Big Data; 04 Practical - MongoDB Basics

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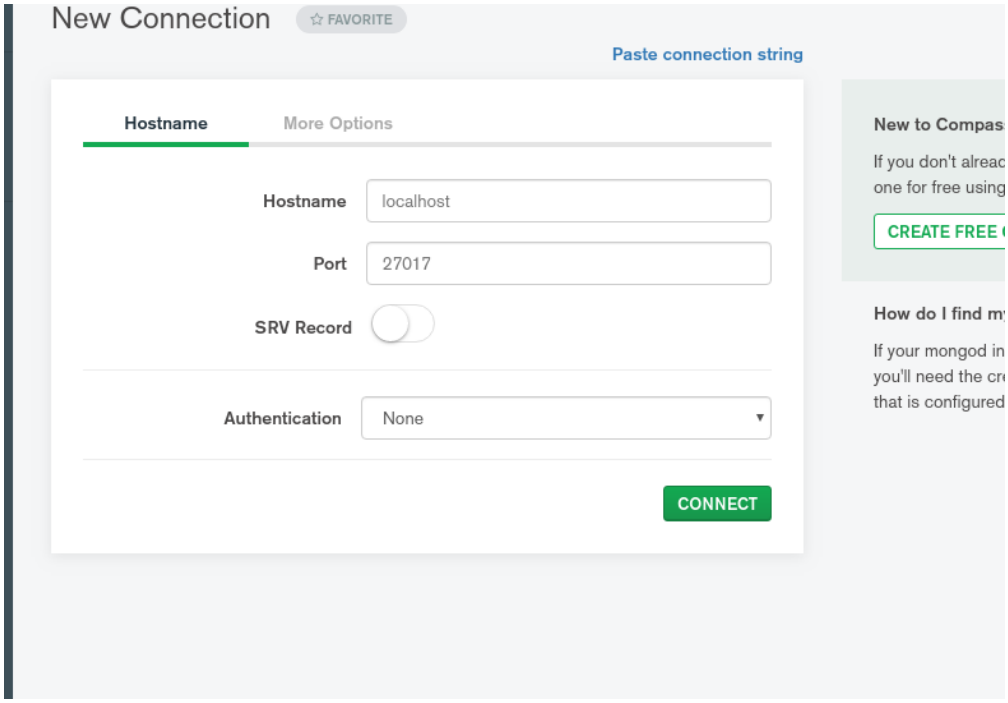
Contents

Using the `product` Database

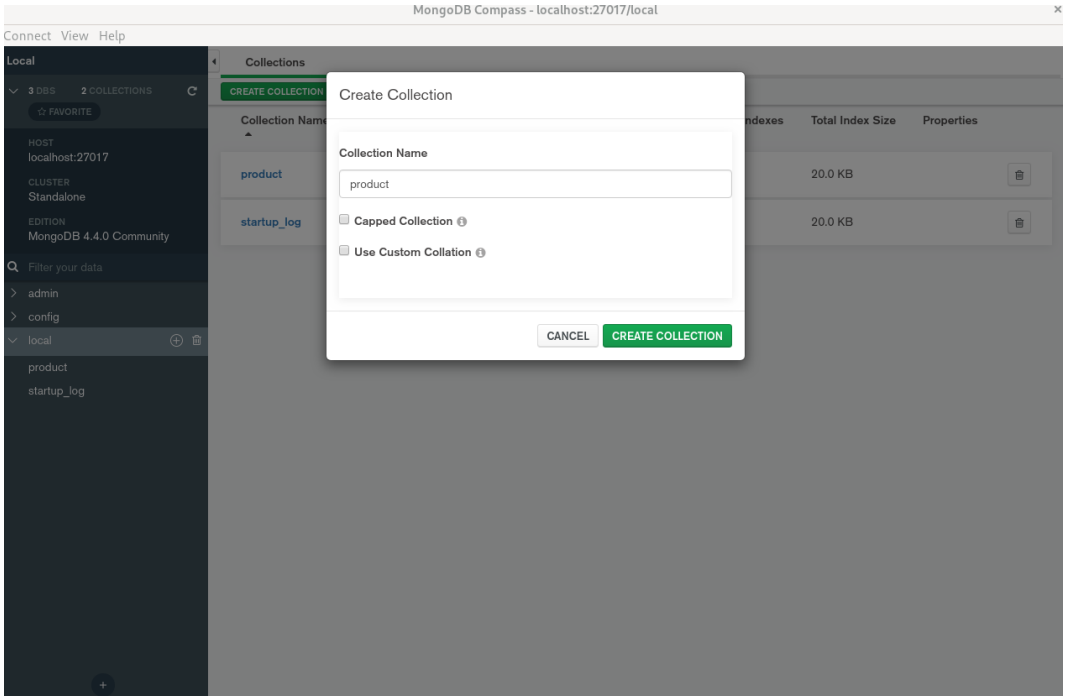
The `./product.json` Database will be used here

Using the Mongo-compass program ATTACH

1. Open mongo-compass
2. Connect to the mongoDB server
   (a) Probably localhost:27017
      i. If you're on SystemD maybe check with `sudo systemctl status mongodb`, for me I got a different port number.



3. Create a new collection



4. Import the JSON File

5. Now from the terminal run `mongo` to open a shell and then `use local` to switch to that database.

List Movies

First see if you can list everything, if you created product underneath local, you'll need to do something like this:

```
use local
db.product.find()
```

In the case of ./product.json, the following should return some output.

```
db.product.find({'Type': 'Movie'})
```

```
{ "_id" : ObjectId("551668dbeb88341eb801f2d2"), "Classification" : "PG-13", "Title" : "Inception", "Price" : { "Buy" : 9.99, "Rent" : 2.99 }, "Director" : "Christopher Nolan", "Cast" : [ "Leonardo DiCaprio", "Joseph Gordon-Levitt" ], "Year" : "2010", "Genre" : [ "Drama", "Action", "Science Fiction" ], "Type" : "Movie", "Length (min)" : 148 }
{ "_id" : ObjectId("551668dbeb88341eb801f2db"), "Classification" : "R", "Title" : "Superbad", "Price" : { "Buy" : 9.99, "Rent" : 2.99 }, "Director" : "Greg Mottola", "Cast" : [ "Jonah Hill", "Michael Cera" ], "Year" : "2007", "Genre" : "Comedy", "Type" : "Movie", "Length (min)" : 113 }
{ "_id" : ObjectId("551668dbeb88341eb801f2dc"), "Title" : "Dracula", "Price" : { "Buy" : 9.99, "Rent" : 3.99 }, "Director" : "Tod Browning", "Cast" : [ "Bela Lugosi", "Helen Chandler" ], "Year" : "1931", "Genre" : [ "Classics", "Horror" ], "Type" : "Movie", "Length (min)" : 75 }

...
...
...
```

To query all the text, something like this might be useful:

```
mongo --eval 'db.product.find()' local | fzf
```

To return All Movies that contain, for example, Morgan Freeman, Compass can be inspected to reveal the cast field and then the following can be used:

```
db.product.find({'Cast': 'Morgan Freeman'})
```

```
{ "_id" : ObjectId("551668dbeb88341eb801f2de"), "Title" : "The Shawshank Redemption" }
{ "_id" : ObjectId("551668dbeb88341eb801f2e7"), "Title" : "The Dark Knight" }
> db.product.find({'Cast': 'Morgan Freeman'})
{ "_id" : ObjectId("551668dbeb88341eb801f2de"), "Classification" : "R", "Title" : "The Shawshank Redemption", "Price" : { "Buy" : 9.99, "Rent" : 3.99 }, "Director" : "Frank Darabont", "Cast" : [ "Tim Robbins", "Morgan Freeman" ], "Year" : "1994", "Genre" : "Drama", "Type" : "Movie", "Length (min)" : 142 }
{ "_id" : ObjectId("551668dbeb88341eb801f2e7"), "Classification" : "PG-13", "Title" : "The Dark Knight", "Price" : { "Buy" : 12.99, "Rent" : 3.99 }, "Director" : "Christopher Nolan", "Cast" : [ "Christian Bale", "Heath Ledger", "Morgan Freeman" ], "Year" : "2008", "Genre" : [ "Drama", "Action", "Science Fiction" ], "Type" : "Movie", "Length (min)" : 152 }
>
```

This however returns too much information, instead we can use projection to filter the results:

```
db.product.find({'Cast': 'Morgan Freeman'}, {Title: 1})
```

```
{ "_id" : ObjectId("551668dbeb88341eb801f2de"), "Title" : "The Shawshank Redemption" }
{ "_id" : ObjectId("551668dbeb88341eb801f2e7"), "Title" : "The Dark Knight" }
```

Find Songs

To Find the Songs in the Database the following can be used:

```
db.product.find({'Type': 'Song'})
```

This returns far too many results, so instead projection can be used:

```
db.product.find({'Type': 'Song'}, {'Title': 1, })
```

```
{ "_id" : ObjectId("551668dbeb88341eb801f2d3"), "Title" : "Someone Like You" }
{ "_id" : ObjectId("551668dbeb88341eb801f2d5"), "Title" : "Billie Jean" }
{ "_id" : ObjectId("551668dbeb88341eb801f2d6"), "Title" : "Speak to Me" }
{ "_id" : ObjectId("551668dbeb88341eb801f2d7"), "Title" : "I Will Always Love You" }
{ "_id" : ObjectId("551668dbeb88341eb801f2d9"), "Title" : "Back in Black" }
{ "_id" : ObjectId("551668dbeb88341eb801f2df"), "Title" : "2 Becomes 1" }
{ "_id" : ObjectId("551668dbeb88341eb801f2e2"), "Title" : "Enter Sandman" }
{ "_id" : ObjectId("551668dbeb88341eb801f2e4"), "Title" : "Smells Like Teen Spirit" }
{ "_id" : ObjectId("551668dbeb88341eb801f2e6"), "Title" : "Yesterday" }
{ "_id" : ObjectId("551668dbeb88341eb801f2e9"), "Title" : "When You Believe" }
```

In order to filter by Genre we could just add that to the `find` field, however because we want any type of rock, we'll need to use the `.*Rock.*` regex, this has an odd syntax in *MongoDB* where a regex term is denoted like this: `{ $regex: /.*Rock.*/ }`, so putting that together:

```
db.product.find({'Type': 'Song', 'Genre': { $regex: /.*Rock.*/ }},
    {'Title': 1, 'Artist': 1, 'Album': 1})
```

```
{ "_id" : ObjectId("551668dbeb88341eb801f2d5"), "Album" : { "Certification" : "43xPlatinium", "Title" : "Thriller" }, "Artist" : "Michael Jackson", "Title" : "Billie Jean" }
{ "_id" : ObjectId("551668dbeb88341eb801f2d6"), "Album" : { "Certification" : "23xPlatinium", "Title" : "The Dark Side of the Moon" }, "Artist" : "Pink Floyd", "Title" : "Speak to Me" }
{ "_id" : ObjectId("551668dbeb88341eb801f2d9"), "Album" : { "Certification" : "26xPlatinium", "Title" : "Back in Black" }, "Artist" : "AC/DC", "Title" : "Back in Black" }
{ "_id" : ObjectId("551668dbeb88341eb801f2e4"), "Album" : { "Certification" : "17xPlatinium", "Title" : "Nevermind" }, "Artist" : "Nirvana", "Title" : "Smells Like Teen Spirit" }
{ "_id" : ObjectId("551668dbeb88341eb801f2e6"), "Album" : { "Certification" : "22xPlatinium", "Title" : "1" }, "Artist" : "The Beatles", "Title" : "Yesterday" }
```

To sort thhe results, the `.sort()` method can be tacked on the end like so:

```
db.product.find({'Type': 'Song', 'Genre': { $regex: /.*Rock.*/ }},
    {'Title': 1, 'Artist': 1, 'Album': 1}).sort({ 'ReleaseDate': -1 })
```

```
{ "_id" : ObjectId("551668dbeb88341eb801f2e6"), "Album" : {
    "Certification" : "22xPlatinium", "Title" : "1" }, "Artist" : "The
    Beatles", "Title" : "Yesterday" }
{ "_id" : ObjectId("551668dbeb88341eb801f2e4"), "Album" : {
    "Certification" : "17xPlatinium", "Title" : "Nevermind" }, "Artist"
    : "Nirvana", "Title" : "Smells Like Teen Spirit" }
{ "_id" : ObjectId("551668dbeb88341eb801f2d5"), "Album" : {
    "Certification" : "43xPlatinium", "Title" : "Thriller" }, "Artist"
    : "Michael Jackson", "Title" : "Billie Jean" }
{ "_id" : ObjectId("551668dbeb88341eb801f2d9"), "Album" : {
    "Certification" : "26xPlatinium", "Title" : "Back in Black" },
    "Artist" : "AC/DC", "Title" : "Back in Black" }
{ "_id" : ObjectId("551668dbeb88341eb801f2d6"), "Album" : {
    "Certification" : "23xPlatinium", "Title" : "The Dark Side of the
    Moon" }, "Artist" : "Pink Floyd", "Title" : "Speak to Me" }
>
```

Calculate the Average Price of Books

To find all books with more than 500 pages, the And operator can be used inside `find`, this amounts to just using a `,`.

Operators are, much like regex, a little odd, they require cages and $ prefixes.

```
 db.product.find( { 'Type': 'Book', Pages: { $gt: 500 } } )
```

```
{ "_id" : ObjectId("551668dbeb88341eb801f2d0"), "Publisher" : "Prentice Hall", "ISBN" : "132126958", "Author" : "Andrew Tanenbaum", "Price" : 129.79, "Title" : "Computer Networks", "Shipping" : { "Weight (lb)" : 2.9, "Dimension (in)" : { "Width" : 6.6, "Depth" : 1.5, "Height" : 9.2 } }, "Edition" : "5", "Year" : "2010", "Type" : "Book", "Pages" : 960 }
{ "_id" : ObjectId("551668dbeb88341eb801f2d4"), "Publisher" : "Pearson", "ISBN" : "032182573X", "Author" : "Peter Tanenbaum", "Price" : 153.16, "Title" : "Excursions in Modern Mathematics", "Shipping" : { "Weight (lb)" : 3.2, "Dimension (in)" : { "Width" : 8.8, "Depth" : 1.1, "Height" : 10.9 } }, "Edition" : "8", "Year" : "2012", "Type" : "Book", "Pages" : 608 }
{ "_id" : ObjectId("551668dbeb88341eb801f2e0"), "Publisher" : "Prentice Hall", "ISBN" : "013359162X", "Author" : "Andrew Tanenbaum, Herbert Bos", "Price" : 153.09, "Title" : "Modern Operating Systems", "Shipping" : { "Weight (lb)" : NaN, "Dimension (in)" : { "Width" : 7.1, "Depth" : 1.6, "Height" : 9.1 } }, "Edition" : "4", "Year" : "2014", "Type" : "Book", "Pages" : 1136 }
{ "_id" : ObjectId("551668dbeb88341eb801f2e3"), "Publisher" : "Addison-Wesley", "ISBN" : "321349806", "Author" : "Ken Arnold, James Gosling", "Price" : 53.69, "Title" : "The Java Programming Language", "Shipping" : { "Weight (lb)" : NaN, "Dimension (in)" : { "Width" : 7.4, "Depth" : 1.2, "Height" : 9.2 } }, "Edition" : "4", "Year" : "2005", "Type" : "Book", "Pages" : 928 }
{ "_id" : ObjectId("551668dbeb88341eb801f2ea"), "Publisher" : "Addison Wesley", "ISBN" : "321500245", "Author" : "Mario Triola", "Price" : 28.99, "Title" : "Elementary Statistics", "Shipping" : { "Weight (lb)" : 4.7, "Dimension (in)" : { "Width" : 8.5, "Depth" : 1.4, "Height" : 11.2 } }, "Edition" : "11", "Year" : "2009", "Type" : "Book", "Pages" : 896 }
> db.product.find( { 'Type': 'Book', Pages: { $gt: 500 } } )
```

To Average the price first use projection to return only the price values:

```
db.product.find( { 'Type': 'Book', Pages: { $gt: 100 } }, { 'Price': 1} )
```

```
{ "_id" : ObjectId("551668dbeb88341eb801f2d0"), "Price" : 129.79 }
{ "_id" : ObjectId("551668dbeb88341eb801f2d1"), "Price" : 52.89 }
{ "_id" : ObjectId("551668dbeb88341eb801f2d4"), "Price" : 153.16 }
{ "_id" : ObjectId("551668dbeb88341eb801f2d8"), "Price" : NaN }
{ "_id" : ObjectId("551668dbeb88341eb801f2da"), "Price" : NaN }
{ "_id" : ObjectId("551668dbeb88341eb801f2e0"), "Price" : 153.09 }
{ "_id" : ObjectId("551668dbeb88341eb801f2e1"), "Price" : 37.99 }
{ "_id" : ObjectId("551668dbeb88341eb801f2e3"), "Price" : 53.69 }
{ "_id" : ObjectId("551668dbeb88341eb801f2ea"), "Price" : 28.99 }
{ "_id" : ObjectId("551668dbeb88341eb801f2eb"), "Price" : 27.68 }
>
```

Next drop any results with missing values by not equal ($ne) operator:

```
db.product.find( { 'Type': 'Book', Pages: { $gt: 100 }, Price: { $ne:
↪  NaN } }, { 'Price': 1} )
```

```
{ "_id" : ObjectId("551668dbeb88341eb801f2d0"), "Price" : 129.79 }
{ "_id" : ObjectId("551668dbeb88341eb801f2d1"), "Price" : 52.89 }
{ "_id" : ObjectId("551668dbeb88341eb801f2d4"), "Price" : 153.16 }
{ "_id" : ObjectId("551668dbeb88341eb801f2e0"), "Price" : 153.09 }
{ "_id" : ObjectId("551668dbeb88341eb801f2e1"), "Price" : 37.99 }
{ "_id" : ObjectId("551668dbeb88341eb801f2e3"), "Price" : 53.69 }
{ "_id" : ObjectId("551668dbeb88341eb801f2ea"), "Price" : 28.99 }
{ "_id" : ObjectId("551668dbeb88341eb801f2eb"), "Price" : 27.68 }
```

To do this we'll create a variable, note however that `find` is such that any variable returned is a temporary cursor, which means that after the variable is called again it is cleared:

```
var price = db.product.find( { 'Type': 'Book', Pages: { $gt: 100 },
↪  Price: { $ne: NaN } }, { 'Price': 1} )
price
```

```
{ "_id" : ObjectId("551668dbeb88341eb801f2d0"), "Price" : 129.79 }
{ "_id" : ObjectId("551668dbeb88341eb801f2d1"), "Price" : 52.89 }
{ "_id" : ObjectId("551668dbeb88341eb801f2d4"), "Price" : 153.16 }
{ "_id" : ObjectId("551668dbeb88341eb801f2e0"), "Price" : 153.09 }
{ "_id" : ObjectId("551668dbeb88341eb801f2e1"), "Price" : 37.99 }
{ "_id" : ObjectId("551668dbeb88341eb801f2e3"), "Price" : 53.69 }
{ "_id" : ObjectId("551668dbeb88341eb801f2ea"), "Price" : 28.99 }
{ "_id" : ObjectId("551668dbeb88341eb801f2eb"), "Price" : 27.68 }
```

but then calling `price` again would return no output:

```
price
```

To overcome this make the result an array first:

```
var price = db.product.find( { 'Type': 'Book', Pages: { $gt: 500 },
    Price: { $ne: NaN } }, { 'Price': 1} ).toArray()
price
```

```
[
^^I{
^^I^^I"_id" : ObjectId("551668dbeb88341eb801f2d0"),
^^I^^I"Price" : 129.79
^^I},
^^I{
^^I^^I"_id" : ObjectId("551668dbeb88341eb801f2d4"),
^^I^^I"Price" : 153.16
^^I},
^^I{
^^I^^I"_id" : ObjectId("551668dbeb88341eb801f2e0"),
^^I^^I"Price" : 153.09
^^I},
^^I{
^^I^^I"_id" : ObjectId("551668dbeb88341eb801f2e3"),
^^I^^I"Price" : 53.69
^^I},
^^I{
^^I^^I"_id" : ObjectId("551668dbeb88341eb801f2ea"),
^^I^^I"Price" : 28.99
^^I}
]
```

Aggregate

Unfoututately we can't just grab the results and average, we need to use the aggregate method with `$group` and `$match` functions.

So for example, to average all the prices period, we could do something like this:

```
db.product.aggregate([
    {$group: {_id:null, "AveragePrice": {$avg:"$Price"} } }
]);
```

```
{ "_id" : null, "AveragePrice" : NaN }
```

This returns `NaN` because some of the prices were missing, we'll fix this later.

The `$_id` variable denotes grouping, in this case we just want to average everything so we set it to `null`.

In order to aggregate the matches to our `.find()`, the values can be put inside a `match` group like so:

```
db.product.aggregate([
    { "$match": { 'Type': 'Book', Pages: { $gt: 500 }, Price: { $ne:
    ↪  NaN } } },
    {$group: {_id:null, "AveragePrice": {$avg:"$Price"} } }
]);
```

This will then return:

```
{ "_id" : null, "AveragePrice" : 103.744 }
```

So the Average price of books with more than 500 pages is $\backslash 103.75$