IT2234: Web Service and Server Technologies - Practical

Assignment 04

Department of Physical Science

Faculty of Applied Science, University of Vavuniya

2021ICT96

1. Create a Database Library.
   Answer:- use Library

```
> use Library
< switched to db Library
```

2. Create collections named libraries, books and authors.
   Answer:- db.createCollection("libraries")

```
> db.createCollection("libraries")
< { ok: 1 }
```

db.createCollection("books")

```
> db.createCollection("books")
< { ok: 1 }
Library>
```

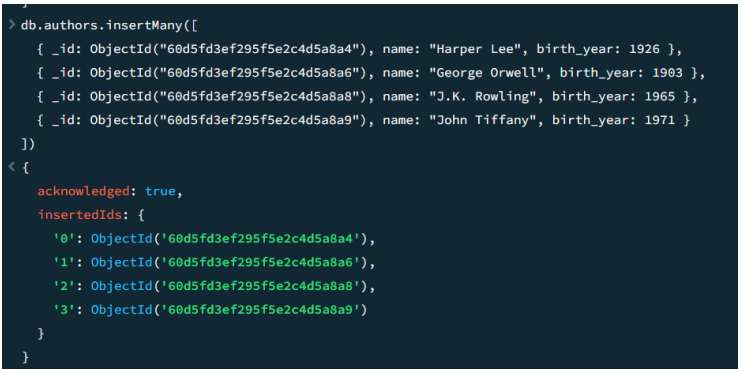
db.createCollection("authors")

```
> db.createCollection("authors")
< { ok: 1 }
Library>
```

3. Insert some sample documents into the collections.

Answer:- db.libraries.insertMany([
{ _id: ObjectId("60d5fbb2f295f5e2c4d5a8a1"), name: "Central Library", location: "Downtown" },
{ _id: ObjectId("60d5fbb2f295f5e2c4d5a8a2"), name: "Westside Branch", location: "Westside" }
])

db.authors.insertMany([
{ _id: ObjectId("60d5fd3ef295f5e2c4d5a8a4"), name: "Harper Lee", birth_year: 1926 },
{ _id: ObjectId("60d5fd3ef295f5e2c4d5a8a6"), name: "George Orwell", birth_year: 1903 },
{ _id: ObjectId("60d5fd3ef295f5e2c4d5a8a8"), name: "J.K. Rowling", birth_year: 1965 },
{ _id: ObjectId("60d5fd3ef295f5e2c4d5a8a9"), name: "John Tiffany", birth_year: 1971 }
])

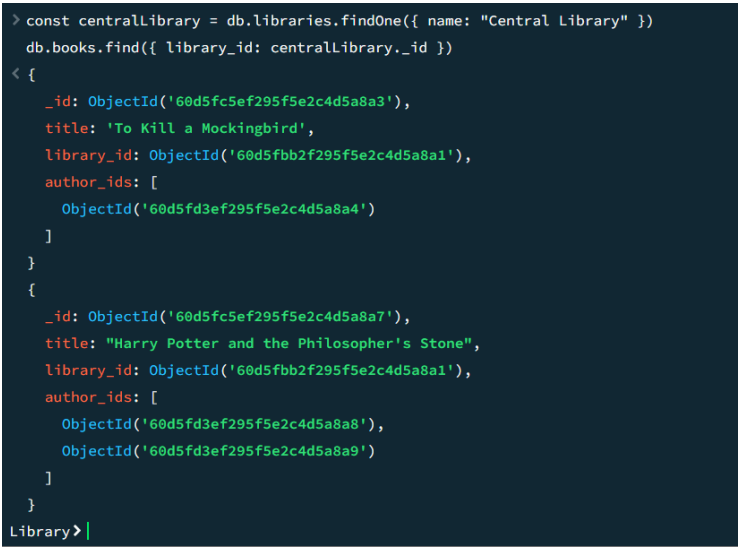



```
db.books.insertMany([
  {
    _id: ObjectId("60d5fc5ef295f5e2c4d5a8a3"),
    title: "To Kill a Mockingbird",
    library_id:
ObjectId("60d5fbb2f295f5e2c4d5a8a1"),
    author_ids:
[ObjectId("60d5fd3ef295f5e2c4d5a8a4")]
  },
  {
    _id: ObjectId("60d5fc5ef295f5e2c4d5a8a5"),
    title: "1984",
    library_id:
ObjectId("60d5fbb2f295f5e2c4d5a8a2"),
    author_ids:
[ObjectId("60d5fd3ef295f5e2c4d5a8a6")]
  },
  {
    _id: ObjectId("60d5fc5ef295f5e2c4d5a8a7"),
```

```
    title: "Harry Potter and the Philosopher's Stone",
    library_id:
ObjectId("60d5fbb2f295f5e2c4d5a8a1"),
    author_ids: [
      ObjectId("60d5fd3ef295f5e2c4d5a8a8"),
      ObjectId("60d5fd3ef295f5e2c4d5a8a9")
    ]
  }
])
```


title: "To Kill a Mockingbird",
library_id: ObjectId("60d5fbb2f295f5e2c4d5a8a1"),
author_ids: [ObjectId("60d5fd3ef295f5e2c4d5a8a4")]
},
{
_id: ObjectId("60d5fc5ef295f5e2c4d5a8a5"),
title: "1984",
library_id: ObjectId("60d5fbb2f295f5e2c4d5a8a2"),
author_ids: [ObjectId("60d5fd3ef295f5e2c4d5a8a6")]
},
{
_id: ObjectId("60d5fc5ef295f5e2c4d5a8a7"),
title: "Harry Potter and the Philosopher's Stone",
library_id: ObjectId("60d5fbb2f295f5e2c4d5a8a1"),
author_ids: [
ObjectId("60d5fd3ef295f5e2c4d5a8a8"),
ObjectId("60d5fd3ef295f5e2c4d5a8a9")
]
}
])
{
acknowledged: true,
insertedIds: {
'0': ObjectId('60d5fc5ef295f5e2c4d5a8a3'),
'1': ObjectId('60d5fc5ef295f5e2c4d5a8a5'),
'2': ObjectId('60d5fc5ef295f5e2c4d5a8a7')
}
}
Library>

4. Find all books in the "Central Library".
   Answer:- const centralLibrary = db.libraries.findOne({ name: "Central Library" })
   db.books.find({ library_id: centralLibrary._id })



5. List all libraries along with the number of books they have.

Answer:- db.books.aggregate([
 {
  $group: {
   _id: "$library_id",
   bookCount: { $sum: 1 }
  }
 },
 {
  $lookup: {
   from: "libraries",
   localField: "_id",
   foreignField: "_id",
   as: "library"
  }
 },
 { $unwind: "$library" },
 {
  $project: {
   libraryName: "$library.name",
   bookCount: 1
  }
 }
])

```
  },
  {
    $lookup: {
      from: "libraries",
      localField: "_id",
      foreignField: "_id",
      as: "library"
    }
  },
  { $unwind: "$library" },
  {
    $project: {
      libraryName: "$library.name",
      bookCount: 1
    }
  }
])
```

```
{
  _id: ObjectId('60d5fbb2f295f5e2c4d5a8a1'),
  bookCount: 2,
  libraryName: 'Central Library'
}
{
  _id: ObjectId('60d5fbb2f295f5e2c4d5a8a2'),
  bookCount: 1,
  libraryName: 'Westside Branch'
}
```

6.Find all books written by "J.K. Rowling".

Answer:- const jk = db.authors.findOne({ name: "J.K. Rowling" })
db.books.find({ author_ids: jk._id })

```
> const jk = db.authors.findOne({ name: "J.K. Rowling" })
  db.books.find({ author_ids: jk._id })
< {
    _id: ObjectId('60d5fc5ef295f5e2c4d5a8a7'),
    title: "Harry Potter and the Philosopher's Stone",
    library_id: ObjectId('60d5fbb2f295f5e2c4d5a8a1'),
    author_ids: [
      ObjectId('60d5fd3ef295f5e2c4d5a8a8'),
      ObjectId('60d5fd3ef295f5e2c4d5a8a9')
    ]
  }
Library>
```

7. List all authors along with the books they have written.

Answer:- db.authors.aggregate([
 {
  $lookup: {
   from: "books",
   localField: "_id",
   foreignField: "author_ids",
   as: "books"
  }
 },
 {
  $project: {
   name: 1,
   books: "$books.title"
  }
 }
])

```
  _id: ObjectId('60d5fd3ef295f5e2c4d5a8a4'),
  name: 'Harper Lee',
  books: [
    'To Kill a Mockingbird'
  ]
}
{
  _id: ObjectId('60d5fd3ef295f5e2c4d5a8a6'),
  name: 'George Orwell',
  books: [
    '1984'
  ]
}
{
  _id: ObjectId('60d5fd3ef295f5e2c4d5a8a8'),
  name: 'J.K. Rowling',
  books: [
    "Harry Potter and the Philosopher's Stone"
  ]
}
{
  _id: ObjectId('60d5fd3ef295f5e2c4d5a8a9'),
  name: 'John Tiffany',
  books: [
    "Harry Potter and the Philosopher's Stone"
  ]
}
```

8. Find all books along with their authors' details.

Answer:- db.books.aggregate([
 {
  $lookup: {
   from: "authors",
   localField: "author_ids",
   foreignField: "_id",
   as: "authors"
  }
 }
])

```
{
  _id: ObjectId('681b84d850de4c23766c5790'),
  title: 'The Catcher in the Rye',
  author: 'J.D. Salinger',
  year_published: 1951,
  genres: [
    'Fiction',
    'Classic'
  ],
  available: true,
  checked_out: false,
  authors: []
}
{
  _id: ObjectId('681b84d850de4c23766c5791'),
  title: 'The Hobbit',
  author: 'J.R.R. Tolkien',
  year_published: 1937,
  genres: [
    'Fantasy',
    'Adventure'
  ],
  available: true,
  checked_out: true,
  authors: []
}
{
  _id: ObjectId('60d5fc5ef295f5e2c4d5a8a3'),
```

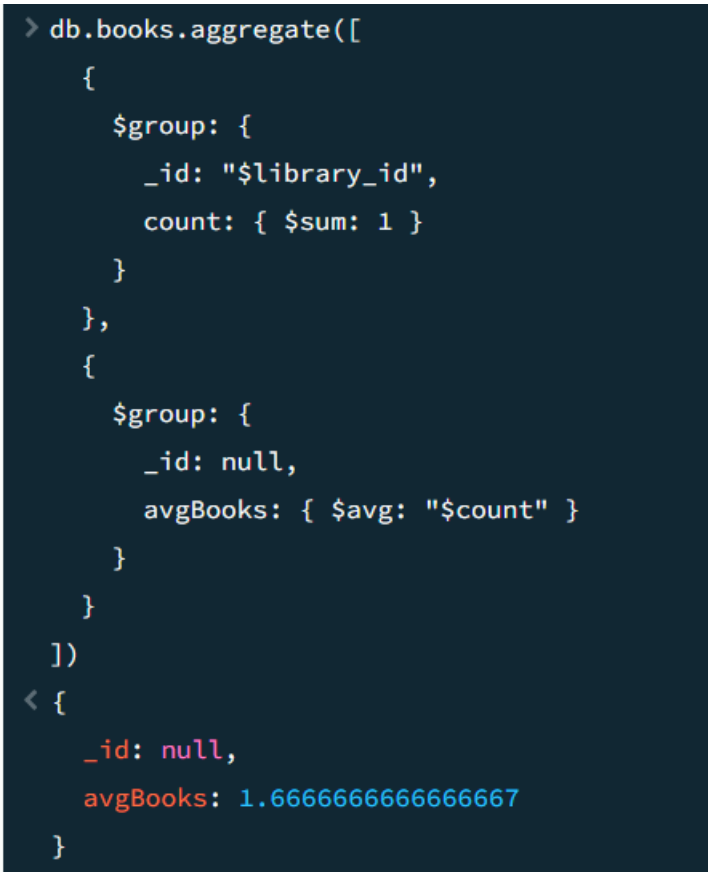
9.List all libraries and the number of books they have, including libraries with no books.

Answer:- db.libraries.aggregate([
{
$lookup: {
from: "books",
localField: "_id",
foreignField: "library_id",
as: "books"
}
},
{
$project: {
name: 1,
bookCount: { $size: "$books" }
}
}
])

```
< {
    _id: ObjectId('60d5fbb2f295f5e2c4d5a8a1'),
    name: 'Central Library',
    bookCount: 2
  }
  {
    _id: ObjectId('60d5fbb2f295f5e2c4d5a8a2'),
    name: 'Westside Branch',
    bookCount: 1
  }
```

10. Calculate the average number of books per library.

Answer:- db.books.aggregate([
 {
  $group: {
   _id: "$library_id",
   count: { $sum: 1 }
  }
 },
 {
  $group: {
   _id: null,
   avgBooks: { $avg: "$count" }
  }
 }
])


db.books.aggregate([
{
$group: {
_id: "$library_id",
count: { $sum: 1 }
}
},
{
$group: {
_id: null,
avgBooks: { $avg: "$count" }
}
}
])
{
_id: null,
avgBooks: 1.6666666666666667
}

11. Find all authors who have written more than one book.

Answer:- db.books.aggregate([
{ $unwind: "$author_ids" },
{
$group: {
_id: "$author_ids",
count: { $sum: 1 }
}
},
{ $match: { count: { $gt: 1 } } },
{
$lookup: {
from: "authors",
localField: "_id",
foreignField: "_id",
as: "author"
}
},
{ $unwind: "$author" },
{ $project: { _id: 0, name: "$author.name", count: 1
} }
])

```
db.books.aggregate([
  { $unwind: "$author_ids" },
  {
    $group: {
      _id: "$author_ids",
      count: { $sum: 1 }
    }
  },
  { $match: { count: { $gt: 1 } } },
  {
    $lookup: {
      from: "authors",
      localField: "_id",
      foreignField: "_id",
      as: "author"
    }
  },
  { $unwind: "$author" },
  { $project: { _id: 0, name: "$author.name", count: 1 } }
])
```

12. Retrieve all books along with their authors' names and the library they belong to.

Answer:-
```
db.books.aggregate([
 {
  $lookup: {
   from: "authors",
   localField: "author_ids",
   foreignField: "_id",
   as: "authors"
  }
 },
 {
  $lookup: {
   from: "libraries",
   localField: "library_id",
   foreignField: "_id",
   as: "library"
  }
 },
 { $unwind: "$library" },
 {
  $project: {
   title: 1,
   library: "$library.name",
   authors: "$authors.name"
  }
 }
])
```


{
_id: ObjectId('60d5fc5ef295f5e2c4d5a8a3'),
title: 'To Kill a Mockingbird',
library: 'Central Library',
authors: [
'Harper Lee'
]
}
{
_id: ObjectId('60d5fc5ef295f5e2c4d5a8a5'),
title: '1984',
library: 'Westside Branch',
authors: [
'George Orwell'
]
}
{
_id: ObjectId('60d5fc5ef295f5e2c4d5a8a7'),
title: "Harry Potter and the Philosopher's Stone",
library: 'Central Library',
authors: [
'J.K. Rowling',
'John Tiffany'
]
}

13. List all authors who have not written any books.

Answer:- db.authors.aggregate([
 {
  $lookup: {
   from: "books",
   localField: "_id",
   foreignField: "author_ids",
   as: "books"
  }
 },
 {
  $match: {
   books: { $size: 0 }
  }
 }
])


db.authors.aggregate([
{
$lookup: {
from: "books",
localField: "_id",
foreignField: "author_ids",
as: "books"
}
},
{
$match: {
books: { $size: 0 }
}
}
])
Library>