




Design and DB Architecture:

ER Diagram:

books
 PK _id
ISBN10
ISBN13
Title
Cover
Publisher
Pages
Authors_arr

book_copies
 PK _id
book_id
no_of_copies
branch_id

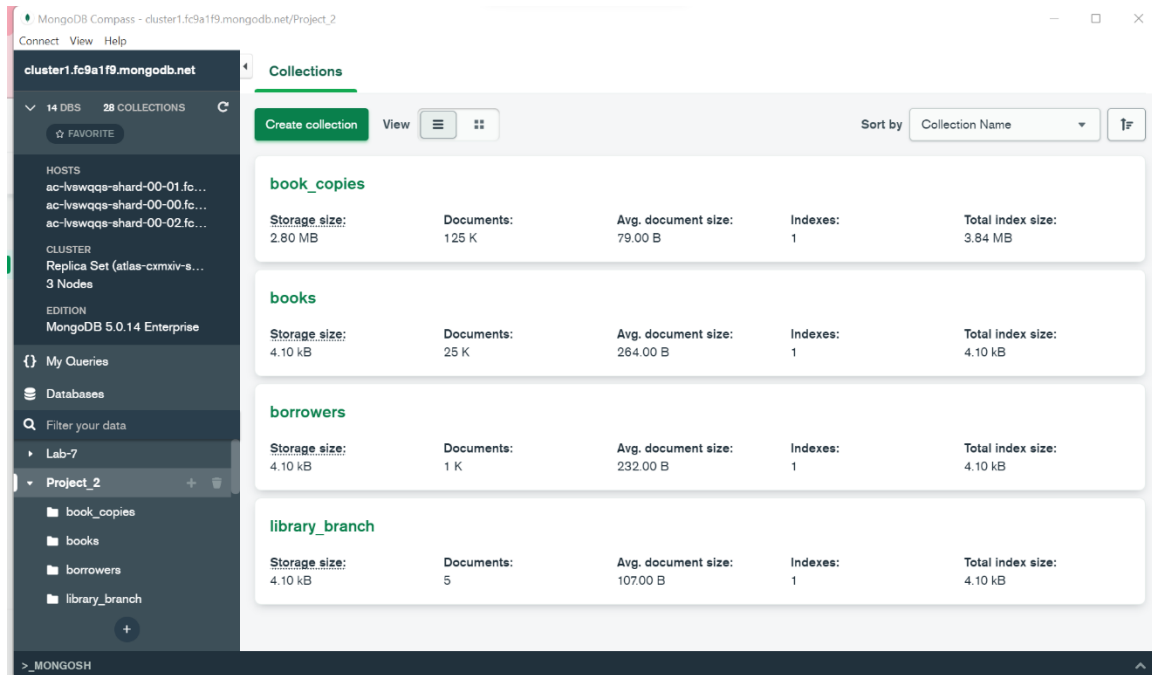
borrowers
 PK _id
ID0000id
ssn
first_name
last_name
email
address
city
state
phone
books_borrowed

library_branch
 PK _id
branch_name
address
branch_id

Data Load and Data Generation:

1. Load data files:

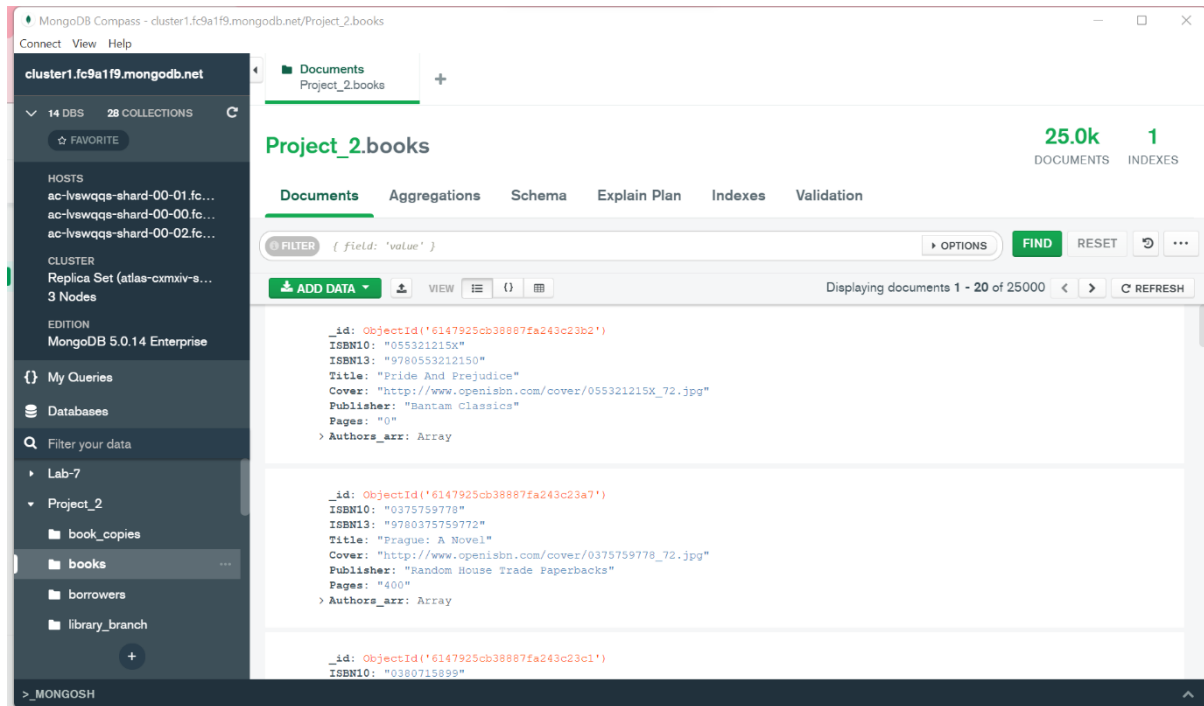
Database “Project_2” and collections:



The screenshot shows the MongoDB Compass interface for a cluster named 'cluster1.fc9a1f9.mongodb.net'. The 'Collections' tab is active, displaying a list of collections within the 'Project_2' database. The left sidebar shows the database structure, including hosts, cluster information, and a list of collections: 'book_copies', 'books', 'borrowers', and 'library_branch'. The main panel shows details for each collection, including storage size, document count, average document size, number of indexes, and total index size.

Collection Name	Storage size	Documents	Avg. document size	Indexes	Total index size
book_copies	2.80 MB	125 K	79.00 B	1	3.84 MB
books	4.10 kB	25 K	264.00 B	1	4.10 kB
borrowers	4.10 kB	1 K	232.00 B	1	4.10 kB
library_branch	4.10 kB	5	107.00 B	1	4.10 kB

Data load into books collection:



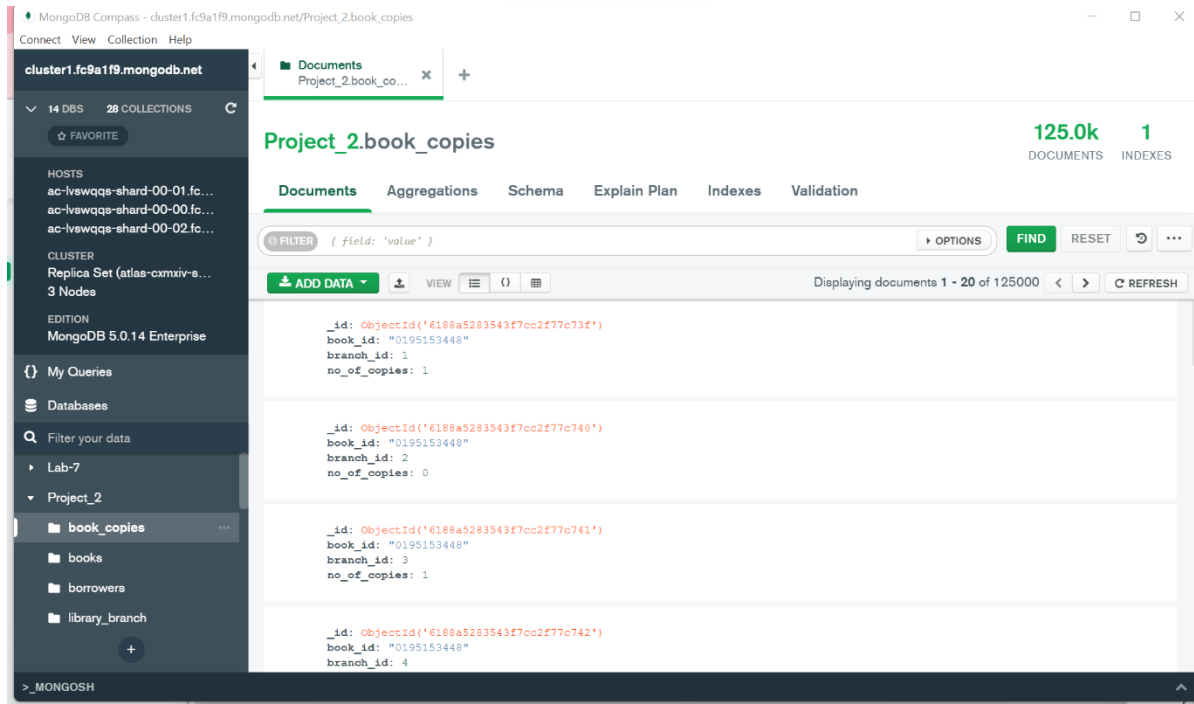
```
Microsoft Windows [Version 10.0.22000.1219]
(c) Microsoft Corporation. All rights reserved.

C:\Users\19452>mongosh "mongodb+srv://cluster1.fc9a1f9.mongodb.net/myFirstDatabase" --apiVersion 1 --username AXR210176
Enter password: *****
Current Mongosh Log ID: 6392b3d60106b9d7c72e15c6
Connecting to:   mongodb+srv://<credentials>@cluster1.fc9a1f9.mongodb.net/myFirstDatabase?appName=mongosh+1.6.0
Using MongoDB:  5.0.14 (API Version 1)
Using Mongosh:  1.6.0

For mongosh info see: https://docs.mongodb.com/mongosh-shell/

Atlas atlas-cxmiv-shard-0 [primary] myFirstDatabase> use Project_2
switched to db Project_2
Atlas atlas-cxmiv-shard-0 [primary] Project_2> db.books.find()
[
  {
    _id: ObjectId("6147925cb38887fa243c23b2"),
    ISBN10: '055321215X',
    ISBN13: '9780553212150',
    Title: 'Pride And Prejudice',
    Cover: 'http://www.openisbn.com/cover/055321215X_72.jpg',
    Publisher: 'Bantam Classics',
    Pages: '0',
    Authors_arr: [ 'Jane Austen' ]
  },
  {
    _id: ObjectId("6147925cb38887fa243c23a7"),
    ISBN10: '0375759778',
    ISBN13: '9780375759772',
    Title: 'Prague: A Novel',
    Cover: 'http://www.openisbn.com/cover/0375759778_72.jpg',
    Publisher: 'Random House Trade Paperbacks',
    Pages: '400',
    Authors_arr: [ 'Arthur Phillips' ]
  },
  {
    _id: ObjectId("6147925cb38887fa243c23c1"),
    ISBN10: '0380715899',
    ISBN13: '9780380715893',
    Title: 'Soldier Of The Great War',
    Cover: 'http://www.openisbn.com/cover/0380715899_72.jpg',
    Publisher: 'Avon Books',
    Pages: '736',
  }
]
```

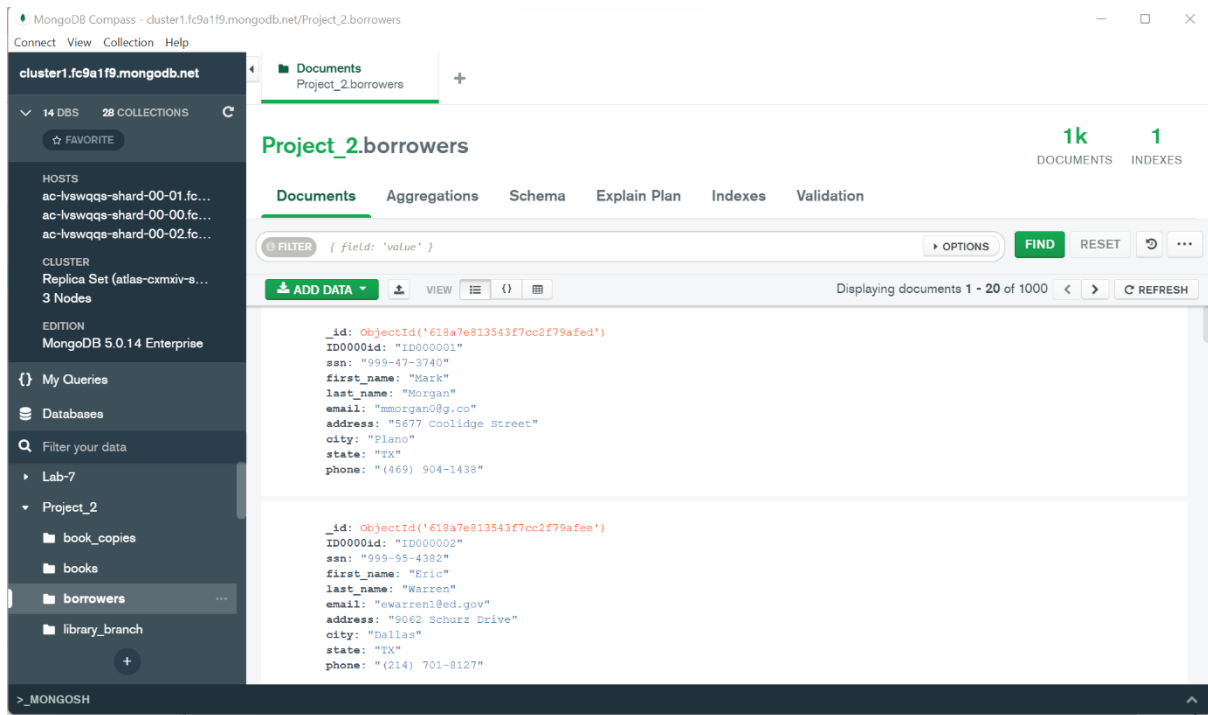
Data load into book_copies collection:



```
Atlas atlas-cxmxiiv-shard-0 [primary] Project_2> db.book_copies.find()
[
  Pages: '198',
  { Authors_arr: [ "Louis L'Amour" ]
    _id: ObjectId("6188a5283543f7cc2f77c73f"),
    book_id: '0195153448',
    branch_id: 1, ("6147925cb38887fa243c23f9"),
    no_of_copies: 18080',
  }, ISBN13: '9780451208088',
  { Title: 'The Short Forever (Stone Barrington)',
    _id: ObjectId("6188a5283543f7cc2f77c740"), 208080_72.jpg',
    book_id: '0195153448',
    branch_id: 2,
    no_of_copies: 0'Stuart Woods' ]
  },
  {
    _id: ObjectId("6188a5283543f7cc2f77c741"),
    book_id: '0195153448',
    branch_id: 3, 553584387',
    no_of_copies: 1m',
  }, Cover: 'http://www.openisbn.com/cover/0553584383_72.jpg',
  { Publisher: 'Bantam',
    _id: ObjectId("6188a5283543f7cc2f77c742"),
    book_id: '0195153448', ohansen' ]
    branch_id: 4,
    no_of_copies: 1
  }, _id: ObjectId("6147925cb38887fa243c23fc"),
  { ISBN10: '0812575954',
    _id: ObjectId("6188a5283543f7cc2f77c743"),
    book_id: '0195153448',
```

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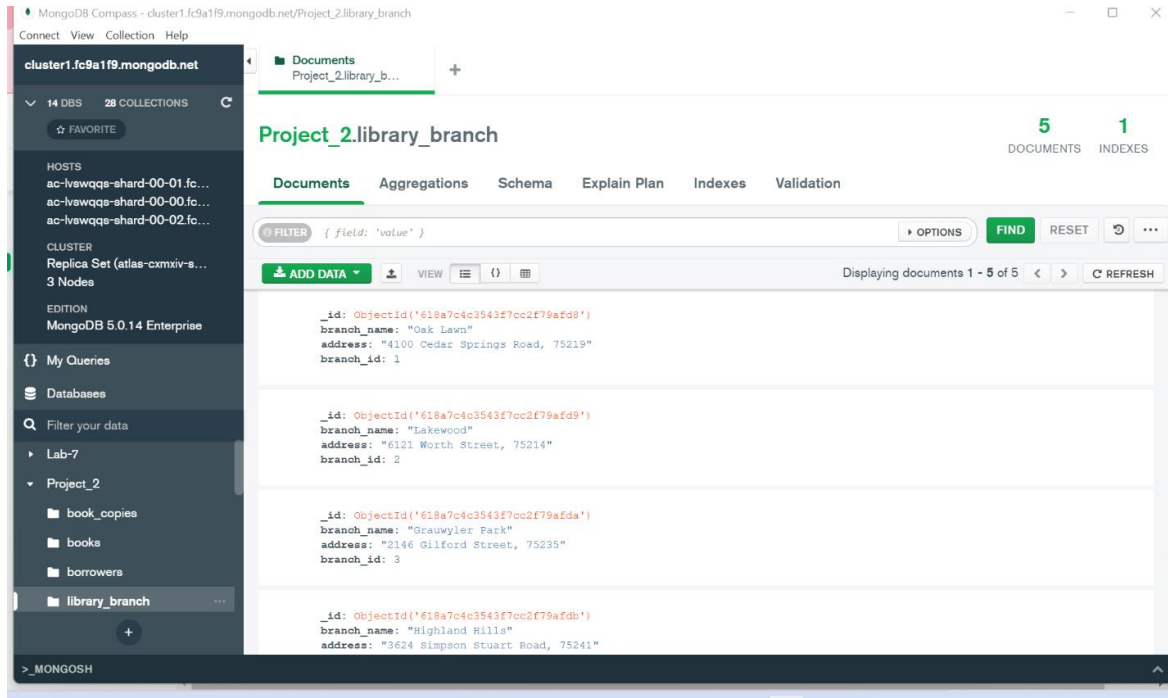
Data load into borrowers collection:



```
type 'it' for more  
Atlas atlas-cxmiv-shard-0 [primary] Project_2> db.borrowers.find()  
[  
  {  
    _id: ObjectId("618a7e813543f7cc2f79afed"),  
    ID0000id: 'ID000001',  
    ssn: '999-47-3740',  
    first_name: 'Mark',  
    last_name: 'Morgan',  
    email: 'mmorgan0@g.co',  
    address: '5677 Coolidge Street',  
    city: 'Plano',  
    state: 'TX',  
    phone: '(469) 904-1438'  
  },  
  {  
    _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'  
  },  
  {  
    _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'  
  }  
]
```

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Data load into library_branch collection:



```
type "it" for more
Atlas atlas-cxmxiv-shard-0 [primary] Project_2> db.library_branch.find()
[
  {
    _id: ObjectId("618a7c4c3543f7cc2f79afd8"),
    branch_name: 'Oak Lawn',
    address: '4100 Cedar Springs Road, 75219',
    branch_id: 1
  },
  {
    _id: ObjectId("618a7c4c3543f7cc2f79afd9"),
    branch_name: 'Lakewood',
    address: '6121 Worth Street, 75214',
    branch_id: 2
  },
  {
    _id: ObjectId("618a7c4c3543f7cc2f79afda"),
    branch_name: 'Grauwylar Park',
    address: '2146 Gilford Street, 75235',
    branch_id: 3
  },
  {
    _id: ObjectId("618a7c4c3543f7cc2f79afdb"),
    branch_name: 'Highland Hills',
    address: '3624 Simpson Stuart Road, 75241',
    branch_id: 4
  },
  {
    _id: ObjectId("618a7c4c3543f7cc2f79afdc"),
    branch_name: 'Audelia Road',
    address: '10045 Audelia Road, 75238',
    branch_id: 5
  }
]
Atlas atlas-cxmxiv-shard-0 [primary] Project_2>
```

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2. MongoDB script:

1. 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"},{"$push":{"books_borrowed":{"book1":{"book_id":0060973129,"return_date":new Date("2021-10-04")},"book2":{"book_id":0002005018,"return_date":null}}}})

db.borrowers.updateOne({"ID0000id":"ID000002"},{"$push":{"books_borrowed":{"book1":{"book_id":0195153448,"return_date":new Date("2021-01-16")},"book2":{"book_id":0002005018,"return_date":null}}}})

db.borrowers.updateOne({"ID0000id":"ID000003"},{"$push":{"books_borrowed":{"book1":{"book_id":0195153448,"return_date":new Date("2021-08-14")},"book2":{"book_id":0060973129,"return_date":null}}}})

db.borrowers.updateOne({"ID0000id":"ID000004"},{"$push":{"books_borrowed":{"book1":{"book_id":0060973129,"return_date":new Date("2021-11-04")},"book2":{"book_id":0425176428,"return_date":null}}}})

db.borrowers.updateOne({"ID0000id":"ID000005"},{"$push":{"books_borrowed":{"book1":{"book_id":0671870432,"return_date":new Date("2021-11-15")},"book2":{"book_id":0002005018,"return_date":null}}}})

db.borrowers.updateOne({"ID0000id":"ID000006"},{"$push":{"books_borrowed":{"book1":{"book_id":0679425608,"return_date":new Date("2021-08-28")},"book2":{"book_id":0679425608,"return_date":null}}}})

db.borrowers.updateOne({"ID0000id":"ID000007"},{"$push":{"books_borrowed":{"book1":{"book_id":0060973129,"return_date":new Date("2021-10-04")},"book2":{"book_id":0679425608,"return_date":null}}}})

db.borrowers.updateOne({"ID0000id":"ID000008"},{"$push":{"books_borrowed":{"book1":{"book_id":0771074670,"return_date":new Date("2021-03-07")},"book2":{"book_id":1552041778,"return_date":null}}}})

db.borrowers.updateOne({"ID0000id":"ID000009"},{"$push":{"books_borrowed":{"book1":{"book_id":1567407781,"return_date":new Date("2021-04-10")},"book2":{"book_id":0771074670,"return_date":null}}}})

db.borrowers.updateOne({"ID0000id":"ID000010"},{"$push":{"books_borrowed":{"book1":{"book_id":1552041778,"return_date":new Date("2021-10-05")},"book2":{"book_id":1567407781,"return_date":null}}}})
```

```
Atlas atlas-cmxiv-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID000id":"ID000004"},{"$push":{"books_borrowed":{"book1":{"book_id":"0060973129","return_date":new Date("2021-11-04")},"book2":{"book_id":"0425176428","return_date":null}}}})})
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}

Atlas atlas-cmxiv-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID000id":"ID000005"},{"$push":{"books_borrowed":{"book1":{"book_id":"067187043","return_date":new Date("2021-11-15")},"book2":{"book_id":"0002005018","return_date":null}}}})})
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}

Atlas atlas-cmxiv-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID000id":"ID000005"},{"$push":{"books_borrowed":{"book1":{"book_id":"0679425608","return_date":new Date("2021-08-26")},"book2":{"book_id":"0679425608","return_date":null}}}})})
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}

Atlas atlas-cmxiv-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID000id":"ID000005"},{"$push":{"books_borrowed":{"book1":{"book_id":"067187043","return_date":new Date("2021-11-15")},"book2":{"book_id":"0002005018","return_date":null}}}})})
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}

Atlas atlas-cmxiv-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID000id":"ID000006"},{"$push":{"books_borrowed":{"book1":{"book_id":"0679425608","return_date":new Date("2021-08-26")},"book2":{"book_id":"0679425608","return_date":null}}}})})
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}
```

```

upsertedCount: 0

atlas atlas-cmxdiv-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID000007":"ID000007"},{"$push":{"books_borrowed":{"book1":{"book_id":"0060973129","return_date":"new
date('2021-10-04')}}},"book2":{"book_id":"0679425608","return_date":null}})})

acknowledged: true,
insertedId: null,
matchedCount: 1,
modifiedCount: 1,
upsertedCount: 0

atlas atlas-cmxdiv-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID000008":"ID000008"},{"$push":{"books_borrowed":{"book1":{"book_id":"0771074670","return_date":"new
date('2021-09-07')}}},"book2":{"book_id":"1552041778","return_date":null}})})

acknowledged: true,
insertedId: null,
matchedCount: 1,
modifiedCount: 1,
upsertedCount: 0

atlas atlas-cmxdiv-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID000009":"ID000009"},{"$push":{"books_borrowed":{"book1":{"book_id":"1567407781","return_date":"new
date('2021-04-18')}}},"book2":{"book_id":"0771074670","return_date":null}})})

acknowledged: true,
insertedId: null,
matchedCount: 1,
modifiedCount: 1,
upsertedCount: 0

atlas atlas-cmxdiv-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID000010":"ID000010"},{"$push":{"books_borrowed":{"book1":{"book_id":"1552041778","return_date":"new
date('2021-10-05')}}},"book2":{"book_id":"1567407781","return_date":null}})})

acknowledged: true,
insertedId: null,
matchedCount: 1,
modifiedCount: 1,
upsertedCount: 0

```



```
db.borrowers.updateOne({"ID0000id":"ID000001"},{"$set":{"books_borrowed":{"book1":{"book_id": 0060973129,"return_date":new Date("2021-10-04"),"due_date":new Date("2021-10-03"),"returned_late":"Y"},
"book2":{"book_id":0002005018,"return_date":null,"due_date":new Date("2021-10-03"),"returned_late":null}}}}})
```

```
db.borrowers.updateOne({"ID0000id":"ID000002"},{"$set":{"books_borrowed":{"book1":{"book_id":0195153448,"return_date":new Date("2021-01-16"),"due_date":new Date("2021-01-15"),"returned_late":"Y"},
"book2":{"book_id":0002005018,"return_date":null,"due_date":new Date("2021-10-03"),"returned_late":null}}}}})
```

```
db.borrowers.updateOne({"ID0000id":"ID000003"},{"$set":{"books_borrowed":{"book1":{"book_id": 0195153448,"return_date":new Date("2021-08-14"),"due_date":new Date("2021-08-13"),"returned_late":"Y"},
"book2":{"book_id":0060973129,"return_date":null,"due_date":new Date("2021-10-03"),"returned_late":null}}}}})
```

```
db.borrowers.updateOne({"ID0000id":"ID000004"},{"$set":{"books_borrowed":{"book1":{"book_id": 0060973129,"return_date":new Date("2021-11-04"),"due_date":new Date("2021-11-03"),"returned_late":"Y"},
"book2":{"book_id":0425176428,"return_date":null,"due_date":new Date("2021-10-03"),"returned_late":null}}}}})
```

```
db.borrowers.updateOne({"ID0000id":"ID000005"},{"$set":{"books_borrowed":{"book1":{"book_id":0671870432,"return_date":new Date("2021-11-15"),"due_date":new Date("2021-11-16"),"returned_late":"Y"},
"book2":{"book_id":0002005018,"return_date":null,"due_date":new Date("2021-10-03"),"returned_late":null}}}}})
```

```
db.borrowers.updateOne({"ID0000id":"ID000006"},{"$set":{"books_borrowed":{"book1":{"book_id": 0679425608,"return_date":new Date("2021-08-28"),"due_date":new Date("2021-08-29"),"returned_late":"N"},
"book2":{"book_id":0679425608,"return_date":null,"due_date":new Date("2021-10-03"),"returned_late":null}}}}})
```

```
db.borrowers.updateOne({"ID000id":"ID000007"},{"$set":{"books_borrowed":{"book1":{"book_id": 0060973129,"return_date":new Date("2021-10-04"),"due_date":new Date("2021-10-05"),"returned_late":"N"}, "book2":{"book_id":0679425608,"return_date":null,"due_date":new Date("2021-10-03"),"returned_late":null}}}}})
```

```
db.borrowers.updateOne({"ID000id":"ID000008"},{"$set":{"books_borrowed":{"book1":{"book_id": 0771074670,"return_date":new Date("2021-03-07"),"due_date":new Date("2021-10-05"),"returned_late":"N"}, "book2":{"book_id":1552041778,"return_date":null,"due_date":new Date("2021-10-03"),"returned_late":null}}}}})
```

```
db.borrowers.updateOne({"ID000id":"ID000009"},{"$set":{"books_borrowed":{"book1":{"book_id": 1567407781,"return_date":new Date("2021-04-10"),"due_date":new Date("2021-10-05"),"returned_late":"N"}, "book2":{"book_id":0771074670,"return_date":null,"due_date":new Date("2021-10-03"),"returned_late":null}}}}})
```

```
db.borrowers.updateOne({"ID000id":"ID000010"},{"$set":{"books_borrowed":{"book1":{"book_id": 1552041778,"return_date":new Date("2021-10-05"),"due_date":new Date("2021-10-05"),"returned_late":"N"}, "book2":{"book_id":1567407781,"return_date":null,"due_date":new Date("2021-10-03"),"returned_late":null}}}}})
```

```

mongosh mongodb+srv://<credentials>@cluster1.fc9a1f9.mongodb.net/myFirstDatabase
Atlas atlas-cxmxiv-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID000001":"ID000001"},{"$push":{"books_borrowed":{"book1":{"book_id":"0060973129","return_date":new Date("2021-10-04"),"due_date":new Date("2021-10-03"),"returned_late":"Y"},"book2":{"book_id":"0002005018","return_date":null,"due_date":new Date("2021-10-03"),"returned_late":null}}}})
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}
Atlas atlas-cxmxiv-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID000002":"ID000002"},{"$push":{"books_borrowed":{"book1":{"book_id":"0195153448","return_date":new Date("2021-01-16"),"due_date":new Date("2021-01-15"),"returned_late":"Y"},"book2":{"book_id":"0002005018","return_date":null,"due_date":new Date("2021-10-03"),"returned_late":null}}}})
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}
Atlas atlas-cxmxiv-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID000003":"ID000003"},{"$push":{"books_borrowed":{"book1":{"book_id":"0195153448","return_date":new Date("2021-08-14"),"due_date":new Date("2021-08-13"),"returned_late":"Y"},"book2":{"book_id":"0060973129","return_date":null,"due_date":new Date("2021-10-03"),"returned_late":null}}}})
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}
Atlas atlas-cxmxiv-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID000004":"ID000004"},{"$push":{"books_borrowed":{"book1":{"book_id":"0060973129","return_date":new Date("2021-11-04"),"due_date":new Date("2021-11-03"),"returned_late":"Y"},"book2":{"book_id":"0425176428","return_date":null,"due_date":new Date("2021-10-03"),"returned_late":null}}}})
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}
Atlas atlas-cxmxiv-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID000005":"ID000005"},{"$push":{"books_borrowed":{"book1":{"book_id":"0671870432","return_date":new Date("2021-11-15"),"due_date":new Date("2021-11-16"),"returned_late":"Y"},"book2":{"book_id":"0002005018","return_date":null,"due_date":new Date("2021-10-03"),"returned_late":null}}}})
{
  acknowledged: true,

```

```

Atlas atlas-cxmxiv-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID000006":"ID000006"},{"$push":{"books_borrowed":{"book1":{"book_id":"0679425608","return_date":new Date("2021-08-28"),"due_date":new Date("2021-08-29"),"returned_late":"N"},"book2":{"book_id":"0679425608","return_date":null,"due_date":new Date("2021-10-03"),"returned_late":null}}}})
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}
Atlas atlas-cxmxiv-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID000007":"ID000007"},{"$push":{"books_borrowed":{"book1":{"book_id":"0060973129","return_date":new Date("2021-11-04"),"due_date":new Date("2021-10-05"),"returned_late":"N"},"book2":{"book_id":"0679425608","return_date":null,"due_date":new Date("2021-10-03"),"returned_late":null}}}})
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}
Atlas atlas-cxmxiv-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID000008":"ID000008"},{"$push":{"books_borrowed":{"book1":{"book_id":"0771074670","return_date":new Date("2021-03-07"),"due_date":new Date("2021-10-05"),"returned_late":"N"},"book2":{"book_id":"1552041778","return_date":null,"due_date":new Date("2021-10-03"),"returned_late":null}}}})
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}
Atlas atlas-cxmxiv-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID000009":"ID000009"},{"$push":{"books_borrowed":{"book1":{"book_id":"1567407781","return_date":new Date("2021-04-10"),"due_date":new Date("2021-10-05"),"returned_late":"N"},"book2":{"book_id":"0771074670","return_date":null,"due_date":new Date("2021-10-03"),"returned_late":null}}}})
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}
Atlas atlas-cxmxiv-shard-0 [primary] Project_2> db.borrowers.updateOne({"ID000010":"ID000010"},{"$push":{"books_borrowed":{"book1":{"book_id":"1552041778","return_date":new Date("2021-10-05"),"due_date":new Date("2021-10-05"),"returned_late":"N"},"book2":{"book_id":"1567407781","return_date":null,"due_date":new Date("2021-10-03"),"returned_late":null}}}})
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}

```

2. Exactly 10 of the above checkouts should have returned the book.

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

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

Book Search and Availability:

```
db.books.aggregate([{$lookup: { from: 'book_copies', localField: 'ISBN10', foreignField: 'book_id', as: 'book_copies' }}, {$match: { $or: [{ Title: { $regex: 'Pride' } }, { Authors_arr: { $regex: "Jane" } } ], ISBN10: { $regex: "055321215X" } } }}, {$project: { "Title": 1, "_id": 0, "Authors_arr": 1, "AvailabilityStatus": {"$switch": {"branches": [{"case": {"$eq": ["$branch_id.no_of_copies", 0]}, "then": "NO" }, {"case": {"$ne": ["$branch_id.no_of_copies", 0]}, "then": "YES" }], "default": "" } } } } })
```

```
Atlas atlas-cxmiv-shard-0 [primary] Project_2> db.books.aggregate([{$lookup: {from: 'book_copies', localField: 'ISBN10', foreignField: 'book_id', as: 'book_copies' }}, {$match: { $or: [{ Title: { $regex: 'Pride' } }, { Authors_arr: { $regex: "Jane" } } ], ISBN10: { $regex: "055321215X" } } }}, {$project: { "Title": 1, "_id": 0, "Authors_arr": 1, "AvailabilityStatus": {"$switch": {"branches": [{"case": {"$eq": ["$branch_id.no_of_copies", 0]}, "then": "NO" }, {"case": {"$ne": ["$branch_id.no_of_copies", 0]}, "then": "YES" }], "default": "" } } } } })
[
  {
    Title: 'Pride And Prejudice',
    Authors_arr: [ 'Jane Austen' ],
    AvailabilityStatus: 'YES'
  },
  {
    Title: 'Pride And Prejudice (Dover Thrift Editions)',
    Authors_arr: [ 'Jane Austen', 'Dover Thrift Editions' ],
    AvailabilityStatus: 'YES'
  },
  {
    Title: 'Female Intelligence',
    Authors_arr: [ 'Jane Heller' ],
    AvailabilityStatus: 'YES'
  },
  {
    Title: 'Horse Heaven (Ballantine Reader's Circle)',
    Authors_arr: [ 'Jane Smiley' ],
    AvailabilityStatus: 'YES'
  },
  {
    Title: 'Emma (Signet Classics)',
    Authors_arr: [ 'Jane Austen', 'Margaret Drabble' ],
    AvailabilityStatus: 'YES'
  },
  {
    Title: 'New Vegetarian: Bold And Beautiful Recipes For Every Occasion',
    Authors_arr: [ 'Gelia Brooks Brown', 'Jane Noraika', 'Philip Webb' ],
    AvailabilityStatus: 'YES'
  },
  {
    Title: 'Through Wolf's Eyes (Wolf, Book 1)',
    Authors_arr: [ 'Jane Lindskold' ],
    AvailabilityStatus: 'YES'
  },
  {
    Title: 'Nowhere To Run',
    Authors_arr: [ 'Mary Jane Clark' ],
    AvailabilityStatus: 'YES'
  },
]
```

```
db.books.aggregate([{$lookup: { from: 'book_copies', localField: 'ISBN10', foreignField: 'book_id', as: 'searchBook' }}, {$unwind: { path: '$searchBook' }}, {$match: { ISBN10: '055321215X', 'searchBook.branch_id': 1, Title: { $regex: 'Pride' }, Authors_arr: { $regex: 'Jane' } } }, {$project: { 'Book Title': '$Title', 'Book Authors': '$Authors_arr', 'Available no of copies at this branch': '$searchBook.no_of_copies', '_id': 0 } } })
```

```
db.books.aggregate([{$lookup: { from: 'book_copies', localField: 'ISBN10', foreignField: 'book_id', as:
'searchBook' }}, {$unwind: { path: '$searchBook' }}, {$match: { 'searchBook.branch_id': 1, Title: {$regex:
'Prague' }, Authors_arr: {$regex: 'Arthur' } }}, {$project: { 'Book Title': '$Title', 'Book Authors':
'$Authors_arr', 'Available no of copies at this branch': '$searchBook.no_of_copies', _id: 0 } }])
```

```
Atlas atlas-cxmxiv-shard-0 [primary] Project_2> db.books.aggregate([{$lookup:{from:'book_copies',localField:'ISBN10',foreignField:'book_id',as:'searchBook'}},{$unwind:{path:'$searchBook'}},{$match:{'searchBook.branch_id':1,Title:{$regex:'Prague'},Authors_arr:{$regex:'Arthur'}}},{$project:{'Book Title':'$Title','Book Authors':'$Authors_arr','Available no of copies at this branch':'$searchBook.no_of_copies',_id:0}}])
[
  {
    'Book Title': 'Prague: A Novel',
    'Book Authors': [ 'Arthur Phillips' ],
    'Available no of copies at this branch': 1
  },
  {
    'Book Title': 'Prague: A Novel',
    'Book Authors': [ 'Arthur Phillips' ],
    'Available no of copies at this branch': 0
  }
]
```

```
db.books.aggregate([{$lookup: { from: 'book_copies', localField: 'ISBN10', foreignField: 'book_id',
as: 'searchBook' }}, {$unwind: { path: '$searchBook' }}, {$match: { ISBN10: '0553584383',
'searchBook.branch_id':1, Title: {$regex: 'Dead' }, Authors_arr: { $regex: 'Iris' } }}, {$project: { 'Book
Title': '$Title', 'Book Authors': '$Authors_arr', 'Available no of copies at this branch':
'$searchBook.no_of_copies', _id: 0 } }])
```

```
Atlas atlas-cxmxiv-shard-0 [primary] Project_2> db.books.aggregate([{$lookup:{from:'book_copies',localField:'ISBN10',foreignField:'book_id',as:'searchBook'}},{$unwind:{path:'$searchBook'}},{$match:{ISBN10:'0553584383','searchBook.branch_id':1,Title:{$regex:'Dead'},Authors_arr:{$regex:'Iris'}}},{$project:{'Book Title':'$Title','Book Authors':'$Authors_arr','Available no of copies at this branch':'$searchBook.no_of_copies',_id:0}}])
[
  {
    'Book Title': 'Dead Aim',
    'Book Authors': [ 'Iris Johansen' ],
    'Available no of copies at this branch': 1
  }
]
```

Reports:

- MongoDB Script to fetch the Number of books (book copies) per library branch.

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

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

- MongoDB Script to fetch Book copies that were returned back late.

```
db.borrowers.aggregate([{$match: { 'books_borrowed.book1.returned_late': 'Y' } }, {$lookup: {
from: 'book_copies', localField: 'books_borrowed.book1.book_id', foreignField: 'book_id', as:
'book_copies' } }, {$unwind: '$book_copies' }, {$lookup: { from: 'books', localField:
'books_borrowed.book1.book_id',foreignField: 'ISBN10', as: 'bookDetails' } }, {$project: {
'books_borrowed.book2': 0 } } ])
```

- MongoDB Script to fetch 10 books that don't have author attribute populated

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

```
Atlas atlas-cxmiv-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: '248',
    Authors_arr: null
  },
  {
    ISBN10: '037383232X',
    ISBN13: '9780373832323',
    Title: 'Sweet Promise',
    Cover: 'http://www.openisbn.com/cover/037383232X_72.jpg',
    Publisher: 'Harlequin',
    Pages: '0',
    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: 'Alemany 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: '0',
    Authors_arr: null
  },
  {
    ISBN10: '2890377741',
    ISBN13: '9782890377745',
    Title: 'Lame',
    Cover: 'http://www.openisbn.com/cover/2890377741_72.jpg',
  },
]
```

```
},
{
  ISBN10: '0007101953',
  ISBN13: '9780007101955',
  Title: 'At Ruby's',
  Cover: 'http://www.openisbn.com/cover/0007101953_72.jpg',
  Publisher: 'HarperCollins Publishers',
  Pages: '311',
  Authors_arr: null
},
{
  ISBN10: '1568652895',
  ISBN13: '9781568652894',
  Title: 'Homecoming',
  Cover: 'http://www.openisbn.com/cover/1568652895_72.jpg',
  Publisher: 'Harper 1997/97',
  Pages: '384',
  Authors_arr: null
},
{
  ISBN10: '0880384433',
  ISBN13: '9780880384438',
  Title: 'Dueltrack (Car Wars Adventure Game Book)',
  Cover: 'http://www.openisbn.com/cover/0880384433_72.jpg',
  Publisher: 'T. S. R.',
  Pages: '192',
  Authors_arr: null
},
{
  ISBN10: '1555472419',
  ISBN13: '9781555472412',
  Title: 'Just Before Daybreak',
  Cover: 'http://www.openisbn.com/cover/1555472419_72.jpg',
  Publisher: 'Critics Choice Paperbacks/Lorevan Publishing',
  Pages: '292',
  Authors_arr: null
},
{
  ISBN10: '034910171X',
  ISBN13: '9780349101712',
  Title: 'Canal Dreams',
  Cover: 'http://www.openisbn.com/cover/034910171X_72.jpg',
  Publisher: 'Abacus',
  Pages: '0',
  Authors_arr: null
},
]
```