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THE TECHNOLOGICAL UNIVERSITY OF THE SHANNON: MIDLANDS MIDWEST

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Course:	**Master's in data Analytics**
Title of Assignment:	**Advance Databases Project Report**
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1.Project Overview

This Auction_Tracker_Register project explores the use of MongoDB to manage and analyze structured auction data consisting of 1000 documents, stored in a database named Auction_db. The dataset includes embedded documents and arrays to reflect real-world auction scenarios, such as venue details and bidder locations. Queries were executed using the MongoDB Shell to perform document retrieval and aggregation using the Aggregation Framework. MongoDB Compass was utilized for visual exploration and testing of key queries, while MongoDB Atlas was configured to demonstrate cloud-based hosting, accessibility, and querying of the same dataset. The project highlights MongoDB's capabilities in both local and cloud environments for data analysis and visualization.

1.1 Preliminary Steps for Connecting to Mongo Shell

- Installed MongoDB Community Edition:
  - Downloaded MongoDB from the official MongoDB Download Center.
  - Ensured the MongoDB binaries (including mongosh and mongoimport) were correctly installed.
- Set Up Environment Variables:
  - Added the MongoDB bin folder (e.g., C:\Program Files\MongoDB\Server\6.0\bin) to the system PATH so that mongosh could be run from any command prompt.
- Started MongoDB Server:
  - Launched the MongoDB server using the mongosh command from the command line.
  - Ensured it started without errors and was listening on the default port 27017.
- Opened the Mongo Shell:
  - Connected to the local MongoDB instance by running:
- Created and Verified Database and Collection:
- Switched to your working database:

```
C:\Users\Pooja Madappa>mongosh
Current Mongosh Log ID: 680e87410252af4b40b5f898
Connecting to:          mongodb://127.0.0.1:27017/?directConnection=true&serverSelectionTimeoutMS=2000&appName=mongosh+2.5.0
Using MongoDB:          6.0.22
Using Mongosh:          2.5.0

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

------
   The server generated these startup warnings when booting
   2025-04-27T20:09:12.546+01:00: Access control is not enabled for the database. Read and write access to data and configuration is
unrestricted
------

test> use Auction_db
switched to db Auction_db
Auction_db> db.Auction.countDocuments()
1000
```

- *The below command displays the details about documents in the* **Auction** *collection in a neater format*

db.Auction.find().pretty()

```
test> use Auction_db
switched to db Auction_db
Auction_db> db.Auction.countDocuments()
1000
Auction_db> db.Auction.find().pretty()
[
  {
    _id: ObjectId('680e8674f2aabda556f87720'),
    Auction_Year: 2024,
    Auction_Month: 'August',
    Duration: 185,
    Category: [ 'Horses', 'Artworks', 'Sheep' ],
    Num_Lots: 113,
    Entry_Fee: 75.17,
    Num_Lots_Sold: 100,
    Num_Attended: 207,
    Bidder_Activity: 'Good',
    Venue: {
      Name: 'Fischer, White and Peck',
      Town: 'Bensonberg',
      Type: 'Garage Forecourt',
      Capacity: 77,
      Cost: 548.76
    },
    Auctioneer_Fees: 1910.55,
    Auctioneer: {
      Name: 'Helen Dyer',
      Specialism: 'Cattle',
      Qualification: 'Accounting'
    },
    Num_Online_Bidders: 7,
```

```
mongosh mongodb://127.0.0.
Auction_db>
```

Imported JSON Data:

- Used the mongoimport to import a JSON file containing 1000 documents:

Verified the successful import message in the terminal.

```
Command Prompt
Microsoft Windows [Version 10.0.26100.3476]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Pooja Madappa>mongoimport --db Auction_db --collection Auction --file "D:\Mongo_db\auction_db_data.json" --jsonArray
2025-04-30T14:25:22.934+0100    connected to: mongodb://localhost/
2025-04-30T14:25:23.014+0100    1000 document(s) imported successfully. 0 document(s) failed to import.

C:\Users\Pooja Madappa>
```

2 SIMPLE QUERIES

Question 1

Auctions held in "Hotel" venues in 2024 with Excellent Bidder Activity and more than 150 attendees

db.Auction.find({Auction_Year: 2024,"Venue.Type": "Hotel", Bidder_Activity: "Excellent", Num_Attended: { $gt: 150 }}, {Auction_Year: 1, "Venue.Type": 1, Bidder_Activity: 1, Num_Attended: 1, _id: 0})

db.Auction.countDocuments({ Auction_Year: 2024, "Venue.Type": "Hotel", Bidder_Activity: "Excellent", Num_Attended: { $gt: 150 }})

```
Auction_db> db.Auction.find({Auction_Year: 2024,"Venue.Type": "Hotel", Bidder_Activity: "Excellent", Num_Attended: { $gt: 150 }}, {Au
Auction_Year: 1, "Venue.Type": 1, Bidder_Activity: 1, Num_Attended: 1, _id: 0})
[
  {
    Auction_Year: 2024,
    Num_Attended: 176,
    Bidder_Activity: 'Excellent',
    Venue: { Type: 'Hotel' }
  },
  {
    Auction_Year: 2024,
    Num_Attended: 341,
    Bidder_Activity: 'Excellent',
    Venue: { Type: 'Hotel' }
  },
  {
    Auction_Year: 2024,
    Num_Attended: 364,
    Bidder_Activity: 'Excellent',
    Venue: { Type: 'Hotel' }
  },
  {
    Auction_Year: 2024,
    Num_Attended: 477,
    Bidder_Activity: 'Excellent',
    Venue: { Type: 'Hotel' }
  }
]
Auction_db> db.Auction.countDocuments({ Auction_Year: 2024, "Venue.Type": "Hotel", Bidder_Activity: "Excellent", Num_Attended: { $gt:
 150 }})
4
Auction_db>
```

Question 2

Retrieve auctions in Community Centre venues where Entry Fee is under 100 and Category includes Artworks

db.Auction.find({"Venue.Type": "Community Centre", Entry_Fee: { $lt: 100 }, Category: "Artworks"}, {Entry_Fee: 1, Category: 1, "Venue.Type": 1, _id: 0})

db.Auction.countDocuments({"Venue.Type": "Community Centre", Entry_Fee: { $lt: 100 }, Category: "Artworks"})

Question 3

Find auctions with Auctioneer qualified in Marketing, held in School Hall, and Bidder Activity marked Fair

db.Auction.find({ "Auctioneer.Qualification": "Marketing", "Venue.Type": "School Hall", Bidder_Activity: "Fair"}, {"Auctioneer.Qualification": 1, "Venue.Type": 1, Bidder_Activity: 1, _id: 0})

db.Auction.countDocuments({ "Auctioneer.Qualification": "Marketing", "Venue.Type": "School Hall", Bidder_Activity: "Fair"})

```
Auction_db> db.Auction.find({ "Auctioneer.Qualification": "Marketing",  "Venue.Type": "School Hall", Bidder_Activity: "Fair"}, {"Auct
ioneer.Qualification": 1, "Venue.Type": 1, Bidder_Activity: 1, _id: 0})
[
  {
    Bidder_Activity: 'Fair',
    Venue: { Type: 'School Hall' },
    Auctioneer: { Qualification: 'Marketing' }
  },
  {
    Bidder_Activity: 'Fair',
    Venue: { Type: 'School Hall' },
    Auctioneer: { Qualification: 'Marketing' }
  },
  {
    Bidder_Activity: 'Fair',
    Venue: { Type: 'School Hall' },
    Auctioneer: { Qualification: 'Marketing' }
  },
  {
    Bidder_Activity: 'Fair',
    Venue: { Type: 'School Hall' },
    Auctioneer: { Qualification: 'Marketing' }
  },
  {
    Bidder_Activity: 'Fair',
    Venue: { Type: 'School Hall' },
    Auctioneer: { Qualification: 'Marketing' }
  },
  {
    Bidder_Activity: 'Fair',
    Venue: { Type: 'School Hall' },
    Auctioneer: { Qualification: 'Marketing' }
  },


  {
    Bidder_Activity: 'Fair',
    Venue: { Type: 'School Hall' },
    Auctioneer: { Qualification: 'Marketing' }
  }
]
Auction_db> db.Auction.countDocuments({ "Auctioneer.Qualification": "Marketing", "Venue.Type": "School Hall", Bidder_Activity: "Fair"
})
7
Auction_db> |
```

Question 4

List auctions that took place in July, included Cattle, and had more than 75 lots sold

db.Auction.find({ Auction_Month: "July", Category: "Cattle", Num_Lots_Sold: { $gt: 75 }}, {Auction_Month: 1, Category: 1, Num_Lots_Sold: 1, _id: 0})

db.Auction.countDocuments({ Auction_Month: "July", Category: "Cattle", Num_Lots_Sold: { $gt: 75 }})

```
Auction_db> db.Auction.find({ Auction_Month: "July", Category: "Cattle", Num_Lots_Sold: { $gt: 75 }}, {Auction_Month: 1, Category: 1,
 Num_Lots_Sold: 1, _id: 0})
[
  {
    Auction_Month: 'July',
    Category: [ 'Artworks', 'Cattle', 'Antique Furniture' ],
    Num_Lots_Sold: 111
  },
  {
    Auction_Month: 'July',
    Category: [ 'Cattle', 'Horses' ],
    Num_Lots_Sold: 156
  },
  {
    Auction_Month: 'July',
    Category: [ 'Jewellery', 'Lorries', 'Cattle' ],
    Num_Lots_Sold: 179
  },
  {
    Auction_Month: 'July',
    Category: [ 'Cattle', 'Lorries' ],
    Num_Lots_Sold: 165
  },
  {
    Auction_Month: 'July',
    Category: [ 'Cattle', 'Antique Furniture' ],
    Num_Lots_Sold: 138
  },
  {
    Auction_Month: 'July',
    Category: [ 'Horses', 'Cattle' ],
    Num_Lots_Sold: 91
  },

  {
    Auction_Month: 'July',
    Category: [ 'Cattle', 'Lorries', 'Sheep' ],
    Num_Lots_Sold: 120
  },
  {
    Auction_Month: 'July',
    Category: [ 'Horses', 'Cattle', 'Antique Furniture' ],
    Num_Lots_Sold: 98
  },
  { Auction_Month: 'July', Category: [ 'Cattle' ], Num_Lots_Sold: 119 },
  {
    Auction_Month: 'July',
    Category: [ 'Cattle', 'Sheep', 'Lorries' ],
    Num_Lots_Sold: 113
  }
]
Auction_db> db.Auction.countDocuments({ Auction_Month: "July", Category: "Cattle", Num_Lots_Sold: { $gt: 75 }})
10
Auction_db>
```

Question 5

Retrieve all auctions held in a Warehouse venue where the only online bidder location is Australia (i.e. no other countries are in the array) and the number of online bidders is greater than 5.

db.Auction.find({ "Venue.Type": "Warehouse", Num_Online_Bidders: { $gt: 5 }, Online_Bidder_Location: ["Australia"] }, { "Venue.Type": 1, Num_Online_Bidders: 1, Online_Bidder_Location: 1, _id: 0})

db.Auction.countDocuments({ "Venue.Type": "Warehouse", Num_Online_Bidders: { $gt: 5 }, Online_Bidder_Location: ["Australia"]})

```
Auction_db> db.Auction.find({ "Venue.Type": "Warehouse", Num_Online_Bidders: { $gt: 5 }, Online_Bidder_Location: ["Australia"] }, { "
Venue.Type": 1, Num_Online_Bidders: 1, Online_Bidder_Location: 1, _id: 0})
[
  {
    Venue: { Type: 'Warehouse' },
    Num_Online_Bidders: 43,
    Online_Bidder_Location: [ 'Australia' ]
  },
  {
    Venue: { Type: 'Warehouse' },
    Num_Online_Bidders: 128,
    Online_Bidder_Location: [ 'Australia' ]
  },
  {
    Venue: { Type: 'Warehouse' },
    Num_Online_Bidders: 192,
    Online_Bidder_Location: [ 'Australia' ]
  },
  {
    Venue: { Type: 'Warehouse' },
    Num_Online_Bidders: 67,
    Online_Bidder_Location: [ 'Australia' ]
  },
  {
    Venue: { Type: 'Warehouse' },
    Num_Online_Bidders: 172,
    Online_Bidder_Location: [ 'Australia' ]
  },
  {
    Venue: { Type: 'Warehouse' },
    Num_Online_Bidders: 94,
    Online_Bidder_Location: [ 'Australia' ]
  },

  .
  {
    Venue: { Type: 'Warehouse' },
    Num_Online_Bidders: 19,
    Online_Bidder_Location: [ 'Australia' ]
  },
  {
    Venue: { Type: 'Warehouse' },
    Num_Online_Bidders: 70,
    Online_Bidder_Location: [ 'Australia' ]
  },
  {
    Venue: { Type: 'Warehouse' },
    Num_Online_Bidders: 96,
    Online_Bidder_Location: [ 'Australia' ]
  },
  {
    Venue: { Type: 'Warehouse' },
    Num_Online_Bidders: 6,
    Online_Bidder_Location: [ 'Australia' ]
  }
]
Auction_db> db.Auction.countDocuments({ "Venue.Type": "Warehouse", Num_Online_Bidders: { $gt: 5 }, Online_Bidder_Location: ["Australi
a"]})
10
Auction_db>
```

Question 6

Find auctions run by Auctioneers specializing in Jewellery, with Law qualification and more than 3 online bidders in the year 2024

db.Auction.find({ "Auctioneer.Specialism": "Jewellery", "Auctioneer.Qualification": "Law", Num_Online_Bidders: { $gt: 3 }, Auction_Year: 2024}, { "Auctioneer.Specialism": 1, "Auctioneer.Qualification": 1, Num_Online_Bidders: 1, Auction_Year: 1, _id: 0 })

db.Auction.countDocuments({ "Auctioneer.Specialism": "Jewellery", "Auctioneer.Qualification": "Law", Num_Online_Bidders: { $gt: 3 }, Auction_Year: 2024 })

```
Auction_db> db.Auction.find({ "Auctioneer.Specialism": "Jewellery", "Auctioneer.Qualification": "Law", Num_Online_Bidders: { $gt: 3 }
, Auction_Year: 2024}, { "Auctioneer.Specialism": 1, "Auctioneer.Qualification": 1, Num_Online_Bidders: 1, Auction_Year: 1, _id: 0 })

[
  {
    Auction_Year: 2024,
    Auctioneer: { Specialism: 'Jewellery', Qualification: 'Law' },
    Num_Online_Bidders: 139
  },
  {
    Auction_Year: 2024,
    Auctioneer: { Specialism: 'Jewellery', Qualification: 'Law' },
    Num_Online_Bidders: 189
  },
  {
    Auction_Year: 2024,
    Auctioneer: { Specialism: 'Jewellery', Qualification: 'Law' },
    Num_Online_Bidders: 37
  },
  {
    Auction_Year: 2024,
    Auctioneer: { Specialism: 'Jewellery', Qualification: 'Law' },
    Num_Online_Bidders: 86
  },
  {
    Auction_Year: 2024,
    Auctioneer: { Specialism: 'Jewellery', Qualification: 'Law' },
    Num_Online_Bidders: 52
  }
]
Auction_db> db.Auction.countDocuments({ "Auctioneer.Specialism": "Jewellery", "Auctioneer.Qualification": "Law", Num_Online_Bidders:
{ $gt: 3 }, Auction_Year: 2024 })
5
```

Question 7

Retrieve auctions in Garage Forecourt venue with category Cars, more than 100 attendees, and Excellent bidder activity

db.Auction.find({ "Venue.Type": "Garage Forecourt", Category: "Cars", Num_Attended: { $gt: 100 }, Bidder_Activity: "Excellent"}, { "Venue.Type": 1, Category: 1, Num_Attended: 1, Bidder_Activity: 1, _id: 0})

db.Auction.countDocuments({ "Venue.Type": "Garage Forecourt", Category: "Cars", Num_Attended: { $gt: 100 }, Bidder_Activity: "Excellent"})

```
Auction_db> db.Auction.find({ "Venue.Type": "Garage Forecourt", Category: "Cars", Num_Attended: { $gt: 100 }, Bidder_Activity: "Excel
lent"}, { "Venue.Type": 1, Category: 1, Num_Attended: 1, Bidder_Activity: 1, _id: 0})
[
  {
    Category: [ 'Cars', 'Sheep' ],
    Num_Attended: 221,
    Bidder_Activity: 'Excellent',
    Venue: { Type: 'Garage Forecourt' }
  },
  {
    Category: [ 'Cars', 'Tractors' ],
    Num_Attended: 220,
    Bidder_Activity: 'Excellent',
    Venue: { Type: 'Garage Forecourt' }
  },
  {
    Category: [ 'Horses', 'Sheep', 'Cars' ],
    Num_Attended: 210,
    Bidder_Activity: 'Excellent',
    Venue: { Type: 'Garage Forecourt' }
  },
  ..
  {
    Category: [ 'Cars', 'Artworks' ],
    Num_Attended: 106,
    Bidder_Activity: 'Excellent',
    Venue: { Type: 'Garage Forecourt' }
  },
  {
    Category: [ 'Cars', 'Sheep' ],
    Num_Attended: 351,
    Bidder_Activity: 'Excellent',
    Venue: { Type: 'Garage Forecourt' }
  }
]
Auction_db> db.Auction.countDocuments({ "Venue.Type": "Garage Forecourt", Category: "Cars", Num_Attended: { $gt: 100 }, Bidder_Activi
ty: "Excellent"})
5
Auction_db>
```

Question 8

Find auctions run by Helen Dyer with Entry Fee above 70 and duration over 120 minutes

db.Auction.find({ "Auctioneer.Name": "Helen Dyer", Entry_Fee: { $gt: 70 }, Duration: { $gt: 120 }}, { "Auctioneer.Name": 1, Entry_Fee: 1, Duration: 1, _id: 0 })

db.Auction.countDocuments({ "Auctioneer.Name": "Helen Dyer", Entry_Fee: { $gt: 70 }, Duration: { $gt: 120 } })

Question 9

Retrieve auctions hosted at a Farmyard venue with Category “Sheep”, where attendance was between 100 and 200, and Duration over 120 minutes

db.Auction.find({ "Venue.Type": "Farmyard", Category: "Sheep", Num_Attended: { $gte: 100, $lte: 200 }, Duration: { $gt: 120 }}, { "Venue.Type": 1, Category: 1, Num_Attended: 1, Duration: 1, _id: 0})

db.Auction.countDocuments({ "Venue.Type": "Farmyard", Category: "Sheep", Num_Attended: { $gte: 100, $lte: 200 }, Duration: { $gt: 120 } })

```
Auction_db> db.Auction.find({
...   Auction_Year: 2022,
Auction_db> db.Auction.find({ "Venue.Type": "Farmyard", Category: "Sheep", Num_Attended: { $gte: 100, $lte: 200 }, Duration: { $gt: 1
20 }}, { "Venue.Type": 1, Category: 1, Num_Attended: 1, Duration: 1, _id: 0})
[
  {
    Duration: 238,
    Category: [ 'Lorries', 'Sheep' ],
    Num_Attended: 128,
    Venue: { Type: 'Farmyard' }
  },
  {
    Duration: 293,
    Category: [ 'Sheep', 'Jewellery' ],
    Num_Attended: 114,
    Venue: { Type: 'Farmyard' }
  },
  {
    Duration: 206,
    Category: [ 'Sheep', 'Cattle' ],
    Num_Attended: 112,
    Venue: { Type: 'Farmyard' }
  },

  {
    Duration: 162,
    Category: [ 'Sheep', 'Antique Furniture', 'Cattle' ],
    Num_Attended: 200,
    Venue: { Type: 'Farmyard' }
  },
  {
    Duration: 292,
    Category: [ 'Sheep' ],
    Num_Attended: 181,
    Venue: { Type: 'Farmyard' }
  },
  {
    Duration: 153,
    Category: [ 'Cattle', 'Antique Furniture', 'Sheep' ],
    Num_Attended: 190,
    Venue: { Type: 'Farmyard' }
  }
]
Auction_db> db.Auction.countDocuments({ "Venue.Type": "Farmyard", Category: "Sheep", Num_Attended: { $gte: 100, $lte: 200 }, Duration
: { $gt: 120 } })
6
Auction_db>
```

Question 10

Retrieve auctions with more than 50 lots, in September, with more than 80% lots sold, Entry Fee greater than 50, and Auctioneer Specialism in Antiques

db.Auction.find({ Num_Lots: { $gt: 50 }, Auction_Month: "September", Entry_Fee: { $gt: 50 }, "Auctioneer.Specialism": "Antiques", $expr: { $gt: ["$Num_Lots_Sold", { $multiply: ["$Num_Lots", 0.8] }] } }, { Num_Lots: 1, Num_Lots_Sold: 1, Auction_Month: 1, Entry_Fee: 1, "Auctioneer.Specialism": 1, _id: 0 })

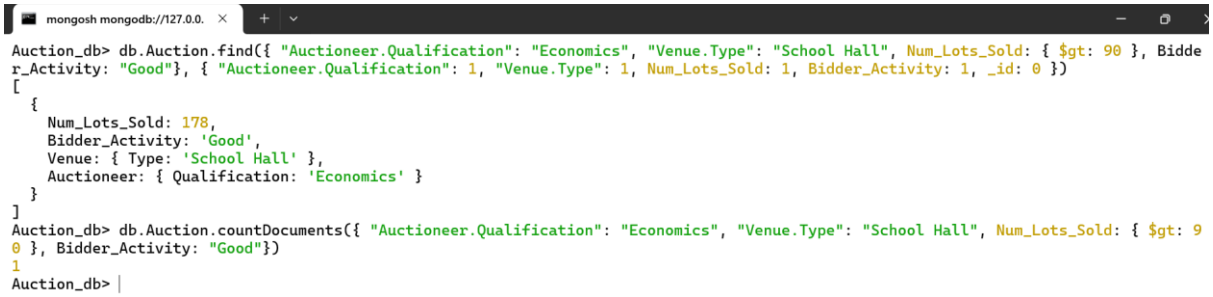
db.Auction.countDocuments({ Num_Lots: { $gt: 50 }, Auction_Month: "September", Entry_Fee: { $gt: 50 }, "Auctioneer.Specialism": "Antiques", $expr: { $gt: ["$Num_Lots_Sold", { $multiply: ["$Num_Lots", 0.8] }] } })

Question 11

List auctions where the auctioneer has a qualification in Economics, the event was held in a School Hall, more than 90 lots were sold, and Bidder Activity was marked as Good.

db.Auction.find({ "Auctioneer.Qualification": "Economics", "Venue.Type": "School Hall", Num_Lots_Sold: { $gt: 90 }, Bidder_Activity: "Good"}, { "Auctioneer.Qualification": 1, "Venue.Type": 1, Num_Lots_Sold: 1, Bidder_Activity: 1, _id: 0 })

db.Auction.countDocuments({ "Auctioneer.Qualification": "Economics", "Venue.Type": "School Hall", Num_Lots_Sold: { $gt: 90 }, Bidder_Activity: "Good"})



Question 12

Find auctions where at least one bidder joined from France, the number of attendees exceeded 200, the category included "Cattle", and the event was hosted in a Warehouse

db.Auction.find({ Online_Bidder_Location: "France", Num_Attended: { $gt: 200 }, Category: "Cattle", "Venue.Type": "Warehouse"}, { Online_Bidder_Location: 1, Num_Attended: 1, Category: 1, "Venue.Type": 1, _id: 0})

db.Auction.countDocuments({ Online_Bidder_Location: "France", Num_Attended: { $gt: 200 }, Category: "Cattle", "Venue.Type": "Warehouse" })

```
Auction_db> db.Auction.find({ Online_Bidder_Location: "France", Num_Attended: { $gt: 200 }, Category: "Cattle", "Venue.Type": "Wareho
use"}, { Online_Bidder_Location: 1, Num_Attended: 1, Category: 1, "Venue.Type": 1, _id: 0})
[
  {
    Category: [ 'Cattle' ],
    Num_Attended: 336,
    Venue: { Type: 'Warehouse' },
    Online_Bidder_Location: [ 'France', 'Scotland' ]
  },
  {
    Category: [ 'Tractors', 'Antique Furniture', 'Cattle' ],
    Num_Attended: 418,
    Venue: { Type: 'Warehouse' },
    Online_Bidder_Location: [ 'Scotland', 'Spain', 'France' ]
  },
  {
    Category: [ 'Cattle', 'Lorries', 'Artworks' ],
    Num_Attended: 350,
    Venue: { Type: 'Warehouse' },
    Online_Bidder_Location: [ 'France' ]
  },
  {
    Category: [ 'Antique Furniture', 'Sheep', 'Cattle' ],
    Num_Attended: 244,
    Venue: { Type: 'Warehouse' },
    Online_Bidder_Location: [ 'Spain', 'France', 'Scotland' ]
  }
]
Auction_db> db.Auction.countDocuments({ Online_Bidder_Location: "France", Num_Attended: { $gt: 200 }, Category: "Cattle", "Venue.Type
": "Warehouse" })
4
Auction_db>
```

Question 13

List auctions in August with Duration over 120 minutes, held in Community Centres, with Bidder Activity as “Good”, and more than 60 online bidders.

db.Auction.find({ Auction_Month: "August", Duration: { $gt: 120 }, "Venue.Type": "Community Centre", Bidder_Activity: "Good", Num_Online_Bidders: { $gt: 60 }}, {Auction_Month: 1, Duration: 1, "Venue.Type": 1, Bidder_Activity: 1, Num_Online_Bidders: 1, _id: 0})

db.Auction.countDocuments({ Auction_Month: "August", Duration: { $gt: 120 }, "Venue.Type": "Community Centre", Bidder_Activity: "Good", Num_Online_Bidders: { $gt: 60} })

```
Auction_db> db.Auction.find({ Auction_Month: "August", Duration: { $gt: 120 }, "Venue.Type": "Community Centre", Bidder_Activity: "Good", Num_Online_Bidders: { $gt: 60 }}, {Auction_Month: 1, Duration: 1, "Venue.Type": 1, Bidder_Activity: 1, Num_Online_Bidders: 1, _id: 0})
[
  {
    Auction_Month: 'August',
    Duration: 250,
    Bidder_Activity: 'Good',
    Venue: { Type: 'Community Centre' },
    Num_Online_Bidders: 184
  },
  {
    Auction_Month: 'August',
    Duration: 226,
    Bidder_Activity: 'Good',
    Venue: { Type: 'Community Centre' },
    Num_Online_Bidders: 71
  },
  {
    Auction_Month: 'August',
    Duration: 257,
    Bidder_Activity: 'Good',
    Venue: { Type: 'Community Centre' },
    Num_Online_Bidders: 109
  },

  {
    Auction_Month: 'August',
    Duration: 298,
    Bidder_Activity: 'Good',
    Venue: { Type: 'Community Centre' },
    Num_Online_Bidders: 193
  }
]
Auction_db> db.Auction.countDocuments({ Auction_Month: "August", Duration: { $gt: 120 }, "Venue.Type": "Community Centre", Bidder_Activity: "Good", Num_Online_Bidders: { $gt: 60} })
4
Auction_db>
```

Question 14

List auctions held in France with more than 4 online bidders, Duration below 90 minutes, Venue capacity above 50, and Excellent Bidder Activity.

db.Auction.find({ Online_Bidder_Location: "France", Num_Online_Bidders: { $gt: 4 }, Duration: { $lt: 90 }, "Venue.Capacity": { $gt: 50 }, Bidder_Activity: "Excellent"}, {Online_Bidder_Location: 1, Num_Online_Bidders: 1, Duration: 1, "Venue.Capacity": 1, Bidder_Activity: 1, _id: 0})

db.Auction.countDocuments({ Online_Bidder_Location: "France", Num_Online_Bidders: { $gt: 4 }, Duration: { $lt: 90 }, "Venue.Capacity": { $gt: 50 }, Bidder_Activity: "Excellent"})

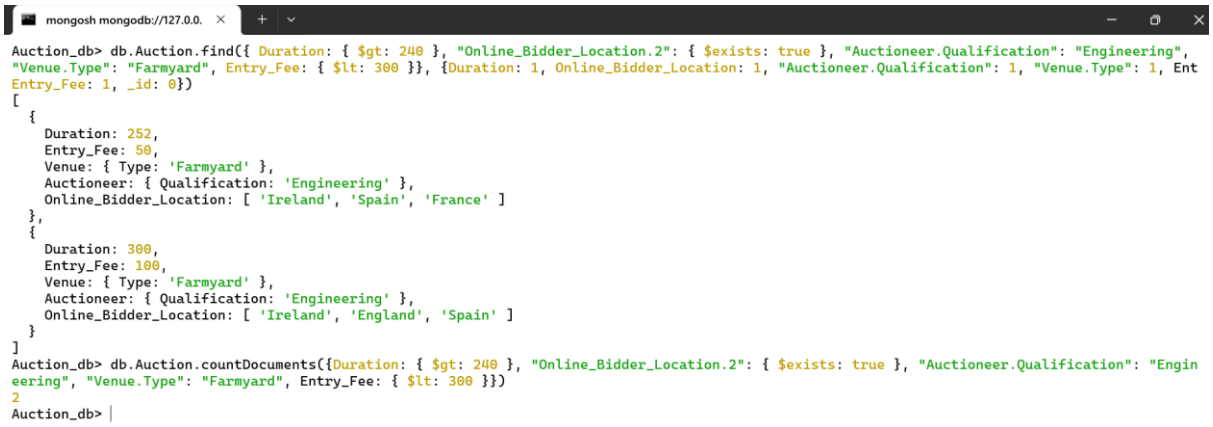
```
Auction_db> db.Auction.find({ Online_Bidder_Location: "France", Num_Online_Bidders: { $gt: 4 }, Duration: { $lt: 90 }, "Venue.Capacit
y": { $gt: 50 }, Bidder_Activity: "Excellent"}, {Online_Bidder_Location: 1, Num_Online_Bidders: 1, Duration: 1, "Venue.Capacity": 1,
Bidder_Activity: 1, _id: 0})
[
  {
    Duration: 65,
    Bidder_Activity: 'Excellent',
    Venue: { Capacity: 967 },
    Num_Online_Bidders: 33,
    Online_Bidder_Location: [ 'France', 'Australia', 'USA' ]
  },
  {
    Duration: 88,
    Bidder_Activity: 'Excellent',
    Venue: { Capacity: 83 },
    Num_Online_Bidders: 151,
    Online_Bidder_Location: [ 'France', 'Australia', 'USA' ]
  },
  {
    Duration: 79,
    Bidder_Activity: 'Excellent',
    Venue: { Capacity: 400 },
    Num_Online_Bidders: 29,
    Online_Bidder_Location: [ 'Ireland', 'France' ]
  },
  {
    Duration: 86,
    Bidder_Activity: 'Excellent',
    Venue: { Capacity: 971 },
    Num_Online_Bidders: 125,
    Online_Bidder_Location: [ 'France', 'Australia', 'Scotland' ]
  },
  {
  {
    Duration: 81,
    Bidder_Activity: 'Excellent',
    Venue: { Capacity: 372 },
    Num_Online_Bidders: 65,
    Online_Bidder_Location: [ 'France' ]
  },
  {
    Duration: 60,
    Bidder_Activity: 'Excellent',
    Venue: { Capacity: 567 },
    Num_Online_Bidders: 63,
    Online_Bidder_Location: [ 'France', 'Ireland' ]
  },
  {
    Duration: 64,
    Bidder_Activity: 'Excellent',
    Venue: { Capacity: 745 },
    Num_Online_Bidders: 39,
    Online_Bidder_Location: [ 'Scotland', 'France', 'Australia' ]
  },
  {
    Duration: 71,
    Bidder_Activity: 'Excellent',
    Venue: { Capacity: 807 },
    Num_Online_Bidders: 151,
    Online_Bidder_Location: [ 'France', 'Ireland', 'Spain' ]
  },
  {
    Duration: 82,
    Bidder_Activity: 'Excellent',
    Venue: { Capacity: 311 },
    Num_Online_Bidders: 122,

  {
    Duration: 83,
    Bidder_Activity: 'Excellent',
    Venue: { Capacity: 771 },
    Num_Online_Bidders: 192,
    Online_Bidder_Location: [ 'France', 'Scotland', 'Spain' ]
  }
]
Auction_db> db.Auction.countDocuments({ Online_Bidder_Location: "France", Num_Online_Bidders: { $gt: 4 }, Duration: { $lt: 90 }, "Ven
ue.Capacity": { $gt: 50 }, Bidder_Activity: "Excellent"})
10
Auction_db>
```

Question 15

List auctions with more than 240 minutes duration, more than 2 online bidder countries, auctioneer with Engineering qualification, held in Farmyard, and entry fee under €300.

db.Auction.find({ Duration: { $gt: 240 }, "Online_Bidder_Location.2": { $exists: true }, "Auctioneer.Qualification": "Engineering", "Venue.Type": "Farmyard", Entry_Fee: { $lt: 300 }}, {Duration: 1, Online_Bidder_Location: 1, "Auctioneer.Qualification": 1, "Venue.Type": 1, Entry_Fee: 1, _id: 0})

db.Auction.countDocuments({Duration: { $gt: 240 }, "Online_Bidder_Location.2": { $exists: true }, "Auctioneer.Qualification": "Engineering", "Venue.Type": "Farmyard", Entry_Fee: { $lt: 300 }})



Question 16

Question: Retrieve auctions from April with a venue capacity of less than 80, auctioneer specialized in Sheep, more than 75 lots, and with Fair bidder activity.

db.Auction.find({ Auction_Month: "April", "Venue.Capacity": { $lt: 80 },"Auctioneer.Specialism": "Sheep", Num_Lots: { $gt: 75 },Bidder_Activity: "Fair"}, {Auction_Month: 1, "Venue.Capacity": 1, "Auctioneer.Specialism": 1, Num_Lots: 1, Bidder_Activity: 1, _id: 0})

db.Auction.countDocuments({Auction_Month: "April", "Venue.Capacity": { $lt: 80 },"Auctioneer.Specialism": "Sheep", Num_Lots: { $gt: 75 }, Bidder_Activity: "Fair"})

```
Auction_db> db.Auction.find({ Auction_Month: "April", "Venue.Capacity": { $lt: 80 },"Auctioneer.Specialism": "Sheep", Num_Lots: { $gt
: 75 },Bidder_Activity: "Fair"}, {Auction_Month: 1, "Venue.Capacity": 1, "Auctioneer.Specialism": 1, Num_Lots: 1, Bidder_Activity: 1,
 _id: 0})
[
  {
    Auction_Month: 'April',
    Num_Lots: 167,
    Bidder_Activity: 'Fair',
    Venue: { Capacity: 75 },
    Auctioneer: { Specialism: 'Sheep' }
  }
]
Auction_db> db.Auction.countDocuments({Auction_Month: "April", "Venue.Capacity": { $lt: 80 },"Auctioneer.Specialism": "Sheep", Num_Lo
ts: { $gt: 75 }, Bidder_Activity: "Fair"})
1
Auction_db>
```

Question 17

Retrieve auctions held in Spain as an online bidder location, from the month of May, with Auctioneer Fee above €5000, more than 60 lots, and a venue cost under €900.

db.Auction.find({ Online_Bidder_Location: "Spain", Auction_Month: "May", Auctioneer_Fees: { $gt: 5000 }, Num_Lots: { $gt: 60 }, "Venue.Cost": { $lt: 900 }}, {Online_Bidder_Location: 1, Auction_Month: 1, Auctioneer_Fees: 1, Num_Lots: 1, "Venue.Cost": 1, _id: 0})

db.Auction.countDocuments({ Online_Bidder_Location: "Spain", Auction_Month: "May", Auctioneer_Fees: { $gt: 5000 },Num_Lots: { $gt: 60 }, "Venue.Cost": { $lt: 900 }})

Question 18

Retrieve auctions in France or Ireland as online bidder locations, conducted by auctioneers specialized in Antiques, with Excellent bidder activity, and more than 70 lots sold in December.

db.Auction.find({ Online_Bidder_Location: { $in: ["France", "Ireland"] }, "Auctioneer.Specialism": "Antiques", Bidder_Activity: "Excellent", Num_Lots_Sold: { $gt: 70 }, Auction_Month: "December"}, { Online_Bidder_Location: 1, "Auctioneer.Specialism": 1, Bidder_Activity: 1, Num_Lots_Sold: 1, Auction_Month: 1, _id: 0})

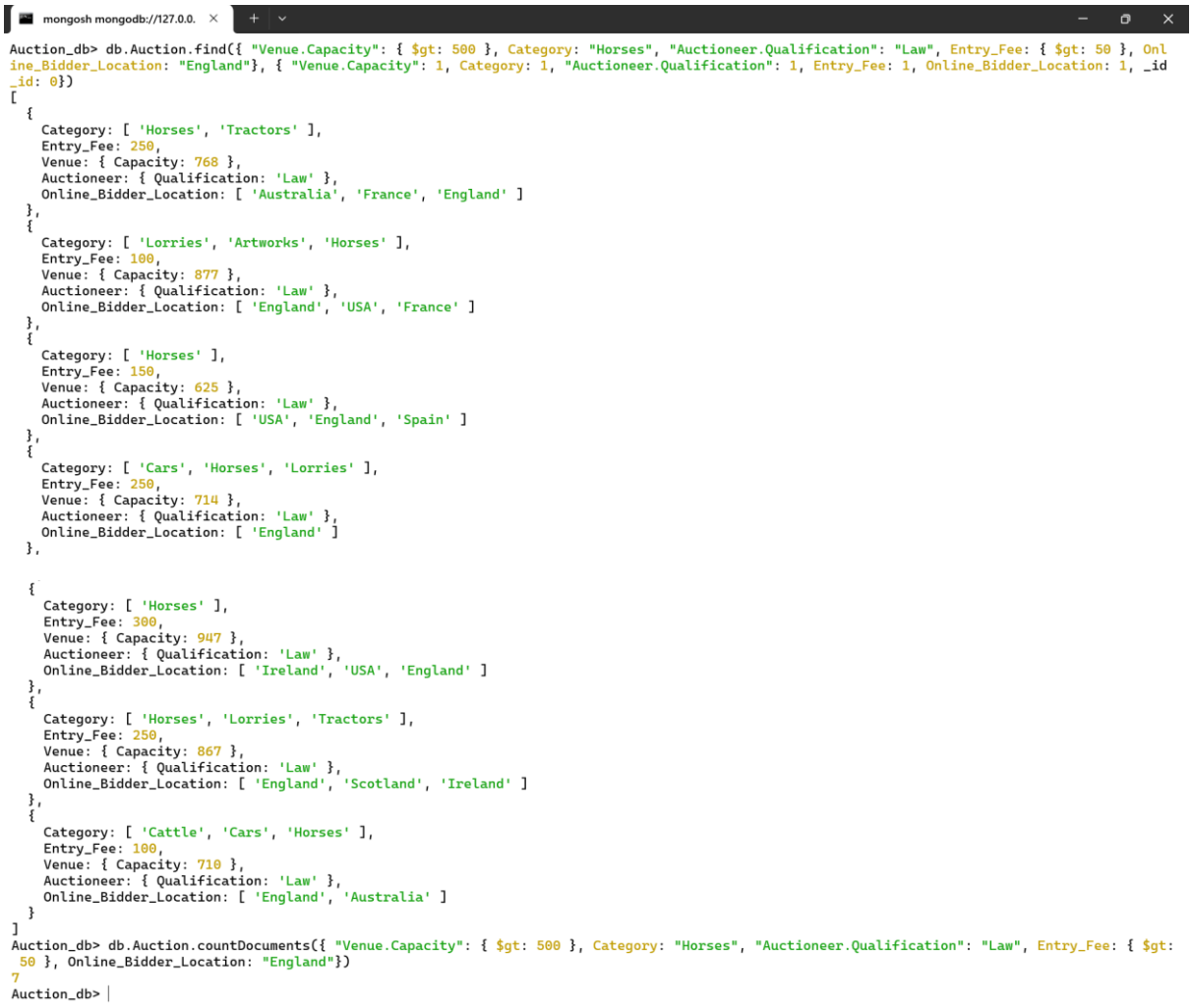
db.Auction.countDocuments({ Online_Bidder_Location: { $in: ["France", "Ireland"] },"Auctioneer.Specialism": "Antiques", Bidder_Activity: "Excellent", Num_Lots_Sold: { $gt: 70 }, Auction_Month: "December"})

Question 19

Find auctions where venue capacity is more than 500, includes Horses in category, conducted by an auctioneer with Law qualification, entry fee over €50, and held in England (as online bidder location).

db.Auction.find({ "Venue.Capacity": { $gt: 500 }, Category: "Horses", "Auctioneer.Qualification": "Law", Entry_Fee: { $gt: 50 }, Online_Bidder_Location: "England"}, { "Venue.Capacity": 1, Category: 1, "Auctioneer.Qualification": 1, Entry_Fee: 1, Online_Bidder_Location: 1, _id: 0})

db.Auction.countDocuments({ "Venue.Capacity": { $gt: 500 }, Category: "Horses", "Auctioneer.Qualification": "Law", Entry_Fee: { $gt: 50 }, Online_Bidder_Location: "England"})

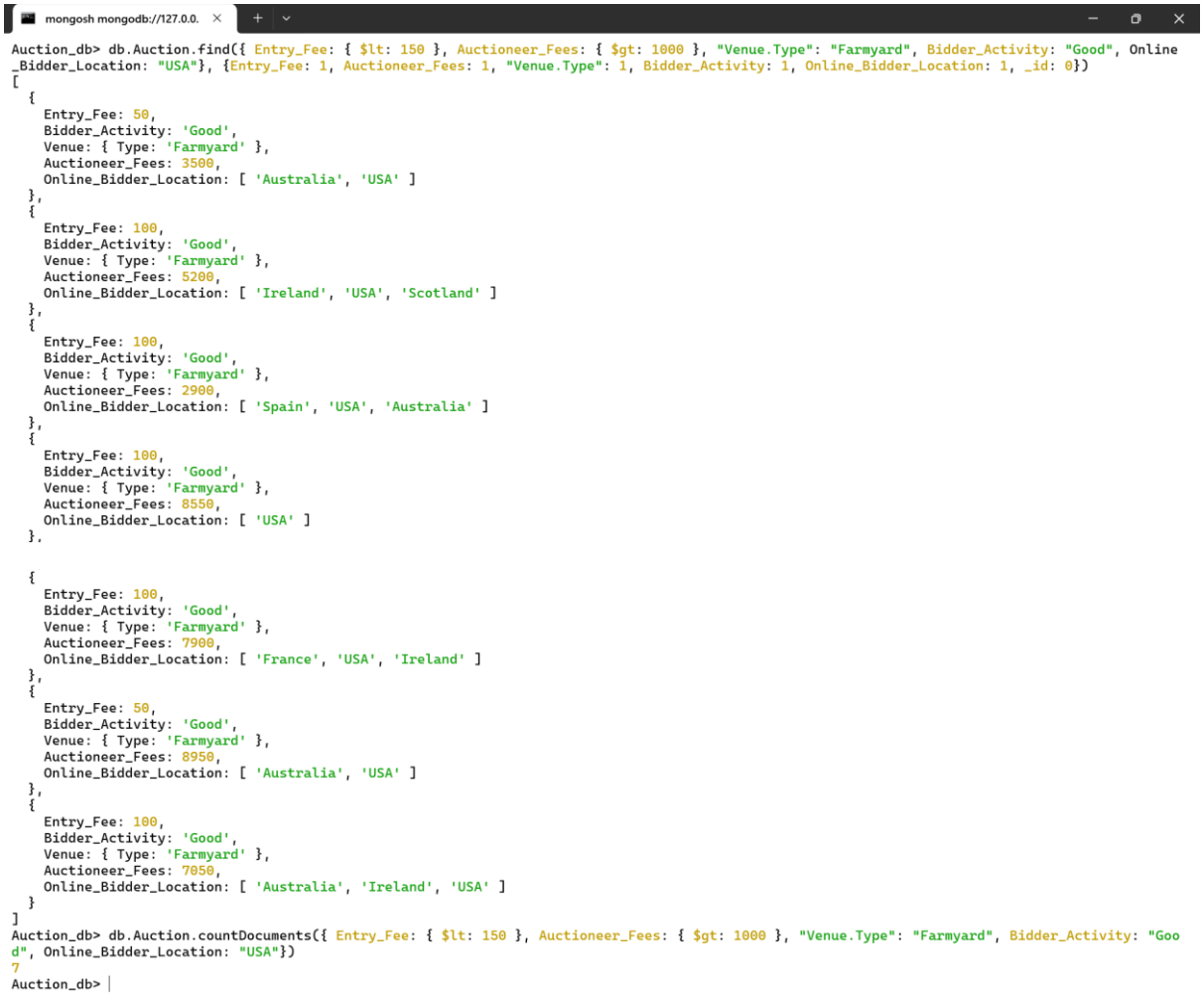


Question 20

Find auctions with entry fee under €150, Auctioneer Fee greater than €1000, held in Farmyard, with Good bidder activity, and Online Bidders from USA.

db.Auction.find({ Entry_Fee: { $lt: 150 }, Auctioneer_Fees: { $gt: 1000 }, "Venue.Type": "Farmyard", Bidder_Activity: "Good", Online_Bidder_Location: "USA"}, {Entry_Fee: 1, Auctioneer_Fees: 1, "Venue.Type": 1, Bidder_Activity: 1, Online_Bidder_Location: 1, _id: 0})

db.Auction.countDocuments({ Entry_Fee: { $lt: 150 }, Auctioneer_Fees: { $gt: 1000 }, "Venue.Type": "Farmyard", Bidder_Activity: "Good", Online_Bidder_Location: "USA"})



Question 21

Find auctions from Scotland as bidder location, with more than 80% lots sold, run by auctioneers with Cars specialism, held in August, and with total lots greater than 60.

db.Auction.find({ Online_Bidder_Location: "Scotland", "Auctioneer.Specialism": "Cars", Auction_Month: "August", Num_Lots: { $gt: 60 }, $expr: { $gt: ["$Num_Lots_Sold", { $multiply: ["$Num_Lots", 0.8] }] }}, { Online_Bidder_Location: 1, "Auctioneer.Specialism": 1, Auction_Month: 1, Num_Lots: 1, Num_Lots_Sold: 1, _id: 0})

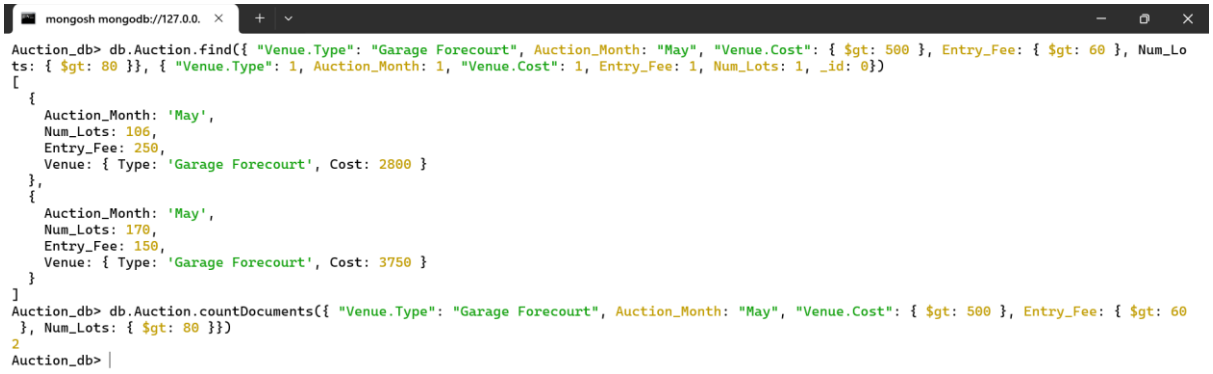
db.Auction.countDocuments({ Online_Bidder_Location: "Scotland", "Auctioneer.Specialism": "Cars", Auction_Month: "August", Num_Lots: { $gt: 60 }, $expr: { $gt: ["$Num_Lots_Sold", { $multiply: ["$Num_Lots", 0.8] }] }})

Question 22

Find auctions held in a Garage Forecourt, during May, where Venue cost greater than €500, Entry Fee greater than €60, and total lots greater than 80

db.Auction.find({ "Venue.Type": "Garage Forecourt", Auction_Month: "May", "Venue.Cost": { $gt: 500 }, Entry_Fee: { $gt: 60 }, Num_Lots: { $gt: 80 }}, { "Venue.Type": 1, Auction_Month: 1, "Venue.Cost": 1, Entry_Fee: 1, Num_Lots: 1, _id: 0})

db.Auction.countDocuments({ "Venue.Type": "Garage Forecourt", Auction_Month: "May", "Venue.Cost": { $gt: 500 }, Entry_Fee: { $gt: 60 }, Num_Lots: { $gt: 80 }})

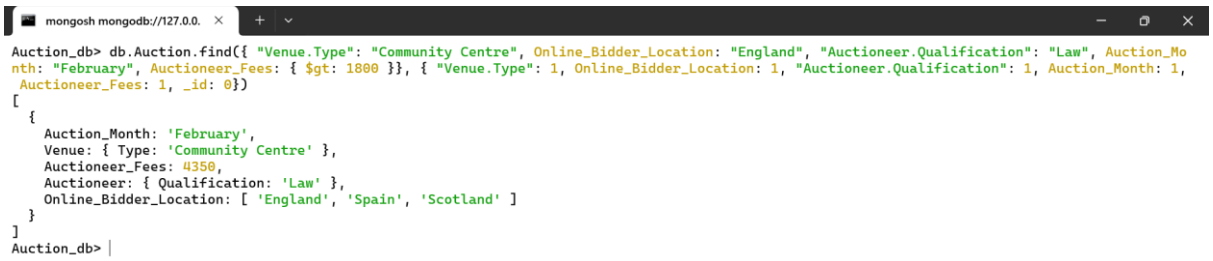


Question 23

Retrieve auctions held in Community Centre, where Online Bidders included England, Auctioneer has Law qualification, Auction Month is February, and total Auctioneer Fees greater than €1800.

db.Auction.find({ "Venue.Type": "Community Centre", Online_Bidder_Location: "England", "Auctioneer.Qualification": "Law", Auction_Month: "February", Auctioneer_Fees: { $gt: 1800 }}, { "Venue.Type": 1, Online_Bidder_Location: 1, "Auctioneer.Qualification": 1, Auction_Month: 1, Auctioneer_Fees: 1, _id: 0})

db.Auction.countDocuments({"Venue.Type": "Community Centre", Online_Bidder_Location: "England", "Auctioneer.Qualification": "Law", Auction_Month: "February", Auctioneer_Fees: { $gt: 1800 }})

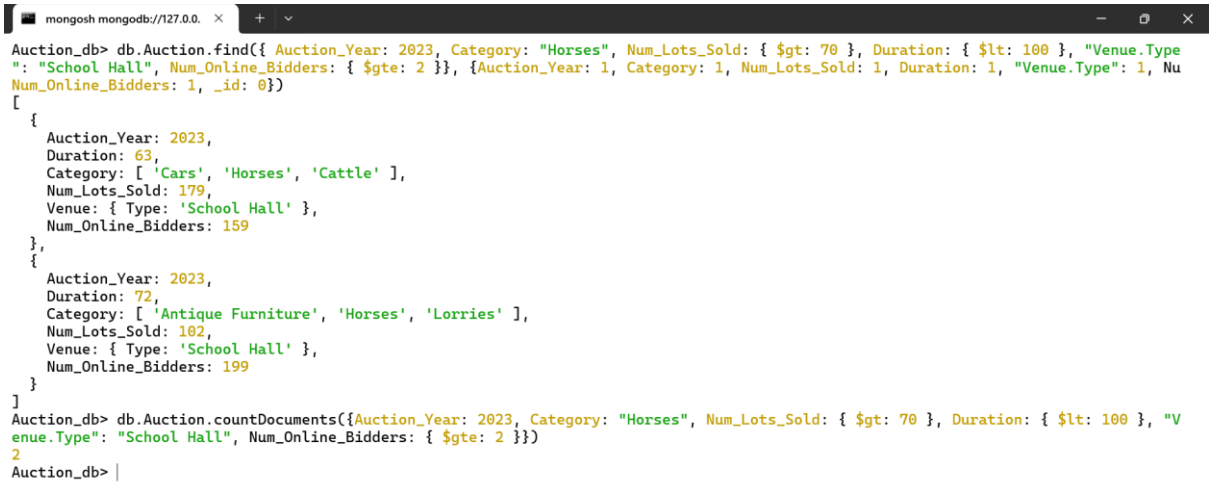


Question 24

List auctions from 2023, with Category as Horses, more than 70 lots sold, duration under 100 minutes, held in a School Hall, and at least 2 online bidders.

db.Auction.find({ Auction_Year: 2023, Category: "Horses", Num_Lots_Sold: { $gt: 70 }, Duration: { $lt: 100 }, "Venue.Type": "School Hall", Num_Online_Bidders: { $gte: 2 }}, {Auction_Year: 1, Category: 1, Num_Lots_Sold: 1, Duration: 1, "Venue.Type": 1, Num_Online_Bidders: 1, _id: 0})

db.Auction.countDocuments({Auction_Year: 2023, Category: "Horses", Num_Lots_Sold: { $gt: 70 }, Duration: { $lt: 100 }, "Venue.Type": "School Hall", Num_Online_Bidders: { $gte: 2 }})



Question 25

Retrieve auctions where the Auctioneer specialized in Artworks, Venue Capacity was more than 100, more than 80 lots were sold, held in Scotland, and the bidder activity was Excellent.

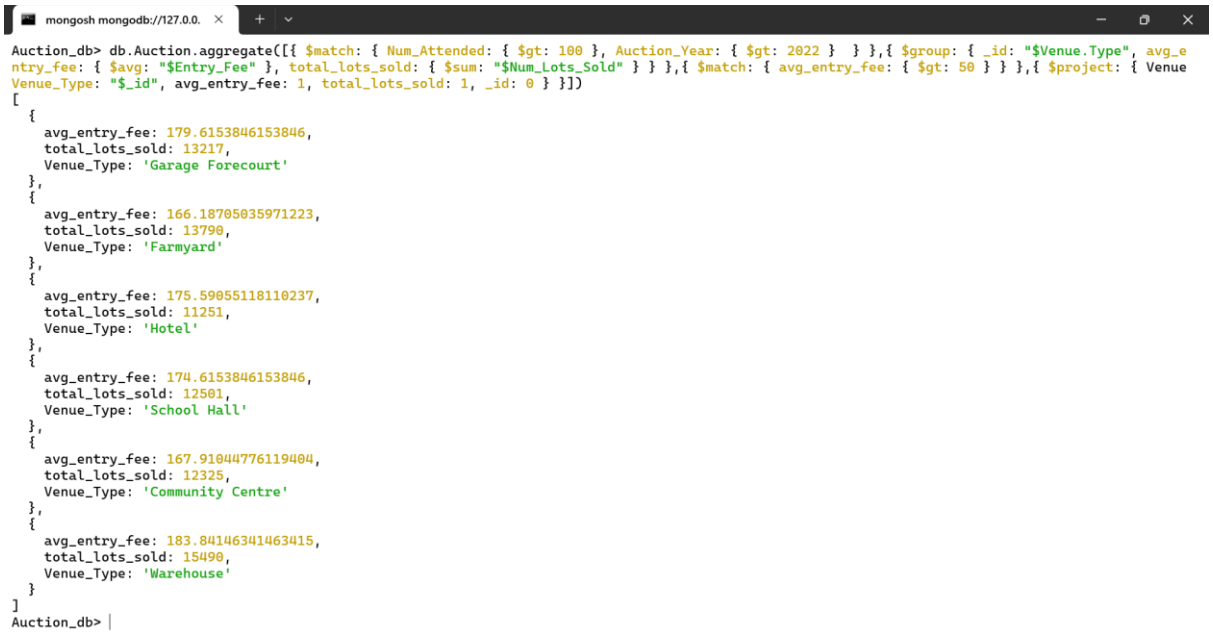
db.Auction.find({"Auctioneer.Specialism": "Artworks", "Venue.Capacity": { $gt: 100 }, Num_Lots_Sold: { $gt: 80 }, Online_Bidder_Location: "Scotland", Bidder_Activity: "Excellent"}, {"Auctioneer.Specialism": 1, "Venue.Capacity": 1, Num_Lots_Sold: 1, Online_Bidder_Location: 1, Bidder_Activity: 1, _id: 0})

db.Auction.countDocuments({"Auctioneer.Specialism": "Artworks", "Venue.Capacity": { $gt: 100 }, Num_Lots_Sold: { $gt: 80 }, Online_Bidder_Location: "Scotland", Bidder_Activity: "Excellent"})

3 AGGREGATION FRAMEWORK QUERIES

Q1. What is the total number of lots sold and the average entry fee for auctions held in each venue type, considering only auctions with more than 100 attendees and held after 2022? Display only those venue types where the average entry fee exceeds €50

db.Auction.aggregate([{ $match: { Num_Attended: { $gt: 100 }, Auction_Year: { $gt: 2022 } } },{ $group: { _id: "$Venue.Type", avg_entry_fee: { $avg: "$Entry_Fee" }, total_lots_sold: { $sum: "$Num_Lots_Sold" } } },{ $match: { avg_entry_fee: { $gt: 50 } } },{ $project: { Venue_Type: "$_id", avg_entry_fee: 1, total_lots_sold: 1, _id: 0 } }])



Explanation:

This query uses the Aggregation Framework to calculate the total number of lots sold and the average entry fee for auctions in each venue type, with a few specific conditions applied:

1. Match Stage 1: Filter auctions with more than 100 attendees and those held after 2022.
2. Group Stage: Group auctions by venue type, calculating the total number of lots sold and the average entry fee for each venue type.
3. Match Stage 2: Filter the results to only include those venue types where the average entry fee exceeds €50.
4. Project Stage: Format the output to display only the relevant fields in the results.

Question 2

For each auctioneer qualification, how many auctions were run, what was the maximum number of attendees, and what was the total auctioneer fee collected, considering only auctions held in 2024 with Excellent bidder activity and more than 50 lots sold?

db.Auction.aggregate([{$match: {Auction_Year: 2024, Bidder_Activity: "Excellent", Num_Lots_Sold: { $gt: 50 }} },{ $group: { _id: "$Auctioneer.Qualification",auction_count: { $sum: 1 }, max_attendees: { $max: "$Num_Attended" }, total_fees: { $sum: "$Auctioneer_Fees" } }},{ $project: { Qualification: "$_id", auction_count: 1, max_attendees: 1,total_fees: 1, _id: 0}}])

Explanation:

We begin with a $match stage that filters the dataset to only include auctions from the year 2024, where Bidder_Activity is "Excellent", and the number of lots sold (Num_Lots_Sold) is greater than 50. Then, we apply the $group stage by Auctioneer.Qualification to compute:

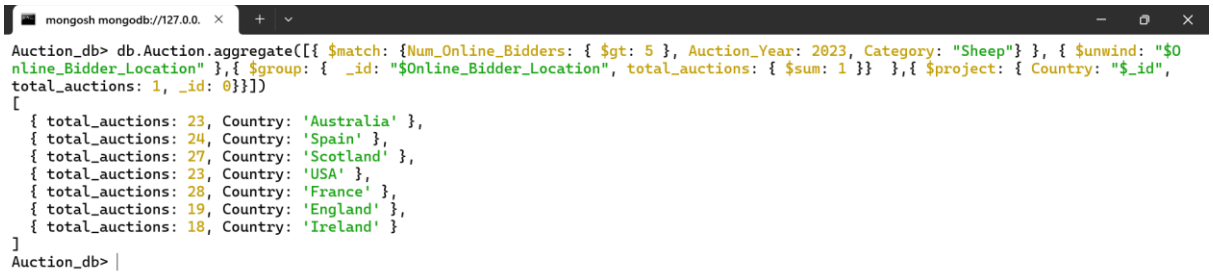
- auction_count: the number of auctions using $count,
- max_attendees: the maximum value of Num_Attended using $max,
- total_fees: the total sum of Auctioneer_Fees.

We finish with a $project stage to format the output and remove the internal _id.

Question 3

For each online bidder location, calculate the total number of auctions that included that country, but only if the auction had more than 5 online bidders, occurred in 2023, and involved the Sheep category.

db.Auction.aggregate([{ $match: {Num_Online_Bidders: { $gt: 5 }, Auction_Year: 2023, Category: "Sheep"} }, { $unwind: "$Online_Bidder_Location" },{ $group: { _id: "$Online_Bidder_Location", total_auctions: { $sum: 1 }} },{ $project: { Country: "$_id", total_auctions: 1, _id: 0}}])



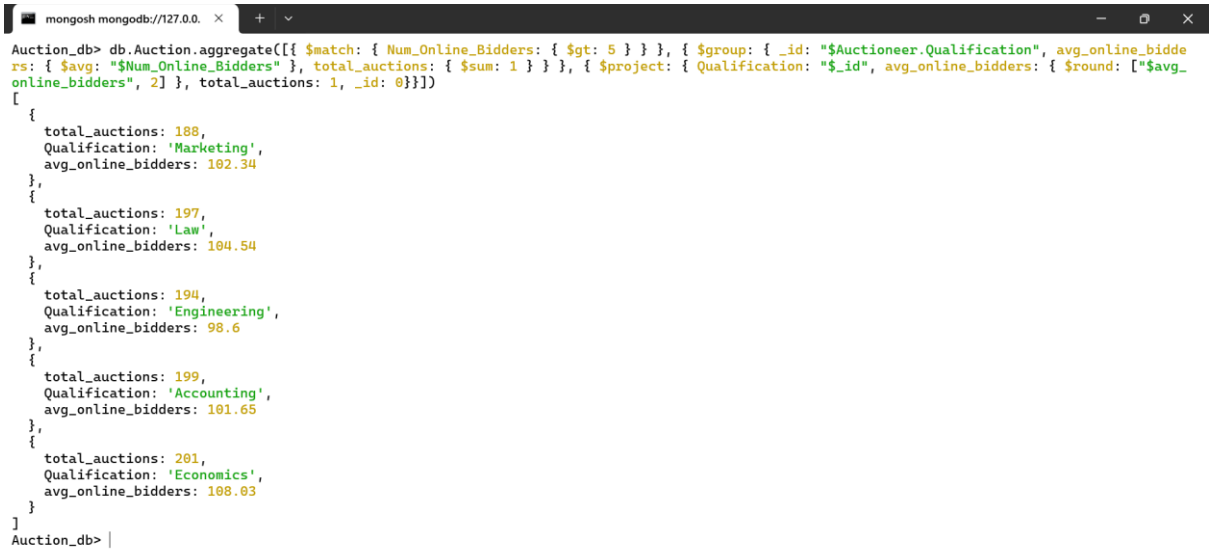
Explanation:

This query calculates the total number of auctions for each country where the auction had more than 5 online bidders, occurred in 2023, and involved the Sheep category. The query also uses the $unwind operator to handle the Online_Bidder_Location array, allowing us to count auctions by location.
match: Filters the auctions based on multiple conditions (online bidders, auction year, and category).
unwind: Deconstructs the Online_Bidder_Location array so that each country is treated as a separate document.
group: Aggregates the data by country (auctioneer qualification) and counts the total number of auctions per location.
project: Renames fields and formats the output to ensure clarity and relevance.

Question 4.

What is the average number of online bidders and count of auctions by Auctioneer.Qualification, limited to those auctions with more than 5 online bidders

db.Auction.aggregate([{ $match: { Num_Online_Bidders: { $gt: 5 } } }, { $group: { _id: "$Auctioneer.Qualification", avg_online_bidders: { $avg: "$Num_Online_Bidders" }, total_auctions: { $sum: 1 } } }, { $project: { Qualification: "$_id", avg_online_bidders: { $round: ["$avg_online_bidders", 2] }, total_auctions: 1, _id: 0}}])



Explanation:

This query calculates the average number of online bidders and the total count of auctions for each Auctioneer Qualification, but only for those auctions where the number of online bidders exceeds 5

$match: Filters the auctions based on the number of online bidders.

$group: Groups data by Auctioneer Qualification and calculates the average and count of online bidders.

$project: Formats the results by renaming fields and rounding the average number of online bidders.

Question 5

Find the maximum Auctioneer_Fees earned at auctions held in each type of venue.

db.Auction.aggregate([{ $group: { _id: "$Venue.Type", max_fees: { $max: "$Auctioneer_Fees" }}},{ $project: { Venue_Type: "$_id", max_fees: { $round: ["$max_fees", 2] }, _id: 0}}])

Explanation:

This query calculates the maximum auctioneer fees earned at auctions for each type of venue. It groups the auctions by venue type and then identifies the highest auctioneer fee for each venue type.

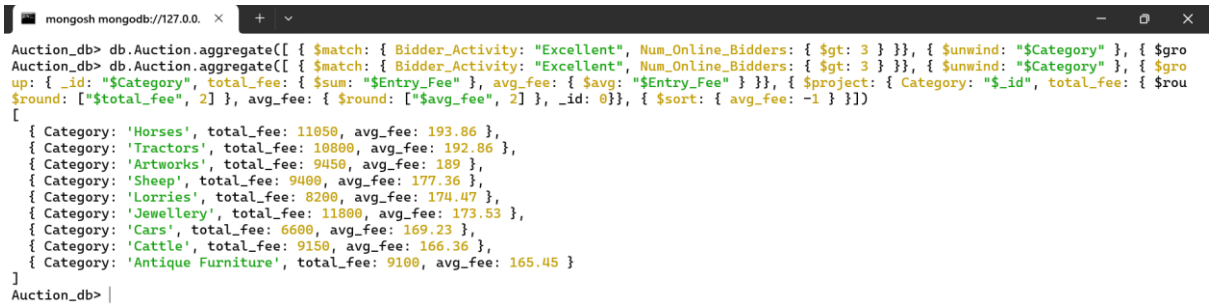
$group: Groups data by Venue Type and calculates the maximum auctioneer fee for each venue type.

$project: Renames fields and rounds the maximum fee to two decimal places for clarity.

Question 6

What are the total and average Entry Fees collected per Auction Category ("Cars", "Jewellery", etc.), for auctions with Excellent bidder activity and more than 3 online bidders

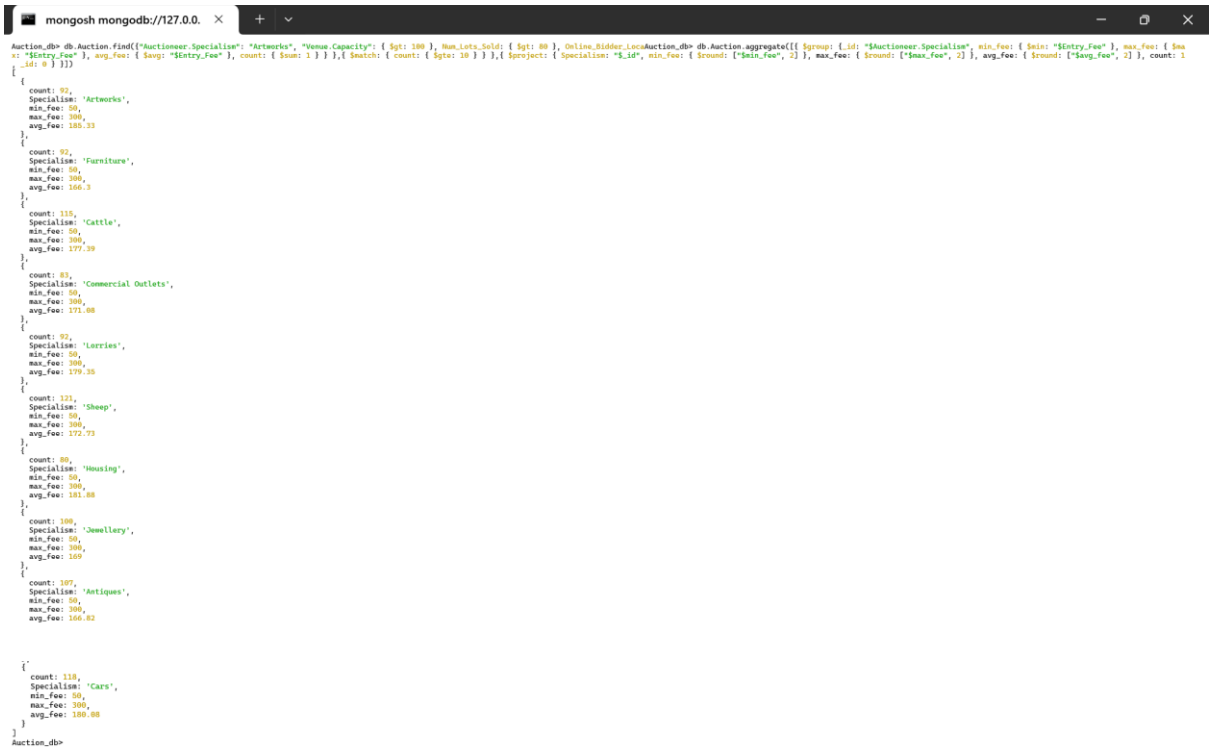
```
db.Auction.aggregate([ { $match: { Bidder_Activity: "Excellent", Num_Online_Bidders: { $gt: 3 } }}, { $unwind: "$Category" }, { $group: { _id: "$Category", total_fee: { $sum: "$Entry_Fee" }, avg_fee: { $avg: "$Entry_Fee" } }}, { $project: { Category: "$_id", total_fee: { $round: ["$total_fee", 2] }, avg_fee: { $round: ["$avg_fee", 2] }, _id: 0}}, { $sort: { avg_fee: -1 } }])
```


mongosh mongodb://127.0.0.
Auction_db> db.Auction.aggregate([{ $match: { Bidder_Activity: "Excellent", Num_Online_Bidders: { $gt: 3 } }}, { $unwind: "$Category" }, { $gro
Auction_db> db.Auction.aggregate([{ $match: { Bidder_Activity: "Excellent", Num_Online_Bidders: { $gt: 3 } }}, { $unwind: "$Category" }, { $gro
up: { _id: "$Category", total_fee: { $sum: "$Entry_Fee" }, avg_fee: { $avg: "$Entry_Fee" } }}, { $project: { Category: "$_id", total_fee: { $rou
$round: ["$total_fee", 2] }, avg_fee: { $round: ["$avg_fee", 2] }, _id: 0}}, { $sort: { avg_fee: -1 } }])
[
{ Category: 'Horses', total_fee: 11050, avg_fee: 193.86 },
{ Category: 'Tractors', total_fee: 10800, avg_fee: 192.86 },
{ Category: 'Artworks', total_fee: 9450, avg_fee: 189 },
{ Category: 'Sheep', total_fee: 9400, avg_fee: 177.36 },
{ Category: 'Lorries', total_fee: 8200, avg_fee: 174.47 },
{ Category: 'Jewellery', total_fee: 11800, avg_fee: 173.53 },
{ Category: 'Cars', total_fee: 6600, avg_fee: 169.23 },
{ Category: 'Cattle', total_fee: 9150, avg_fee: 166.36 },
{ Category: 'Antique Furniture', total_fee: 9100, avg_fee: 165.45 }
]
Auction_db>
```

**Explanation:**

This query calculates both the total entry fees and average entry fees collected for each auction category (such as "Cars", "Jewellery", etc.), but only for auctions with Excellent bidder activity and more than 3 online bidders. The query processes data in several stages to achieve this.

$match: Filters auctions based on Bidder Activity and the number of Online Bidders.

$unwind: Flattens the Category array to allow grouping by individual categories.

$group: Aggregates data by Category, calculating the total and average entry fees.

$project: Formats the output, rounding the fees for readability.

$sort: Sorts the results by average fee in descending order.
```

Question 7

List the minimum, maximum, and average entry fee charged for each Auctioneer.Specialism where the total number of auctions is at least 10.

db.Auction.aggregate([{ $group: {_id: "$Auctioneer.Specialism", min_fee: { $min: "$Entry_Fee" }, max_fee: { $max: "$Entry_Fee" }, avg_fee: { $avg: "$Entry_Fee" }, count: { $sum: 1 } } },{ $match: { count: { $gte: 10 } } },{ $project: { Specialism: "$_id", min_fee: { $round: ["$min_fee", 2] }, max_fee: { $round: ["$max_fee", 2] }, avg_fee: { $round: ["$avg_fee", 2] }, count: 1, _id: 0 } }])



Explanation:

This query helps to analyze the total entry fees and average entry fees collected for each auction category (e.g., "Cars", "Jewellery", etc.), focusing on auctions with Excellent bidder activity and more than 3 online bidders. By sorting the results by average fee, the query allows us to easily see which categories have higher entry fees on average, providing insights into which categories may attract more premium auctions.

$match: Filters auctions based on Bidder Activity and the number of Online Bidders.

$unwind: Flattens the Category array to allow grouping by individual categories.

$group: Aggregates data by Category, calculating the total and average entry fees.

$project: Formats the output, rounding the fees for readability.

$sort: Sorts the results by average fee in descending order.

Question 8

Find the maximum and minimum number of online bidders for each Online_Bidder_Location, but only for auctions that included 'France'.

db.Auction.aggregate([{ $match: { Online_Bidder_Location: "France" } }, { $unwind: "$Online_Bidder_Location" },{ $group: {_id: "$Online_Bidder_Location", max_online_bidders: { $max: "$Num_Online_Bidders" },min_online_bidders: { $min: "$Num_Online_Bidders" }}},{ $project: { Location: "$_id", max_online_bidders: 1, min_online_bidders: 1, _id: 0 } }])

Explanation:

This query is particularly useful for gauging the variation in online bidder engagement across different countries, restricted to auctions that had at least one French online bidder.

$match for filtering by array content.

$unwind to allow per-element grouping of arrays.

$group to perform statistical aggregation.

$max / $min operators for extracting numerical range.

$project to customize output fields.

4 CONNECTING MONGODB ATLAS AND MONGODB COMPASS

Step 1: Creating a MongoDB Atlas Cluster

- navigate to https://www.mongodb.com/cloud/atlas and signed in or create a new account.
- On the Atlas dashboard, Click On “Build a Database”.
- choose the Free Shared Cluster (M0) option suitable for student and test use.
- selecte the default cloud provider (e.g., AWS) and region which is closest (for best performance).
- Give a cluster name (e.g., Auction) and clicked Create Cluster.

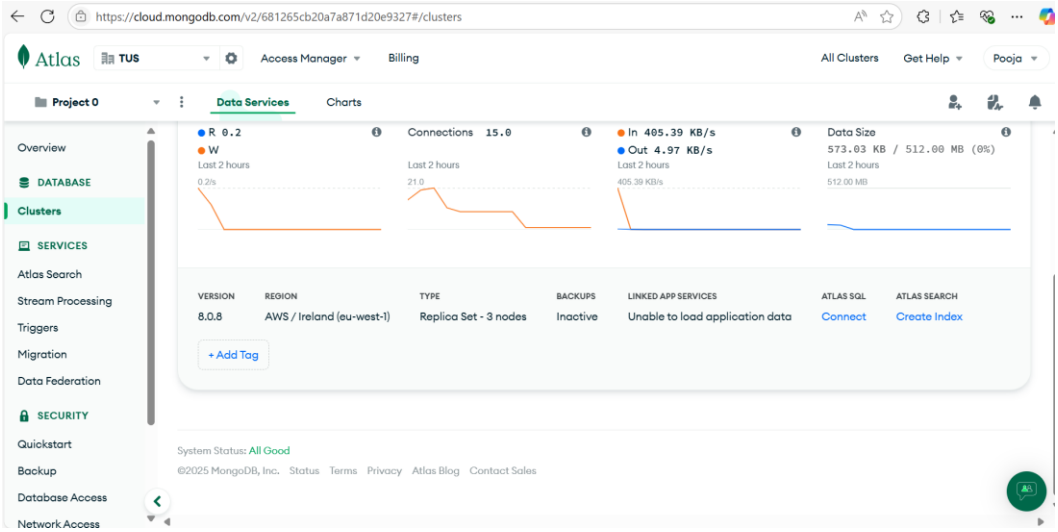


Figure 1: Screenshot of cluster creation complete

Step 2: Setting Up Database Access

- Click on “Database Access” from the left menu.
- Add a new database user with a username and password. give the user read and write access to all databases.

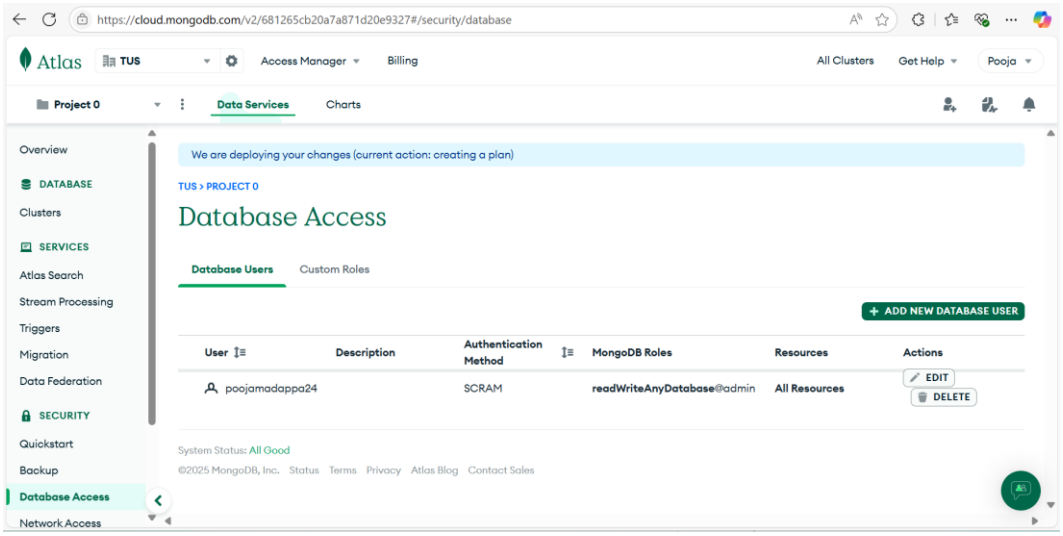


Figure 2: Screenshot of user creation form

Step 3 : Create a Database and Collection

- Inside the cluster, click **Collections**
- Click **"Create Database"**, Enter a **Database Name, Enter a Collection Name**
- Click **Create**

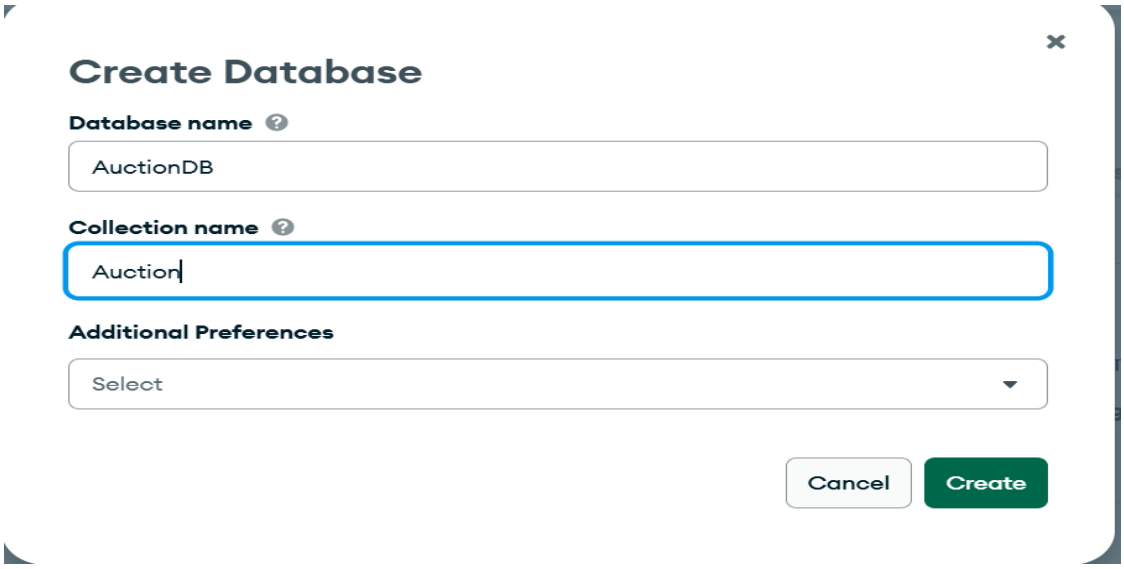


Figure 3: Screenshot of creating a new database and collection

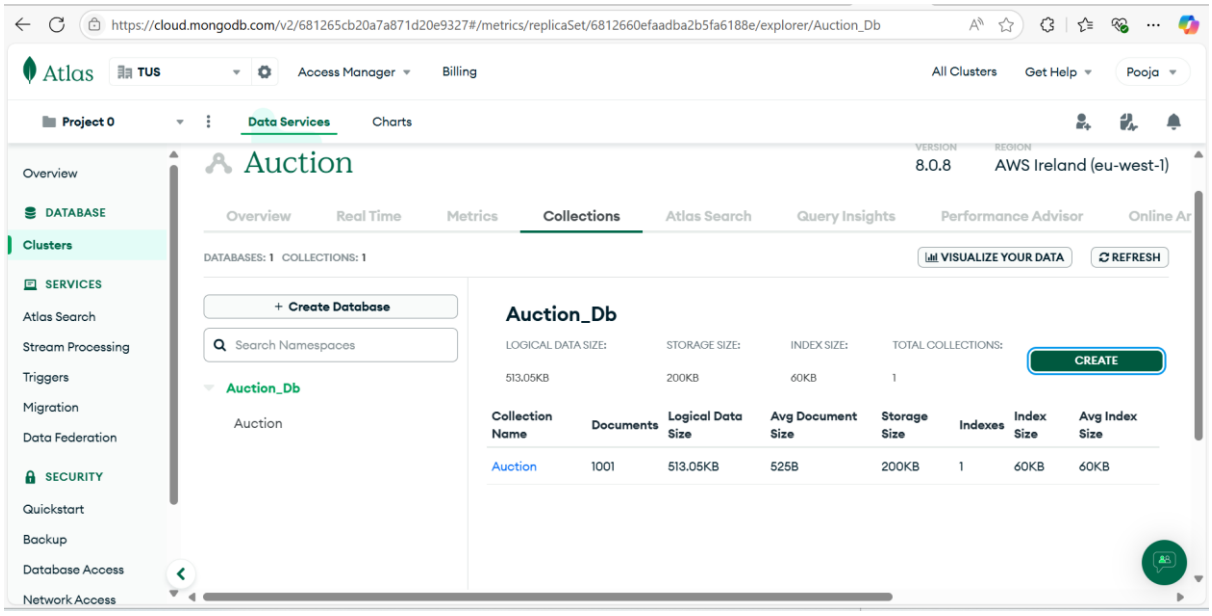


Figure 4: Screenshot of Compass displaying the Auction collection data

Step 4: Getting the Connection String

1. Back in the **Clusters** section, Click on the **"Connect"** button.

2. choose **“Connect with MongoDB Compass”**.
3. MongoDB provided a **connection string** in this format
4. Copy the string and replaced <username> and <password> with actual MongoDB user credentials.

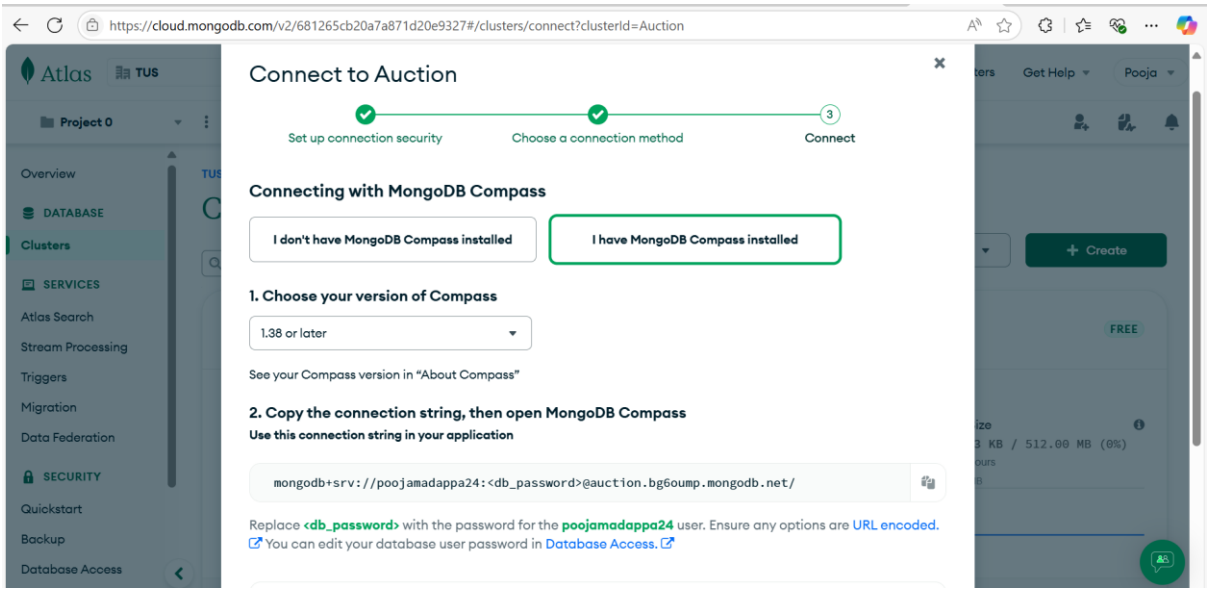


Figure 5: Screenshot showing the connection string copy dialog

Step 5: Connecting MongoDB Compass to Atlas

1. Launch the **MongoDB Compass** on the computer.
2. In the connection screen, paste the **Atlas connection string** into the input field.
3. Click **“save”**, and Compass connected successfully to remote Atlas cluster.

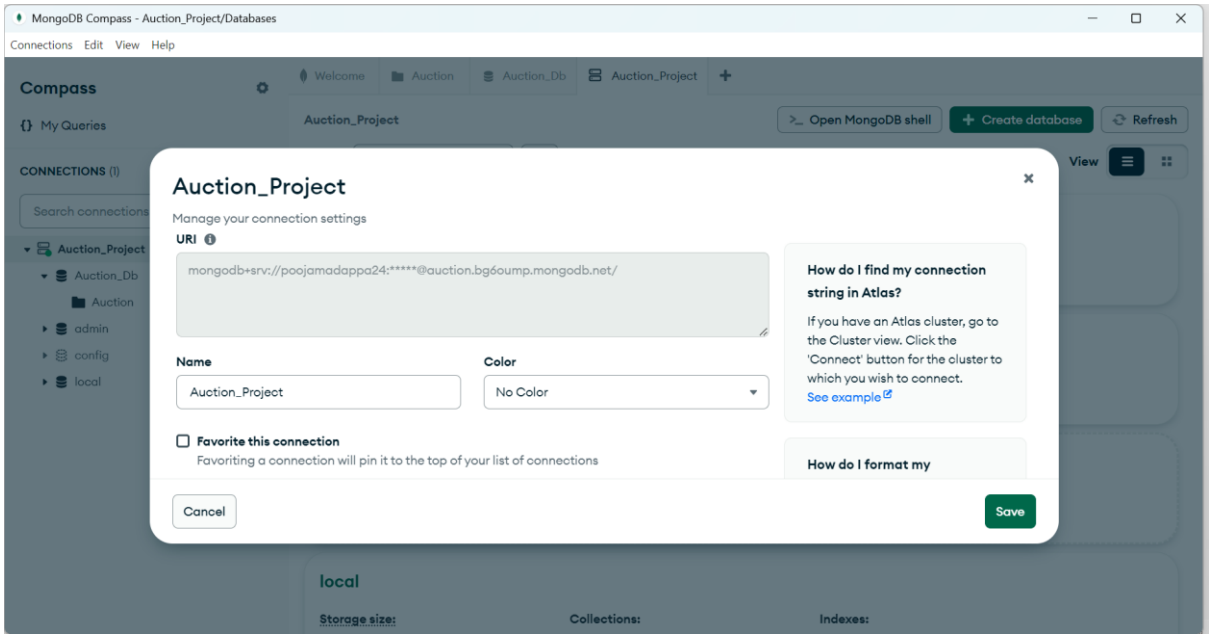


Figure6: Screenshot of Compass connected to Atlas cluster

Step 6: Verifying the Connection

1. Inside Compass, now we can see all databases and collections within the cluster.
2. Select the relevant **Auction** database and **Auction collection** to begin running queries

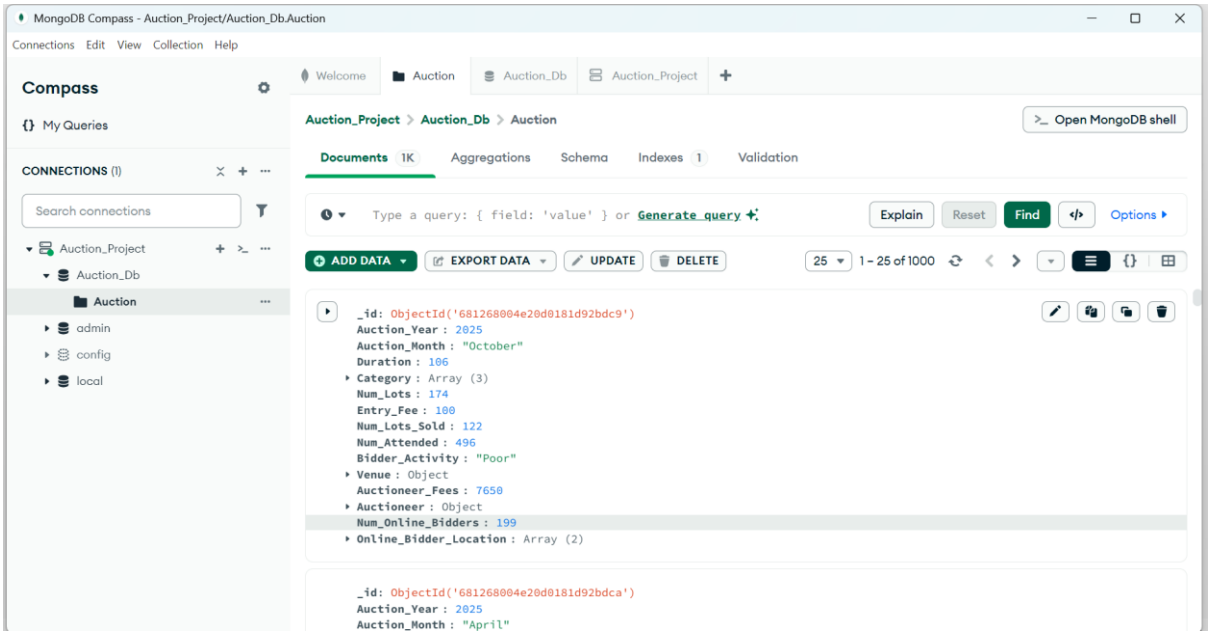


Figure 7: Screenshot of Compass displaying the Auction collection data

5 ATLAS SIMPLE QUERIES

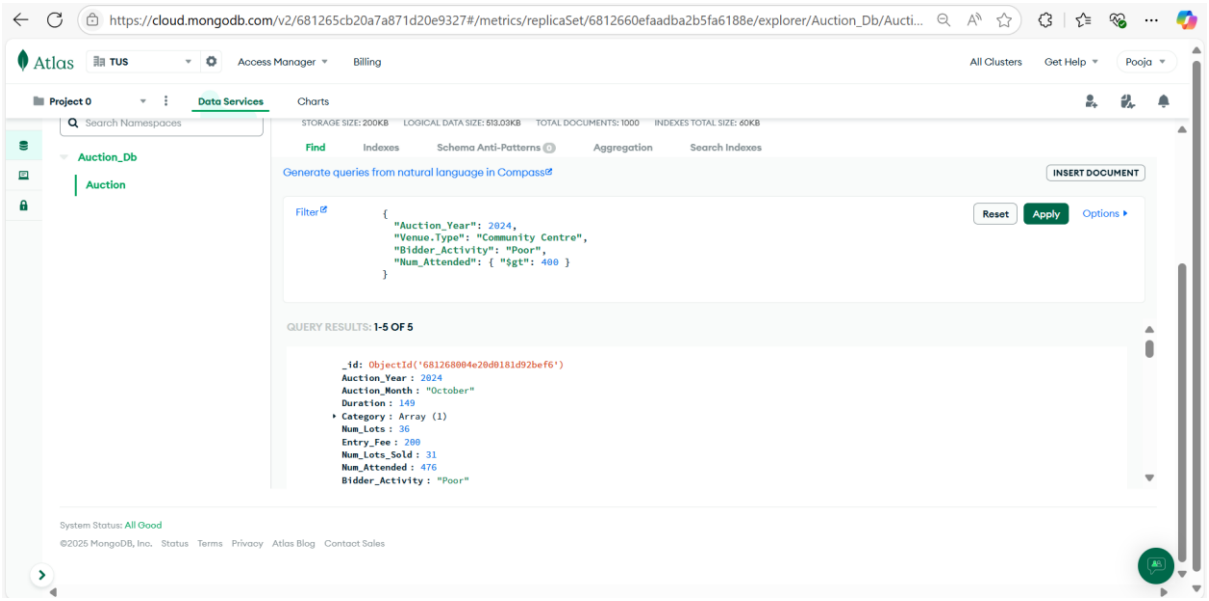
Question 1

Find details of auctions held in 2024 at Community Centre venues where bidder activity was poor and attendance exceeded 400.

Query

db.Auction.find({Auction_Year: 2024, "Venue.Type": "Community Centre", Bidder_Activity: "Poor", Num_Attended: { $gt: 400 } },

- Select the Auction database and then the Auction collection.
- Click “Find” (top bar) to open the Filter box and write a query
- Then click on Apply.

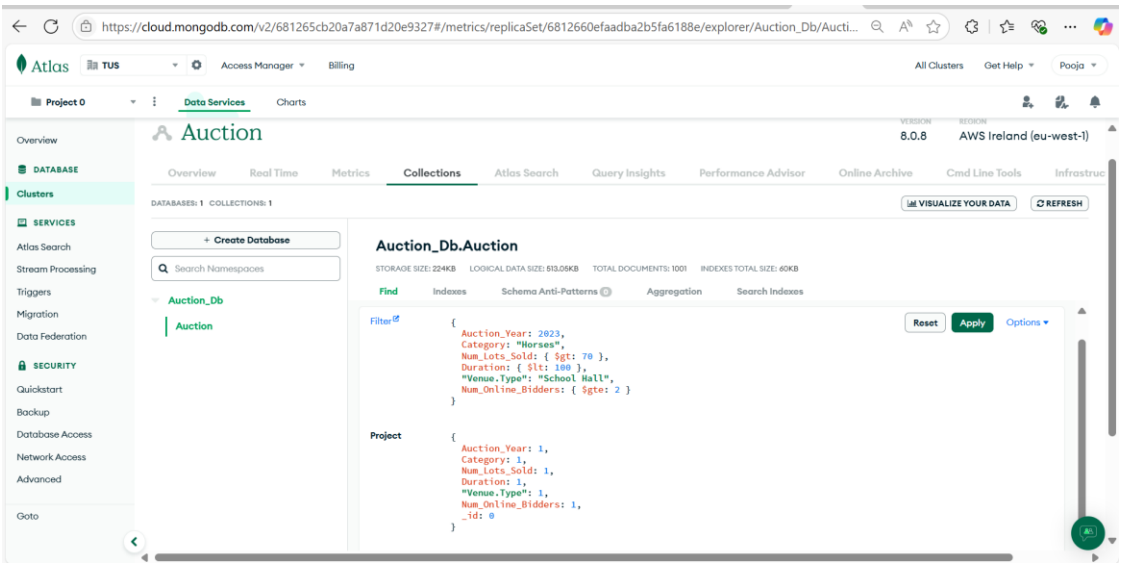


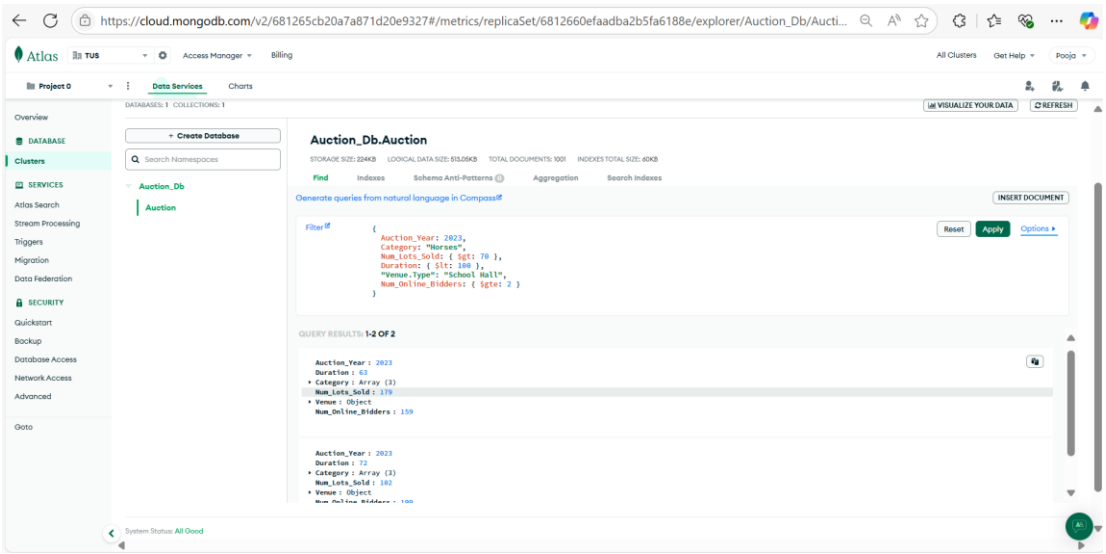
Question 2

List auctions from 2023, with Category as Horses, more than 70 lots sold, duration under 100 minutes, held in a School Hall, and at least 2 online bidders.

db.Auction.find({ Auction_Year: 2023, Category: "Horses", Num_Lots_Sold: { $gt: 70 }, Duration: { $lt: 100 }, "Venue.Type": "School Hall", Num_Online_Bidders: { $gte: 2 }}, {Auction_Year: 1, Category: 1, Num_Lots_Sold: 1, Duration: 1, "Venue.Type": 1, Num_Online_Bidders: 1, _id: 0})

- Paste the following **full query** into the **Filter** box:
- Then click on the **Options** dropdownicon beside the box and add this to the **Project** field:





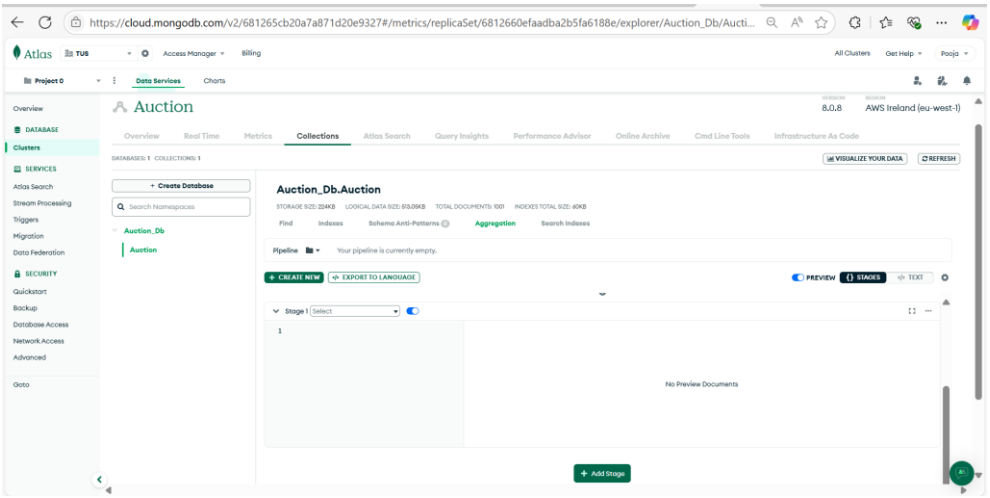
6 ATLAS AGGREGATION QUERIES

Question1

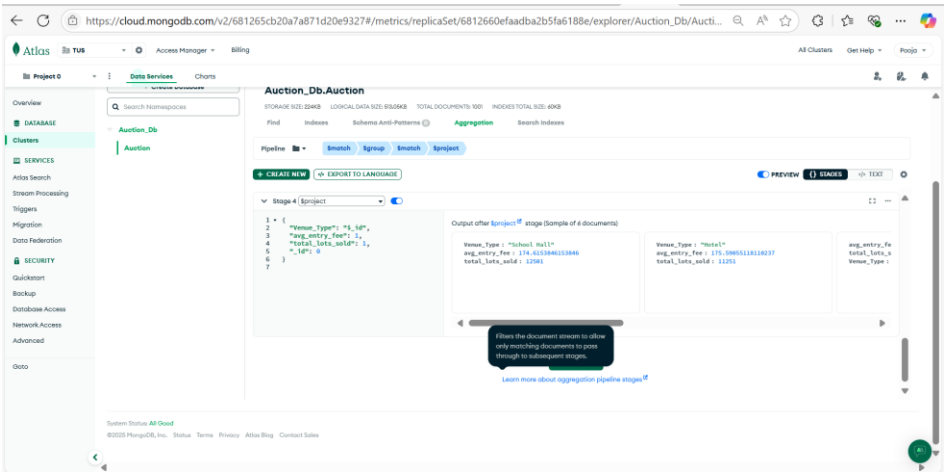
What is the total number of lots sold and the average entry fee for auctions held in each venue type, considering only auctions with more than 100 attendees and held after 2022? Display only those venue types where the average entry fee exceeds €50

db.Auction.aggregate([{ $match: { Num_Attended: { $gt: 100 }, Auction_Year: { $gt: 2022 } } },{ $group: { _id: "$Venue.Type", avg_entry_fee: { $avg: "$Entry_Fee" }, total_lots_sold: { $sum: "$Num_Lots_Sold" } } },{ $match: { avg_entry_fee: { $gt: 50 } } },{ $project: { Venue_Type: "$_id", avg_entry_fee: 1, total_lots_sold: 1, _id: 0 } }])

- Click On Aggregation
- Click on Add Satge and the stages such as $match, $group, Smatch, $project



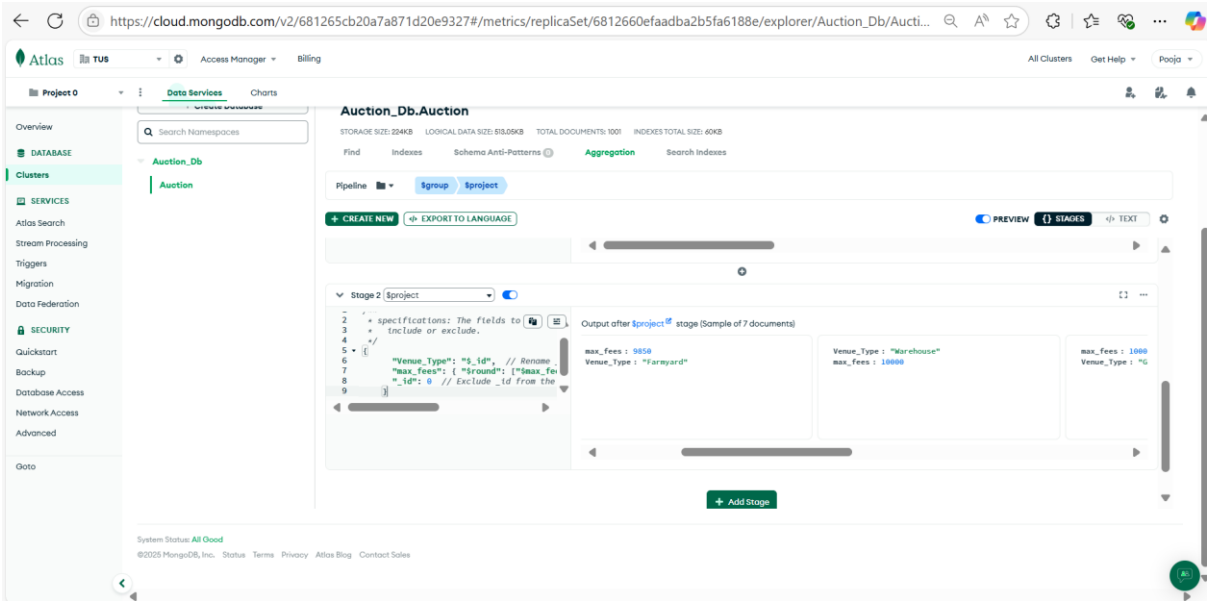
After adding the stages we can see the output



Question 2

Find the maximum Auctioneer_Fees earned at auctions held in each type of venue.

db.Auction.aggregate([{ $group: { _id: "$Venue.Type", max_fees: { $max: "$Auctioneer_Fees" }}},{ $project: { Venue_Type: "$_id", max_fees: { $round: ["$max_fees", 2] }, _id: 0}}])



7 COMPASS SIMPLE QUERIES

Question 1

Auctions held in "Hotel" venues in 2024 with Excellent Bidder Activity and more than 150 attendees

```
{
 "Auction_Year": 2024,
 "Venue.Type": "Hotel",
 "Bidder_Activity": "Excellent",
 "Num_Attended": { "$gt": 150 }
}
```

Paste the filter into the query box in Compass:

- Click **"Find"** to run the query.
- Compass displays matching documents below the query box.
- You can scroll and verify fields like `Auction_Year`, `Venue.Type`, etc.

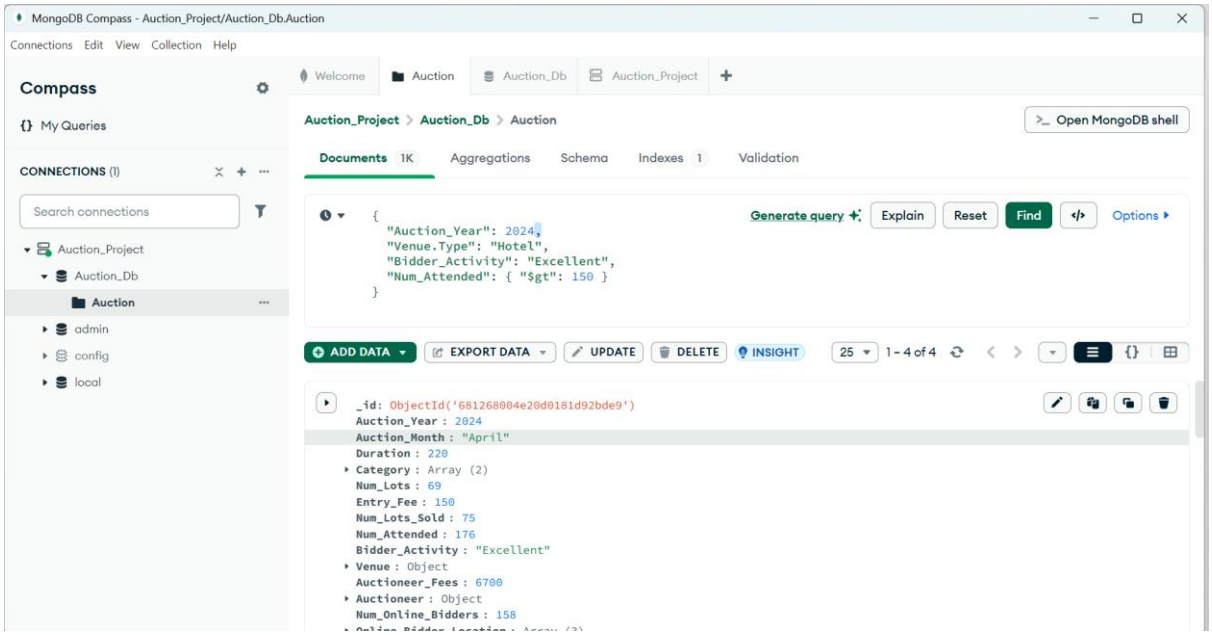
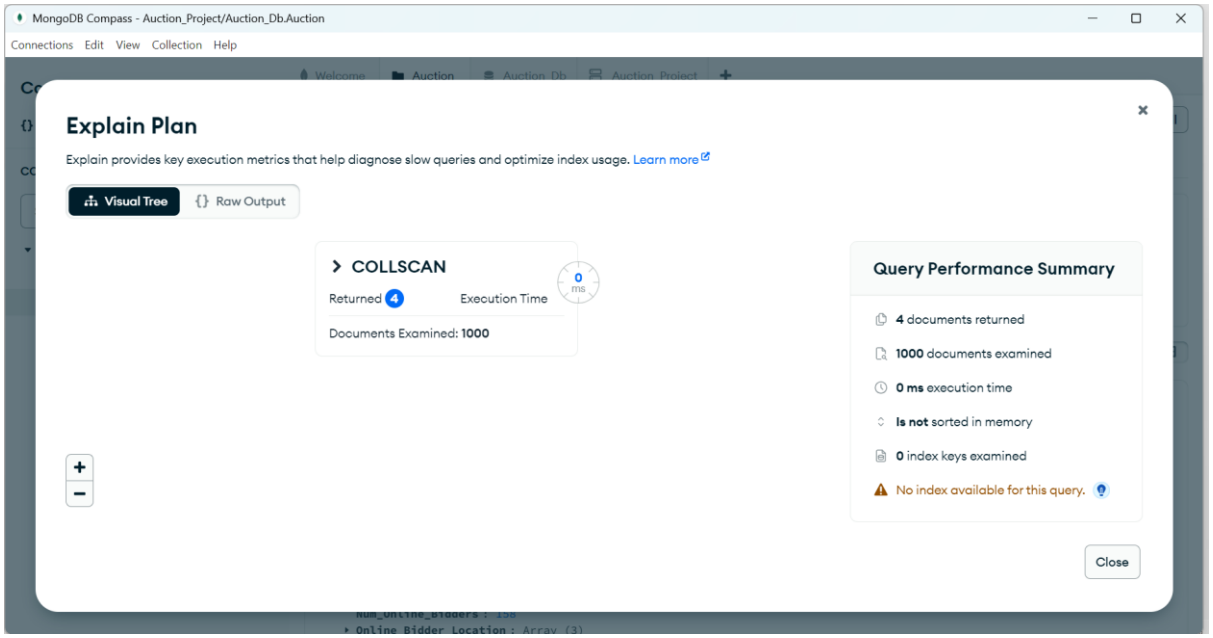
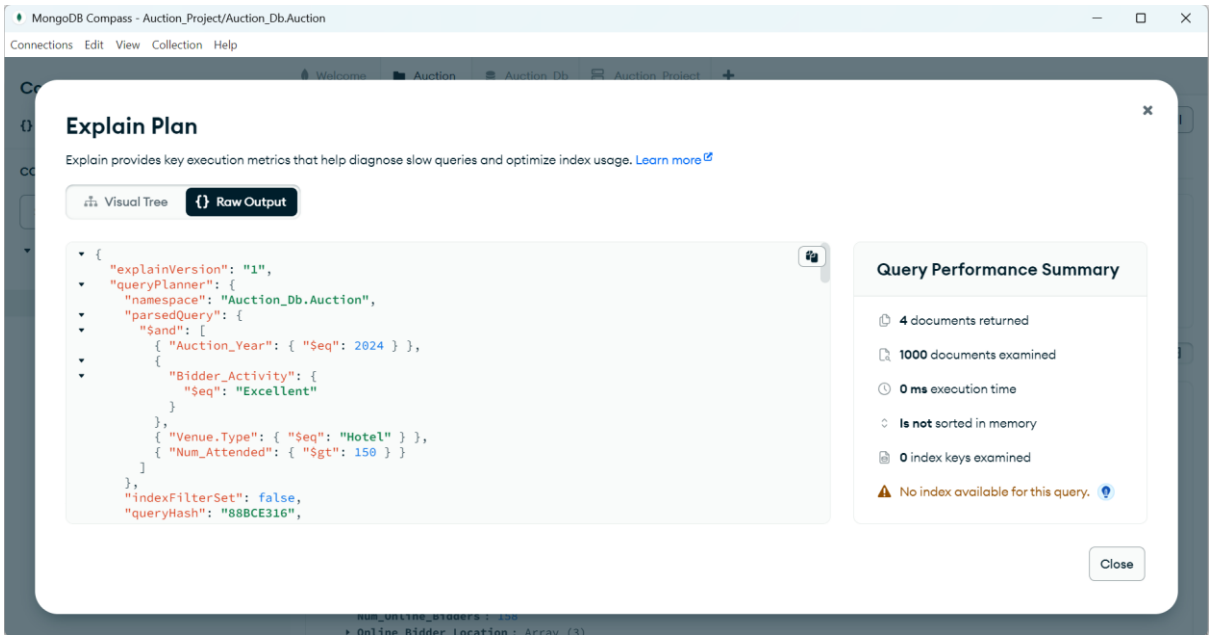


Figure1: Entering and run the query in Compass.

Step 5: Use the "Explain" Feature

1. Click the **"Explain"** button beside the filter box.
2. Explore either **Visual Tree** or **Raw Output** to analyze execution.


MongoDB Compass - Auction_Project/Auction_Db.Auction
Connections Edit View Collection Help
Explain Plan
Explain provides key execution metrics that help diagnose slow queries and optimize index usage. Learn more
Visual Tree
Raw Output
COLLSCAN
Returned 4
Execution Time
0 ms
Documents Examined: 1000
Query Performance Summary
4 documents returned
1000 documents examined
0 ms execution time
Is not sorted in memory
0 index keys examined
No index available for this query.
Close


MongoDB Compass - Auction_Project/Auction_Db.Auction
Connections Edit View Collection Help
Explain Plan
Explain provides key execution metrics that help diagnose slow queries and optimize index usage. Learn more
Visual Tree
Raw Output
{
"explainVersion": "1",
"queryPlanner": {
"namespace": "Auction_Db.Auction",
"parsedQuery": {
"$and": [
{ "Auction_Year": { "$eq": 2024 } },
{
"Bidder_Activity": {
"$eq": "Excellent"
}
},
{ "Venue.Type": { "$eq": "Hotel" } },
{ "Num_Attended": { "$gt": 150 } }
]
},
"indexFilterSet": false,
"queryHash": "88BCE316",
Query Performance Summary
4 documents returned
1000 documents examined
0 ms execution time
Is not sorted in memory
0 index keys examined
No index available for this query.
Close

Question2

Retrieve auctions in Community Centre venues where Entry_Fee is under 100 and Category includes Artworks

- Paste the following **full query** into the **Filter** box:

{"Venue.Type": "Community Centre", "Entry_Fee": { "$lt": 100 }, "Category": "Artworks"}

- Then click on the **Options** dropdownicon beside the box and add this to the **Project** field:

{"Entry_Fee": 1, "Category": 1, "Venue.Type": 1, "_id": 0}

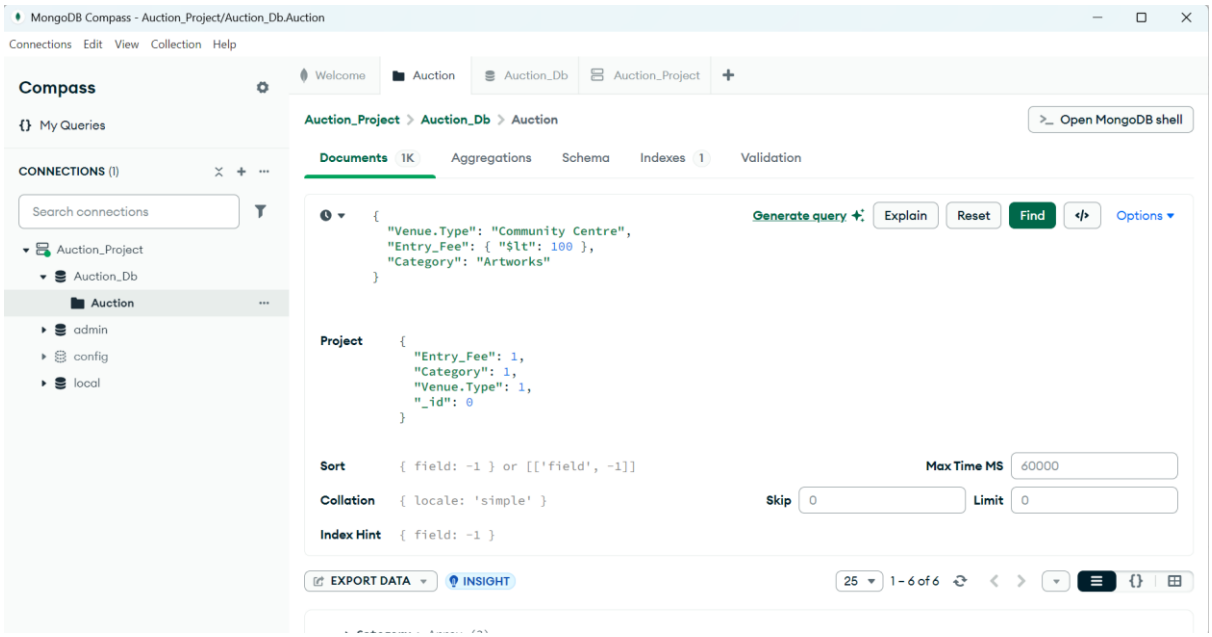


Figure 1: Options expanded to add projection fields

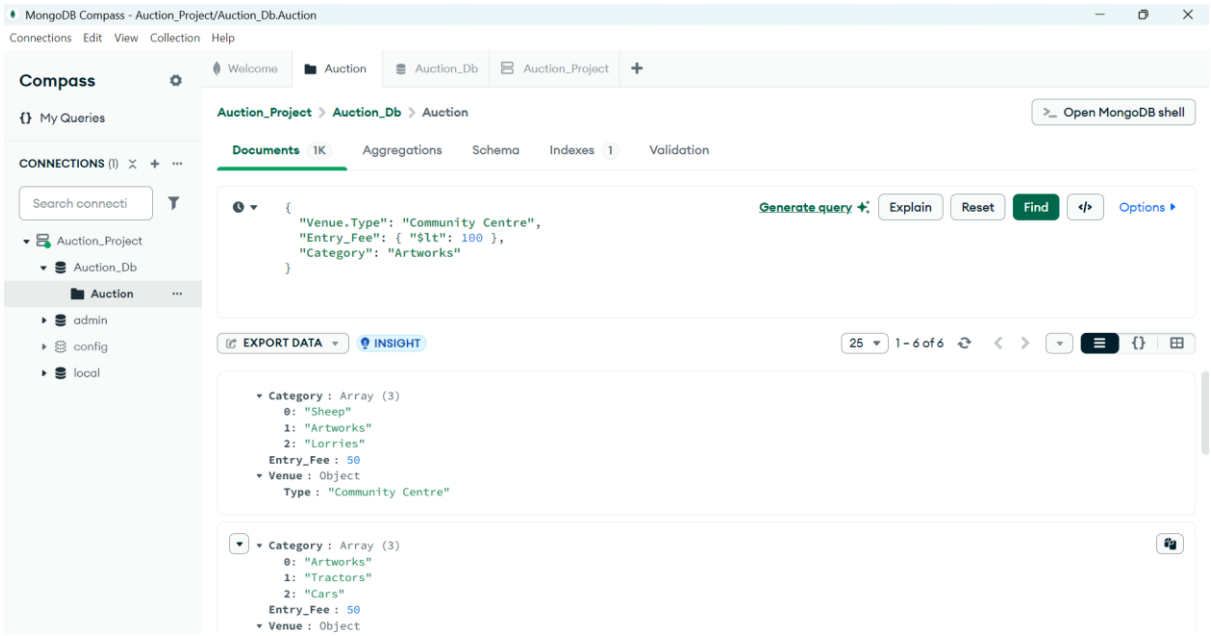


Figure 2: Results area displaying the filtered documents

Explore either **Visual Tree** or **Raw Output** to analyze execution.

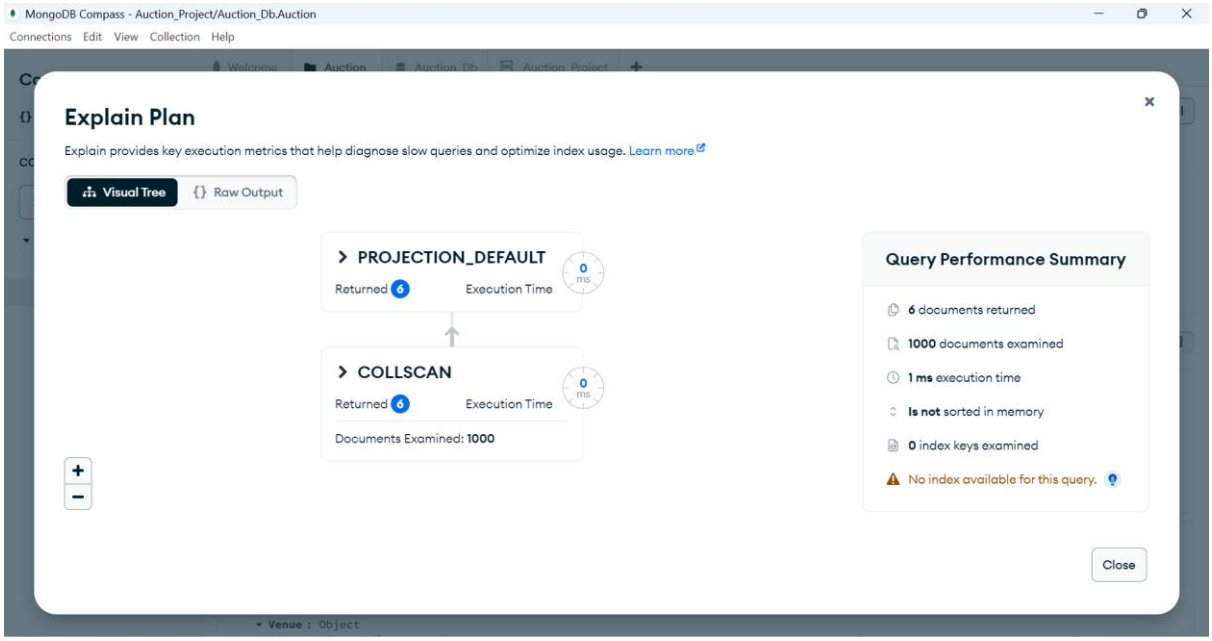


Figure 3: Query plan shown in Visual Tree Output.

8 COMPASS AGGREGATION QUERIES :

Q1. What is the total number of lots sold and the average entry fee for auctions held in each venue type, considering only auctions with more than 100 attendees and held after 2022? Display only those venue types where the average entry fee exceeds €50

db.Auction.aggregate([{ $match: { Num_Attended: { $gt: 100 }, Auction_Year: { $gt: 2022 } } },{ $group: { _id: "$Venue.Type", avg_entry_fee: { $avg: "$Entry_Fee" }, total_lots_sold: { $sum: "$Num_Lots_Sold" } } },{ $match: { avg_entry_fee: { $gt: 50 } } },{ $project: { Venue_Type: "$_id", avg_entry_fee: 1, total_lots_sold: 1, _id: 0 } }])

- Click on Stage and add all the stages such as $match, $group, $match, $project
- Click On Run

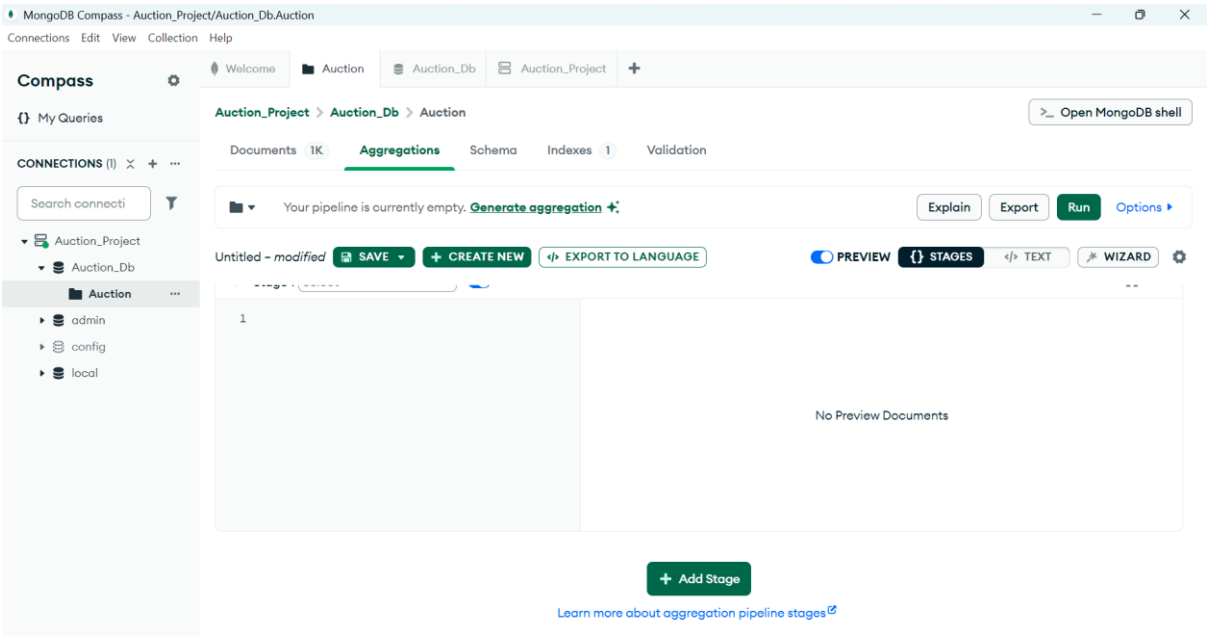


Figure 1: Aggregation Tab Opened in Compass

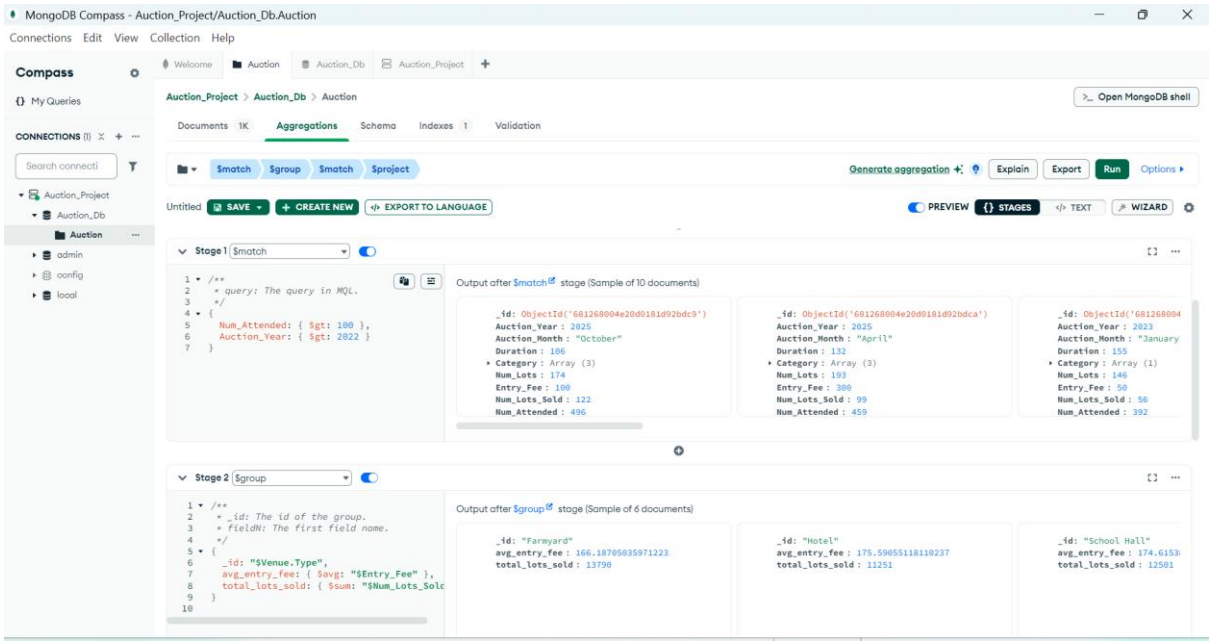


Figure 2: Adding Stages

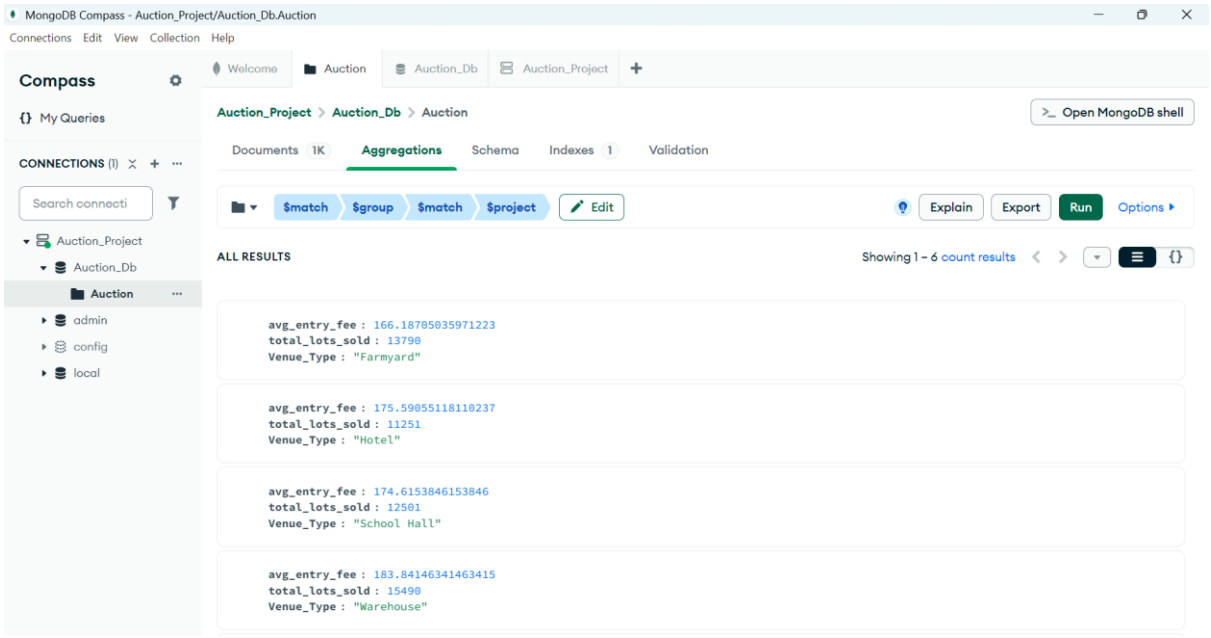


Figure 3: Final Aggregation Results in Compass

Question 2

Find the maximum and minimum number of online bidders for each Online_Bidder_Location, but only for auctions that included 'France'.

db.Auction.aggregate([{ $match: { Online_Bidder_Location: "France" } }, { $unwind: "$Online_Bidder_Location" },{ $group: {_id: "$Online_Bidder_Location", max_online_bidders: { $max: "$Num_Online_Bidders" },min_online_bidders: { $min: "$Num_Online_Bidders" }}},{ $project: { Location: "$_id", max_online_bidders: 1, min_online_bidders: 1, _id: 0 } }])

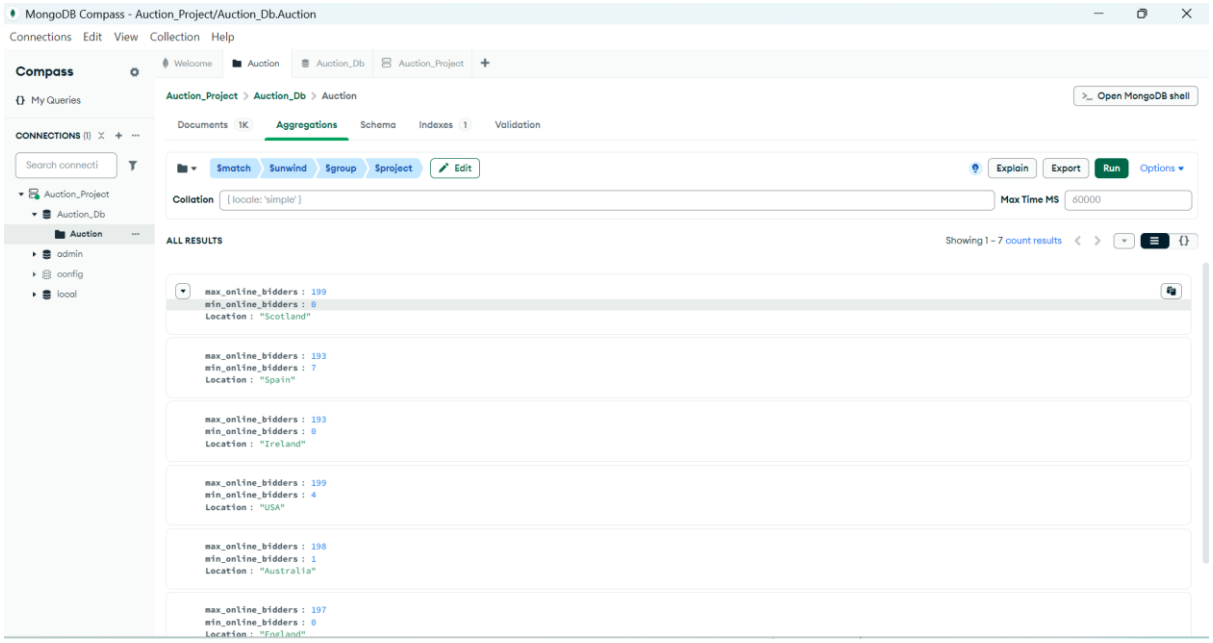


Figure 3: Final Aggregation Results in Compass

9. YOUTUBE LINKS

1. https://youtu.be/TUtUQ-U3EVc

2. https://youtu.be/Md3cSsTzNiI