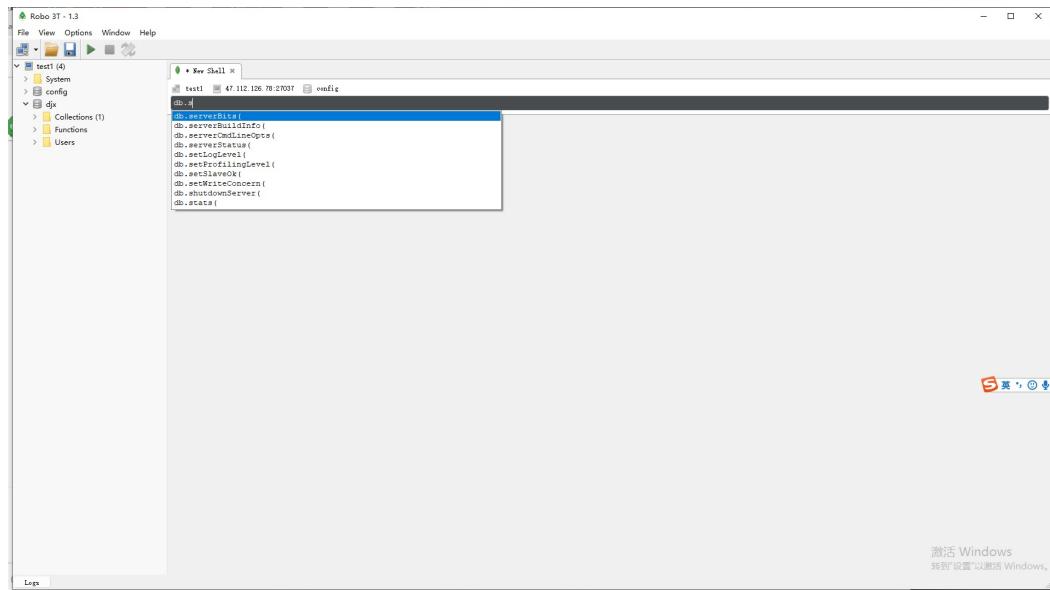


- 特点

- 免费

## ■ 功能够用

### ◦ 截图



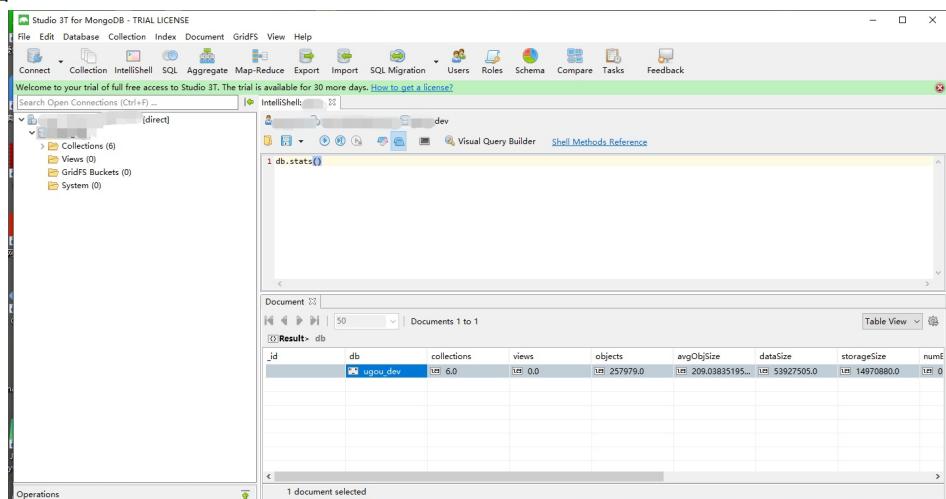
### ◦ 官网

■ [Robo 3T | Free, open-source MongoDB GUI \(formerly Robomongo\)](#)

### ◦ 同一家公司的另外一款收费版

#### ■ Studio 3T

##### ■ 截图



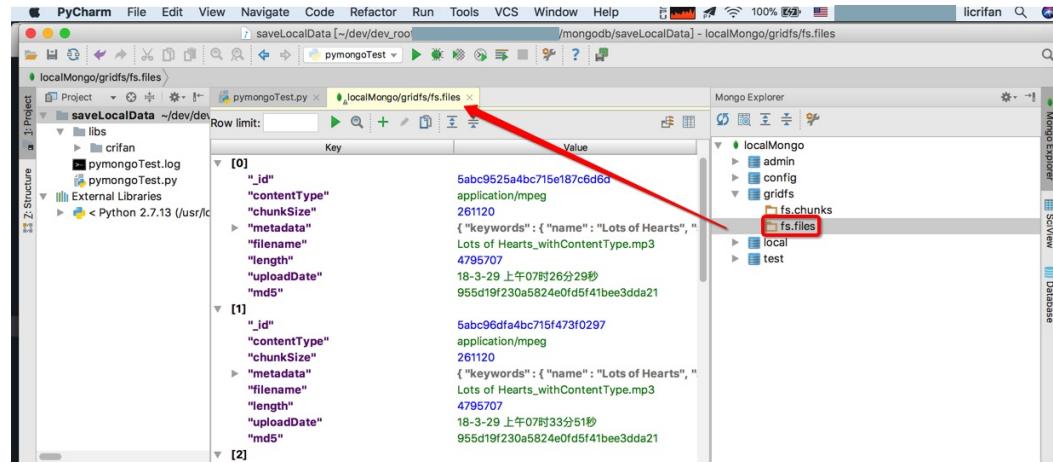
##### ■ 官网

■ [The Professional GUI, IDE & Client for MongoDB | Studio 3T](#)

### • mongo4idea

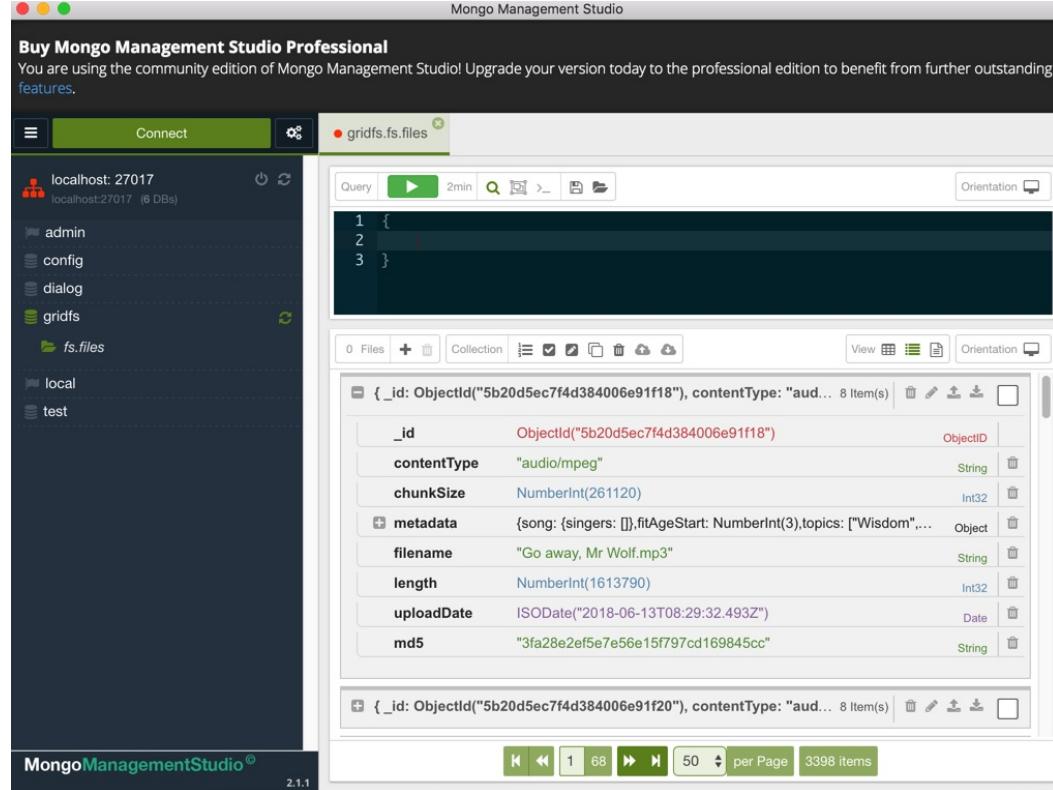
#### ◦ PyCharm的MongoDB的插件

#### ◦ 截图



- 官网
  - Github
    - [dboissier/mongo4idea: MongoDB integration in IntelliJ](#)
- MMS = Mongo Management Studio

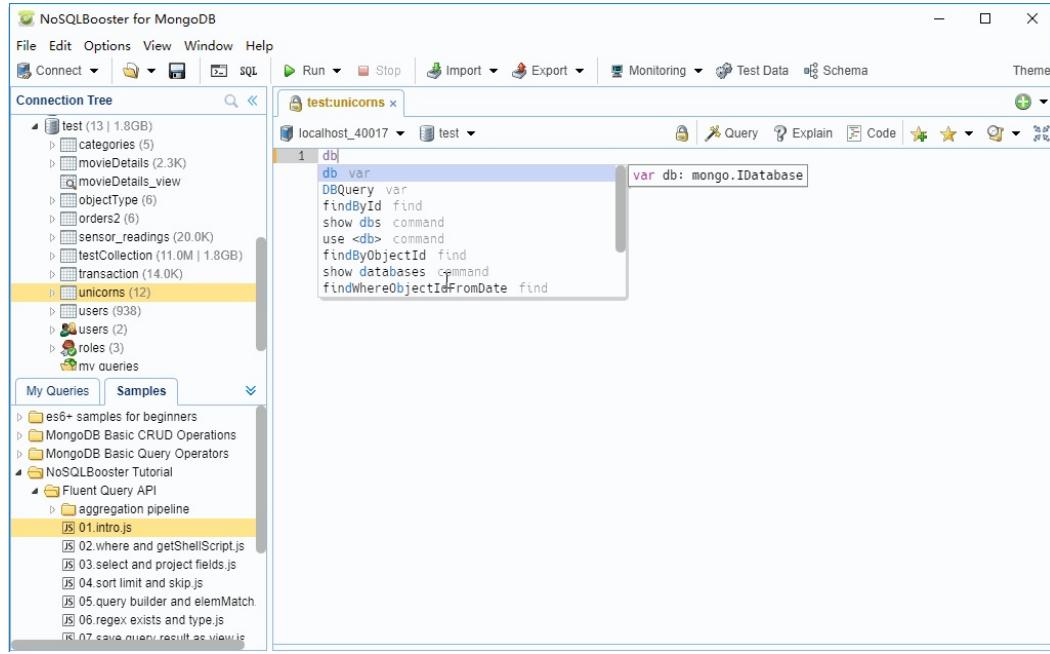
- 截图



- 特点
  - 号称支持 GridFS
    - 但是支持的不完美
      - 不支持写入
- 官网
  - [Mongo Management Studio - the professional MongoDB GUI](#)
- NoSQLBooster
  - 有免费版

- 也有收费版

- 截图



- 其他

- VSCode 支持 MongoDB

## 部分对比

### Robot 3T vs Studio 3T

- Studio 3T
  - Migrate databases & relations between SQL & MongoDB
  - Auto-complete queries with IntelliShell
  - Drag & drop fields to visually build queries
  - Use SQL to query MongoDB
  - Build aggregation queries stage by stage
  - Generate driver code in 6 languages
  - Automate repetitive MongoDB tasks like imports
  - And so much more...
- Robo 3T
  - For simple tasks
  - Embedded shell
  - Lightweight & fun



## MongoDB Compass

TODO:

- 【已解决】MongoDB Compass中如何快速高效地刷新数据

## 下载和安装MongoDB Compass

根据官网介绍

[Download and Install Compass — MongoDB Compass stable](#)

去下载页面

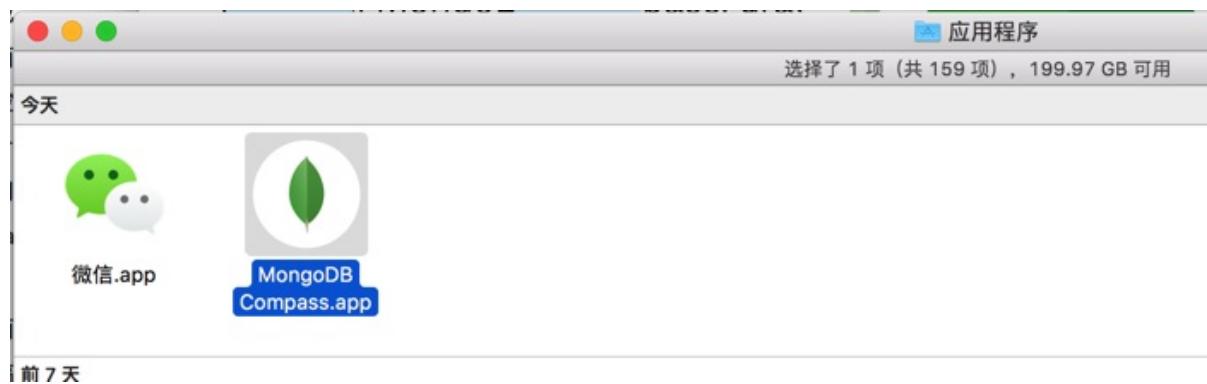
[Compass | MongoDB](#)

下载安装包

比如Mac的是

<https://downloads.mongodb.com/compass/mongodb-compass-1.14.5-darwin-x64.dmg>

下载后，安装即可。安装后是：



前 7 天

当前版本是： 1.14.5



## 实际使用效果

## 截图举例：

MongoDB Compass - localhost:27017/storybook.lexile

My Cluster

localhost:27017 STANDALONE

storybook.lexile

DOCUMENTS 29.9k TOTAL SIZE 83.9MB AVG. SIZE 1.2KB INDEXES 1 TOTAL SIZE 516.0KB AVG. SIZE 516.0KB

**Documents** Aggregations Schema Explain Plan Indexes Validation

**INSERT DOCUMENT** VIEW LIST TABLE

Displaying documents 1 - 20 of 29911

```
_id: ObjectId("5bf7a583bfaa44f87df75d34")
url: "https://fab.lexile.com/book/details/9780590353403/"
> authors: Array
  pages: 320
  isbn13: "9780590353403"
> ages: Object
  title: "Harry Potter and the Sorcerer's Stone"
  coverImgUrl: "https://images-na.ssl-images-amazon.com/images/P/0590353403.jpg"
  description: "After 10 miserable years with his aunt and uncle, Harry Potter is invi..."
  seriesName: "Harry Potter"
  language: "English"
  copyright: "1997"
> vocabularyWordsList: Array
  lexileMeasure: "B80L"
  seriesNumber: 0
> categoriesList: Array
> awardsList: Array
> recommendations: Array
```

storybook.main

DOCUMENTS 7.2k TOTAL SIZE 8.7M

Documents Aggregations Schema Explain Plan Indexes

**INSERT DOCUMENT** VIEW LIST TABLE

**FILTER** { field: 'value' }

**Tags:** Array

- 0: "Elementary School"
- 1: "Mischief"
- 2: "Superheroes and Action Figures"

**sourceRecommendations:** Array

- 0: Object
- 1: Object
- 2: Object

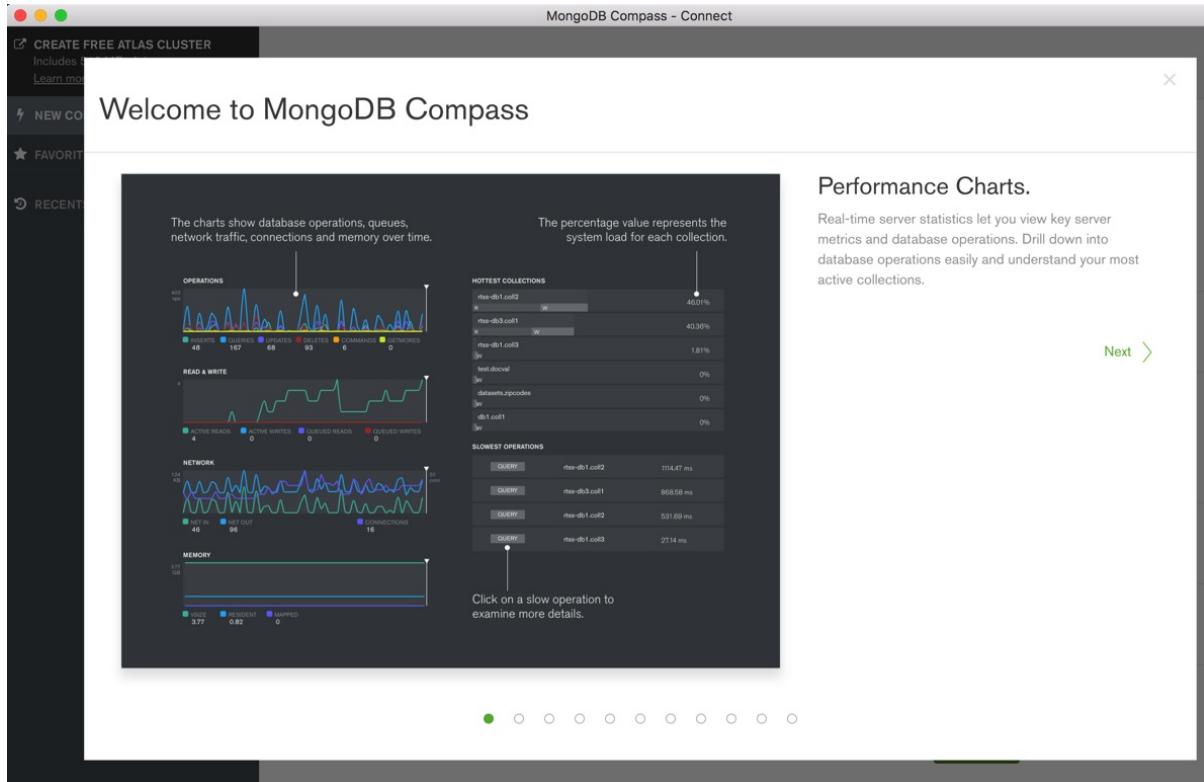
**recommendations:** Array

```
_id: ObjectId("5bd2b007bfaa442dbd39303f")
url: "https://www.scholastic.com/teachers/books/i-survived-the-attacks-of-se..."
title: "I Survived the Attacks of September 11, 2001"
description: "On the day that shocks the world, one boy just wants to find his dad. ..."
coverImgUrl: "https://www.scholastic.com/content5/media/products/03/9780545207003_mr..."
> author: Object
> series: Object
> grades: Array
> grading: Object
  genre: "Fiction"
  pages: 112
> isbn: Object
> tags: Array
> sourceRecommendations: Array
> recommendations: Array
```

## 功能特性介绍=引导页

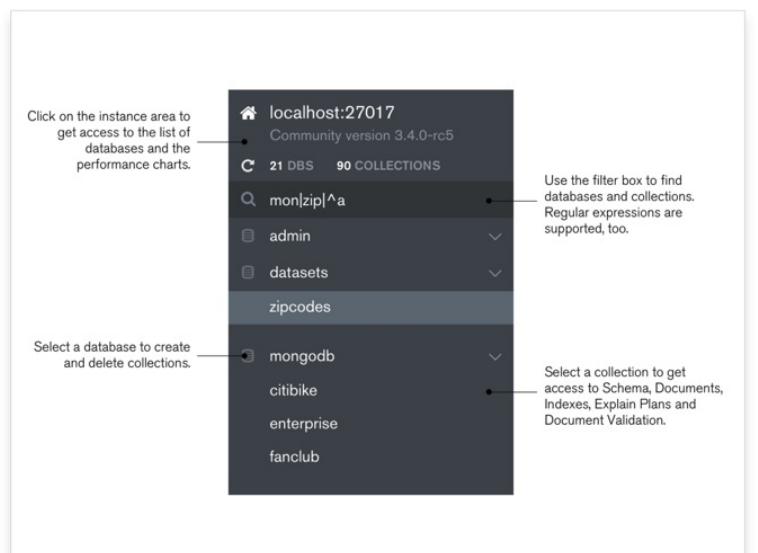
引导页有截图介绍其好用的功能和特点，供参考：

### Perfromance Charts



### Sidebar Redesigned

## Welcome to MongoDB Compass



### Sidebar. Redesigned.

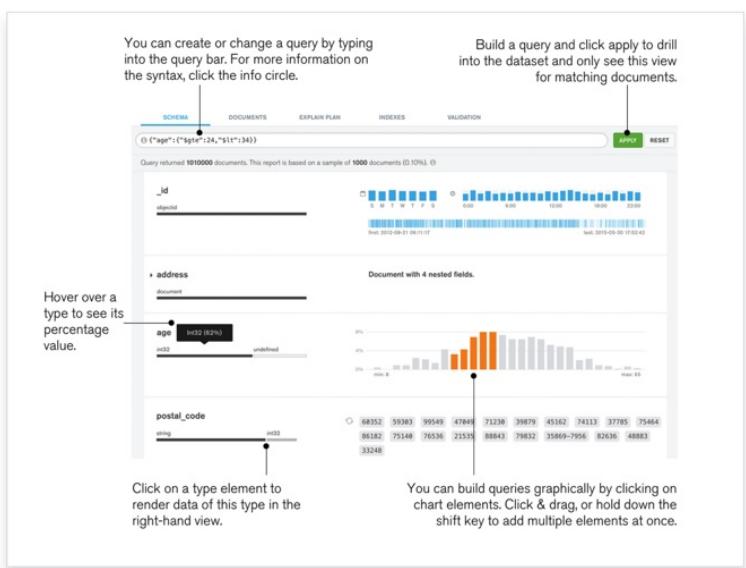
See with one glance what server you are connected to. Navigate between instance, database and collection level, with powerful filtering of your namespaces.

[Previous](#)

[Next](#)

## Visualize your Schema

### Welcome to MongoDB Compass



### Visualize your Schema.

MongoDB Compass analyzes your documents and displays rich structures within your collections through an intuitive GUI. It allows you to quickly visualize and explore your schema to understand the frequency, types and ranges of fields in your data set.

[Previous](#)

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## Build Geo Queries

## Welcome to MongoDB Compass

Use the controls to zoom in and out of the map. You can also use the scroll wheel on your mouse, or two-finger swipe up/down on the trackpad to zoom the map.

Click & drag with the mouse cursor to pan across the map.

Shift-click and drag the mouse cursor to open a selection circle. Once the circle is created, you can move and resize it with the red handles.

**Build Geo Queries.**

Visualize, understand, and work with your geospatial data. Point and click to construct sophisticated queries, execute them with the push of a button and Compass will display your results both graphically and as sets of JSON documents.

Previous Next

## Interactive Document Editor

### Welcome to MongoDB Compass

You can undo any modifications with the circular arrow icon.

new fields are green, changes are yellow, and deletions are red.

Click the pen icon in the top right corner of a document to enter edit mode.

Dismiss the changes with the Cancel button or send them to the server with the Update button.

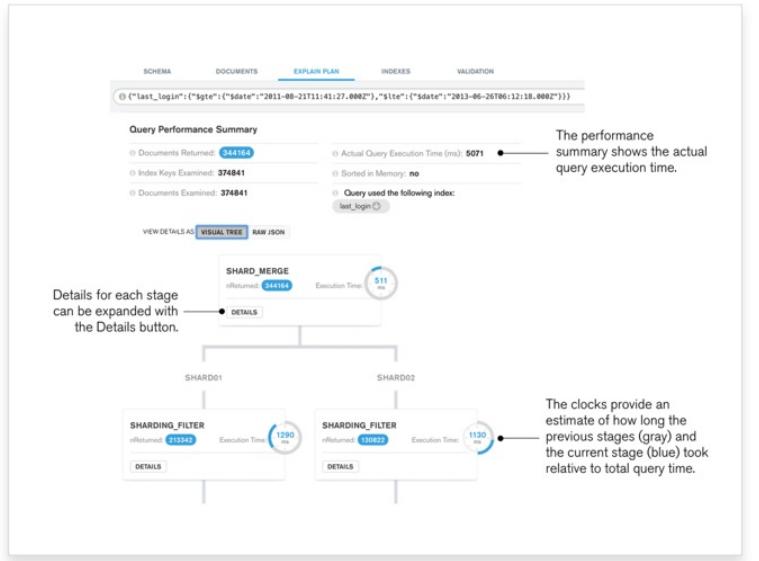
**Interactive Document Editor.**

Modify existing documents with greater confidence using the intuitive visual editor, or insert new documents and clone or delete existing ones in just a few clicks.

Previous Next

## Visual Explain Plains

## Welcome to MongoDB Compass



### Visual Explain Plans.

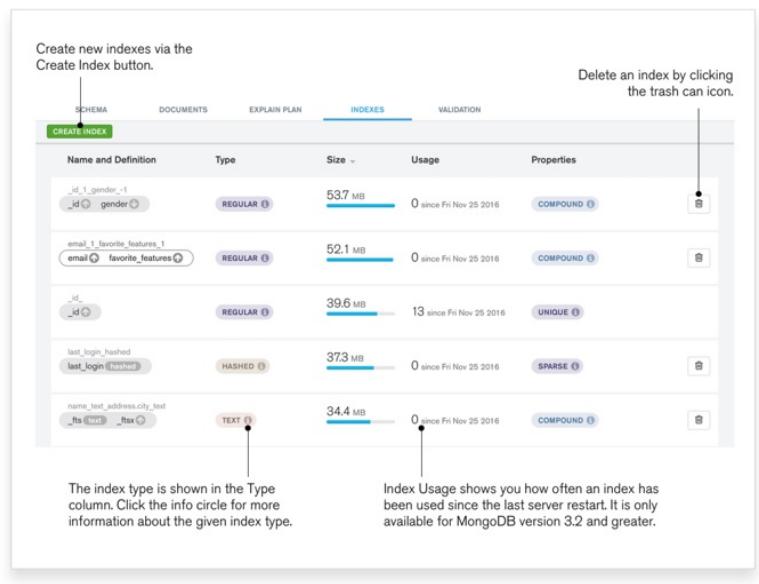
Know how queries are running through an easy-to-understand GUI that helps you identify and resolve performance issues.

[Previous](#)

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## Index Management

### Welcome to MongoDB Compass



### Index Management.

Understand the type and size of your indexes, their utilization and special properties. Add and remove indexes at the click of a button.

[Previous](#)

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## Document Validation

## Welcome to MongoDB Compass

Toggle between the Rule Builder and the JSON view. Complex validation rules may only be represented as JSON.

Modify the validation action and level. See the Document Validation section in the MongoDB documentation for more information.

validation action: WARNING validation level: OFF

Field Name	Rule	Nullable
email	REGEX .+@.+\.c[2]	<input type="checkbox"/>
name	EXISTS	<input type="checkbox"/>
age	TYPE BSON Type 32-BIT INTEGER	<input checked="" type="checkbox"/>

+ ADD RULE

Validation modified

If a rule is marked "Nullable", it is also fulfilled if the value is null or the field is not present.

### Document Validation.

Create and modify rules that validate your data using a simple point and click interface. CRUD support lets you fix data quality issues easily in individual documents.

< Previous

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## Improved CURD

Values are now validated inline based on their type.

```

1 _id: ObjectId('50317ff7fe4dce3731b54ab0')
2 favorite_feature : "Document Validation"
3 membership_status : "PENDING"
4 name : "Elle Harrison"
5 gender : "female"
6 age : 999999999 Value 999999999 is outside the valid Int32 range.
7 phone_no : "+17232403234"
8 last_login : July 29 2017
9 > address : Object
10 > last_position : Object
11 email : "sidewalkenforcer4@aim.com"

```

Improved type conversion: pick any type from the dropdown to convert a value to the chosen type.

ObjectID  
String  
String  
String  
String  
Int32  
String  
Date  
Object  
Object  
String

Update not permitted while document contains errors.

CANCEL UPDATE

Flexible date inputs: Compass tries to interpret the entered value as a date.

### Improved CRUD

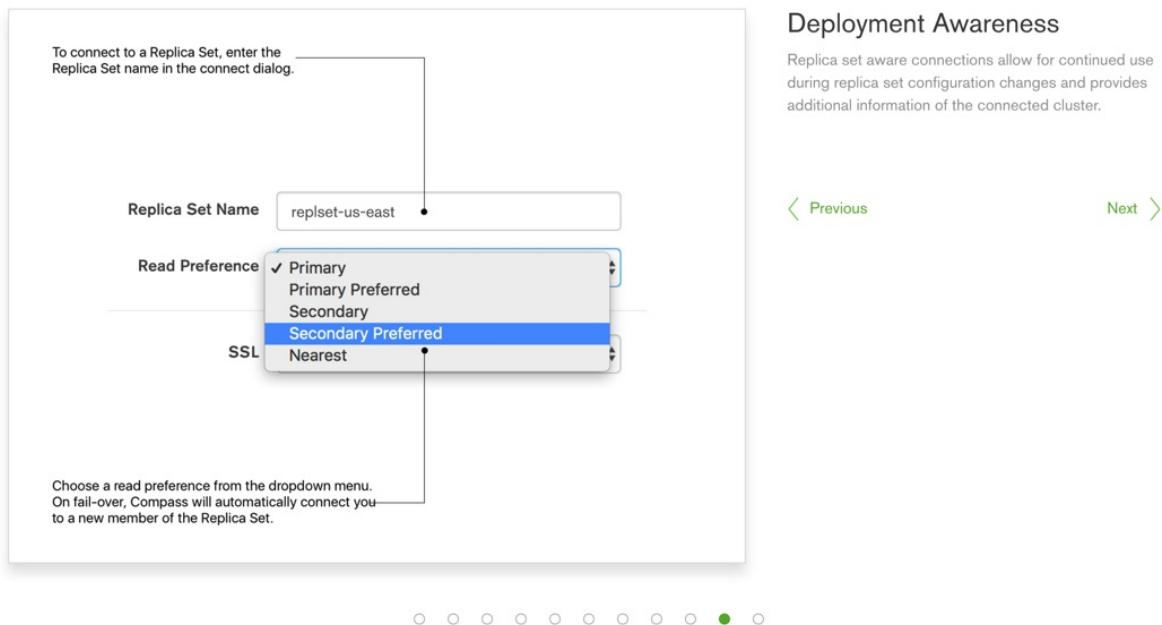
Better editing with validation of individual BSON types.

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Next >

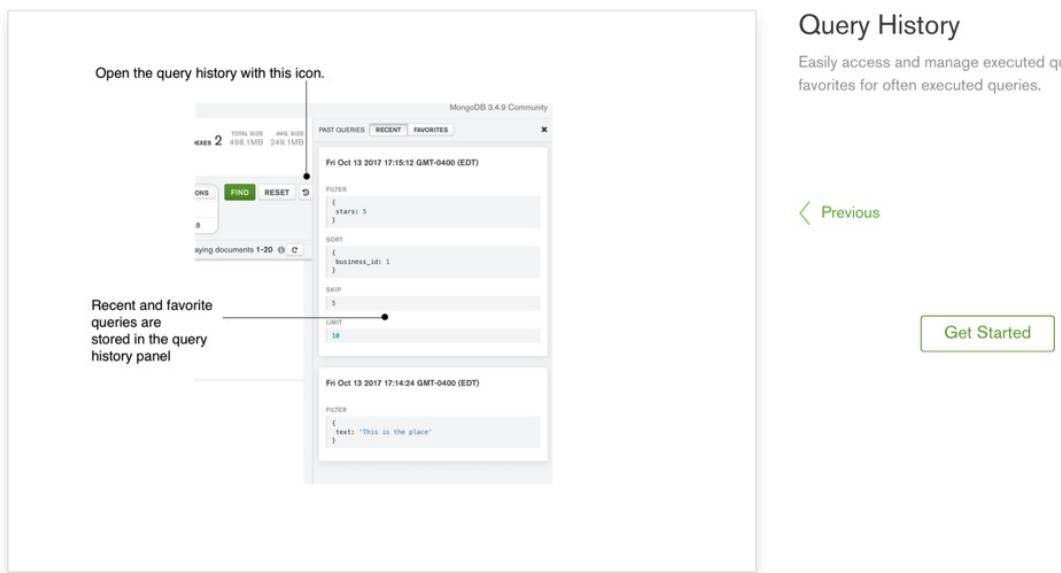
## Deployment Awareness

## Welcome to MongoDB Compass



## Query History

### Welcome to MongoDB Compass



好用之处

直接编辑内容

## 截图举例：

The screenshot shows the MongoDB Compass interface for the 'storybook.main' collection. The left sidebar lists databases and collections. The main panel displays a document with various fields. A red arrow points to the expand/collapse icon next to the first field, illustrating how fields can be collapsed or expanded.

```

1  _id: ObjectId("5bd7bd31bfaa44fe2c73736b")
2  url : "https://www.scholastic.com/teachers/books/adventures-of-captain-underpants-the-by-dav-pilkey/ "
3  title : "The Adventures of Captain Underpants "
4  : "George likes to write. Harold likes to draw. They figure all superheroes look like they're wearing underpants - and so a..." String
5  coverImgUrl : "https://www.scholastic.com/content5/media/products/88/9780590846288_mres.jpg "
6  > author :Object
7  > series :Object
8  > grades :Array
9  > grading :Object
10 > genre :"Fiction "
11 > pages :128
12 > isbn :Object
13 > tags :Array
14 > sourceRecommendations :Array
15 > 0 :Object
16 > 1 :Object
17 > 2 :Object
18 > url :"https://www.scholastic.com/teachers/books/how-not-to-start-third-grade-by-cathy-hapka "
19 > title :"How Not to Start Third Grade "
20 > source :"scholastic "
21 > id :"5bd7bf0bbfaa44fe2c73f111"
22 > recommendations :Array

```

字段可以很方便的折叠和展开

点击每条记录前面的箭头：

The screenshot shows the MongoDB Compass interface for the 'exercise.dialog' collection. The left sidebar lists databases and collections. The main panel displays a document with fields like \_id, topic, dialog\_index, title, contents, questions, vocabulary, and difficulty. A red arrow points to the expand/collapse icon next to the '\_id' field, indicating how to expand all fields.

```

_id: ObjectId("5c7f780ddc5486753efef052")
topic: 5795
dialog_index: "2.1.1"
title: "Finger family"
contents: Array
questions: Array
vocabulary: Array
difficulty: 1

```

即可展开所有字段：

MongoDB Compass - localhost:27017/exercise.dialog

localhost:27017 STANDALONE

## exercise.dialog

DOCUMENTS 1 TOTAL SIZE 554B

Documents Aggregations Schema Explain Plan Indexes

**FILTER { field: 'value' }**

**INSERT DOCUMENT** VIEW LIST TABLE

```
_id: ObjectId("5c7f780ddc5486753efef052")
topic: 5795
dialog_index: "2.1.1"
title: "Finger family"
contents: Array
  0: Object
    index: 0
    role_id: 0
    content: "Daddy finger, daddy finger, where are you? Here I am, here I am, how d..."
    audio: ObjectId("5c7f780ddc5486753efef050")
  1: Object
    index: 1
    role_id: 1
    content: "Hey, YY. What are you singing? Such a great song!"
    audio: ObjectId("5c7f780ddc5486753efef050")
questions: Array
  0: Object
    index: 0
    content: "How many people in your family?"
    answer: Object
      keyword: "five"
vocabulary: Array
  0: "daddy"
  1: "mommy"
  2: "brother"
  3: "sister"
difficulty: 1
```

再次点击，即可缩回。

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# 通过API操作MongoDB

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# 用Python通过API操作MongoDB

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## 基本操作

### 创建数据库 + 创建集合 + 写入数据

#### mongo shell

举例：

```
> use crifanDemo
switched to db crifanDemo
> db
crifanDemo
> db.crifanDemo.in
db.crifanDemo.initializeOrderedBulkOp( db.crifanDemo.insert(
db.crifanDemo.initializeUnorderedBulkOp( db.crifanDemo.insertMany(
> db.crifanDemo.insertOne({ "name": "crifan" });
{
    "acknowledged" : true,
    "insertedId" : ObjectId("5ecd08641d1e7cfaa2e1051f")
}
> db.crifanDemo.find()
db.crifanDemo.find() db.crifanDemo.findOne() db.crifanDemo.findOneAndReplace(
db.crifanDemo.findAndModify() db.crifanDemo.findOneAndDelete() db.crifanDemo.findOneAndUpdate(
> db.crifanDemo.find()
{ "_id" : ObjectId("5ecd08641d1e7cfaa2e1051f"), "name" : "crifan" }
> db.crifanDemo.insertOne({ "company": "fibodt" });
{
    "acknowledged" : true,
    "insertedId" : ObjectId("5ecd08831d1e7cfaa2e10520")
}
> db.crifanDemo.find()
{ "_id" : ObjectId("5ecd08641d1e7cfaa2e1051f"), "name" : "crifan" }
{ "_id" : ObjectId("5ecd08831d1e7cfaa2e10520"), "company" : "fibodt" }
> [
```

过程解释：

直接 use crifanDemo

```
> use crifanDemo
switched to db crifanDemo
```

即可创建新的数据库 crifanDemo

```
> db
crifanDemo
```

用 db 查看当前所在数据库

后续用：

```
> db.crifanDemo.insertOne({ "name": "crifan" });
{
    "acknowledged" : true,
    "insertedId" : ObjectId("5ecd08641d1e7cfaa2e1051f")
}
```

去真正写入数据，才会真正（自动）创建一个 `database`。

然后再去确认数据的确已经写入，可以用 `find` 去查找当前所有数据

在输入了 `db.crifanDemo.find`，再按 `Tab` 键，则可以自动匹配出相关命令：

```
> db.crifanDemo.find
db.crifanDemo.find(
  ndReplace(
    db.crifanDemo.findAndModify(
      db.crifanDemo.findOne(
        db.crifanDemo.findOneAndDelete(
          db.crifanDemo.findOneAndUpdate(
```

然后用 `find` 可以找出当前的所有数据：

```
> db.crifanDemo.find()
{ "_id" : ObjectId("5ecd08641d1e7cfaa2e1051f"), "name" : "crifan" }
```

再去新增一条数据：

```
> db.crifanDemo.insertOne({ "company" : "fibodt" });
{
  "acknowledged" : true,
  "insertedId" : ObjectId("5ecd08831d1e7cfaa2e10520")
}
```

再去 `find` 即可看到数据的确增加到2条了：

```
> db.crifanDemo.find()
{ "_id" : ObjectId("5ecd08641d1e7cfaa2e1051f"), "name" : "crifan" }
{ "_id" : ObjectId("5ecd08831d1e7cfaa2e10520"), "company" : "fibodt" }
```

`find` 也支持参数查找，比如：

```
> db.crifanDemo.find({ "name" : "crifan" })
{ "_id" : ObjectId("5ecd08641d1e7cfaa2e1051f"), "name" : "crifan" }
```

以及支持更多其他高级用法，比如搜索条件支持正则：

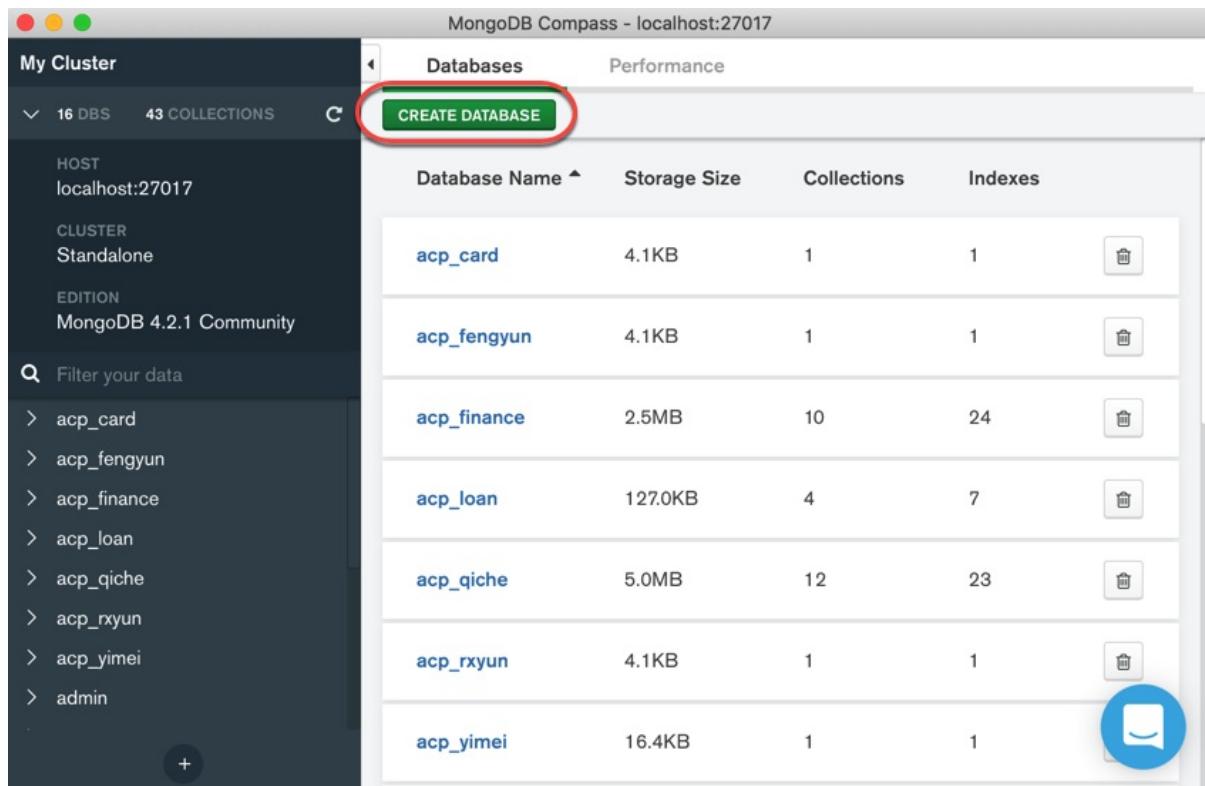
```
> db.crifanDemo.find({ "name" : {$regex: "cri"} })
{ "_id" : ObjectId("5ecd08641d1e7cfaa2e1051f"), "name" : "crifan" }
```

更多数据查询和用法，详见后面章节：

[高级搜索](#)

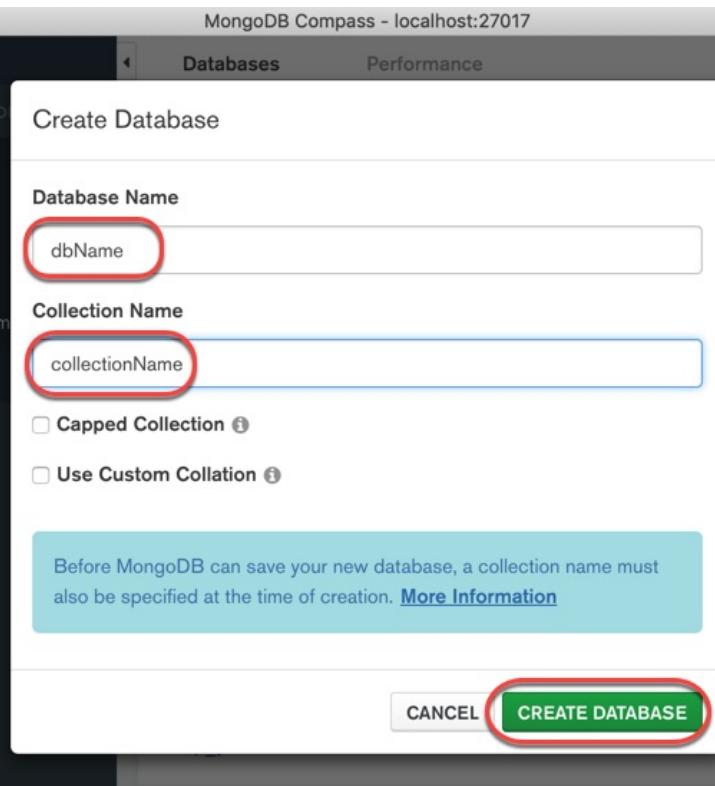
## MongoDB Compass

## 创建数据库和集合



The screenshot shows the MongoDB Compass interface with the 'My Cluster' sidebar on the left. The main area displays a table of databases. A red box highlights the green 'CREATE DATABASE' button at the top of the table.

Database Name	Storage Size	Collections	Indexes
acp_card	4.1KB	1	1
acp_fengyun	4.1KB	1	1
acp_finance	2.5MB	10	24
acp_loan	127.0KB	4	7
acp_qiche	5.0MB	12	23
acp_rxyun	4.1KB	1	1
acp_yimei	16.4KB	1	1

The screenshot shows the 'Create Database' dialog box. It contains fields for 'Database Name' (with 'dbName' highlighted) and 'Collection Name' (with 'collectionName' highlighted). Below these are two checkboxes: 'Capped Collection' and 'Use Custom Collation'. A note at the bottom states: 'Before MongoDB can save your new database, a collection name must also be specified at the time of creation.' A red box highlights the green 'CREATE DATABASE' button at the bottom right of the dialog.

The screenshot shows two instances of the MongoDB Compass interface. The top window is titled "MongoDB Compass - localhost:27017" and displays the "Databases" tab. It lists 16 databases with their sizes and document counts. One database, "dbName", is highlighted with a red circle. The bottom window is also titled "MongoDB Compass - localhost:27017" and displays the "Collections" tab for the "dbName" database. It lists one collection named "collectionName" with 0 documents. Both windows have a sidebar on the left showing a list of other databases and collections.

Databases

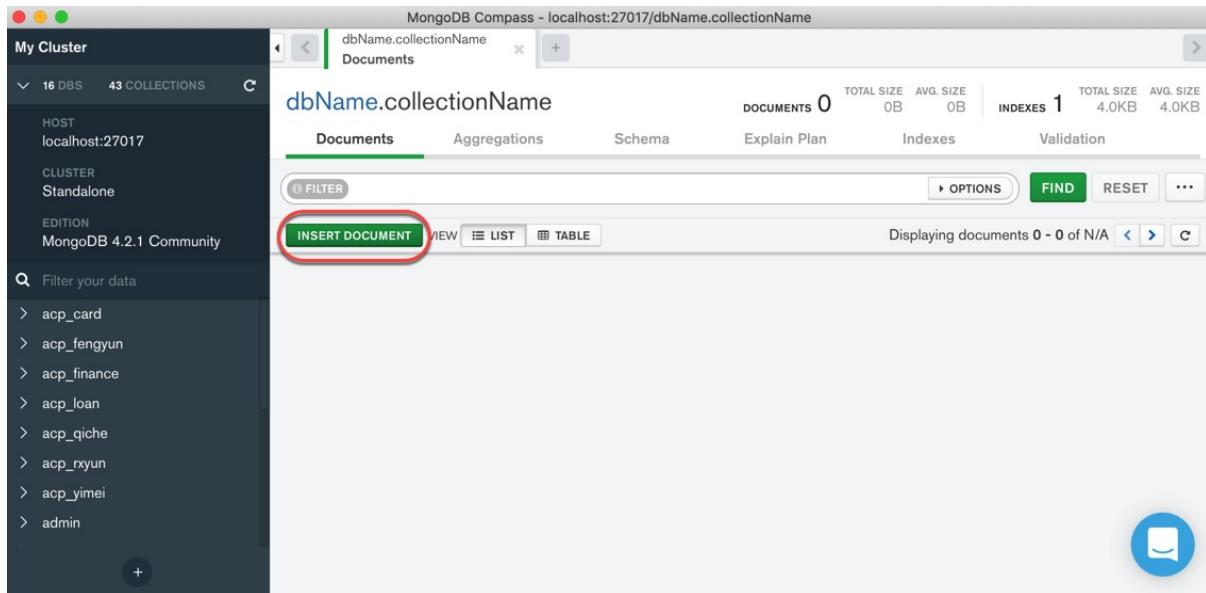
Name	Size	Documents	Indexes	Operations
admin	69.6KB	0	3	
config	36.9KB	0	2	
crifanDemo	36.9KB	1	1	
dbName	4.1KB	1	1	
education	16.4KB	1	1	
finance	438.3KB	2	2	
forecast	259.1MB	6	11	
local	73.7KB	1	1	

Collections

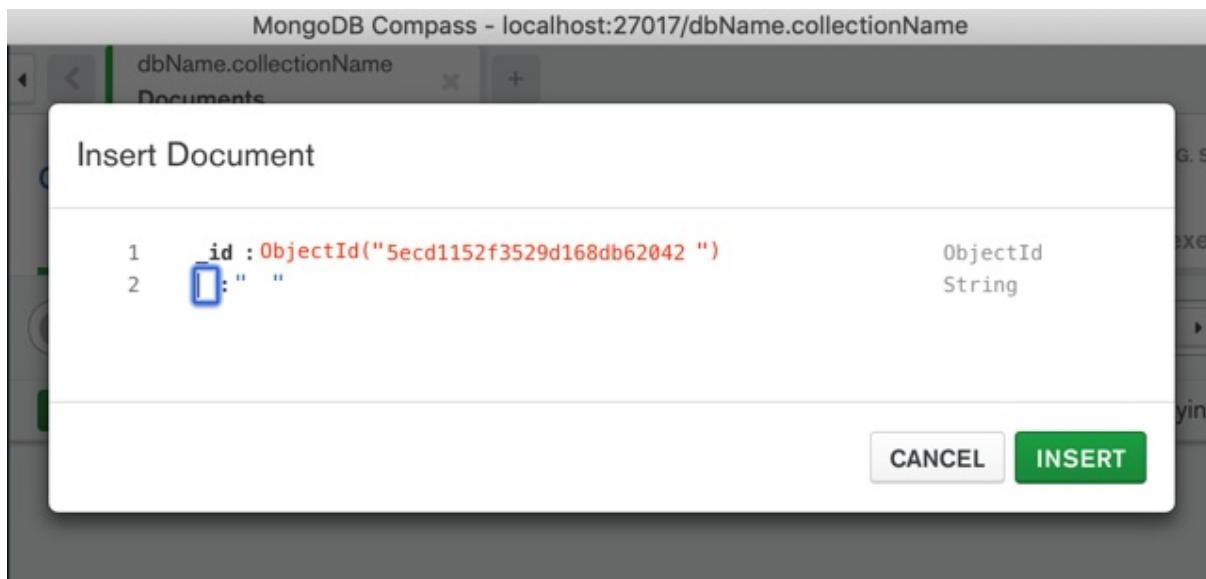
Name	Documents	Avg. Document Size	Total Document Size	Num. Indexes	Total Index Size	Properties
collectionName	0	-	0.0 B	1	4.1 KB	

## 写入数据

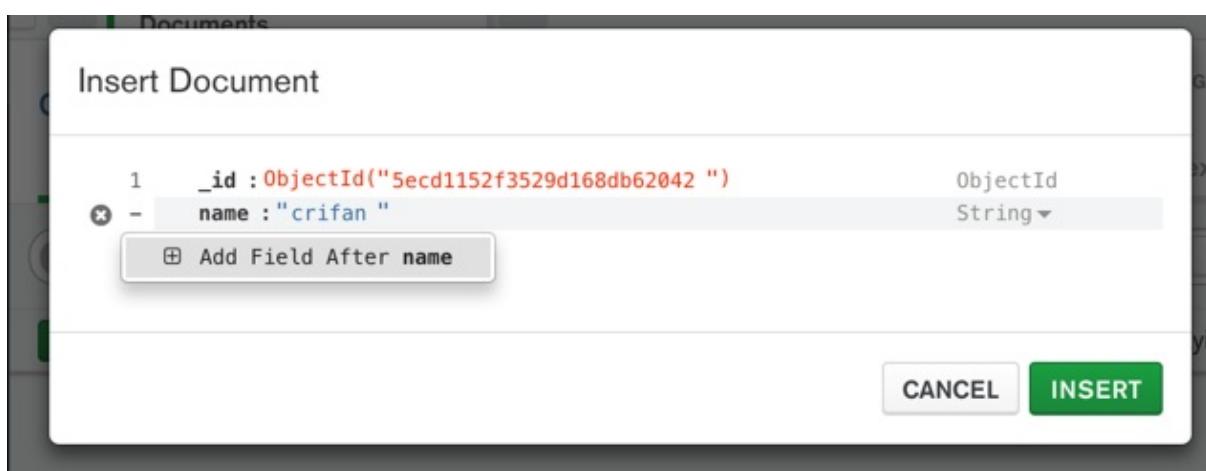
点击 **INSERT DOCUMENT** :



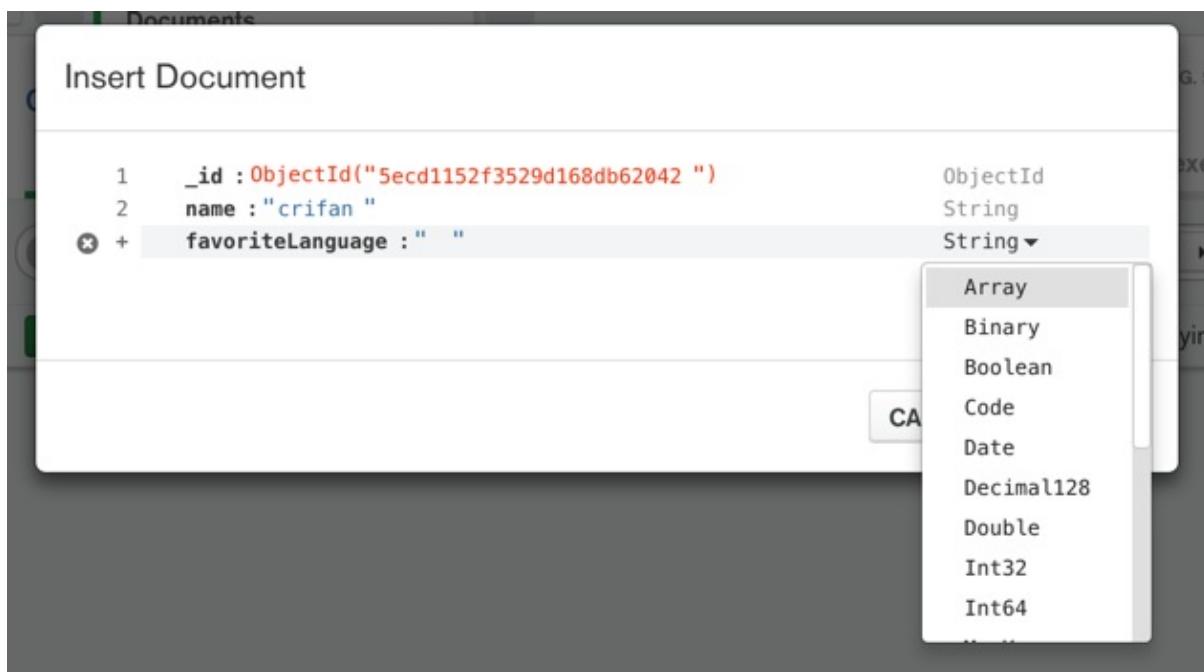
会出现编辑数据的弹框：



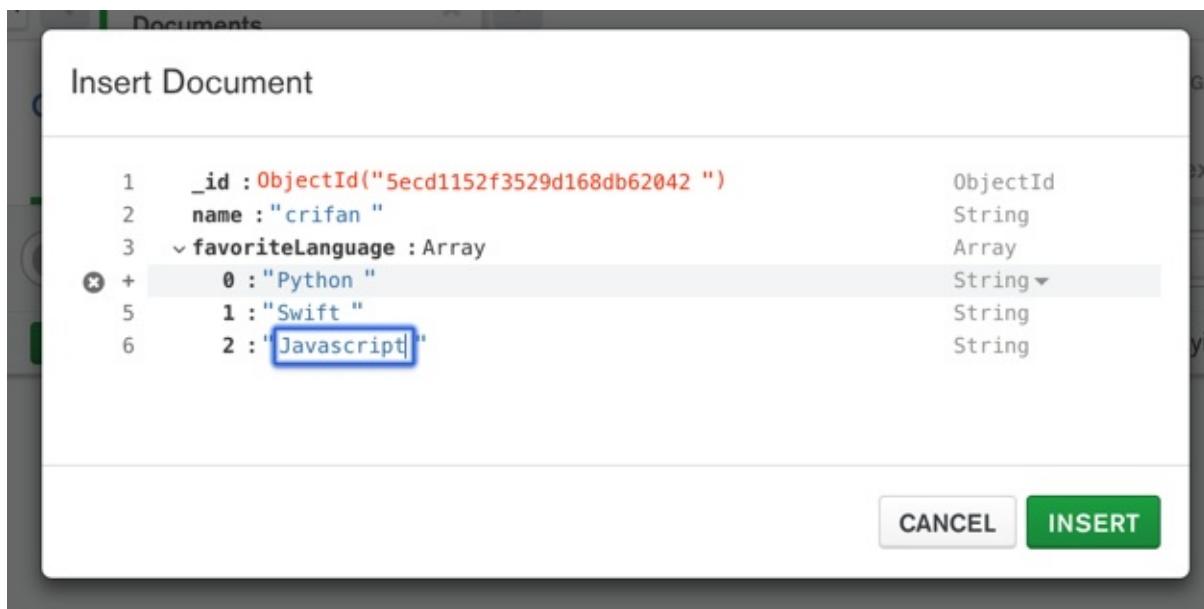
输入对应的数据的 key 和 value，如果想要新增字段，则点击左边的 加号 ，会弹出 Add Field after xxx :



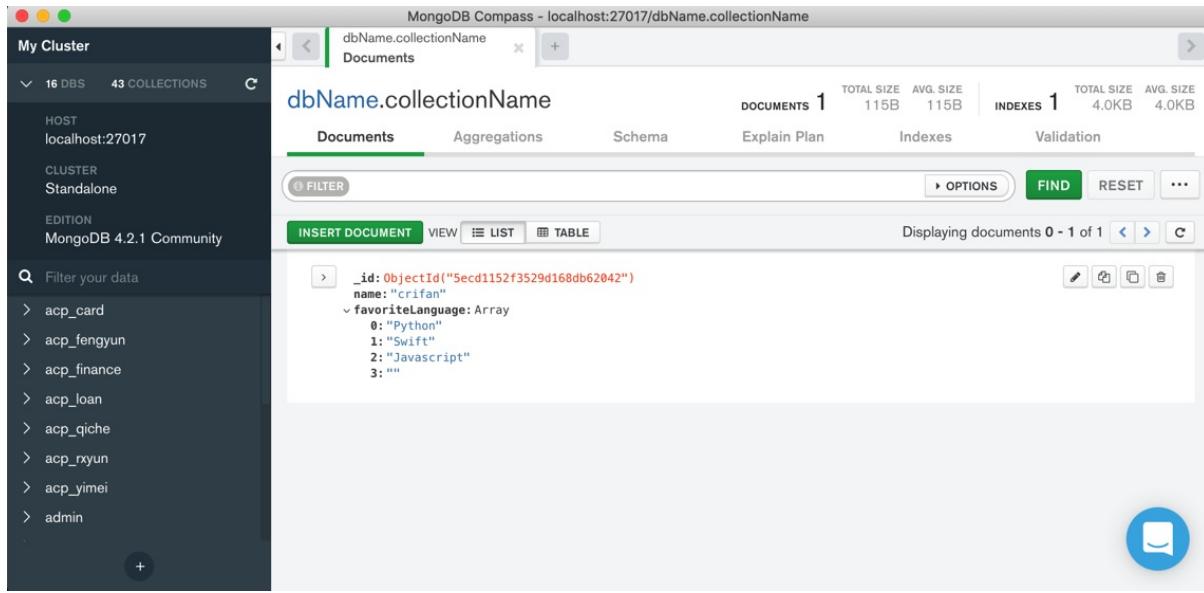
数据的类型，除了默认的 String，还支持其他类型，比如 Array 数组：



分别输入数组的每项的值后，点击 INSERT：

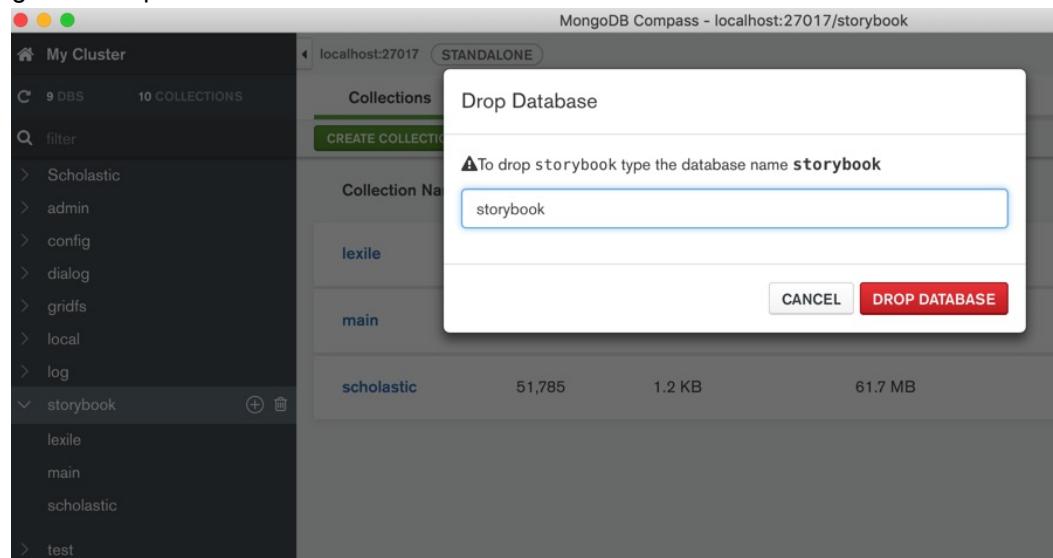


即可返回列表页，看到刚插入的数据：



## 删除数据库

- GUI工具
  - MongoDB Compass



- 命令行

```
> db.dropDatabase()
{ "dropped" : "storybook", "ok" : 1 }
```

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## 高级用法

此处介绍一些，相对来说属于高级的， MongoDB的用法。

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## IP限制

有时候为了安全，需要限定只有某个或某些IP才可以访问自己的（远端）MongoDB数据库。

这时候，就可以用上IP限制的功能了。

举例：

编辑配置文件 `vi /etc/mongod.conf`，改为：

```
bindIp: 127.0.0.1,112.4.64.141 # Listen to specific IP
```

即可允许除了本机外的别的固定IP的访问。

**添加了IP限制的mongod重启出错：Job for mongod.service failed because the control process exited with error code**

不过，可能会遇到，添加了IP限制后，mongod启动出错：

```
Job for mongod.service failed because the control process exited with error code
```

的原因是：

其实有多种多样，具体的情况，需要根据实际情况去找原因，再去解决。

其中，辅助的办法是：

参考提提示的：

```
Job for mongod.service failed because the control process exited with error code. See  
"systemctl status mongod.service" and "journalctl -xe" for details.
```

去运行：

```
journalctl -xe
```

去看看具体的错误。

比如此处的：

```
Unregistered Authentication Agent for unix-process:4637:8872553
```

但是后来证明，无法根据此现象找到根本原因。

只是看起来像是：

端口权限方面的问题，有些人是SELINUX限制了端口导致的，而我此处没有开启SELINU，所以不是这方面的问题。

而真正解决问题的办法是：

此处主要是去看log文件

-> 从中（先后多次）找到真正的具体的错误信息

-> 然后才能知道错误原因

-> 然后才得以解决：

(1) 错误：listen(): bind() failed errno:98 Address already in use for socket: 127.0.0.1:32018

办法：停止掉mongo后再重新启动：

- 如果和我一样，没有root用户密码，则：reboot重启服务器
- 有root密码：以mongod用户去停止mongo
  - sudo -u mongod systemctl stop mongod

(2) 错误：getaddrinfo("112.4.64.141") failed: Name or service not known

办法：确保bindIp中多个IP中间逗号分隔时，没有空格：

```
bindIp: 127.0.0.1,112.4.64.141
```

(3) 错误：WiredTiger (13) [1523341777:968015][1095:0x7fa3cf097dc0], file:WiredTiger.wt, connection: /var/lib/mongo/WiredTiger.turtle: handle-open: open: Permission denied

办法：确认

/var/lib/mongo

其下的所有的文件，包括此处的WiredTiger.turtle，对于此处的mongod用户，要有权限

-> 可以考虑把所有文件的owner所有者，改为此处mongo 服务对应的所属用户：mongod:mongod

-> 以及后续还有另外一个相关的：

```
/var/lib/mongo/journal/
```

(4) 错误：Failed to unlink socket file /tmp/mongodb-32018.sock errno:1 Operation not permitted

办法：

删除这个sock文件：

```
sudo rm /tmp/mongodb-32018.sock
```

后，重启mongod服务，或直接重启服务器-》启动服务器会去启动mongod服务的

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# 用户和权限

为了数据安全，可以针对同一个数据库，以及不同的内部的集合，创建和允许不同的用户和权限，去访问。

MongoDB支持 基于用户权限的访问控制= RBAC = Role-Based Access Control`

一个用户可以有一个或多个角色Role，决定了能访问哪个数据库，能进行什么操作

如何验证权限：

- 方式：启动mongod时加 --auth 参数
- 方式2：设置：[security.authorization](#)
  - 配置文件中去设置
    - security 的 authorization 为 enabled

在开启认证auth==开启访问控制之前，需要你在admin数据库中，创建一个是带有 userAdmin 或 userAdminAnyDatabase 权限的用户

-» 否则意味着你没有一个拥有管理权限的用户，就没法创建其他普通用户了

不过对于创建用户本身来说：在开启访问控制之前或者之后，都是可以的。

关于权限的详细解释如下：

- Authentication Database
  - 创建一个用户的时候，需要制定对应数据库的
    - 这个数据库就是该用户的Authentication Database
    - 不过一个用户的权限，可以不限定Authentication Database，只要针对别的数据库给了相应权限即可
  - 创建用户
    - 主要含义：增加一个用户，对于某个资源resource，允许某些操作action（就有了某些权限privilege）
      - resource:
        - 典型的只有一个db
        - 也可以针对其他的，比如collection:
          - { db: "products", collection: "inventory" }
      - 典型写法：
        - createUser
        - 其中参数：
          - role的参数：
            - 可以用系统内置的，比如：
              - read
              - readWrite
              - dbAdmin
              - dbOwner
              - userAdmin

- 也可以用用户自定义的role
- 在创建用户时没有指定对应role的话，可以后续用：grantRolesToUser去额外加上role
- 用户的唯一标识是：用户名+授权数据库
  - 换句话说：如果在创建用户时，两个用户名一样，但是授权数据库不同，也是不同的用户
  - 如果想要用一个用户对多个数据库都有权限，那么应该是：创建单个用户，带上对应角色role，而这个role是允许访问多个数据库的
- MongoDB中是把所有用户相关信息都保存到admin数据库中的system.users中了
  - 包括：用户名，密码，用户的授权数据库
  - 不建议直接操作该数据库，而建议（在mongo shell中）用用户管理命令，比如：
    - createUser
    - grantRolesToUser
    - usersInfo
    - 等等

## 认证Authentication和授权Authorization

官网总结：

Authentication verifies the identity of a user

Authorization determines the verified user's access to resources and operations

自己想到的比喻：

- Authentication=认证=识别用户（的身份）：是否是之前添加过（认识的）的用户，否则不让进
  - 就像要进去一间屋子，需要一把钥匙
  - 对于Mongo shell：
    - 需要提供：
      - 用户名username
      - 密码password
      - 对应的哪个数据库database
    - 对应着 mongo shell（或其他mongo API）的参数：
      - --username <username> , -u <username>
      - --password <password> , -p <password>
      - --authenticationDatabase <dbname>
    - 或者，先进去，再认证：
      - 先运行mongo，在shell里再去：
        - use xxxDb
        - db.auth("username", "password")
  - 而对于其他语言的Driver
    - Python
      - pymongo
        - MongoClient初始化时传递对应参数即可

```
mongoClient = MongoClient(
```

```
host "11.22.33.44",
port 27017,
username="usr",
password="pwd"
)
```

- 或者是用Mongo URI, 比如:

```
mongodb://usr:pwd@11.22.33.44:27017/dbName
```

- Authorization=授权=判断用户能干嘛: 针对哪个数据库, 有哪些操作权限
  - 就像进了一间屋子, 到底能进哪间房, 且每间房里只能允许能干什么事
    - 不能进别的房间, 进了允许进的房间后, 也不能干不允许干的事

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# 心得和总结

下面总结一些在MongoDB使用期间的心得和注意事项等内容。

先列出一些小的心得

## 导入数据之前，确保ID不能重复，否则会由于ID重复而无法覆盖

之前某次去恢复数据，故意没有删除本地之前已有（同样但是旧的）数据：

看看导入能否直接覆盖，结果由于ID重复而报错，覆盖失败：

```
- E11000 duplicate key error collection: storybook.main index: _id_ dup key: { : ObjectId('5bd7be33bfaa44fe2c73bda2') }

^C2018-12-06T11:02:12.531+0800    signal 'interrupt' received; attempting to shut down
2018-12-06T11:02:12.560+0800    error: multiple errors in bulk operation:
- E11000 duplicate key error collection: storybook.scholastic index: _id_ dup key: { : ObjectId('5bc71849bfaa4425b7ea8082') }
- E11000 duplicate key error collection: storybook.scholastic index: _id_ dup key: { : ObjectId('5bc7184dbfaa4425b7ea8083') }
- E11000 duplicate key error collection: storybook.scholastic index: _id_ dup key: { : ObjectId('5bc7184dbfaa4425b7ea8084') }
```



# PyMongo心得

此处整理Python语言操作MongoDB的常用的库 PyMongo 的一些使用心得。

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## 生成URI

在开发期间，可能会涉及到，从配置中生成MongoDB的URI

下面代码供参考使用

```
def generateMongoUri(host=None,
                      port=None,
                      isUseAuth=False,
                      username=None,
                      password=None,
                      authSource=None,
                      authMechanism=None):
    """generate mongodb uri"""
    mongoDbUri = ""

    if not host:
        # host = "127.0.0.0"
        host = "localhost"

    if not port:
        port = 27017

    mongoDbUri = "mongodb://{:s}:{:s}{}".format(
        host, \
        port
    )
    # 'mongodb://localhost:27017'
    # 'mongodb://ip:27017'

    if isUseAuth:
        mongoDbUri = "mongodb://{:s}{:@}{:s}:{:s}{}".format(
            quote_plus(username), \
            quote_plus(password), \
            host, \
            port \
        )
        print(mongoDbUri)

    if authSource:
        mongoDbUri += "/{:s}{}".format(authSource)
        print("mongoDbUri={:s}{}".format(mongoDbUri))

    if authMechanism:
        mongoDbUri += "?authMechanism={:s}{}".format(authMechanism)
        print("mongoDbUri={:s}{}".format(mongoDbUri))

    print("return mongoDbUri={:s}{}".format(mongoDbUri))
#mongodb://username:quoted_password@host:port/authSource?authMechanism=authMechanism
#mongodb://localhost:27017
```

```
return mongodbUri
```

调用举例：

```
from pymongo import MongoClient

mongoUri = generateMongoUri(
    host MONGODB_HOST,
    port=int(MONGODB_PORT),
    username MONGODB_USERNAME,
    password MONGODB_PASSWORD,
    authSource MONGODB_AUTH_SOURCE,
    authMechanism MONGODB_AUTH_MECHANISM,
)
mongoClient = MongoClient(mongoUri)
```

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## 插入新增记录

举例：

```
insertResult = questionCollection.insert_one(newQuestion)
newQuestionIdObj = insertResult.inserted_id
log.debug("newQuestionIdObj=%s", newQuestionIdObj)
```

类似的用Postman通过API调用效果：

The screenshot shows the Postman interface with the following details:

- Request Method:** POST
- Request URL:** {{evaluation\_host}}/question
- Request Body (Pretty JSON):**

```
1 {  
2   "audio_text": "Linda likes playing with her cat so much.",  
3   "checkpoint": [73, 83, "字母和单词"],  
4   "audio": "5c33111d12758809ff86787c",  
5   "sub_questions": [{  
6     "question_texts": [""],  
7     "options": [{  
8       "option_index": 1,  
9       "option_text": "Linda",  
10      "option_image": ""  
11    }, {  
12      "option_index": 2,  
13      "option_text": "Tina",  
14      "option_image": ""  
15    }, {  
16      "option_index": 3,  
17      "option_text": "Amada",  
18      "option_image": ""  
19    }]  
21 }.
```

- Response Status:** 200 OK
- Response Time:** 184927 ms
- Response Size:** 1.43 KB
- Response Body (Pretty JSON):**

```
1 {  
2   "code": 200,  
3   "data": {  
4     "_id": "5c4ff63abfaa44473dd4c066",  
5     "audio": "http://127.0.0.1:34800/audio/5c33111d12758809ff86787c/19.mp3",  
6     "audio_length": 3,  
7     "audio_text": "Linda likes playing with her cat so much.",  
8     "ave_answer_time": 10,  
9     "checkpoint": [  
10   ]  
11 }
```

插入后的数据在 MongoDB Compass 的显示效果：

**evaluation.question**

DOCUMENTS	875	TOTAL SIZE	657.1KB	AVG. SIZE	769B	INDEXES	1	TOTAL SIZE	20.0KB	AVG. SIZE	20.0KB
Documents	Aggregations	Schema	Explain Plan	Indexes	Validation						

**FILTER { field: 'value' }** **FIND**

**INSERT DOCUMENT** VIEW LIST TABLE Displaying documents 861 - 876 of 875 **OPTIONS**

```

_id: ObjectId("5c4ff63abfaa44473dd4c066")
audio_text: "Linda likes playing with her cat so much."
checkpoint: Array
  0: 73
  1: 83
  2: "字母和单词"
audio: ObjectId("5c33111d12758809ff86787c")
sub_questions: Array
  0: Object
    question_texts: Array
      0: ""
    options: Array
      0: Object
        option_index: 1
        option_text: "Linda"
        option_image: ""
      1: Object
        option_index: 2
        option_text: "Tina"
        option_image: ""
      2: Object
        option_index: 3
        option_text: "Amada"
        option_image: ""
    option_type: "text"
    correct_option: Array
      0: 1
stem_text: "_____ likes playing with her cat so much."
audio_length: 3
stem_type: "mix"
ave_answer_time: 10
major_type: "单选"
difficulty: 1.1
max_answer_time: 20
stem_image: ObjectId("5c32f6ae12758802476f7ce2")
question_number: 890

```

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## 设置时间范围等查询条件

代码：

```
import pymongo
import datetime

curTime = datetime.datetime.now()
# timeKeyName = "start_time"
timeKeyName = "finish_time"
earliestTime = curTime - datetime.timedelta(days = 180)
userEvaluations = evalCollection.find({
    "user_id": userId,
    timeKeyName: {
        "$gte": earliestTime,
        "$lte": curTime
    }
}).sort(timeKeyName, pymongo.DESCENDING).limit(20)
userEvaluationList = list(userEvaluations)
userEvaluationList.reverse()
historyList = []
for eachEvaluation in userEvaluationList:
    if "overall_level" in eachEvaluation:
        curTimeLevelDict = {
            "time": eachEvaluation[timeKeyName],
            "overall_level": eachEvaluation["overall_level"]
        }
        historyList.append(curTimeLevelDict)
log debug("historyList=%s", historyList)
```

实现了期望的逻辑：

- 去mongodb查询
  - 最早半年前，最晚当前时间
  - 结果中再去根据时间倒序
  - 然后再去取最多20个
    - 从而实现：最近半年，最多20个，只不过顺序是反的而已
- 对于时间倒序后的结果，再调换顺序

即可得到需要的：最近半年的，最多20个，按照时间升序排列

然后输出希望的结果：

The screenshot shows a REST client interface with three tabs at the top: "GET 获取验证码短信", "GET 用户", and "GET 获取用户历史报告". The third tab is selected. Below the tabs, there is a search bar with the URL: {{evaluation\_host}}/user/evaluation?userId=28&action=getHistoryReport. Underneath the URL, there is a table with two rows: "userId" (value: 28) and "action" (value: getHistoryReport). A "Send" button is visible to the right of the URL input.

Below the table, there are tabs for "Body", "Cookies", "Headers (5)", and "Test Results". The "Body" tab is selected, showing a JSON response with line numbers:

```
1 {  
2   "code": 200,  
3   "data": [  
4     {  
5       "overall_level": 1,  
6       "time": "Mon, 07 Jan 2019 14:52:52 GMT"  
7     },  
8     {  
9       "overall_level": 1,  
10      "time": "Thu, 10 Jan 2019 14:54:07 GMT"  
11    }  
12  ],  
13  "message": "get user evaluation info ok"  
14 }
```

At the bottom of the interface, status information is displayed: Status: 200 OK, Time: 2504 ms, Size: 432 B, with "Save" and "Download" buttons.

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# 备份和恢复

MongoDB数据库，支持导出数据到文件，也支持从数据库文件导入，对应着备份和恢复。

与之对应，MongoDB提供了两个成对的配套的工具：

- `mongodump` 和 `mongorestore`
- `mongoexport` 和 `mongoimport`

下面详细介绍一下区别和具体用法。

## mongoimport/mongoexport和mongodump/mongorestore的区别

- 背景知识
  - JSON vs BSON
    - MongoDB内部数据保存用BSON
    - 原因：JSON是BSON的子集
      - -> 部分数据类型无法用JSON保存
      - -> 所以如果导出为JSON格式，可能会丢失部分复杂的数据类型的数据

	mongoimport/mongoexport	mongodump/mongorestore
导出格式	JSON	BSON
主要用途	小规模的或部分的Mongo的数据的，测试期间的数据备份/恢复	简单且高效的 小型的MongoDB的数据的备份/恢复
额外说明	导出数据时使用严格模式 ( <code>strict mode representation= MongoDB Extended JSON</code> ) 仅支持UTF-8编码的数据	不适合备份/恢复 大型MongoDB数据库 默认是不拷贝local这个（特殊的）数据库
经验和结论	不支持普通导出单个db的所有的collection	支持普通导出单个db的所有的collection 建议：普通的，简单的，数据的备份和恢复，都还是用 <code>mongodump/mongorestore</code> 这套工具

- 其他相关
  - 如果是在线云平台部署的Mongo，备份/恢复可以使用
    - [MongoDB Atlas](#)
      - Fully Managed MongoDB, hosted on AWS, Azure, and GCP | MongoDB
  - 如果是 `replica sets`，备份/恢复可以使用：
    - [MongoDB Cloud Manager](#)
    - 或

- [Ops Manager](#)

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## mongodump 和 mongorestore

### mongodump备份

用法：

- 导出 本地MongoDB 的某表到当前文件夹
  - mongodump -d storybook -o .
- 导出 本地MongoDB 某表中某集合到当前文件夹，且指定host和port
  - mongodump -h 127.0.0.1 --port 27017 -d Scholastic -c Storybook -o .
- 导出 远程阿里云的MongoDB 某表中某集合到当前文件夹，且指定host和port，以及指定用户名和密码
  - mongodump --host dds-xxx.mongodb.rds.aliyuncs.com --port xxx --authenticationDatabase admin -u root -p xxx -d exercise -o .

参数解释：

- -d = --database : 数据库 Scholastic
- -c = --collection : 集合=表， Storybook
- --type : 默认为 json
  - 所以此处可以不传此参数，用默认值
- -o == --out : . 表示 当前文件夹

shell输出：

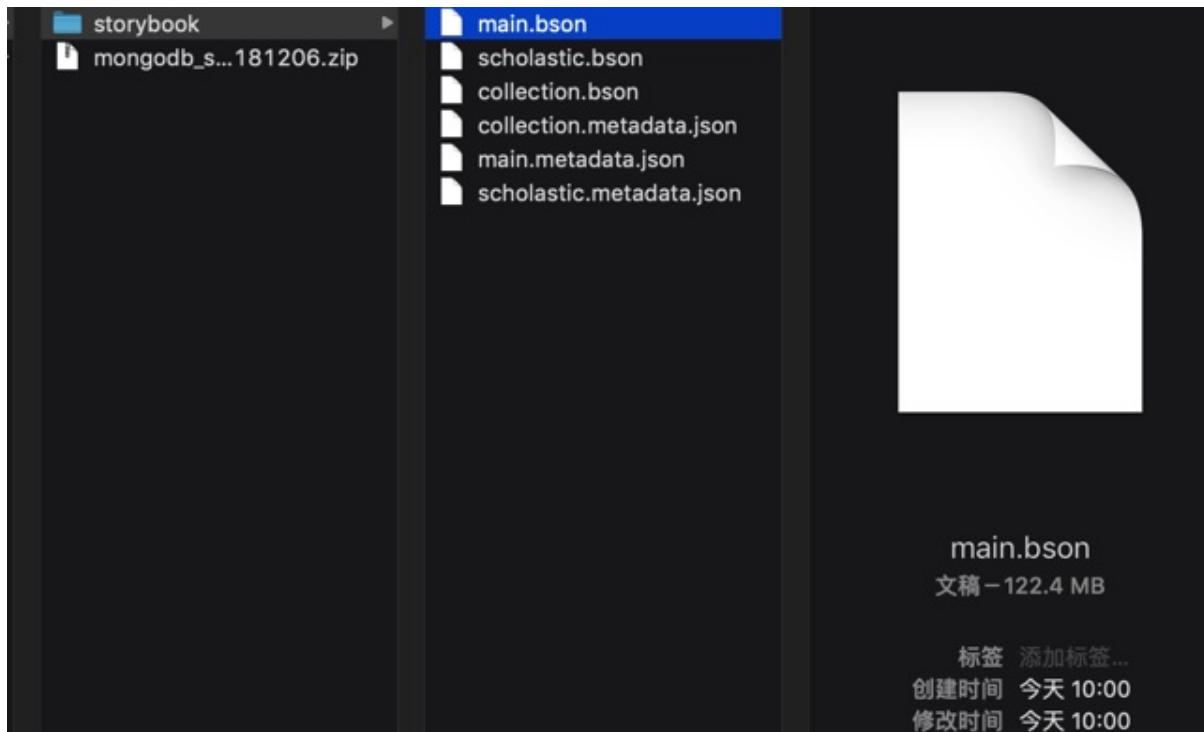
```
Scholastic
Storybook.bson # 数据文件, 60M
Storybook.metadata.json # 元数据, 130B
```

举例：

```
[root@xxx-general-01 exercise]# mongodump --host dds-xxx.mongodb.rds.aliyuncs.com --port xx --authenticationDatabase admin -u root -p xxx -d exercise -o .
2019-03-07T11:30:24.036+0800      writing exercise.storybook to
2019-03-07T11:30:24.037+0800      writing exercise.unit to
2019-03-07T11:30:24.037+0800      writing exercise.dialog to
2019-03-07T11:30:24.037+0800      writing exercise.audio.files to
2019-03-07T11:30:24.038+0800      done dumping exercise.storybook (2 documents)
2019-03-07T11:30:24.038+0800      writing exercise.audio.chunks to
2019-03-07T11:30:24.038+0800      done dumping exercise.unit (1 document)
2019-03-07T11:30:24.039+0800      done dumping exercise.audio.chunks (1 document)
2019-03-07T11:30:24.047+0800      done dumping exercise.audio.files (1 document)
2019-03-07T11:30:24.048+0800      done dumping exercise.dialog (1 document)
[root@xxx-general-01 exercise]# ll
total 4
drwxr-xr-x 2 root root 4096 Mar  7 11:30 exercise
[root@xxx-general-01 exercise]# ll exercise/
```

```
total 60
-rw-r--r-- 1 root root 20737 Mar  7 11:30 audio.chunks.bson
-rw-r--r-- 1 root root 195 Mar  7 11:30 audio.chunks.metadata.json
-rw-r--r-- 1 root root 249 Mar  7 11:30 audio.files.bson
-rw-r--r-- 1 root root 197 Mar  7 11:30 audio.files.metadata.json
-rw-r--r-- 1 root root 554 Mar  7 11:30 dialog.bson
-rw-r--r-- 1 root root 87 Mar  7 11:30 dialog.metadata.json
-rw-r--r-- 1 root root 834 Mar  7 11:30 storybook.bson
-rw-r--r-- 1 root root 90 Mar  7 11:30 storybook.metadata.json
-rw-r--r-- 1 root root 309 Mar  7 11:30 unit.bson
-rw-r--r-- 1 root root 85 Mar  7 11:30 unit.metadata.json
```

另附上，之前某次导出的数据的文件如下：



## mongodump语法help帮助

```
→ output git:(master) ✘ mongodump --help
Usage:
  mongodump <options>

  Export the content of a running server into .bson files.

  Specify a database with -d and a collection with -c to only dump that database or collection.

  See http://docs.mongodb.org/manual/reference/program/mongodump/ for more information.

general options:
  --help                               print usage
  --version                            print the tool version and exit
```

```

verbosity options:
  -v, --verbose <level>                                more detailed log output (incl
  use multiple times for more verbosity, e.g. -vvvvv, or specify a
  numeric value, e.g. --verbose N
)
  --quiet                                                 hide all log output

connection options:
  -h, --host <hostname>                                 mongodb host to connect to (se
  tname/host1,host2 for replica sets)
  --port <port>                                         server port (can also use --ho
  st hostname:port)

ssl options:
  --ssl                                                 connect to a mongod or mongos
  that has ssl enabled
  --sslCAFile <filename>                               the .pem file containing the r
 oot certificate chain from the certificate authority
  --sslPEMKeyFile <filename>                           the .pem file containing the c
ertificate and key
  --sslPEMKeyPassword <password>                      the password to decrypt the ss
lPEMKeyFile, if necessary
  --sslCRLFile <filename>                             the .pem file containing the c
ertificate revocation list
  --sslAllowInvalidCertificates                         bypass the validation for serv
er certificates
  --sslAllowInvalidHostnames                          bypass the validation for serv
er name
  --sslFIPSMode                                       use FIPS mode of the installed
openssl library

authentication options:
  -u, --username <username>                           username for authentication
  -p, --password <password>                            password for authentication
  --authenticationDatabase= <database-name>           database that holds the user's
credentials
  --authenticationMechanism=<mechanism>                authentication mechanism to us
e

namespace options:
  -d, --db=<database-name>                           database to use
  -c, --collection=<collection-name>                  collection to use

uri options:
  --uri=mongodb-uri                                    mongodb uri connection string

query options:
  -q, --query= <e.g., '{x:{$gt:1}}>                 query filter, as a JSON string
  --queryFile= <query filter (JSON)>                  path to a file containing a qu
ery filter (JSON)

```

```

--readPreference=<string>|<json>
               specify either a preference na
me or a preference json object

--forceTableScan
               force a table scan

output options:
-o, --out=<directory-path>
tdout (defaults to 'dump')
               output directory, or '-' for s
--gzip
n output with Gzip
               compress archive our collectio
--repair
damaged data files (not supported by all storage engines)
               try to recover documents from
--oplog
n-time snapshot
               use oplog for taking a point-i
--archive <file-path>
               dump as an archive to the spec
ified path. If flag is specified without a value, archive is written
               to stdout
--dumpDbUsersAndRoles
               dump user and role definitions
for the specified database
--excludeCollection <collection-name>
               collection to exclude from the
dump (may be specified multiple times to exclude additional
               collections)
--excludeCollectionsWithPrefix <collection-prefix>
               exclude all collections from t
he dump that have the given prefix (may be specified multiple times
               to exclude additional prefixes)

-j, --numParallelCollections
               number of collections to dump
in parallel (4 by default) (default: 4)
--viewsAsCollections
               dump views as normal collectio
ns with their produced data, omitting standard collections

```

## mongorestore恢复

用法：

- 从某个文件夹 导入某个表到 本地MongoDB
  - mongorestore -d exercise ./exercise
  - mongorestore -d evaluation ./evaluation
  - mongorestore -d storybook ./storybook
- 从某个文件夹 导入某个表 到 本地MongoDB, 且指定host和port
  - mongorestore -h localhost --port 32018 -u storybook -p pwd -d storybook ./storybook
- 从某个文件 导入某个表 到 MongoDB
  - mongorestore -d storybook -c lexile ./storybook/lexile.bson
    - 注：mongorestore从文件导入数据的话，不支持JSON文件，只支持BSON文件
    - 且是用mongodump导出的BSON文件

举例：

- 从某个目录， 导入整个database：

```

→ from_server ll
total 48
drwxr-xr-x 12 crifan staff 384B 3 7 11:30 exercise
-rw-r--r--@ 1 crifan staff 20K 3 7 11:32 exercise_290307.zip
→ from_server ll exercise
total 120
-rw-r--r-- 1 crifan staff 20K 3 7 11:30 audio.chunks.bson
-rw-r--r-- 1 crifan staff 195B 3 7 11:30 audio.chunks.metadata.json
-rw-r--r-- 1 crifan staff 249B 3 7 11:30 audio.files.bson
-rw-r--r-- 1 crifan staff 197B 3 7 11:30 audio.files.metadata.json
-rw-r--r-- 1 crifan staff 554B 3 7 11:30 dialog.bson
-rw-r--r-- 1 crifan staff 87B 3 7 11:30 dialog.metadata.json
-rw-r--r-- 1 crifan staff 834B 3 7 11:30 storybook.bson
-rw-r--r-- 1 crifan staff 90B 3 7 11:30 storybook.metadata.json
-rw-r--r-- 1 crifan staff 309B 3 7 11:30 unit.bson
-rw-r--r-- 1 crifan staff 85B 3 7 11:30 unit.metadata.json
→ from_server mongorestore -d exercise ./exercise
2019-03-07T11:51:15.303+0800    the --db and --collection args should only be used when re
storing from a BSON file. Other uses are deprecated and will not exist in the future; use
--nsInclude instead
2019-03-07T11:51:15.305+0800    building a list of collections to restore from exercise dir
2019-03-07T11:51:15.308+0800    reading metadata for exercise.audio.chunks from exercise/a
udio.chunks.metadata.json
2019-03-07T11:51:15.309+0800    reading metadata for exercise.storybook from exercise/stor
ybook.metadata.json
2019-03-07T11:51:15.309+0800    reading metadata for exercise.dialog from exercise/dialog.
metadata.json
2019-03-07T11:51:15.310+0800    reading metadata for exercise.unit from exercise/unit.meta
data.json
2019-03-07T11:51:15.585+0800    restoring exercise.unit from exercise/unit.bson
2019-03-07T11:51:15.678+0800    restoring exercise.storybook from exercise/storybook.bson
2019-03-07T11:51:15.760+0800    restoring exercise.dialog from exercise/dialog.bson
2019-03-07T11:51:15.846+0800    restoring exercise.audio.chunks from exercise/audio.chunks
.bson
2019-03-07T11:51:15.851+0800    no indexes to restore
2019-03-07T11:51:15.851+0800    finished restoring exercise.dialog (1 document)
2019-03-07T11:51:15.851+0800    no indexes to restore
2019-03-07T11:51:15.851+0800    finished restoring exercise.unit (1 document)
2019-03-07T11:51:15.858+0800    restoring indexes for collection exercise.audio.chunks fro
m metadata
2019-03-07T11:51:15.860+0800    no indexes to restore
2019-03-07T11:51:15.860+0800    finished restoring exercise.storybook (2 documents)
2019-03-07T11:51:15.864+0800    reading metadata for exercise.audio.files from exercise/au
dio.files.metadata.json
2019-03-07T11:51:15.930+0800    finished restoring exercise.audio.chunks (1 document)
2019-03-07T11:51:16.029+0800    restoring exercise.audio.files from exercise/audio.files.b
son
2019-03-07T11:51:16.031+0800    restoring indexes for collection exercise.audio.files from
metadata
2019-03-07T11:51:16.077+0800    finished restoring exercise.audio.files (1 document)
2019-03-07T11:51:16.077+0800    done
→ from_server

```

- 导入单个collection:

```
→ mongodb_migration git:(master) pwd
/Users/crifan/xxx/pyspider_migration/mongodb_migration
→ mongodb_migration git:(master) ll storybook
total 416536
-rw-r--r-- 1 crifan staff 34M 11 26 11:58 lexile.bson
-rw-r--r-- 1 crifan staff 130B 11 26 11:58 lexile.metadata.json
-rw-r--r-- 1 crifan staff 106M 11 26 11:58 main.bson
-rw-r--r-- 1 crifan staff 128B 11 26 11:58 main.metadata.json
-rw-r--r-- 1 crifan staff 62M 11 26 11:58 scholastic.bson
-rw-r--r-- 1 crifan staff 134B 11 26 11:58 scholastic.metadata.json
→ mongodb_migration git:(master) mongorestore -d storybook -c lexile ./storybook/lexile.b
son
2019-01-03T14:58:44.324+0800      checking for collection data in storybook/lexile.bson
2019-01-03T14:58:44.328+0800      reading metadata for storybook.lexile from storybook/lexil
e.metadata.json
2019-01-03T14:58:44.480+0800      restoring storybook.lexile from storybook/lexile.bson
2019-01-03T14:58:45.166+0800      no indexes to restore
2019-01-03T14:58:45.166+0800      finished restoring storybook.lexile (29911 documents)
2019-01-03T14:58:45.166+0800      done
```

- 已有一个之前用mongodump备份出来的文件夹: evaluation, 其中保存了整个evaluation的database的数据, 将其恢复到此处本地的mongodb数据库

```
→ mongodb mongorestore -d evaluation ./evaluation
2018-12-21T13:36:00.173+0800      the --db and --collection args should only be used when re
storing from a BSON file. Other uses are deprecated and will not exist in the future; use
--nsInclude instead
2018-12-21T13:36:00.175+0800      building a list of collections to restore from evaluation
dir
2018-12-21T13:36:00.176+0800      reading metadata for evaluation.image.chunks from evaluati
on/image.chunks.metadata.json
2018-12-21T13:36:00.176+0800      reading metadata for evaluation.question from evaluation/q
uestion.metadata.json
2018-12-21T13:36:00.176+0800      reading metadata for evaluation.audio.chunks from evaluati
on/audio.chunks.metadata.json
2018-12-21T13:36:00.274+0800      restoring evaluation.image.chunks from evaluation/image.ch
unks.bson
2018-12-21T13:36:00.277+0800      reading metadata for evaluation.image.files from evaluatio
n/image.files.metadata.json
2018-12-21T13:36:00.393+0800      restoring evaluation.audio.chunks from evaluation/audio.ch
unks.bson
2018-12-21T13:36:00.475+0800      restoring evaluation.question from evaluation/question.bso
n
2018-12-21T13:36:00.571+0800      restoring evaluation.image.files from evaluation/image.fil
es.bson
2018-12-21T13:36:00.579+0800      restoring indexes for collection evaluation.audio.chunks f
rom metadata
2018-12-21T13:36:00.653+0800      finished restoring evaluation.audio.chunks (1 document)
```

```
2018-12-21T13:36:00.654+0800    reading metadata for evaluation.audio.files from evaluation/audio.files.metadata.json
2018-12-21T13:36:00.739+0800    restoring evaluation.audio.files from evaluation/audio.files.bson
2018-12-21T13:36:00.747+0800    no indexes to restore
2018-12-21T13:36:00.747+0800    finished restoring evaluation.question (880 documents)
2018-12-21T13:36:00.747+0800    restoring indexes for collection evaluation.audio.files from metadata
2018-12-21T13:36:00.823+0800    finished restoring evaluation.audio.files (1 document)
2018-12-21T13:36:00.825+0800    restoring indexes for collection evaluation.image.files from metadata
2018-12-21T13:36:00.932+0800    finished restoring evaluation.image.files (663 documents)
2018-12-21T13:36:03.167+0800    [#####.....] evaluation.image.chunks 222MB /357MB (62.1%)
2018-12-21T13:36:04.849+0800    [#####] evaluation.image.chunks 357MB /357MB (100.0%)
2018-12-21T13:36:04.849+0800    restoring indexes for collection evaluation.image.chunks from metadata
2018-12-21T13:36:04.974+0800    finished restoring evaluation.image.chunks (1829 documents)
2018-12-21T13:36:04.974+0800    done
```

导入后的MongoDB Compass中数据效果：

The screenshot shows the MongoDB Compass interface. On the left, the sidebar lists 'My Cluster' with 10 DBs and 16 collections. The 'evaluation' database is expanded, showing its collections: 'audio.chunks', 'audio.files', 'image.chunks', 'image.files', and 'question'. The 'question' collection is selected and highlighted in blue. The main right panel shows the 'evaluation.question' collection with two documents listed.

```

_id: ObjectId("5c1777e1cc6df4563adf4a4f")
> checkpoint: Array
stem_type: "empty"
stem_image: ""
ave_answer_time: 5
difficulty: 1.1
audio_text: "rabbit"
audio: ObjectId("5c1b697d1275881df24566ec")
question_number: 1
major_type: "单选"
audio_length: 0
max_answer_time: 10
stem_text: ""
> sub_questions: Array

_id: ObjectId("5c1777e1cc6df4563adf4a50")
> sub_questions: Array
max_answer_time: 10
question_number: 2
stem_image: ""
ave_answer_time: 5
stem_text: ""
difficulty: 1.1
> checkpoint: Array
audio_text: "make"
audio: ObjectId("5c1b697d1275881df24566ec")
stem_type: "empty"
audio_length: 0
major_type: "单选"

_id: ObjectId("5c1777e1cc6df4563adf4a51")

```

- 带指定用户名和密码的

```

[root@xxx-general-01 for_backup_mongodb]# mongorestore -h localhost --port 32018 -u storybook -p pwd -d storybook ./storybook
2018-10-30T13:59:21.040+0800      building a list of collections to restore from storybook dir
2018-10-30T13:59:21.041+0800      reading metadata for storybook.scholastic from storybook/scholastic.metadata.json
2018-10-30T13:59:21.041+0800      reading metadata for storybook.main from storybook/main.metadata.json

```

2018-10-30T13:59:21.061+0800	restoring storybook.main from storybook/main.bson
2018-10-30T13:59:21.075+0800	restoring storybook.scholastic from storybook/scholastic.bson
2018-10-30T13:59:22.567+0800	restoring indexes for collection storybook.scholastic from metadata
2018-10-30T13:59:22.567+0800	finished restoring storybook.scholastic (51785 documents)
2018-10-30T13:59:22.629+0800	restoring indexes for collection storybook.main from metadata
2018-10-30T13:59:22.629+0800	finished restoring storybook.main (51785 documents)
2018-10-30T13:59:22.629+0800	done

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## mongoexport 和 mongoimport

基本语法：

```
mongoimport -d database_name -c collection_name --file exported_mongodb_collection_file.json
```

举例：

```
mongoimport -d evaluation -c question --file questions_181219_2.json
```

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## 新建空数据库和空集合

想要新建一个空的MongoDB的数据库，以及在空数据库中创建一个空的集合。

思路是：新建一个db，给db插入一个值，再删掉，就得到空的db的collection（和空的db数据库）了。

具体做法：

```
use newDb
db.newCollection.insert({"fakeKey": "fakeValue"})
db.newCollection.find() # 会输出刚插入的记录的_id
db.newCollection.deleteOne({_id: ObjectId("newInsertedId")})
```

然后用：

```
db.newCollection.find()
```

会看到输出是空的 -> 说明的确已经新建一个空的db和空的collection了。

提示：

在此期间可以随时用：

```
db
```

查看当前所处的数据库

和

```
show dbs
```

看看当前有哪些数据库

和：

```
show collections
```

看看当前数据库中有哪些集合

### 举例：新建一个db=storybook和collection=main

步骤：

```
> use storybook
switched to db storybook
> show dbs
```

```
admin    0.000GB
dialog   0.272GB
gridfs  13.869GB
local    0.000GB
> db.main.insert({"fakeKey": "fakeValue"})
WriteResult({ "nInserted" : 1 })
> show collections
main
> db
storybook
> db.main.find()
{ "_id" : ObjectId("5bd2bddb6ec5fdeabfb6ecb"), "fakeKey" : "fakeValue" }
> db.main.deleteOne({_id: ObjectId("5bd2bddb6ec5fdeabfb6ecb")})
{ "acknowledged" : true, "deletedCount" : 1 }
> db.main.find()
>
```

## 如何更新数据

对于已有一个MongoDB的记录，想要去更新其中的部分数据，有如下几种方式：

### MongoDB shell

官网举例

```
db.col.update( { "count" : { $gt : 5 } } , { $set : { "test5" : "OK"} },true,true );
```

举例：设置active为Y

mongo shell中去插入新字段

```
db.question.update({}, {$set: {"active": "Y"}}, {upsert: false, multi: true})
```

输出：

```
> db.question.update({}, {$set: {"active": "Y"}}, {upsert: false, multi: true})
WriteResult({ "nMatched" : 883, "nUpserted" : 0, "nModified" : 883 })
```

效果：

## evaluation.question

Documents      Aggregations      Schema

**FILTER** { field: 'value' }

**PROJECT** { field: 0 }

**SORT** {"question\_number": 1}

**INSERT DOCUMENT**    VIEW    LIST    TABLE

```
_id: ObjectId("5c1777e1cc6df4563adf4a4f")
> checkpoint: Array
  stem_type: "empty"
  stem_image: ""
  ave_answer_time: 5
  difficulty: 1.1
  audio_text: "rabbit"
  audio: ObjectId("5c33111b12758809ff86775f")
  question_number: 1
  major_type: "单选"
  audio_length: 2
  max_answer_time: 10
  stem_text: ""
> sub_questions: Array
  active: "Y"
```

**INSERT DOCUMENT**    VIEW    LIST    TABLE

```
_id: ObjectId("5c1777e1cc6df4563adf4a50")
> sub_questions: Array
  max_answer_time: 10
  question_number: 2
  stem_image: ""
  ave_answer_time: 5
  stem_text: ""
  difficulty: 1.1
  > checkpoint: Array
    audio_text: "make"
    audio: ObjectId("5c33111c12758809ff8677a3")
    stem_type: "empty"
    audio_length: 1
    major_type: "单选"
    active: "Y"
```

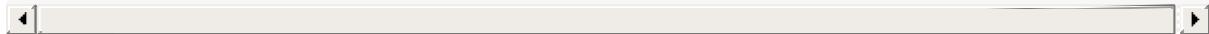
## pymongo

通过PyMongo去更新某个记录的部分数据

举例：

```
insertResult = mongoDstCollection.insert_one(dstBookInfo)
logging.debug("insertResult=%s", insertResult)
newDstRecordId = insertResult.inserted_id
logging.debug("newDstRecordId=%s", newDstRecordId)
# update inserted id into existing old source record
mergedId = ""
```

```
if newDstRecordId:
    mergedId = str(newDstRecordId)
    logging.debug("mergedId=%s", mergedId) # '5bd28426bfaa44216e98a496'
    updateResult = mongoSrcCollection.update_one(filter={"_id": curSrcBookIdObj}, update={"$set": {"mergedId": mergedId}})
    logging.debug("updateResult=%s", updateResult)
    matched_count = updateResult.matched_count
    modified_count = updateResult.modified_count
    logging.debug("matched_count=%s, modified_count=%s", matched_count, modified_count)
```



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# 高级搜索

下面介绍在搜索和查询想要的记录时，涉及到的一些高级搜索技巧，尤其是正则搜索和嵌套搜索。

## 搜索期间的条件组合

背景：搜索数据期间，可能会用到多种条件，不同条件，可能需要组合在一起。

对于组合的种类和语法，详见官网：

[Operators — MongoDB Manual](#)

->

[Query and Projection Operators — MongoDB Manual](#)

先列出有哪些类型：

- Comparison
  - \$eq
    - Matches values that are equal to a specified value.
  - \$gt
    - Matches values that are greater than a specified value.
  - \$gte
    - Matches values that are greater than or equal to a specified value.
  - \$in
    - Matches any of the values specified in an array.
  - \$lt
    - Matches values that are less than a specified value.
  - \$lte
    - Matches values that are less than or equal to a specified value.
  - \$ne
    - Matches all values that are not equal to a specified value.
  - \$nin
    - Matches none of the values specified in an array.
- Logical
  - \$and
    - Joins query clauses with a logical AND returns all documents that match the conditions of both clauses.
  - \$not
    - Inverts the effect of a query expression and returns documents that do not match the query expression.
  - \$nor
    - Joins query clauses with a logical NOR returns all documents that fail to match both clauses.

- \$or
  - Joins query clauses with a logical OR returns all documents that match the conditions of either clause.
- Element
  - \$exists
    - Matches documents that have the specified field.
  - \$type
    - Selects documents if a field is of the specified type.
- Evaluation
  - \$expr
    - Allows use of aggregation expressions within the query language.
  - \$jsonSchema
    - Validate documents against the given JSON Schema.
  - \$mod
    - Performs a modulo operation on the value of a field and selects documents with a specified result.
  - \$regex
    - Selects documents where values match a specified regular expression.
  - \$text
    - Performs text search.
  - \$where
    - Matches documents that satisfy a JavaScript expression.
- Geospatial
  - \$geoIntersects
    - Selects geometries that intersect with a GeoJSON geometry. The 2dsphere index supports \$geoIntersects.
  - \$geoWithin
    - Selects geometries within a bounding GeoJSON geometry. The 2dsphere and 2d indexes support \$geoWithin.
  - \$near
    - Returns geospatial objects in proximity to a point. Requires a geospatial index. The 2dsphere and 2d indexes support \$near.
  - \$nearSphere
    - Returns geospatial objects in proximity to a point on a sphere. Requires a geospatial index. The 2dsphere and 2d indexes support \$nearSphere.
- Array
  - \$all
    - Matches arrays that contain all elements specified in the query.
  - \$elemMatch
    - Selects documents if element in the array field matches all the specified \$elemMatch conditions.
  - \$size
    - Selects documents if the array field is a specified size.
- Bitwise

- \$bitsAllClear
  - Matches numeric or binary values in which a set of bit positions all have a value of 0.
- \$bitsAllSet
  - Matches numeric or binary values in which a set of bit positions all have a value of 1.
- \$bitsAnyClear
  - Matches numeric or binary values in which any bit from a set of bit positions has a value of 0.
- \$bitsAnySet
  - Matches numeric or binary values in which any bit from a set of bit positions has a value of 1.
- Comments
  - \$comment
    - Adds a comment to a query predicate.
- Projection Operators
  - \$
    - Projects the first element in an array that matches the query condition.
  - \$elemMatch
    - Projects the first element in an array that matches the specified \$elemMatch condition.
  - \$meta
    - Projects the document's score assigned during \$text operation.
  - \$slice
    - Limits the number of elements projected from an array. Supports skip and limit slices.

可以根据需要选择合适的组合方式。

举例：

```
db.inventory.find( { $or: [ { quantity: { $lt: 20 } }, { price: 10 } ] } )
```

和：

```
var cursor = db.collection('inventory').find({
  $or: [ { status: "A" }, { qty: { $lt: 30 } } ]
});
```

## 列表子元素搜索

如果是搜索list中所有的元素，即不关心list中具体是第几个元素，那么就直接写成：

```
mainField.subFieldList
```

如果要关心具体是哪个位置的元素的值，则使用： .N

比如 第一个是

```
mainField.subFieldList.0
```

而更加复杂的组合，可以用到：

- `$size`
  - 表示list的个数
- `$all`
  - 表示所有的
- `$elemMatch`

即可。

更多语法细节可参考：

[Array Query Operators — MongoDB Manual](#)

## 字段嵌套搜索

用点`.`实现字段的嵌套的搜索：

**举例：搜索子字段sub\_questions的options的option\_text**

对于内容：

```
{
  "_id": "5c1777e1cc6df4563adf4a5c",
  "max_answer_time": 20,
  "audio": "5c33111d12758809ff867931",
  "stem_type": "mix",
  "sub_questions": [
    {
      "option_type": "text",
      "correct_option": [3],
      "question_texts": [""],
      "options": [
        {
          "option_index": 1,
          "option_text": "lean",
          "option_image": ""
        },
        {
          "option_index": 2,
          "option_text": "less",
          "option_image": ""
        },
        {
          "option_index": 3,
          "option_text": "lesson",
          "option_image": ""
        }
      ]
    },
    ...
  ]
}
```

想要通过子字段 `sub_questions` 的 `options` 的 `option_text` 之类的嵌套字段去搜索

写成：

```
sub_questions.options.option_text
```

即可。

## 支持正则查询

举例：

### MongoDB Compass

举例：搜索AD开头的lexile

MongoDB Compass中，想要用正则搜索字段：

```
grading
  lexile: "AD450L"
```

写法是：

```
{"grading.lexile": {$regex: "AD.*"}}
```

或： regex加上行首和行尾判断：

```
{"grading.lexile": {$regex: "^AD.*$"}}
```

或 regex用引号引起来

```
{"grading.lexile": {"$regex": "AD.*"}}
```

注：

另外试了试：

```
{"grading.lexile": {$regex: "^AD\d+.*$"}}
```

发现搜索不到，所以结论是：此处正则搜索不支持 `\d` 数字

举例：用正则语法去搜索title

```
{"title": {"$regex": "Chicka Chicka .*"}}
```

可以搜到匹配的多个数据：

The screenshot shows the MongoDB Compass interface with the following details:

- My Cluster** sidebar: Shows 9 DBs and 10 collections. The 'storybook' collection is expanded, showing 'main' and 'scholastic' sub-collections.
- storybook.main** collection summary: DOCUMENTS 51.8k, TOTAL SIZE 116.8MB, AVG. SIZE 2.3KB, INDEXES 3, TOTAL SIZE 1000.0KB, AVG. SIZE 333.3KB.
- Documents** tab selected: Displays two documents matching the filter '{ "title": { "\$regex": "Chicka Chicka .\*" } }'.
- Filter**: { "title": { "\$regex": "Chicka Chicka .\*" } }
- Find** button: FIND, RESET, CANCEL.
- Displaying documents 1 - 4 of 4**
- Document Preview** (top document):
 

```
_id: ObjectId("5bd7beecbfaa44fe2c73e73f")
url: "https://www.scholastic.com/teachers/books/chicka-chicka-1-2-3-by-bill-ma..."
title: "Chicka Chicka ABC"
description: "This spectacular follow-up to the bestselling Chicka Chicka Boom Boom ..."
coverImgUrl: "https://www.scholastic.com/content5/media/products/72/9780439731072_mr...""
author: Object
series: Object
grades: Array
grading: Object
genre: "Fiction"
pages: 40
isbn: Object
tags: Array
sourceRecommendations: Array
recommendations: Array
popularity: 0
```
- Document Preview** (second document):
 

```
_id: ObjectId("5bd7c00bbfaa44fe2c7439d9")
url: "https://www.scholastic.com/teachers/books/chicka-chicka-abc-by-bill-ma..."
title: "Chicka Chicka ABC"
description: "This rollicking alphabet chant for the youngest children is paired wit...""
coverImgUrl: "https://www.scholastic.com/content5/media/products/31/9780671878931_xl...""
author: Object
series: Object
grades: Array
grading: Object
genre: ""
pages: 0
isbn: Object
tags: Array
sourceRecommendations: Array
recommendations: Array
popularity: 0
```

## 举例：多个字段同时正则搜索+嵌套搜索+列表字段搜索

此处去实现一个更加复杂的：

- 正则搜索
- 多个条件组合搜索
- 字段嵌套搜索
- 列表字段搜索

要搜索的内容：

```
{
  "_id": "5c1777e1cc6df4563adf4b3c",
  "audio": "http://10.108.133.251:34800/audio/5c33111e12758809ff867a5e/238.mp3",
  "audio_length": 29,
  "audio_text": "f: Hi. I'm Tania. What's your name? m: Hello. My name's Jing. f: Nice t o meet you, Jing. What class are you in? m: I'm in class 1B. And you? f: Me too. I'm in Cl ass 1B too. m: Who's our teacher? f: Mr Smith. m: And where's our classroom? f: This way. Come with me. m: OK. Great.",
  "ave_answer_time": 70,
  "checkpoint": [
    73,
    83,
    "对话和应答"
  ],
  "difficulty": 3.2,
  "major_type": "单选多题",
  "max_answer_time": 140,
  "question_number": 238,
  "stem_image": "http://10.108.133.251:34800/image/5c32f6b012758802476f7f9d/school.png",
}
```

```
"stem_text": "",  
"stem_type": "mix",  
"sub_questions": [  
    {  
        "correct_option": [  
            1  
        ],  
        "option_type": "text",  
        "options": [  
            {  
                "option_image": "",  
                "option_index": 1,  
                "option_text": "Yes"  
            },  
            {  
                "option_image": "",  
                "option_index": 2,  
                "option_text": "No"  
            }  
        ],  
        "question_texts": [  
            "Jing and Tania are in the same class."  
        ]  
    },  
    {  
        "correct_option": [  
            1  
        ],  
        "option_type": "text",  
        "options": [  
            {  
                "option_image": "",  
                "option_index": 1,  
                "option_text": "Yes"  
            },  
            {  
                "option_image": "",  
                "option_index": 2,  
                "option_text": "No"  
            }  
        ],  
        "question_texts": [  
            "Their teacher is a man."  
        ]  
    },  
    {  
        "correct_option": [  
            2  
        ],  
        "option_type": "text",  
        "options": [  
            {  
                "option_image": "",  
                "option_index": 1,  
                "option_text": "Yes"  
            },  
            {  
                "option_image": "",  
                "option_index": 2,  
                "option_text": "No"  
            }  
        ],  
        "question_texts": [  
            "The teacher is a man."  
        ]  
    }  
],  
"total": 3
```

```

        "option_index": 1,
        "option_text": "Yes"
    },
    {
        "option_image": "",
        "option_index": 2,
        "option_text": "No"
    }
],
"question_texts": [
    "Jing knows where the classroom is."
]
}
]
},

```

想要搜索字段：

- stem\_text
- audio\_text
- sub\_questions的question\_texts（这个列表）中的任何一个
- sub\_questions的options（这个列表中的）任何一个的option\_text

包含了teacher的话

则搜索条件可以写成：

```

{
  '$or': [
    {
      'stem_text': {
        '$regex': 'teacher',
        '$options': 'im'
      }
    },
    {
      'audio_text': {
        '$regex': 'teacher',
        '$options': 'im'
      }
    },
    {
      'sub_questions.question_texts': {
        '$regex': 'teacher',
        '$options': 'im'
      }
    },
    {
      'sub_questions.options.option_text': {
        '$regex': 'teacher',
        '$options': 'im'
      }
    }
  ]
}

```

```
    ]
}
```

对应代码:

```
findParam["$or"] = [
    {"stem_text": {"$regex": searchText, "$options": "im"}},
    {"audio_text": {"$regex": searchText, "$options": "im"}},
    {"sub_questions.question_texts": {"$regex": searchText, "$options": "im"}},
    {"sub_questions.options.option_text": {"$regex": searchText, "$options": "im"}}
},
```

相关部分完整代码:

```
findParam = {}

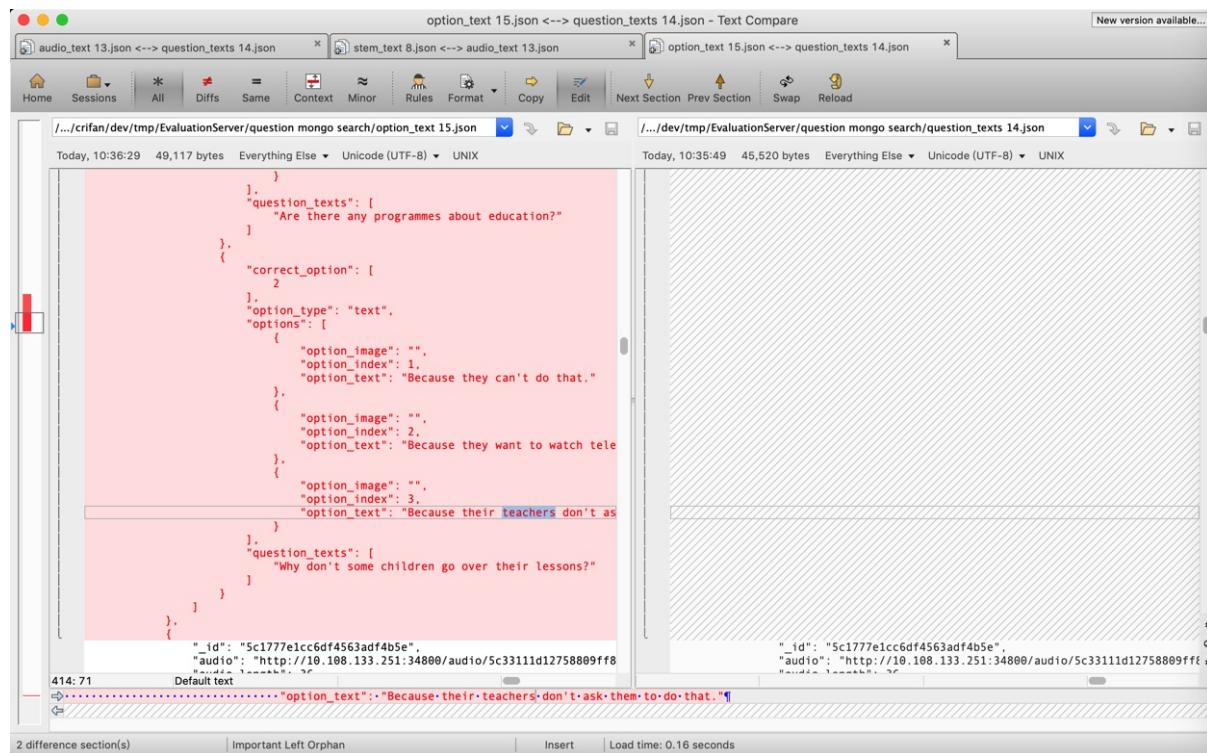
searchText = parsedArgs["searchText"]
if searchText:
    findParam["$or"] = [
        {"stem_text": {"$regex": searchText, "$options": "im"}},
        {"audio_text": {"$regex": searchText, "$options": "im"}},
        {"sub_questions.question_texts": {"$regex": searchText, "$options": "im"}},
        {"sub_questions.options.option_text": {"$regex": searchText, "$options": "im"}}
],
```

```
majorType = parsedArgs["majorType"]
if majorType:
    findParam["major_type"] = majorType

sortBy = "question_number"
log.debug("findParam=%s", findParam)
sortedQuestionsCursor = questionCollection.find(findParam).sort(sortBy, pymongo.ASCENDING)
totalCount = sortedQuestionsCursor.count()
```

即可搜索到要的内容:



## 举例：搜索题干类型题目中包含teach的题目

举例另一个复杂的例子：

代码：

```

findParam = {}

majorType = parsedArgs["majorType"]
if majorType:
    findParam["major_type"] = majorType

stemType = parsedArgs["stemType"]
if stemType:
    findParam["stem_type"] = stemType

checkpointList = parsedArgs["checkpointList"]
if checkpointList:
    checkpointList = checkpointList split(",")
    checkpointOrParamList = []
    for eachCheckpoint in checkpointList:
        curCheckpointRegex = {"checkpoint": {"$regex": eachCheckpoint, "$options": "im"}}
        checkpointOrParamList.append(curCheckpointRegex)
    checkpointAndParamList = [ { "$or": checkpointOrParamList} ]
    if "$and" in findParam:
        findParam["$and"].extend(checkpointAndParamList)
    else:
        findParam["$and"] = checkpointAndParamList

searchText = parsedArgs["searchText"]
if searchText:

```

```

searchTextOrParamList = [
    {"stem_text": {"$regex": searchText, "$options": "im"}},
    {"audio_text": {"$regex": searchText, "$options": "im"}},
    # {"sub_questions.option_type": "text"},
    {"sub_questions.question_texts": {"$regex": searchText, "$options": "im"}},
    {"sub_questions.options.option_text": {"$regex": searchText, "$options": "im"}},
    # {"sub_questions.options.option_image": {"$regex": searchText, "$options": "im"}},
]

searchTextAndParamList = [{"$or": searchTextOrParamList}]
if "$and" in findParam:
    findParam["$and"].extend(searchTextAndParamList)
else:
    findParam["$and"] = searchTextAndParamList

sortBy = "question_number"
log.debug("findParam=%s", findParam)
sortedQuestionsCursor = questionCollection.find(findParam).sort(sortBy, pymongo.ASCENDING)

```

生成的相关搜索条写法是：

```
{
    'major_type': '单选多题',
    'stem_type': 'mix',
    '$and': [
        {
            '$or': [
                {
                    'checkpoint': {
                        '$regex': '对话',
                        '$options': 'im'
                    }
                },
                {
                    'checkpoint': {
                        '$regex': '理解',
                        '$options': 'im'
                    }
                }
            ]
        },
        {
            '$or': [
                {
                    'stem_text': {
                        '$regex': 'teacher',
                        '$options': 'im'
                    }
                },
                {
                    'audio_text': {
                        '$regex': 'teacher',
                        '$options': 'im'
                    }
                },
                {
                    'sub_questions.question_texts': {
                        '$regex': 'teacher',
                        '$options': 'im'
                    }
                }
            ]
        }
    ]
}
```

```

        '$options': 'im'
    }
},
{
    'sub_questions.options.option_text': {
        '$regex': 'teacher',
        '$options': 'im'
    }
}
]
}
}

```

即可查到需要的内容。

## 对搜索结果排序

对于搜索出的结果，想要针对某个或某些键去排序，则：

- 总体逻辑
  - 给 `sort` 传入 `key` 和排序方向
    - 排序方向值
      - 顺序： `1`
      - 倒序： `-1`

## Python的API代码

语法：

```
collection.find(xxx).sort("key", pymongo.ASCENDING)
```

举例：不区分大小写找包含sleep的文件名

```
findFileCursor = fsCollection2.find({"filename": {"$regex": "sleep", "$options": "i"}})
```

举例：搜索结果根据question\_number排序

举例：

```

sortBy = "question_number"
sortedQuestionsCursor = questionCollection.find(findParam).sort(sortBy, pymongo.ASCENDING)

```

## 工具

`MongoDB shell` 或其他GUI工具（比如 `Robot 3T`）中是：

```
collection.find(xxx).sort({"key": 1})
```

举例：

```
db.collection.find().sort( { age: 1 } )
```

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## GridFS存储文件

MongoDB针对于文件，尤其是大文件，专门设计了一套接口，叫做：GridFS

此处总结一下GridFS的使用心得。

TODO:

- 如何基于Flask搭建一个文件下载服务，甚至可以支持断点续传功能。把之前相关代码贴过来。
- 把更多帖子内容整理至此
  - GridFS
    - 【已解决】GridFS保存文件时如何得到文件的id或\_id
    - 【已解决】用Python去连接本地mongoDB去用GridFS保存文件
    - 【已解决】MongoDB的GridFS中基于文件名或id去下载文件
    - 【已解决】MongoDB的GridFS中只返回file的chunks的个数而不返回chunks.data
    - 【基本解决】Python中把wma、wav等格式音频转换为mp3
    - 【未解决】Mongo中更新gridfs中的mp3文件的metadata信息且尽量保持id不变
    - 【已解决】远程的mongoDB中GridFS报错：AttributeError GridFS object has no attribute totalSize
    - 【规避解决】Flask-PyMongo中如何查询gridfs中的文件
    - 【已解决】如何用PyMongo中的GridFS的put去保存添加文件
    - 【已解决】PyMongo中GridFS的exists始终检测不到文件已存在
    - 【已解决】Flask中Mongo的GridFS数据如何保存为绝对路径的下载文件地址
    - 【已解决】MongoDB通过GridFS的API的put保存文件时添加额外信息
    - 【已解决】PyMongo的GridFS中使用fs的collection去put出错：TypeError Collection object is not callable
    - 【已解决】把本地mp3文件存入在线Mongo中且填写meta信息
    - 【已解决】Flask中连接远程MongoDB数据库的gridfs并返回查询到的文件数据
  - 和其中mongofiles相关的：
    - 【已解决】用mongofiles去删除GridFS中的文件
    - 【无法也无须解决】用mongofiles给GridFS中添加文件时添加额外参数属性字段
    - 【已解决】mongofiles中put保存和get下载获取时指定文件名

一些供参考的资料：

- GridFS官网文档
  - [GridFS — MongoDB Manual 3.6](#)
- Pymongo
  - GridFS的例子
    - [GridFS Example — PyMongo 3.6.1 documentation](#)
  - GridFS的API
    - [gridfs – Tools for working with GridFS — PyMongo 3.6.1 documentation](#)
  - 相关的grid\_file
    - [grid\\_file – Tools for representing files stored in GridFS — PyMongo 3.6.1 documentation](#)

## 一些GridFS的心得

### 通过id查找gridfs中file文件

注意不是：

```
> db.fs.files.find({"id": "5b556ee47f4d38ba6a189222"})
> db.fs.files.find({"_id": "5b556ee47f4d38ba6a189222"})
```

而是 `ObjectId("5b556ee47f4d38ba6a189222")` :

```
> db.fs.files.find({_id: ObjectId("5b556ee47f4d38ba6a189222")})
{
  "_id" : ObjectId("5b556ee47f4d38ba6a189222"),
  "contentType" : "audio/mpeg",
  "chunkSize" : 261120,
  "metadata" : {
    "song" : {
      "singers" : [ "ChuChu TV" ]
    },
    "series" : {
      "number" : 0,
      "name" : "",
      "topics" : [],
      "storybook" : {
        "publisher" : "",
        "isFiction" : "未知",
        "lexileIndex" : "",
        "awards" : "",
        "authors" : [],
        "foreignCountry" : ""
      },
      "keywords" : {
        "fromName" : [ "Finger", "Family" ],
        "other" : [],
        "fromContent" : [ "Daddy Finger" ]
      },
      "name" : "Finger Family",
      "resourceType" : "song",
      "mainActors" : [],
      "contentAbstract" : "",
      "isSeries" : false,
      "fitAgeStart" : 3,
      "fitAgeEnd" : 6,
      "fileInfo" : {
        "isAudio" : true,
        "contentType" : "audio/mpeg",
        "name" : "Finger Family.mp3",
        "suffix" : "mp3"
      },
      "fileName" : "Finger Family.mp3",
      "length" : 2604280,
      "uploadDate" : ISODate("2018-07-23T06:00:04.925Z"),
      "md5" : "946564effc4c0a835c55564377e7d819"
    }
  }
}
```

### 删除文件

举例：

```
> db.fs.files.deleteOne({_id: ObjectId("5b556ee47f4d38ba6a189222")})
{
  "acknowledged" : true,
  "deletedCount" : 1
}
```

### 格式化带缩进美观的输出结果

后面加上：`.pretty()`

```
> db.fs.files.find({_id: ObjectId("5b556ee47f4d38ba6a189222")}).pretty()
{
  "_id" : ObjectId("5b556ee47f4d38ba6a189222"),
  "contentType" : "audio/mpeg",
  "chunkSize" : 261120,
  "metadata" : {
    "song" : {
      "singers" : [
        "ChuChu TV"
      ]
    },
    "series" : {
```

```
        "number" : 0,
        "name" : ""
    },
    "topics" : [ ],
    "storybook" : {
        "publisher" : "",
        "isFiction" : "未知",
        "lexileIndex" : "",
        "awards" : "",
        "authors" : [ ],
        "foreignCountry" : ""
    },
    "keywords" : {
        "fromName" : [
            "Finger",
            "Family"
        ],
        "other" : [ ],
        "fromContent" : [
            "Daddy Finger"
        ]
    },
    "name" : "Finger Family",
    "resourceType" : "song",
    "mainActors" : [ ],
    "contentAbstract" : "",
    "isSeries" : false,
    "fitAgeStart" : 3,
    "fitAgeEnd" : 6,
    "fileInfo" : {
        "isAudio" : true,
        "contentType" : "audio/mpeg",
        "name" : "Finger Family.mp3",
        "suffix" : "mp3"
    }
},
"filename" : "Finger Family.mp3",
"length" : 2604280,
"uploadDate" : ISODate("2018-07-23T06:00:04.925Z"),
"md5" : "946564efffc4c0a835c55564377e7d819"
}
>
```

## 查看当前MongoDB信息

想要查看当前MongoDB信息，即如何得知mongod的启动文件、配置文件、log日志文件、数据文件路径等等是什么

经过研究，可以用如下方法：

可以通过：

```
systemctl status mongod
```

中看到启动文件，比如：

```
[root@xxx-general-01 ~]# systemctl status mongod
[...]
mongod.service - SYSV: Mongo is a scalable, document-oriented database.
   Loaded: loaded (/etc/rc.d/init.d/mongod; bad; vendor preset: disabled)
     Active: active (running) since Tue 2018-04-10 15:37:29 CST; 20h ago
       Docs: man:systemd-sysv-generator(8)
    CGroup: /system.slice/mongod.service
           1096 /usr/bin/mongod -f /etc/mongod.conf

Apr 10 15:37:28 xxx-general-01 systemd[1]: Starting SYSV: Mongo is a scalable, document-oriented database...
Apr 10 15:37:28 xxx-general-01 runuser[1077]: pam_unix(runuser:session): session opened for user mongod by (uid 0)
Apr 10 15:37:29 xxx-general-01 runuser[1077]: pam_unix(runuser:session): session closed for user mongod
Apr 10 15:37:29 xxx-general-01 mongod[1058]: Starting mongod: [ OK ]
Apr 10 15:37:29 xxx-general-01 systemd[1]: Started SYSV: Mongo is a scalable, document-oriented database.
```

中的：

```
/etc/rc.d/init.d/mongod
```

是启动脚本

然后再去查看此启动脚本的内容，可以找到配置文件：

```
[root@xxx-general-01 ~]# cat /etc/rc.d/init.d/mongod
#!/bin/bash

# mongod - Startup script for mongod

# chkconfig: 35 85 15
# description: Mongo is a scalable, document-oriented database.
# processname: mongod
# config: /etc/mongod.conf
```

```
. /etc/rc.d/init.d/functions

# NOTE: if you change any OPTIONS here, you get what you pay for:
# this script assumes all options are in the config file.
CONFIGFILE="/etc/mongod.conf"
OPTIONS="-f $CONFIGFILE"

mongod ${MONGOD-/usr/bin/mongod}

MONGO_USER mongod
MONGO_GROUP mongod
. . .
```

中的：

```
/etc/mongod.conf
```

然后再从配置文件中看到，对应的log日志，数据文件等信息：

```
[root@xxx-general-01 ~]# cat /etc/mongod.conf
# mongod.conf

# for documentation of all options, see:
#   http://docs.mongodb.org/manual/reference/configuration-options/

# where to write logging data.
systemLog:
  destination: file
  logAppend: true
  path: /var/log/mongodb/mongod.log

# Where and how to store data.
storage:
  dbPath: /var/lib/mongo
  journal:
    enabled: true
  # engine:
  #   mmapv1:
  #     wiredTiger:

# how the process runs
processManagement:
  fork: true # fork and run in background
  pidFilePath: /var/run/mongodb/mongod.pid # location of pidfile

# network interfaces
net:
  port: 32018
  bindIp: 127.0.0.1,172.16.141.197 # Listen to specific IP
  # bindIp: 127.0.0.1 # Listen to local interface only, comment to listen on all interface
  # s.
  # bindIp: 0.0.0.0 # Listen to all interfaces
  # port: 27017
```

```
security:  
  authorization: 'enabled'  
  
#operationProfiling:  
  
#replication:  
  
#sharding:  
  
## Enterprise-Only Options  
  
#auditLog:  
  
#snmp:
```

中，找到：

- 日志文件： /var/log/mongodb/mongod.log
- 数据文件（路径）： /var/lib/mongo

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## 连接远程MongoDB的方式

背景：

在远程阿里云ECS服务器中有个MongoDB数据库：

- IP: 47.96.131.109
- Port: 32018

其中有个：

- gridfs数据库
  - 用户名: gridfs
  - 角色: dbOwner

且服务端mongod正在运行了

下面是如何去连接该远程的mongo数据库几种方式：

### 服务器中本地连接

服务器上本地客户端： mongo shell

```
[root@xxx-general-01 ~]# mongo --port 32018
MongoDB shell version: 3.2.19
connecting to: 127.0.0.1:32018/test
```

进去后再：

```
use gridfs
db.auth("gridfs", "password")
```

或者直接：

```
mongo gridfs --port 32018 -u gridfs -p password --authenticationDatabase gridfs
```

### Mac本地连接远端MongoDB

Mac中本地 mongo shell 去连接远程MongoDB

#### 以gridfs用户去登录

以用户gridfs去登录，且（限定了）只（能）访问数据库gridfs：

```
mongo 47.96.131.109:32018/gridfs -u gridfs -p password --authenticationDatabase gridfs
```

或：

```
mongo gridfs --host 47.96.131.109 --port 32018 -u gridfs -p password --authenticationData  
base gridfs
```

以admin用户去登录

以用户admin去登录，没有限定访问哪个数据库（后续则可以访问其他数据，前提是admin本身有这个权限）：

```
mongo --host 47.96.131.109 --port 32018 -u root -p pwd --authenticationDatabase admin
```

Python的pymongo代码连接远程MongoDB

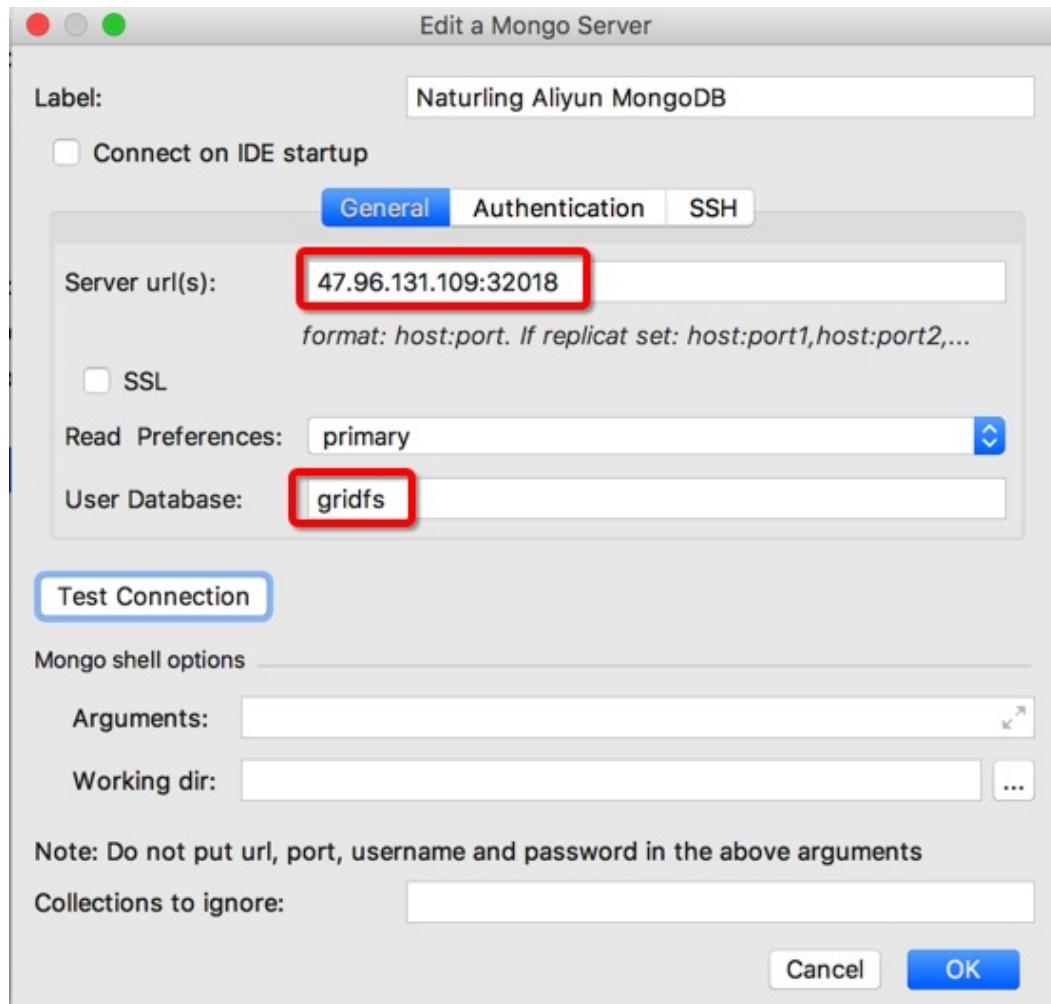
```
import pymongo  
from pymongo import MongoClient  
import gridfs  
  
# from pymongo.objectid import ObjectId  
# from pymongo import objectid  
from bson.objectid import ObjectId  
  
from gridfs import GridFS  
  
MongoHost = "47.96.131.109"  
MongoPort = 32018  
  
MongoUseAuth = True  
# MongoUseAuth = False  
  
# with auth  
MongoUsername = "gridfs"  
MongoPassword = "password"  
MongoAuthenticationDatabase = "gridfs"  
  
mongodbUri = ""  
if MongoUseAuth :  
    mongodbUri = "mongodb://%(username)s:%(password)s@%(host)s:%(port)s/%(database)s" % (  
        quote_plus(MongoUsername), \  
        quote_plus(MongoPassword), \  
        MongoHost, \  
        MongoPort, \  
        MongoAuthenticationDatabase \  
    )  
    #'mongodb://gridfs:password@47.96.131.109:32018/gridfs'  
else:  
    mongodbUri = "mongodb://%(host)s:%(port)s/%(database)s" % (  
        MongoHost, \  
        MongoPort, \  
        MongoAuthenticationDatabase \  
    )
```

```
MongoPort  
)  
# 'mongodb://localhost:32018'  
# 'mongodb://47.96.131.109:32018'  
  
mongoClient = MongoClient(mongodbUri)  
gridfsDb = mongoClient.gridfs  
fsCollection = GridFS(gridfsDb)
```

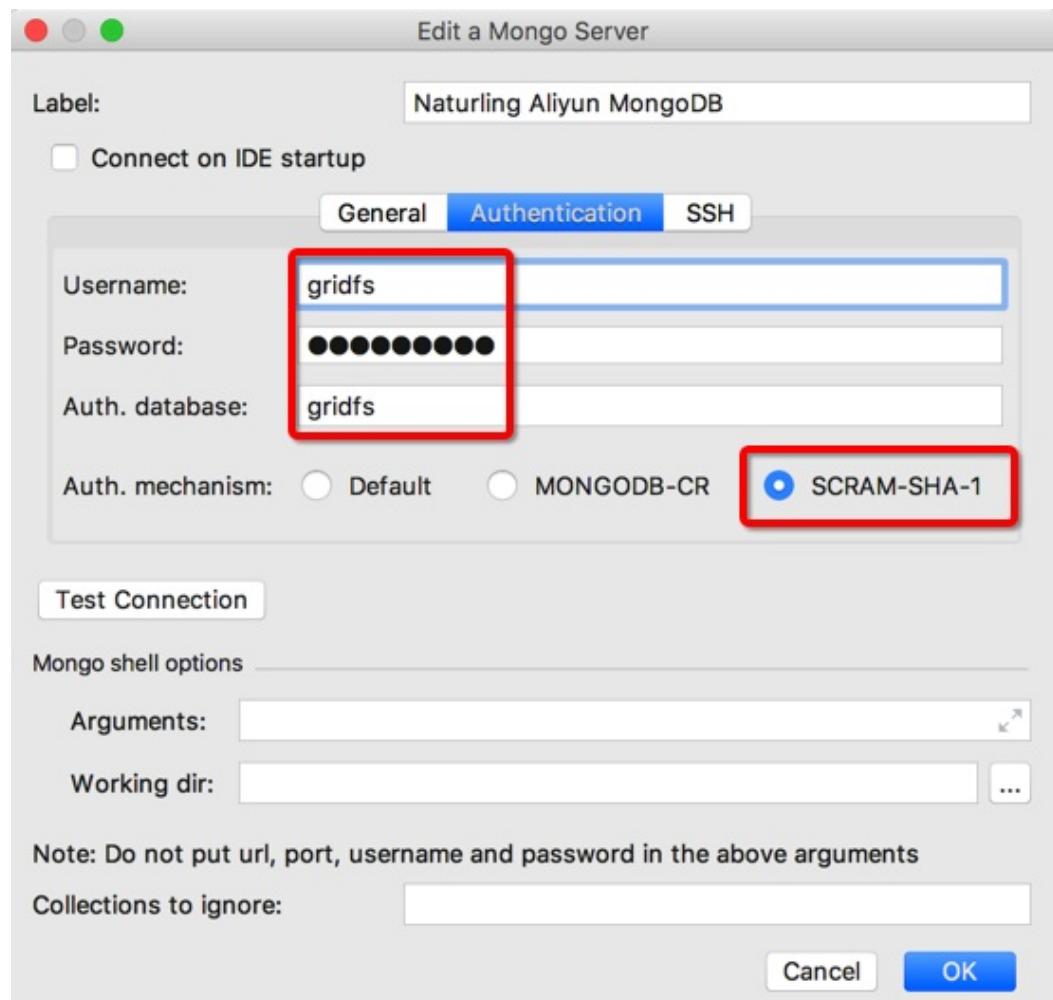
## PyCharm中mongo4idea中的连接远端MongoDB

配置参数：

- General
  - 截图：



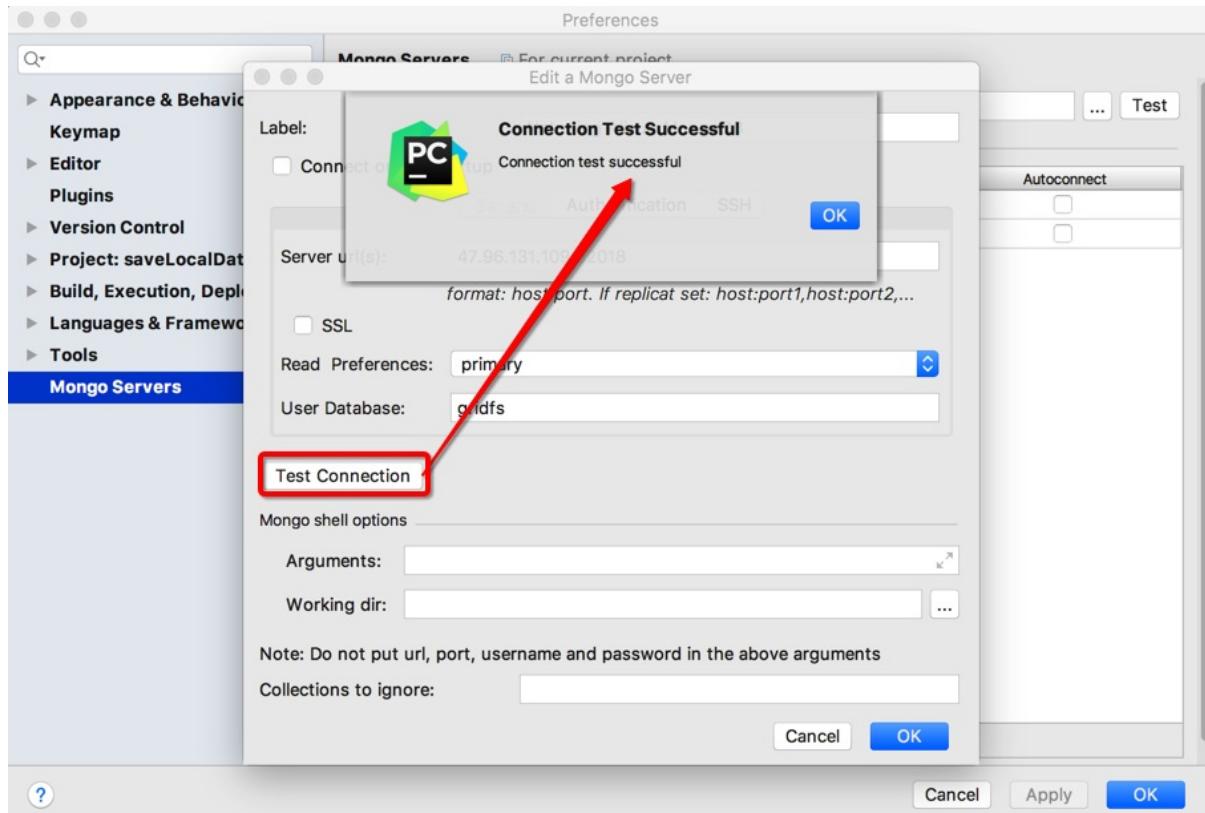
- 文字：
  - Server url(s): 47.96.131.109:32018
  - User Database: gridfs
- Authentication
  - 截图：



◦ 文字：

- Username: gridfs
- Password: your\_password
- Auth. database: gridfs
- Auth. mechanism: SCRAM-SHA-1

即可成功连接：



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# 坑

此处整理一些常见的MongoDB的坑及解决办法。

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## 停止MongoDB

想要去停止MongoDB的服务端。

对于之前是正常安装方式

```
brew install mongodb-community
```

则去停止运行方式是

```
brew services stop mongodb-community
```

不过之前遇到过特殊情况，试了各种方式都无法直接关闭掉，经研究最后是用：

```
sudo mongod -f /etc/mongod.conf --shutdown
```

输出：

```
killing process with pid: 30213
```

才算真正的关闭了MongoDB。

详见：

[【已解决】CentOS中如何彻底真正关闭mongod的服务](#)

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## Cursor not found

用pymongo期间可能会报错：

```
pymongo.errors.CursorNotFound: Cursor not found
```

原因：

此处的：

```
for eachDialog in dialogCollection.find():
```

find会返回多个数据，而这些数据的处理时间，超过了默认最长时间10分钟，所以超时报错了。

解决办法：

去掉超时时间的设置，加上参数 `no_cursor_timeout=True`

代码改为：

```
# for eachDialog in dialogCollection.find():
cursor = dialogCollection.find(no_cursor_timeout True)
for eachDialog in cursor:
    yield eachDialog
cursor.close()
```

即可。

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## 参数id是ObjectId对象而不是id字符串

直接说具体的坑是：Pymongo中的很多函数，比如exists等，传入的参数id是ObjectId对象而不是id的字符串

发现并解决坑的具体过程：

此处，gridfs的官网文档：

[gridfs – Tools for working with GridFS — PyMongo 3.6.1 documentation](#)

```
| exists(document_or_id=None, session=None, **kwargs)
```

函数来说，没有说明 document\_or\_id 是个特殊的 ObjectId 的这个类的实例，而其例子：

```
>>> fs.exists(file_id)
>>> fs.exists({_id:file_id})
>>> fs.exists(_id=file_id)
>>> fs.exists({"filename": "mike.txt"})
>>> fs.exists(filename="mike.txt")
```

很容易让人误解就是普通的\_id的值的字符串，比如：

```
"5abc96dfa4bc715f473f0297"
```

或

```
"ObjectId('5abc96dfa4bc715f473f0297')"
```

搞得尝试半天也无法正常执行，找不到本来已存在的文件。

幸亏：

[django - Querying by "\\_id" doesn't return file in MongoDB in Python, using PyMongo - Stack Overflow](#)

中解释的，对于pymongo

2.2版本之前：

```
from pymongo.objectid import ObjectId
```

2.2版本之后：

```
from bson.objectid import ObjectId
```

然后才能用于exists：

```
fileIdToDelete = '5abc8d77a4bc71563222d455'
fileObjectIdToDelete = ObjectId(fileIdToDelete)
if fsCollection.exists(fileObjectIdToDelete):
```

```
fsCollection.delete(fileObjectIdToDelete)
```

并且注意到作者是2012年，6年前就回复了该答案，结果此处pymongo在6年后，都没有及时更新此内容，真是醉了。

希望mongodb的文档以后能及时更新啊。

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## 附录

下面列出相关参考资料。

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# 教程和文档

此处整理一些关于MongoDB的官方和非官网的各种有用资料，供需要时查询和参考。

## MongoDB官网资料

官方文档入口：

[The MongoDB 4.0 Manual — MongoDB Manual](#)

官网还有个系列教程：

- [MongoDB University](#)

部分细节内容：

- 更新数据
  - [db.collection.update\(\) — MongoDB Manual](#)
- 查询
  - [Query Documents — MongoDB Manual](#)
  - [Query on Embedded/Nested Documents — MongoDB Manual](#)
  - [Query an Array — MongoDB Manual](#)
  - [Query an Array of Embedded Documents — MongoDB Manual](#)
- 查询期间条件组合
  - [\\$or — MongoDB Manual](#)
  - [Read Data using Operators and Compound Queries](#)
- 正则搜索
  - [\\$regex](#)
- 列表查询
  - [Array Query Operators — MongoDB Manual](#)
- 聚合
  - [Aggregation — MongoDB Manual 3.4](#)
- Driver的
  - [MongoDB Drivers and Client Libraries — MongoDB Manual 3.6](#)
- 用户和权限认证
  - Authentication
    - [Authentication — MongoDB Manual 3.6](#)
    - [authenticate — MongoDB Manual 3.6](#)
  - Users
    - [Users — MongoDB Manual 3.6](#)
  - 权限
    - RBAC
      - [Role-Based Access Control — MongoDB Manual 3.6](#)
    - 角色
      - [Built-In Roles — MongoDB Manual 3.6](#)

- [User-Defined Roles — MongoDB Manual 3.6](#)
- [grantRolesToUser — MongoDB Manual 3.6](#)
- Resource
  - [Resource Document — MongoDB Manual 3.6](#)
- 新建用户
  - [createUser — MongoDB Manual 3.6](#)

## 第三方资料

官网的（部分完成的）中文翻译：

- [mongoing.com](#)
  - MongoDB 4.2 手册
    - [Documentation | MongoDB中文社区](#)
  - MongoDB 3.4 手册
    - [安装MongoDB — MongoDB Manual 3.4](#)
- 极客学院
  - [mongodb 数据库 \(1\) - 《从零开始学 Python》\(第二版\) - 极客学院Wiki](#)

## Mongo Shell资料

Mongo Shell的资料：

- 英文
  - [mongo Shell Quick Reference — MongoDB Manual 3.6](#)
- 中文
  - [mongo shell — MongoDB Manual 3.4](#)
    - 注：翻译未必是完整的，且不一定是最新版本

## PyMongo资料

官网：

- 旧
  - PyMongo教程
    - [Tutorial — PyMongo 3.5.1 documentation](#)
  - API概览
    - [API Documentation — PyMongo 3.6.1 documentation](#)
  - Mongo的Client
    - [mongo\\_client – Tools for connecting to MongoDB — PyMongo 3.6.1 documentation](#)
- 最新：[readthedocs.io](https://readthedocs.io)
  - [PyMongo 3.10.1 Documentation — PyMongo 3.10.1 documentation](#)

第三方：

- [nummy/pymongo-tutorial-cn: pymongo中文教程](#)

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## 参考资料

- 【已解决】MongoDB版本区别：Community vs Enterprise
- 【记录】mac搭建开发环境：安装最新版MongoDB
- 【已解决】Python的Flask中pymysql中mysql返回分页查询结果
- 【已解决】Pymongo中新增插入记录
- 【已解决】Python的pymongo中根据指定字段的时间范围去查询数据且排序
- 【或许解决】Python的Pymongo中gridfs文件去更新保存metadata信息
- 【已解决】mongoimport/mongoexport和mongodump/mongorestore的区别
- 【已解决】从MongoDB数据库中导出数据
- 【已解决】把json数据恢复导入到本地MongoDB数据库的某个集合中
- 【已解决】重新将本地MongoDB数据storybook导入到在线环境
- 【记录】把在线的dev的MongoDB备份后恢复到本地
- 【已解决】PySpider项目迁移到别的电脑重新继续运行
- 【已解决】确认服务器是否已经正在运行MongoDB的服务mongod
- 【已解决】去更新绘本查询中的MongoDB中的绘本的title字段数据
- 【已解决】MongoDB中更新现有记录新插入字段
- 【已解决】Mongo的shell中新建一个空的db数据库和collection集合
- 【已解决】Python的MongoDB的Pymongo中实现嵌套字段即子字段的搜索
- 【已解决】Python的MongoDB的Pymongo中实现list列表中的内容的搜索
- 【已解决】Python的MongoDB的Pymongo中实现多个正则条件的组合搜索
- 【已解决】Python的MongoDB的pymongo中搜索查询支持regex正则和多个条件组合和字段嵌套和列表字段
- 【已解决】Python的MongoDB的Pymongo中搜索列表字段中是否包含某个列表值中任何一个以及正则匹配部分内容
- 
- 【已解决】Mongo中让搜索支持不区分大小写
- 【已解决】Pymongo出错： pymongo.errors.OperationFailure: Authentication failed
- 【已解决】MongoDB的MongoDB Compass中用正则进行模糊匹配字段
- 【规避解决】Flask-PyMongo中如何查询gridfs中的文件 – 在路上
- 【已解决】python中mongo出错： pymongo.errors.CursorNotFound: Cursor not found
- 【记录】MongoDB中本地写代码实现数据合并和迁移
- 【已解决】在线CentOS中Flask运行mongo出错： pymongo.errors.ServerSelectionTimeoutError  
localhost Errno 111 Connection refused
- 【已解决】添加了IP限制的mongod重启出错： Job for mongod.service failed because the control process exited with error code
- 【已解决】mongo中给bindIp添加多个IP后出错： getaddrinfo failed Name or service not known
- 【已解决】mongo启动失败： connection /var/lib/mongo/WiredTiger.turtle handle-open open  
Permission denied
- 【已解决】mongo启动失败： Failed to unlink socket file /tmp/mongodb-xxx.sock errno 1  
Operation not permitted
- 【已解决】添加了IP限制的mongod重启出错： Job for mongod.service failed because the control

process exited with error code – 在路上

- 【已解决】 mongo启动失败: connection /var/lib/mongo/WiredTiger.turtle handle-open open  
Permission denied
- 【已解决】 配置mongod以允许内网其他服务器访问mongo服务
- 【无法解决】 尝试用mongo的bindIp去实现限制特定IP才能连接mongo服务
- 【未解决】 systemctl或service无法重启或启动mongod的服务mongod
- 【已解决】 mongo中给bindIp添加多个IP后出错: getaddrinfo failed Name or service not known
- 【已解决】 mongo启动失败: Failed to unlink socket file /tmp/mongodb-xxx.sock errno 1  
Operation not permitted
- 【已解决】 给MongoDB数据库新建用户和权限
- 【已解决】 pymongo中用MongoClient去连接远程加了权限控制的MongoDB
- 【已解决】 本地mongo shell中连接远程加了权限控制的MongoDB
- 【已解决】 如何允许外网IP远程访问MongoDB数据库
- 【已解决】 连接远程MongoDB失败: Failed to connect to after 5000ms milliseconds giving up
- 【已解决】 阿里云ECS服务器中已有的MongoDB的用户名密码和端口
- 【已解决】 PyMongo中GridFS的exists始终检测不到文件已存在
- 【已解决】 安装MongoDB Compass去图形化查看Mongo数据 – 在路上
- 
- How to Import .bson file format on mongodb - Stack Overflow
- 最佳的MongoDB客户端管理工具 - chzs的专栏 - CSDN博客
- Working with MongoDB in Visual Studio Code
- 文档数据库\_文档型数据库\_AWS 数据库服务 - AWS 云服务
- Top 12 NoSQL Document Databases in 2020 - Reviews, Features, Pricing, Comparison
- 常用数据库及nosql - 简书
- Sql Or NoSql, 看完这一篇你就懂了 - 五月的仓颉 - 博客园
- NoSQL 还是 SQL ? 这一篇讲清楚 - 掘金
- 常用数据库有哪些 (附带数据库排名) ?
- MongoDB跑步进中国
- MongoDB API
- MongoDB Drivers and Ecosystem — MongoDB Drivers
- VSCode支持MongoDB
- MongoDB 常用的几大GUI工具 - 自由早晚乱余生 - 博客园
- Mongodb 工具 Studio 3T 和 Robo 3T · 码农装备
- Robo 3T | Free, open-source MongoDB GUI (formerly Robomongo)
- MongoDB的可视化工具: Studio 3T和Robo 3T有什么区别啊? - SegmentFault 思否
- cursor.sort() — MongoDB Manual
- \$orderby — MongoDB Manual
- MongoDB 排序 | 菜鸟教程
- mongodb - How do you tell Mongo to sort a collection before limiting the results? - Stack Overflow
- MongoDB find() Method: Introduction & Query Examples | Studio 3T
- MongoDB Python Drivers — MongoDB Drivers
- 初尝node.js + Express + MongoDB + Vue.js 项目构建(2) - 个人文章 - SegmentFault
-

## TODO 待整理

- 【已解决】 mongo命令行中如何删除文件
- 【已解决】 把本地的音频字幕等数据存储到远程服务器的MongoDB数据库中
- 【已解决】 mongo中给普通数据库gridfs创建root的角色失败：Error couldn't add user No role named root@gridfs
- 【已解决】 本地mongo shell中连接远程加了权限控制的mongoDB
- 【已解决】 阿里云ECS服务器中已有的MongoDB的用户名密码和端口
- 【未解决】 尝试用Mongo Management Studio去实现导入文件到Mongo的gridfs且带metadata信息
- 【已解决】 确认服务器中MongoDB数据库是否有或已开启记录登录的日志
- 【已解决】 确认服务器中MongoDB数据库是否有或已开启记录登录的日志
- 【已解决】 MongoDB开启访问控制后currentOp出错：not authorized on admin to execute command
- 【已解决】 给MongoDB数据库新建用户和权限
- 【已解决】 修改MongoDB的默认端口号27017为别的端口
- 【已解决】 mongo的shell中find返回多个有限个数的结果
- 【已解决】 公司Wi-Fi更换运营商导致IP变化导致远程Mongo连不上
- 【已解决】 连接远程mongoDB失败：Failed to connect to after 5000ms milliseconds giving up
- 【已解决】 pymongo中用MongoClient去连接远程加了权限控制的mongoDB
- 【已解决】 用PyCharm的MongoDB插件连接远程MongoDB数据库
- 【已解决】 MongoDB的用户的密码中包含@如何写URI
- 【已解决】 给MongoDB限制IP访问
- 【已解决】 远程MongoDB新增dialog数据库并新增对应用户和权限
- 【已解决】 PyCharm连接远程添加security的authorization的MongoDB出错：  
com.mongodb.MongoCommandExceptions: Command failed with error 13
- 【已解决】 Flask-PyMongo出错：RuntimeError Working outside of application context
- 【已解决】 pymongo的count()出错：pymongo.errors.ServerSelectionTimeoutError timed out
- 【记录】 通过阿里云ECS服务器安全组限制访问mongo的IP和端口
- 【已解决】 用PyCharm写Python的MongoDB代码并调试
- 【已解决】 配置mongod以允许内网其他服务器访问mongo服务
- 【已解决】 PyCharm中安装MongoDB的插件：mongo4idea
- 

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