

PROJECT 2

BUAN 6320.SW1 - Database Foundations for Business Analytics - F22

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CREDENTIALS: -

MONGO SHELL

```
mongosh "mongodb+srv://fall22-db.s1dceer.mongodb.net/Fall22-DB" --apiVersion 1 --username prof_valid  
USERNAME: -prof_valid  
PASSWORD: -prof_valid_fall_2021
```

MONGODB COMPASS

```
mongodb+srv://prof_valid:prof_valid_fall_2021@fall22-db.s1dceer.mongodb.net/test
```

IMPORTING DATA INTO CLUSTER: -

BOOKS COLLECTION:

_id	ObjectId	ISBN10 String	ISBN13 String	Title String	Cover String	Publisher String	Pages String	Authors Array	Description
1	00ject101	63479251338887fa243...	9780511211587	"Pride And Prejudice"	"http://www.openisbn.com/cove...	"Bantam Classics"	"9"	[] 1 elements	"A Novel"
2	00ject101	63479251338887fa243...	9780575977278	"Pride: A Novel"	"http://www.openisbn.com/cove...	"Random House Trade Paperback"	"age"	[] 1 elements	
3	00ject101	63479251338887fa243...	9780575975999	"Solider Of The Great War"	"http://www.openisbn.com/cove...	"Avon Books"	"776"	[] 1 elements	
4	00ject101	63479251338887fa243...	9780510020422	"The Daybreakers (The Louis L...	"http://www.openisbn.com/cove...	"Bantam Doubleday Dell"	"198"	[] 1 elements	
5	00ject101	63479251338887fa243...	9780451206988	"The Short Forever (Stone Barl...	"http://www.openisbn.com/cove...	"Signed"	"432"	[] 1 elements	
6	00ject101	63479251338887fa243...	9780535613817	"Dead Aim"	"http://www.openisbn.com/cove...	"Bantam"	"364"	[] 1 elements	
7	00ject101	63479251338887fa243...	9780021279587	"The Deal"	"http://www.openisbn.com/cove...	"Forge"	"328"	[] 1 elements	
8	00ject101	63479251338887fa243...	9780809932238	"CONTE WAITS FOR ME (Joe Leaphor...	"http://www.openisbn.com/cove...	"HarperTorch"	"364"	[] 1 elements	
9	00ject101	63479251338887fa243...	9780452052186	"With You Well"	"http://www.openisbn.com/cove...	"Warner Books"	"468"	[] 1 elements	
10	00ject101	63479251338887fa243...	97808073401492	"The Hitchhiker's Guide to Th...	"http://www.openisbn.com/cove...	"Pocket"	"78"	[] 1 elements	
11	00ject101	63479251338887fa243...	9780575515437	"My Antonia"	"http://www.openisbn.com/cove...	"Harper Books"	"272"	[] 1 elements	
12	00ject101	63479251338887fa243...	9780807140144	"Always Daddy's Girl: Underst...	"http://www.openisbn.com/cove...	"Regal Books"	"284"	[] 1 elements	
13	00ject101	63479251338887fa243...	9783836686568	"Heftischfrauen"	"http://www.openisbn.com/cove...	"Droemer Knaur"	"672"	[] 2 elements	
14	00ject101	63479251338887fa243...	97837370300997	"Das Intellektuel Des Adrian Mo...	"http://www.openisbn.com/cove...	"Cott"	"416"	[] 2 elements	
15	00ject101	63479251338887fa243...	9780557349497	"Cong"	"http://www.openisbn.com/cove...	"Bellantine"	"8"	[] 1 elements	
16	00ject101	63479251338887fa243...	9780804164972	"Pet Semetary (Signet)"	"http://www.openisbn.com/cove...	"Signet"	"448"	[] 1 elements	
17	00ject101	63479251338887fa243...	9780804658773	"Peter Pan: The Original Sto...	"http://www.openisbn.com/cove...	"HarperFestival"	"248"	[] 1 elements	
18	00ject101	63479251338887fa243...	9780785234467	"The Subtle Knife (His Dark M...	"http://www.openisbn.com/cove...	"Knopf Books for Young Reader..."	"392"	[] 1 elements	
19	00ject101	63479251338887fa243...	9780553916951	"The Battle for God"	"http://www.openisbn.com/cove...	"Ballantine Books"	"488"	[] 1 elements	
20	00ject101	63479251338887fa243...	978722087687	"Symposium"	"http://www.openisbn.com/cove...	"Hackett Publishing Co"	"387"	[] 3 elements	

BOOK_COPIES COLLECTION:

MongoDB Compass - Fall22-DB/Project_2.book_copies

Connect View Collection Help

Fall22-DB

My Queries Databases +

Project_2.book_copies

Documents Aggregations Schema Explain Plan Indexes Validation

book_copies

_id, book_id, branch_id, no_of_copies

_id	book_id	branch_id	no_of_copies
0	"093e110c-638848283949fc12f7.."	"093e110c-638848283949fc12f7.."	1
1	"093e110c-638848283949fc12f7.."	"093e110c-638848283949fc12f7.."	2
2	"093e110c-638848283949fc12f7.."	"093e110c-638848283949fc12f7.."	3
3	"093e110c-638848283949fc12f7.."	"093e110c-638848283949fc12f7.."	4
4	"093e110c-638848283949fc12f7.."	"093e110c-638848283949fc12f7.."	5
5	"093e110c-638848283949fc12f7.."	"093e110c-638848283949fc12f7.."	6
6	"093e110c-638848283949fc12f7.."	"093e110c-638848283949fc12f7.."	1
7	"093e110c-638848283949fc12f7.."	"093e110c-638848283949fc12f7.."	2
8	"093e110c-638848283949fc12f7.."	"093e110c-638848283949fc12f7.."	3
9	"093e110c-638848283949fc12f7.."	"093e110c-638848283949fc12f7.."	4
10	"093e110c-638848283949fc12f7.."	"093e110c-638848283949fc12f7.."	5
11	"093e110c-638848283949fc12f7.."	"093e110c-638848283949fc12f7.."	6
12	"093e110c-638848283949fc12f7.."	"093e110c-638848283949fc12f7.."	1
13	"093e110c-638848283949fc12f7.."	"093e110c-638848283949fc12f7.."	2
14	"093e110c-638848283949fc12f7.."	"093e110c-638848283949fc12f7.."	3
15	"093e110c-638848283949fc12f7.."	"093e110c-638848283949fc12f7.."	4
16	"093e110c-638848283949fc12f7.."	"093e110c-638848283949fc12f7.."	5
17	"093e110c-638848283949fc12f7.."	"093e110c-638848283949fc12f7.."	1
18	"093e110c-638848283949fc12f7.."	"093e110c-638848283949fc12f7.."	2
19	"093e110c-638848283949fc12f7.."	"093e110c-638848283949fc12f7.."	3
20	"093e110c-638848283949fc12f7.."	"093e110c-638848283949fc12f7.."	4
21	"093e110c-638848283949fc12f7.."	"093e110c-638848283949fc12f7.."	5
22	"093e110c-638848283949fc12f7.."	"093e110c-638848283949fc12f7.."	1

BORROWERS COLLECTION:

MongoDB Compass - Fall22-DB/Project_2.borrowers

Connect View Collection Help

Fall22-DB

My Queries Databases +

Project_2.borrowers

Documents Aggregations Schema Explain Plan Indexes Validation

borrowers

_id, book_id, ssn, first_name, last_name, email, address, city, phone

_id	book_id	ssn	first_name	last_name	email	address	city
1	"093e110c-638848283949fc12f7.."	"999-41-3748"	"Mark"	"Morgan"	"morgan@qg.co"	"5677 Coolidge Street"	"Plano"
2	"093e110c-638848283949fc12f7.."	"999-51-4382"	"Eric"	"Barren"	"evarren@ed.gov"	"9882 Schurz Drive"	"Dallas"
3	"093e110c-638848283949fc12f7.."	"999-51-5268"	"Robert"	"Harper"	"rharper@engelfire.com"	"7785 Sachs Place"	"Plano"
4	"093e110c-638848283949fc12f7.."	"999-41-2514"	"Donna"	"Franklin"	"franklin@qjexxa.com"	"3 Madeline Terrace"	"Plano"
5	"093e110c-638848283949fc12f7.."	"999-41-3568"	"Linda"	"King"	"lking@lllinois.edu"	"4126 Kestle Terrace"	"Dallas"
6	"093e110c-638848283949fc12f7.."	"999-41-7141"	"Judy"	"Holmes"	"holness@github.io"	"6561 Mainwood Hill"	"Dallas"
7	"093e110c-638848283949fc12f7.."	"999-41-3547"	"Deborah"	"Lawrence"	"dlawrence@chicagotribune.co.."	"72 Merina Trail"	"Dallas"
8	"093e110c-638848283949fc12f7.."	"999-21-8492"	"Adam"	"Johnson"	"ajohnston@l14.gq"	"86571 Nerney Maple Court"	"Dallas"
9	"093e110c-638848283949fc12f7.."	"999-11-4697"	"Pamela"	"Car"	"pcarr@tumbalepon.com"	"1848 Fordem Avenue"	"Richardson"
10	"093e110c-638848283949fc12f7.."	"999-32-7951"	"Donald"	"Fisher"	"dfisher@liveinternet.ru"	"488 Cody Lane"	"Plano"
11	"093e110c-638848283949fc12f7.."	"999-30-7753"	"Stephen"	"Fields"	"sfields@phoenix.com"	"99 Fair Oaks Drive"	"Plano"
12	"093e110c-638848283949fc12f7.."	"999-51-3734"	"Haliter"	"Ferguson"	"wferguson@jalbum.net"	"814 Sutteridge Point"	"Dallas"
13	"093e110c-638848283949fc12f7.."	"999-41-6511"	"Paul"	"Cook"	"pcook@digitalkreato.com"	"5229 Pierstorff Pass"	"Richardson"
14	"093e110c-638848283949fc12f7.."	"999-24-4368"	"Roy"	"Smith"	"rsmith@qsemitronics.com"	"563 Fairview Park"	"Dallas"
15	"093e110c-638848283949fc12f7.."	"999-41-8412"	"Michelle"	"Gardner"	"mgardner@wpress.org"	"23389 Paget Court"	"Plano"
16	"093e110c-638848283949fc12f7.."	"999-75-5475"	"George"	"Powell"	"gpowell@scrbd.com"	"31 Clove Crossing"	"Dallas"
17	"093e110c-638848283949fc12f7.."	"999-41-5822"	"Nicholas"	"Hudson"	"nhudson@qjxuo.com.br"	"29 Ester Trail"	"Dallas"
18	"093e110c-638848283949fc12f7.."	"999-41-7179"	"Linda"	"Henderson"	"lhenderson@macyclinic.com"	"117 Katie center"	"Dallas"
19	"093e110c-638848283949fc12f7.."	"999-99-1826"	"Gregory"	"Fowler"	"gfowler@xmeds.com"	"42404 Hermita Plaza"	"Dallas"
20	"093e110c-638848283949fc12f7.."	"999-52-7008"	"Carol"	"Sanders"	"csanders@busa.gov"	"9900 Holand Way"	"Dallas"

LIBRARY_BRANCH COLLECTION:

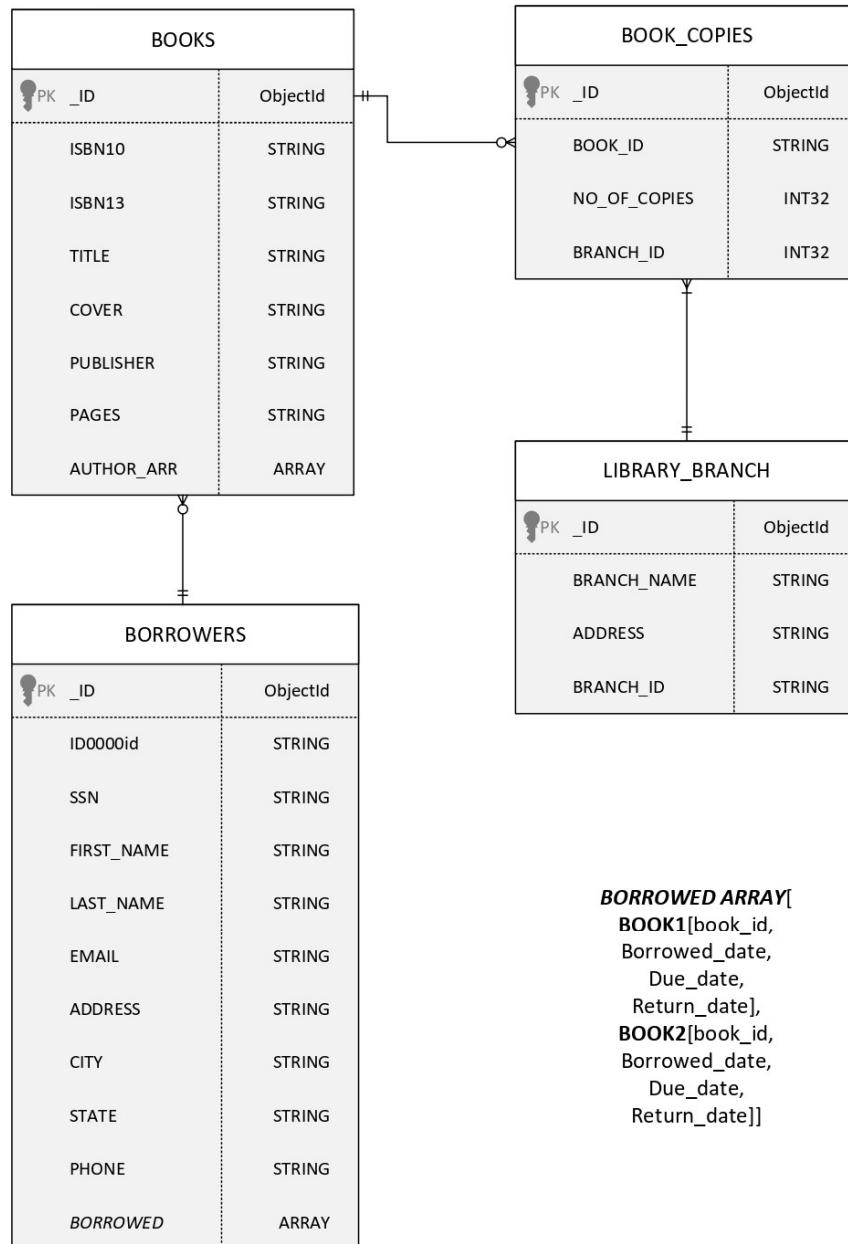
The screenshot shows the MongoDB Compass interface with the database 'Fall22-DB' selected. The 'Project_2.library_branch' collection is open, displaying 5 documents and 1 index. The collection schema includes fields: '_id' (ObjectID), 'branch_name' (String), 'address' (String), and 'branch_id' (Int32). The data is as follows:

_id	branch_name	address	branch_id
00fe110f-6887-4c39-a9fc-f7c12f7f...	"Oak Lane"	"4100 Cedar Springs Road, Plz. 1"	1
00fe110f-6887-4c39-a9fc-f7c12f7f...	"Lakewood"	"4121 North Street, 75214"	2
00fe110f-6887-4c39-a9fc-f7c12f7f...	"Waxahachie Park"	"2144 Gilford Street, 75138"	3
00fe110f-6887-4c39-a9fc-f7c12f7f...	"Highland Hills"	"3124 Simpson Stuart Road, Plz. 4"	4
00fe110f-6887-4c39-a9fc-f7c12f7f...	"Audelia Road"	"10440 Audelia Road, 75238"	5



ENTITY RELATIONSHIP DIAGRAM

PROJECT 2



CREATING TRANSACTIONS

Exactly 20 books check-outs for exactly 10 different borrowers and exactly 10 different books. Same borrower should not check out same book more than once.

```
db.borrowers.updateOne({"ID0000id":"ID000001"},{$set:{"borrowed":[{"book1":{"book_id":"0195153448","borrowed_date":new Date("2020-01-01"),"due_date":new Date("2020-02-01"),"returned_date":new Date("2020-01-15")},"book2":[{"book_id":"0002005018","borrowed_date":new Date("2020-01-01"),"due_date":new Date("2020-02-01"),"returned_date":null}]}]})
```

```
Atlas atlas-pw2ihb-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID0000id":"ID000001"},{$set:{"borrowed":[{"book1":{"book_id":"0195153448","borrowed_date":new Date("2020-01-01"),"due_date":new Date("2020-02-01"),"returned_date":new Date("2020-01-15")},"book2":[{"book_id":"0002005018","borrowed_date":new Date("2020-01-01"),"due_date":new Date("2020-02-01"),"returned_date":null}]}]})
```

```
{  
    acknowledged: true,  
    insertedId: null,  
    matchedCount: 1,  
    modifiedCount: 1,  
    upsertedCount: 0  
}
```

```
_id: ObjectId('618a7e813543f7cc2f79afed')  
ID0000id: "ID000001"  
ssn: "999-47-3740"  
first_name: "Mark"  
last_name: "Morgan"  
email: "mmorgan@gg.co"  
address: "5677 Coolidge Street"  
city: "Plano"  
state: "TX"  
phone: "(469) 904-1438"  
borrowed: Object  
  ▼ book1: Array  
    ▼ 0: Object  
      book_id: "0195153448"  
      borrowed_date: 2020-01-01T00:00:00.000+00:00  
      due_date: 2020-02-01T00:00:00.000+00:00  
      returned_date: 2020-01-15T00:00:00.000+00:00  
  ▼ book2: Array  
    ▼ 0: Object  
      book_id: "0002005018"  
      borrowed_date: 2020-01-01T00:00:00.000+00:00  
      due_date: 2020-02-01T00:00:00.000+00:00  
      returned_date: null
```

THE UNIVERSITY
OF TEXAS AT DALLAS

```
db.borrowers.updateOne({"ID0000id":"ID000002"},{$set:{"borrowed":[{"book1":{"book_id":"0002005018","borrowed_date":new Date("2020-02-01"),"due_date":new Date("2020-03-01"),"returned_date":new Date("2020-02-15")},"book2":[{"book_id":"0060973129","borrowed_date":new Date("2020-02-01"),"due_date":new Date("2020-03-01"),"returned_date":null}]}}})
```

```
Atlas atlas-pw2ihb-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID0000id":"ID000002"},{$set:{"borrowed":[{"book1":{"book_id":"0002005018","borrowed_date":new Date("2020-02-01"),"due_date":new Date("2020-03-01"),"returned_date":new Date("2020-02-15")},"book2":[{"book_id":"0060973129","borrowed_date":new Date("2020-02-01"),"due_date":new Date("2020-03-01"),"returned_date":null}]}}})
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}

_id: ObjectId('618a7e813543f7cc2f79afee')
ID0000id: "ID000002"
ssn: "999-95-4382"
first_name: "Eric"
last_name: "Warren"
email: "ewarren1@ed.gov"
address: "9062 Schurz Drive"
city: "Dallas"
state: "TX"
phone: "(214) 701-8127"
borrowed: Object
  book1: Array
    0: Object
      book_id: "0002005018"
      borrowed_date: 2020-02-01T00:00:00.000+00:00
      due_date: 2020-03-01T00:00:00.000+00:00
      returned_date: 2020-02-15T00:00:00.000+00:00
  book2: Array
    0: Object
      book_id: "0060973129"
      borrowed_date: 2020-02-01T00:00:00.000+00:00
      due_date: 2020-03-01T00:00:00.000+00:00
      returned_date: null
```



```
db.borrowers.updateOne({"ID0000id":"ID000003"},{$set:{"borrowed":[{"book1":{"book_id":"0060973129","borrowed_date":new Date("2020-03-01"),"due_date":new Date("2020-04-01"),"returned_date":new Date("2020-03-15")},"book2":{"book_id":"0374157065","borrowed_date":new Date("2020-03-01"),"due_date":new Date("2020-04-01"),"returned_date":null}]}})
```

```
Atlas atlas-pw2ihb-shard-0 [primary] Fall22-DB> use Project_2
switched to db Project_2
Atlas atlas-pw2ihb-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID0000id":"ID000003"},{$set:{"borrowed":[{"book1":{"book_id":"0060973129","borrowed_date":new Date("2020-03-01"),"due_date":new Date("2020-04-01"),"returned_date":new Date("2020-03-15")},"book2":{"book_id":"0374157065","borrowed_date":new Date("2020-03-01"),"due_date":new Date("2020-04-01"),"returned_date":null}]}})
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}
Atlas atlas-pw2ihb-shard-0 [primary] Project_2>
```

```
_id: ObjectId('618a7e813543f7cc2f79afef')
ID0000id: "ID000003"
ssn: "999-51-5268"
first_name: "Robert"
last_name: "Harper"
email: "rharper2@angelfire.com"
address: "7786 Sachs Place"
city: "Plano"
state: "TX"
phone: "(214) 875-5911"
borrowed: Object
  book1: Array
    0: Object
      book_id: "0060973129"
      borrowed_date: 2020-03-01T00:00:00.000+00:00
      due_date: 2020-04-01T00:00:00.000+00:00
      returned_date: 2020-03-15T00:00:00.000+00:00
  book2: Array
    0: Object
      book_id: "0374157065"
      borrowed_date: 2020-03-01T00:00:00.000+00:00
      due_date: 2020-04-01T00:00:00.000+00:00
      returned_date: null
```

```
db.borrowers.updateOne({"ID0000id":"ID000004"},{$set:{'borrowed':[{"book1":{"book_id":"0374157065","borrowed_date":new Date("2020-04-01"),"due_date":new Date("2020-05-01"),"returned_date":new Date("2020-04-15")}}, {"book2":{"book_id":"0393045218","borrowed_date":new Date("2020-04-01"),"due_date":new Date("2020-05-01"),"returned_date":null}}]})
```

```
Atlas atlas-pw2ihb-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID0000id":"ID000004"},{$set:{'borrowed':[{"book1":{"book_id":"0374157065","borrowed_date":new Date("2020-04-01"),"due_date":new Date("2020-05-01"),"returned_date":new Date("2020-04-15")}}, {"book2":{"book_id":"0393045218","borrowed_date":new Date("2020-04-01"),"due_date":new Date("2020-05-01"),"returned_date":null}}]}})
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}
Atlas atlas-pw2ihb-shard-0 [primary] Project_2>
```

```
_id: ObjectId('618a7e813543f7cc2f79aff0')
ID0000id: "ID000004"
ssn: "999-95-2914"
first_name: "Donna"
last_name: "Franklin"
email: "dfranklin3@alexa.com"
address: "3 Magdeline Terrace"
city: "Plano"
state: "TX"
phone: "(214) 800-6127"
borrowed: Object
  book1: Array
    0: Object
      book_id: "0374157065"
      borrowed_date: 2020-04-01T00:00:00.000+00:00
      due_date: 2020-05-01T00:00:00.000+00:00
      returned_date: 2020-04-15T00:00:00.000+00:00
  book2: Array
    0: Object
      book_id: "0393045218"
      borrowed_date: 2020-04-01T00:00:00.000+00:00
      due_date: 2020-05-01T00:00:00.000+00:00
      returned_date: null
```

```
db.borrowers.updateOne({"ID0000id":"ID000005"},{$set:{'borrowed':[{"book1": {"book_id": "0393045218", "borrowed_date": new Date("2020-05-01"), "due_date": new Date("2020-06-01"), "returned_date": new Date("2020-05-15")}, {"book2": {"book_id": "0399135782", "borrowed_date": new Date("2020-05-01"), "due_date": new Date("2020-06-01"), "returned_date": null}}]}})
```

```
Atlas atlas-pw2ihb-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID0000id":"ID000005"},{$set:{'borrowed':[{"book1": {"book_id": "0393045218", "borrowed_date": new Date("2020-05-01"), "due_date": new Date("2020-06-01"), "returned_date": new Date("2020-05-15")}, {"book2": {"book_id": "0399135782", "borrowed_date": new Date("2020-05-01"), "due_date": new Date("2020-06-01"), "returned_date": null}}]}})
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}
Atlas atlas-pw2ihb-shard-0 [primary] Project_2>
```

```
_id: ObjectId('618a7e813543f7cc2f79aff1')
ID0000id: "ID000005"
ssn: "999-63-3588"
first_name: "Linda"
last_name: "King"
email: "lking4@illinois.edu"
address: "41260 Kedzie Terrace"
city: "Dallas"
state: "TX"
phone: "(469) 213-2549"
▼ borrowed: Object
  ▼ book1: Array
    ▼ 0: Object
      book_id: "0393045218"
      borrowed_date: 2020-05-01T00:00:00.000+00:00
      due_date: 2020-06-01T00:00:00.000+00:00
      returned_date: 2020-05-15T00:00:00.000+00:00
  ▼ book2: Array
    ▼ 0: Object
      book_id: "0399135782"
      borrowed_date: 2020-05-01T00:00:00.000+00:00
      due_date: 2020-06-01T00:00:00.000+00:00
      returned_date: null
```

```
db.borrowers.updateOne({"ID0000id":"ID000006"},{$set:{'borrowed':[{"book1":{"book_id":"0399135782","borrowed_date":new Date("2020-06-01"),"due_date":new Date("2020-07-01"),"returned_date":new Date("2020-06-15")}}, {"book2":{"book_id":"0425176428","borrowed_date":new Date("2020-06-01"),"due_date":new Date("2020-07-01"),"returned_date":null}]}})
```

```
Atlas atlas-pw2ihb-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID0000id":"ID000006"},{$set:{'borrowed':[{"book1":{"book_id":"0399135782","borrowed_date":new Date("2020-06-01"),"due_date":new Date("2020-07-01"),"returned_date":new Date("2020-06-15")}}, {"book2":{"book_id":"0425176428","borrowed_date":new Date("2020-06-01"),"due_date":new Date("2020-07-01"),"returned_date":null}]}})
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}
Atlas atlas-pw2ihb-shard-0 [primary] Project_2>
```

```
_id: ObjectId('618a7e813543f7cc2f79aff2')
ID0000id: "ID000006"
ssn: "999-26-7141"
first_name: "Judy"
last_name: "Holmes"
email: "jholmes5@github.io"
address: "6583 Manitowish Hill"
city: "Dallas"
state: "TX"
phone: "(972) 898-5909"
borrowed: Object
  book1: Array
    0: Object
      book_id: "0399135782"
      borrowed_date: 2020-06-01T00:00:00.000+00:00
      due_date: 2020-07-01T00:00:00.000+00:00
      returned_date: 2020-06-15T00:00:00.000+00:00
  book2: Array
    0: Object
      book_id: "0425176428"
      borrowed_date: 2020-06-01T00:00:00.000+00:00
      due_date: 2020-07-01T00:00:00.000+00:00
      returned_date: null
```

```
db.borrowers.updateOne({"ID0000id":"ID000007"},{$set:{'borrowed':[{"book1":{"book_id":"0425176428","borrowed_date":new Date("2020-07-01"),"due_date":new Date("2020-08-01"),"returned_date":new Date("2020-07-15")},"book2":{"book_id":"0671870432","borrowed_date":new Date("2020-07-01"),"due_date":new Date("2020-08-01"),"returned_date":null}]}})
```

```
Atlas atlas-pw2ihb-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID0000id":"ID000007"},{$set:{'borrowed':[{"book1":{"book_id":"0425176428","borrowed_date":new Date("2020-07-01"),"due_date":new Date("2020-08-01"),"returned_date":new Date("2020-07-15")},"book2":{"book_id":"0671870432","borrowed_date":new Date("2020-07-01"),"due_date":new Date("2020-08-01"),"returned_date":null}]}})
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}
Atlas atlas-pw2ihb-shard-0 [primary] Project_2>
```

```
_id: ObjectId('618a7e813543f7cc2f79aff3')
ID0000id: "ID000007"
ssn: "999-61-3567"
first_name: "Deborah"
last_name: "Lawrence"
email: "dlawrence6@chicagotribune.com"
address: "2 Hermina Trail"
city: "Dallas"
state: "TX"
phone: "(972) 900-2951"
▼ borrowed: Object
  ▼ book1: Array
    ▼ 0: Object
      book_id: "0425176428"
      borrowed_date: 2020-07-01T00:00:00.000+00:00
      due_date: 2020-08-01T00:00:00.000+00:00
      returned_date: 2020-07-15T00:00:00.000+00:00
  ▼ book2: Array
    ▼ 0: Object
      book_id: "0671870432"
      borrowed_date: 2020-07-01T00:00:00.000+00:00
      due_date: 2020-08-01T00:00:00.000+00:00
      returned_date: null
```

```
db.borrowers.updateOne({"ID0000id":"ID000008"},{$set:{'borrowed':[{"book1":{"book_id":"0671870432","borrowed_date":new Date("2020-08-01"),"due_date":new Date("2020-09-01"),"returned_date":new Date("2020-08-15")}}, {"book2":{"book_id":"0071870432","borrowed_date":new Date("2020-08-01"),"due_date":new Date("2020-09-01"),"returned_date":null}}]})
```

```
Atlas atlas-pw2ihb-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID0000id":"ID000008"},{$set:{'borrowed':[{"book1":{"book_id":"0671870432","borrowed_date":new Date("2020-08-01"),"due_date":new Date("2020-09-01"),"returned_date":new Date("2020-08-15")}}, {"book2":{"book_id":"0071870432","borrowed_date":new Date("2020-08-01"),"due_date":new Date("2020-09-01"),"returned_date":null}}]})  
{  
    acknowledged: true,  
    insertedId: null,  
    matchedCount: 1,  
    modifiedCount: 1,  
    upsertedCount: 0  
}  
Atlas atlas-pw2ihb-shard-0 [primary] Project_2>
```

```
_id: ObjectId('618a7e813543f7cc2f79aff4')  
ID0000id: "ID000008"  
ssn: "999-25-0492"  
first_name: "Adam"  
last_name: "Johnston"  
email: "ajohnston7@is.gd"  
address: "05671 Norway Maple Court"  
city: "Dallas"  
state: "TX"  
phone: "(469) 743-0176"  
▼ borrowed: Object  
  ▼ book1: Array  
    ▼ 0: Object  
      book_id: "0671870432"  
      borrowed_date: 2020-08-01T00:00:00.000+00:00  
      due_date: 2020-09-01T00:00:00.000+00:00  
      returned_date: 2020-08-15T00:00:00.000+00:00  
  ▼ book2: Array  
    ▼ 0: Object  
      book_id: "0071870432"  
      borrowed_date: 2020-08-01T00:00:00.000+00:00  
      due_date: 2020-09-01T00:00:00.000+00:00  
      returned_date: null
```

```
db.borrowers.updateOne({"ID0000id":"ID000009"},{$set:{'borrowed':[{"book1":{"book_id":"0071870432","borrowed_date":new Date("2020-09-01"),"due_date":new Date("2020-10-01"),"returned_date":new Date("2020-09-15")}}, {"book2":{"book_id":"0679425608","borrowed_date":new Date("2020-09-01"),"due_date":new Date("2020-10-01"),"returned_date":null}}]})
```

```
Atlas atlas-pw2ihb-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID0000id":"ID000009"},{$set:{'borrowed':[{"book1":{"book_id":"0071870432","borrowed_date":new Date("2020-09-01"),"due_date":new Date("2020-10-01"),"returned_date":new Date("2020-09-15")}}, {"book2":{"book_id":"0679425608","borrowed_date":new Date("2020-09-01"),"due_date":new Date("2020-10-01"),"returned_date":null}}]})  
{  
    acknowledged: true,  
    insertedId: null,  
    matchedCount: 1,  
    modifiedCount: 1,  
    upsertedCount: 0  
}  
Atlas atlas-pw2ihb-shard-0 [primary] Project_2>
```

```
_id: ObjectId('618a7e813543f7cc2f79aff5')  
ID0000id: "ID000009"  
ssn: "999-12-4697"  
first_name: "Pamela"  
last_name: "Carr"  
email: "pcarr8@stumbleupon.com"  
address: "1848 Fordem Avenue"  
city: "Richardson"  
state: "TX"  
phone: "(972) 247-9852"  
✓ borrowed: Object  
    ✓ book1: Array  
        ✓ 0: Object  
            book_id: "0071870432"  
            borrowed_date: 2020-09-01T00:00:00.000+00:00  
            due_date: 2020-10-01T00:00:00.000+00:00  
            returned_date: 2020-09-15T00:00:00.000+00:00  
    ✓ book2: Array  
        ✓ 0: Object  
            book_id: "0679425608"  
            borrowed_date: 2020-09-01T00:00:00.000+00:00  
            due_date: 2020-10-01T00:00:00.000+00:00  
            returned_date: null
```

```
db.borrowers.updateOne({"ID0000id":"ID000010"},{$set:{'borrowed':[{"book1":{"book_id":"067942560","borrowed_date":new Date("2020-10-01"),"due_date":new Date("2020-11-01"),"returned_date":new Date("2020-10-15")}}, {"book2":{"book_id":"0195153448","borrowed_date":new Date("2020-10-01"),"due_date":new Date("2020-11-01"),"returned_date":null}}]})
```

```
Atlas atlas-pw2ihb-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID0000id":"ID000010"},{$set:{'borrowed':[{"book1":{"book_id":"067942560","borrowed_date":new Date("2020-10-01"),"due_date":new Date("2020-11-01"),"returned_date":new Date("2020-10-15")}}, {"book2":{"book_id":"0195153448","borrowed_date":new Date("2020-10-01"),"due_date":new Date("2020-11-01"),"returned_date":null}}]})  
{  
    acknowledged: true,  
    insertedId: null,  
    matchedCount: 1,  
    modifiedCount: 1,  
    upsertedCount: 0  
}  
Atlas atlas-pw2ihb-shard-0 [primary] Project_2>
```

```
_id: ObjectId('618a7e813543f7cc2f79aff6')  
ID0000id: "ID000010"  
ssn: "999-33-7951"  
first_name: "Daniel"  
last_name: "Fisher"  
email: "dfisher9@liveinternet.ru"  
address: "400 Cody Lane"  
city: "Plano"  
state: "TX"  
phone: "(214) 891-7743"  
✓ borrowed: Object  
    ✓ book1: Array  
        ✓ 0: Object  
            book_id: "067942560"  
            borrowed_date: 2020-10-01T00:00:00.000+00:00  
            due_date: 2020-11-01T00:00:00.000+00:00  
            returned_date: 2020-10-15T00:00:00.000+00:00  
    ✓ book2: Array  
        ✓ 0: Object  
            book_id: "0195153448"  
            borrowed_date: 2020-10-01T00:00:00.000+00:00  
            due_date: 2020-11-01T00:00:00.000+00:00  
            returned_date: null
```

Number of borrowed books that were returned:

```
db.borrowers.find({"borrowed.book1.returned_date":{$ne:null,$exists:true}}).count()
```

```
Atlas atlas-pw2ihb-shard-0 [primary] Project_2> db.borrowers.find({"borrowed.book1.returned_date":{$ne:null,$exists:true}}).count()  
10  
Atlas atlas-pw2ihb-shard-0 [primary] Project_2>
```

SEARCH FUNCTIONALITY

CASE 1:

Title: "Original"

ISBN10: "087220076X"

Author: "Karen"

```
db.books.aggregate([{$lookup:{from:"book_copies",localField:"ISBN10",foreignField:"book_id",as:"book_copies"},{$match:{$or:[{Title:{$regex:"original"}}, {Title:{$regex:"Original"}}, {Title:{$regex:"ORIGINAL"}}, {Authors_arr:{$regex:"karen"}}, {Authors_arr:{$regex:"Karen"}}, {Authors_arr:{$regex:"KAREN"}}, {ISBN10:{$regex:"087220076X"}]}]},{$project:{Title:1,_id:0,Authors_arr:1,Availability_status:{$switch:{"branches": [{"case":{$eq:["$branch_id.no_of_copies",0]}, "then":"NO"}, {"case": {"$ne": ["$branch_id.no_of_copies",0]}, "then":"YES"}], "default":""}}}}])
```

```
Atlas atlas-pw2ihb-shard-0 [primary] Project_2> db.books.aggregate([{$lookup:{from:"book_copies",localField:"ISBN10",foreignField:"book_id",as:"book_copies"},{$match:{$or:[{Title:{$regex:"original"}}, {Title:{$regex:"Original"}}, {Title:{$regex:"ORIGINAL"}}, {Authors_arr:{$regex:"karen"}}, {Authors_arr:{$regex:"Karen"}}, {Authors_arr:{$regex:"KAREN"}}, {ISBN10:{$regex:"087220076X"}]}]},{$project:{Title:1,_id:0,Authors_arr:1,Availability_status:{$switch:{"branches": [{"case":{$eq:["$branch_id.no_of_copies",0]}, "then":"NO"}, {"case": {"$ne": ["$branch_id.no_of_copies",0]}, "then":"YES"}], "default":""}}}}])  
[  
  {  
    Title: 'Peter Pan: The Original Story',  
    Authors_arr: [ 'J. M. Barrie' ],  
    Availability_status: 'YES'  
  },  
  {  
    Title: 'The Battle For God',  
    Authors_arr: [ 'Karen Armstrong' ],  
    Availability_status: 'YES'  
  },  
  {  
    Title: 'Flood : Mississippi 1927',  
    Authors_arr: [ 'Kathleen Duey', 'Karen A. Bale', 'Bill Dodge' ],  
    Availability_status: 'YES'  
  },  
  {  
    Title: 'Love Ruins Everything',  
    Authors_arr: [ 'Karen X. Tulchinsky' ],  
    Availability_status: 'YES'  
  },  
  {  
    Title: 'Ghost Moon',  
    Authors_arr: [ 'Karen Robards' ],  
    Availability_status: 'YES'  
  },  
  {  
    Title: 'Totally Muffins Cookbook (Totally Cookbooks)',  
    Authors_arr: [ 'Helene Siegel', 'Karen Gillingham' ],  
    Availability_status: 'YES'  
  },  
  {  
    Title: 'The Music Of Dolphins',  
    Authors_arr: [ 'Karen Hesse' ],  
    Availability_status: 'YES'  
  },  
  {  
    Title: 'Where No Gods Came (Sweetwater Fiction: Originals)',  
    Authors_arr: [ 'Sheila O'Connor' ],  
    Availability_status: 'YES'  
  },  
  {  
    Title: 'World Of Pies',  
    Authors_arr: [ 'Karen Stoltz' ],  
    Availability_status: 'YES'  
  },  
]
```

CASE 2:

Title: "Discworld"

ISBN10: "034543191X"

Author: "Trudy"

```
db.books.aggregate([{$lookup:{from:"book_copies",localField:"ISBN10",foreignField:"book_id",as:"book_copies"},{$match:{$or:[{Title:{$regex:"discworld"}},{Title:{$regex:"Discworld"}},{Title:{$regex:"DISCWORLD"}},{Authors_arr:{$regex:"trudy"}},{Authors_arr:{$regex:"Trudy"}},{Authors_arr:{$regex:"TRUDY"}},{ISBN10:{$regex:"034543191X"}}}},{$project:{"Title":1,"_id":0,"Authors_arr":1,"Availability_status":{"$switch":{"branches":[{"case":{$eq:["$branch_id.no_of_copies",0]}, "then":"NO"}, {"case":{$ne:["$branch_id.no_of_copies",0]}, "then":"YES"}, {"default":""}]}}}})
```

```
Atlas atlas-pw2ihb-shard-0 [primary] Project_2> db.books.aggregate([{$lookup:{from:"book_copies",localField:"ISBN10",foreignField:"book_id",as:"book_copies"},{$match:{$or:[{Title:{$regex:"discworld"}},{Title:{$regex:"Discworld"}},{Title:{$regex:"DISCWORLD"}},{Authors_arr:{$regex:"trudy"}},{Authors_arr:{$regex:"Trudy"}},{Authors_arr:{$regex:"TRUDY"}},{ISBN10:{$regex:"034543191X"}}}},{$project:{"Title":1,"_id":0,"Authors_arr":1,"Availability_status":{"$switch":{"branches":[{"case":{$eq:["$branch_id.no_of_copies",0]}, "then":"NO"}, {"case":{$ne:["$branch_id.no_of_copies",0]}, "then":"YES"}, {"default":""}]}}}])  
[  
  {  
    Title: 'Interesting Times: A Novel Of Discworld',  
    Authors_arr: [ 'Terry Pratchett' ],  
    Availability_status: 'YES'  
  },  
  {  
    Title: "The King Of Elfland's Daughter (Del Rey Impact)",  
    Authors_arr: [ 'Lord Dunsany', 'Neil Gaiman' ],  
    Availability_status: 'YES'  
  },  
  {  
    Title: 'American Sign Language In 24 Hours (Alpha Teach Yourself In 24 Hours)',  
    Authors_arr: [ 'Trudy Suggs' ],  
    Availability_status: 'YES'  
  },  
  {  
    Title: 'Night Watch: A Novel Of Discworld',  
    Authors_arr: [ 'Terry Pratchett' ],  
    Availability_status: 'YES'  
  },  
  {  
    Title: 'The Last Hero: A Discworld Fable (Discworld Novels)',  
    Authors_arr: [ 'Terry Pratchett', 'Paul Kidby' ],  
    Availability_status: 'YES'  
  },  
  {  
    Title: 'Reaper Man (Discworld)',  
    Authors_arr: [ 'Terry Pratchett' ],  
    Availability_status: 'YES'  
  },  
  {  
    Title: 'Kinship (Laurel-Leaf Books)',  
    Authors_arr: [ 'Trudy Krisher' ],  
    Availability_status: 'YES'  
  },  
  {  
    Title: 'Moving Pictures (Discworld Novels)',  
    Authors_arr: [ 'Terry Pratchett' ],  
    Availability_status: 'YES'  
  },  
]
```

CASE 2:

Title: "Mummies"

ISBN10: "067176537X"

Author: "Dean"

```
db.books.aggregate([{$lookup:{from:"book_copies",localField:"ISBN10",foreignField:"book_id",as:"book_copies"},{$match:{$or:[{Title:{$regex:"mummies"}},{Title:{$regex:"Mummies"}},{Title:{$regex:"MUMMIES"}},{Authors_arr:{$regex:"dean"}},{Authors_arr:{$regex:"Dean"}},{Authors_arr:{$regex:"DEAN"}},{ISBN10:{$regex:"067176537X"}}]},{$project:{Title:1,_id:0,Authors_arr:1,Availability_status:{$$switch:{"branches":[{"case":{$eq:["$branch_id.no_of_copies",0]},"then":"NO"}, {"case":{$ne:["$branch_id.no_of_copies",0]}, "then":"YES"}, {"default":""}}}}}]
```

```
Atlas atlas-pw2ihb-shard-0 [primary] Project_2> db.books.aggregate([{$lookup:{from:"book_copies",localField:"ISBN10",foreignField:"book_id",as:"book_copies"},{$match:{$or:[{Title:{$regex:"mummies"}},{Title:{$regex:"Mummies"}},{Title:{$regex:"MUMMIES"}},{Authors_arr:{$regex:"dean"}},{Authors_arr:{$regex:"Dean"}},{Authors_arr:{$regex:"DEAN"}},{ISBN10:{$regex:"067176537X"}}]}},{$project:{Title:1,_id:0,"Authors_arr":1,"Availability_status":{$$switch:{"branches":[{"case":{$eq:["$branch_id.no_of_copies",0]}, "then":"NO"}, {"case":{$ne:["$branch_id.no_of_copies",0]}, "then":"YES"}, {"default":""}}}}}]  
[  
  {  
    Title: 'The Mummies Of Urumchi',  
    Authors_arr: [ 'Elizabeth Wayland Barber', 'E. J. W. Barber' ],  
    Availability_status: 'YES'  
  },  
  {  
    Title: 'The Therapeutic Touch: How To Use Your Hands To Help Or To Heal',  
    Authors_arr: [ 'Dolores Krieger' ],  
    Availability_status: 'YES'  
  },  
  {  
    Title: 'From The Corner Of His Eye',  
    Authors_arr: [ 'Dean Koontz' ],  
    Availability_status: 'YES'  
  },  
  {  
    Title: 'The Face',  
    Authors_arr: [ 'Dean Koontz' ],  
    Availability_status: 'YES'  
  },  
  {  
    Title: 'Icebound',  
    Authors_arr: [ 'Dean Koontz' ],  
    Availability_status: 'YES'  
  },  
  {  
    Title: 'The Bad Place',  
    Authors_arr: [ 'Dean R. Koontz' ],  
    Availability_status: 'YES'  
  },  
  {  
    Title: 'The Door To December',  
    Authors_arr: [ 'Dean Koontz' ],  
    Availability_status: 'YES'  
  },  
  {  
    Title: 'Strangers',  
    Authors_arr: [ 'Dean Koontz' ],  
    Availability_status: 'YES'  
  },  
  {  
    Title: 'The Door To December',  
    Authors_arr: [ 'Dean Koontz' ],  
    Availability_status: 'YES'  
  },  
]
```

REPORTS

REPORT 1: The number of books per branch

```
db.book_copies.aggregate([{$group:{_id:"$branch_id",Total_num_books:{$sum:"$no_of_copies"}}}])
```

```
Atlas atlas-pw2ihb-shard-0 [primary] Project_2> db.book_copies.aggregate([{$group:{_id:"$branch_id",Total_num_books:{$sum:"$no_of_copies"}}}])
[
  { _id: 4, Total_num_books: 18781 },
  { _id: 1, Total_num_books: 18805 },
  { _id: 2, Total_num_books: 19016 },
  { _id: 5, Total_num_books: 18788 },
  { _id: 3, Total_num_books: 18948 }
]
Atlas atlas-pw2ihb-shard-0 [primary] Project_2>
```



REPORT 2: Book copies that were returned back late. Include all Book and Book copy attributes, including checkout and check-in attributes.

We consider books not returned (`return_date:null`) as the books that were returned back late because they haven't been returned yet.

```
db.borrowers.aggregate([{$match:{'borrowed.book2.returned_date':null}},{$lookup:{from:"book_copies",localField:"borrowed.book2.book_id",foreignField:"book_id",as:"book_copies"}},{$unwind:"$book_copies"},{$lookup:{from:"books",localField:"borrowed.book2.book_id",foreignField:"ISBN10",as:"details"}},{$project:{'borrowed.book1':0}}])
```

```
Atlas atlas-pw2ihb-shard-0 [primary] Project_2> db.borrowers.aggregate([{$match:{'borrowed.book2.returned_date':null}},{$lookup:{from:"book_copies",localField:"borrowed.book2.book_id",foreignField:"book_id",as:"book_copies"}},{$unwind:"$book_copies"},{$lookup:{from:"books",localField:"borrowed.book2.book_id",foreignField:"ISBN10",as:"details"}},{$project:{'borrowed.book1':0}}])
[
  {
    _id: ObjectId("618a7e813543f7cc2f79afed"),
    ID0000id: 'ID000001',
    ssn: '999-47-3740',
    first_name: 'Mark',
    last_name: 'Morgan',
    email: 'mmorgan@qg.co',
    address: '5677 Coolidge Street',
    city: 'Plano',
    state: 'TX',
    phone: '(469) 984-1438',
    borrowed: {
      book2: [
        {
          book_id: '0002005018',
          borrowed_date: ISODate("2020-01-01T00:00:00.000Z"),
          due_date: ISODate("2020-02-01T00:00:00.000Z"),
          returned_date: null
        }
      ]
    },
    book_copies: {
      _id: ObjectId("6188a5283543f7cc2f77c744"),
      book_id: '0002005018',
      branch_id: 1,
      no_of_copies: 1
    },
    details: [
      {
        _id: ObjectId("6147925cb38887fa243c238a"),
        ISBN10: '0002005018',
        ISBN13: '9780002005012',
        Title: 'Clara Callan: A Novel',
        Cover: 'http://www.openisbn.com/cover/0002005018_72.jpg',
        Publisher: 'HarperFlamingoCanada',
        Pages: '414',
        Authors_arr: [ 'Richard Bruce Wright' ]
      }
    ]
  }
]
```

REPORT 3: 10 books that don't have author attribute populated

```
db.books.find({ "Authors_arr": { "$eq": null } }, { "_id": 0}).limit(10)
```

```
Atlas atlas-pw2ihb-shard-0 [primary] Project_2> db.books.find({ "Authors_arr": { "$eq": null } }, { "_id": 0}).limit(10)
[
  {
    ISBN10: '1569871213',
    ISBN13: '9781569871218',
    Title: 'Black Beauty (Illustrated Classics)',
    Cover: 'http://www.openisbn.com/cover/1569871213_72.jpg',
    Publisher: 'Landoll',
    Pages: '240',
    Authors_arr: null
  },
  {
    ISBN10: '037383232X',
    ISBN13: '9780373832323',
    Title: 'Sweet Promise',
    Cover: 'http://www.openisbn.com/cover/037383232X_72.jpg',
    Publisher: 'Harlequin',
    Pages: '8',
    Authors_arr: null
  },
  {
    ISBN10: '0880841109',
    ISBN13: '9780880841108',
    Title: 'The Children's Response: Beyond Tpr Toward Writing (American English)',
    Cover: 'http://www.openisbn.com/cover/0880841109_72.jpg',
    Publisher: 'Allemay Press',
    Pages: '88',
    Authors_arr: null
  },
  {
    ISBN10: '0553279912',
    ISBN13: '9780553279917',
    Title: 'A Is For Alibi',
    Cover: 'http://www.openisbn.com/cover/0553279912_72.jpg',
    Publisher: 'Bantam Crime Line',
    Pages: '6',
    Authors_arr: null
  },
  {
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