



THE TECHNOLOGICAL UNIVERSITY OF THE
SHANNON: MIDLANDS MIDWEST

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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,
  }
]

```

Imported JSON Data:

- Used the mongoimport to import a JSON file containing 1000 documents:
Verified the successful import message in the terminal.

```

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 }}, {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"})
```



```
Auction_db> db.Auction.find({"Venue.Type": "Community Centre", Entry_Fee: { $lt: 100 }, Category: "Artworks"}, {Entry_Fee: 1, Category: 1, "Venue.Type": 1, "_id: 0})
[
  {
    Category: [ 'Sheep', 'Artworks', 'Lorries' ],
    Entry_Fee: 50,
    Venue: { Type: 'Community Centre' }
  },
  {
    Category: [ 'Artworks', 'Tractors', 'Cars' ],
    Entry_Fee: 50,
    Venue: { Type: 'Community Centre' }
  },
  {
    Category: [ 'Artworks', 'Jewellery', 'Tractors' ],
    Entry_Fee: 50,
    Venue: { Type: 'Community Centre' }
  },
  {
    Category: [ 'Tractors', 'Artworks', 'Antique Furniture' ],
    Entry_Fee: 50,
    Venue: { Type: 'Community Centre' }
  },
  {
    Category: [ 'Antique Furniture', 'Artworks', 'Tractors' ],
    Entry_Fee: 50,
    Venue: { Type: 'Community Centre' }
  },
  {
    Category: [ 'Cars', 'Artworks', 'Tractors' ],
    Entry_Fee: 50,
    Venue: { Type: 'Community Centre' }
  }
]
Auction_db> db.Auction.countDocuments({ "Venue.Type": "Community Centre", Entry_Fee: { $lt: 100 }, Category: "Artworks"})
6
```

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"}, {"Auctioneer.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' }
  },
  {
    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: ["Australia"] })
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: "Excellent"}, { "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_Activity: "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 } })
```



```
mongosh mongodb://127.0.0.1:27017/Auction_db> db.Auction.find({ "Auctioneer.Name": "Helen Dyer", Entry_Fee: { $gt: 70 }, Duration: { $gt: 120 }}, { "Auctioneer.Name": 1, Entry_Fee: 1, Duration: 1, _id: 0 })
[{"Duration": 185, "Entry_Fee": 300, "Auctioneer": {"Name": "Helen Dyer"}}]
mongosh mongodb://127.0.0.1:27017/Auction_db> db.Auction.countDocuments({ "Auctioneer.Name": "Helen Dyer", Entry_Fee: { $gt: 70 }, Duration: { $gt: 120 } })
1
mongosh mongodb://127.0.0.1:27017/Auction_db>
```

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: 120 } }}, { "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] }] } })
```



```
[mongosh mongodb://127.0.0.1:27017]  +  -  x
Auction_db> 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 })
[
  {
    Auction_Month: 'September',
    Num_Lots: 116,
    Entry_Fee: 300,
    Num_Lots_Sold: 139,
    Auctioneer: { Specialism: 'Antiques' }
  },
  {
    Auction_Month: 'September',
    Num_Lots: 99,
    Entry_Fee: 200,
    Num_Lots_Sold: 95,
    Auctioneer: { Specialism: 'Antiques' }
  },
  {
    Auction_Month: 'September',
    Num_Lots: 95,
    Entry_Fee: 300,
    Num_Lots_Sold: 175,
    Auctioneer: { Specialism: 'Antiques' }
  }
]
Auction_db> 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] }] } })
3
Auction_db>
```

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"})
```



```
[ mongosh mongoDB://127.0.0.1:27017 ] + | v  
Auction_db> db.Auction.find({ "Auctioneer.Qualification": "Economics", "Venue.Type": "School Hall", Num_Lots_Sold: { $gt: 90 }, Bidde  
r_Activity: "Good"}, { "Auctioneer.Qualification": 1, "Venue.Type": 1, Num_Lots_Sold: 1, Bidder_Activity: 1, _id: 0 })  
[  
  {  
    Num_Lots_Sold: 178,  
    Bidder_Activity: 'Good',  
    Venue: { Type: 'School Hall' },  
    Auctioneer: { Qualification: 'Economics' }  
  }  
]  
Auction_db> db.Auction.countDocuments({ "Auctioneer.Qualification": "Economics", "Venue.Type": "School Hall", Num_Lots_Sold: { $gt: 9  
0 }, Bidder_Activity: "Good"})  
1  
Auction_db> |
```

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": "Warehouse"}, { 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"})

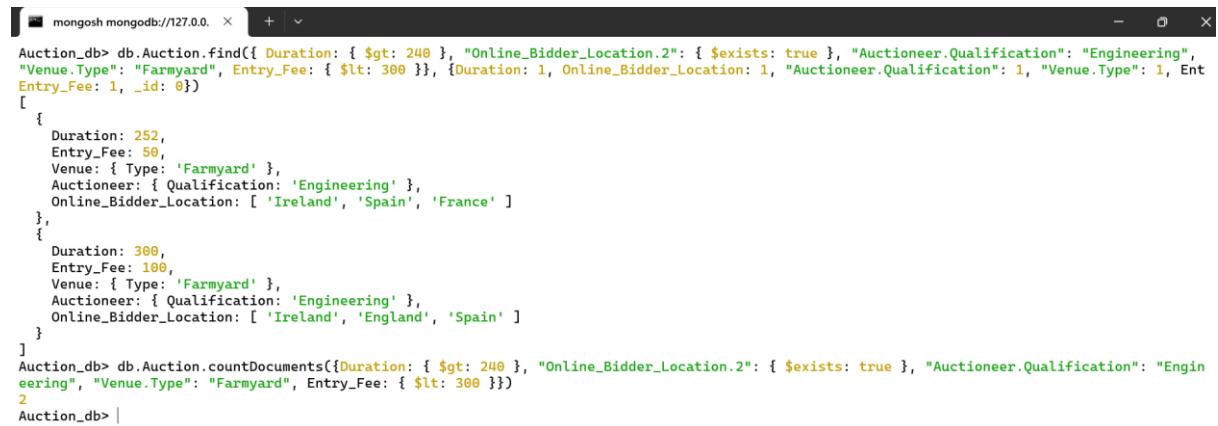
Auction_db> db.Auction.find({ Online_Bidder_Location: "France", Num_Online_Bidders: { $gt: 4 }, Duration: { $lt: 90 }, "Venue.Capacity": { $gt: 50 }, Bidder_Activity: "Excellent"}, {Online_Bidder_Location: 1, Num_Online_Bidders: 1, Duration: 1, "Venue.Capacity": 1,
Bidder_Activity: 1, _id: 0})
[
{
  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,
  Online_Bidder_Location: [ 'France', 'Scotland', 'Spain' ]
}
]
Auction_db> db.Auction.countDocuments({ Online_Bidder_Location: "France", Num_Online_Bidders: { $gt: 4 }, Duration: { $lt: 90 }, "Venue.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 }})
```



```
mongosh mongodb://127.0.0.1:27017/Auction_db> 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})
[ {
  Duration: 252,
  Entry_Fee: 50,
  Venue: { Type: 'Farmyard' },
  Auctioneer: { Qualification: 'Engineering' },
  Online_Bidder_Location: [ 'Ireland', 'Spain', 'France' ]
},
{
  Duration: 300,
  Entry_Fee: 100,
  Venue: { Type: 'Farmyard' },
  Auctioneer: { Qualification: 'Engineering' },
  Online_Bidder_Location: [ 'Ireland', 'England', 'Spain' ]
}
]
Auction_db> db.Auction.countDocuments({Duration: { $gt: 240 }, "Online_Bidder_Location.2": { $exists: true }, "Auctioneer.Qualification": "Engineering",
"Venue.Type": "Farmyard", Entry_Fee: { $lt: 300 }})
2
Auction_db> |
```

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_Lots: { $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 }})
```



```
[mongosh mongoDB:127.0.0.1] + - X
mongosh mongoDB:127.0.0.1
Auction_db> 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})
[
  {
    Auction_Month: "May",
    Num_Lots: 73,
    Venue: { Cost: 600 },
    Auctioneer_Fees: 8800,
    Online_Bidder_Location: [ 'Spain' ]
  }
]
Auction_db> db.Auction.countDocuments({ Online_Bidder_Location: "Spain", Auction_Month: "May", Auctioneer_Fees: { $gt: 5000 }, Num_Lots: { $gt: 60 }, "Venue.Cost": { $lt: 900 }})
1
Auction_db> |
```

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"})
```



```
Auction_db> 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})
[
  {
    Auction_Month: 'December',
    Num_Lots_Sold: 175,
    Bidder_Activity: 'Excellent',
    Auctioneer: { Specialism: 'Antiques' },
    Online_Bidder_Location: [ 'Scotland', 'Spain', 'Ireland' ]
  },
  {
    Auction_Month: 'December',
    Num_Lots_Sold: 181,
    Bidder_Activity: 'Excellent',
    Auctioneer: { Specialism: 'Antiques' },
    Online_Bidder_Location: [ 'USA', 'France', 'Ireland' ]
  }
]
Auction_db> db.Auction.countDocuments({ Online_Bidder_Location: { $in: ["France", "Ireland"] }, "Auctioneer.Specialism": "Antiques", Bidder_Activity: "Excellent", Num_Lots_Sold: { $gt: 70 }, Auction_Month: "December"})
2
Auction_db> |
```

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"})
```

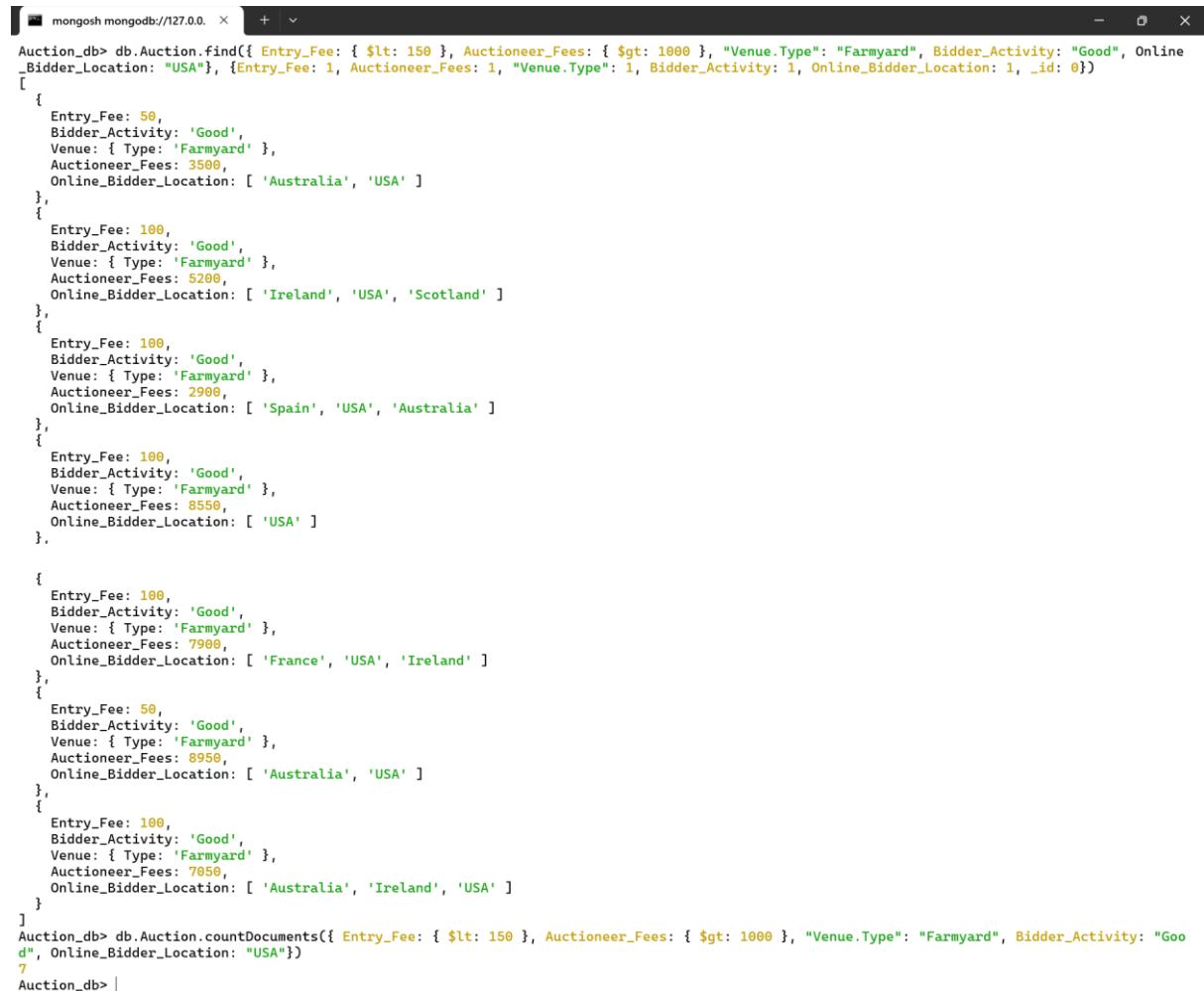
```
[mongosh mongoDB://127.0.0.1:27017/mongosh - + × ]  
Auction_db> db.Auction.find({ "Venue.Capacity": { $gt: 500 }, Category: "Horses", "Auctioneer.Qualification": "Law", Entry_Fee: { $gt: 50 }, Online_Bidder_Location: "England"}, { "Venue.Capacity": 1, Category: 1, "Auctioneer.Qualification": 1, Entry_Fee: 1, Online_Bidder_Location: 1, _id: 0})  
[  
  {  
    Category: [ "Horses", "Tractors" ],  
    Entry_Fee: 250,  
    Venue: { Capacity: 768 },  
    Auctioneer: { Qualification: "Law" },  
    Online_Bidder_Location: [ "Australia", "France", "England" ]  
  },  
  {  
    Category: [ "Lorries", "Artworks", "Horses" ],  
    Entry_Fee: 100,  
    Venue: { Capacity: 877 },  
    Auctioneer: { Qualification: "Law" },  
    Online_Bidder_Location: [ "England", "USA", "France" ]  
  },  
  {  
    Category: [ "Horses" ],  
    Entry_Fee: 150,  
    Venue: { Capacity: 625 },  
    Auctioneer: { Qualification: "Law" },  
    Online_Bidder_Location: [ "USA", "England", "Spain" ]  
  },  
  {  
    Category: [ "Cars", "Horses", "Lorries" ],  
    Entry_Fee: 250,  
    Venue: { Capacity: 714 },  
    Auctioneer: { Qualification: "Law" },  
    Online_Bidder_Location: [ "England" ]  
  },  
  {  
    Category: [ "Horses" ],  
    Entry_Fee: 300,  
    Venue: { Capacity: 947 },  
    Auctioneer: { Qualification: "Law" },  
    Online_Bidder_Location: [ "Ireland", "USA", "England" ]  
  },  
  {  
    Category: [ "Horses", "Lorries", "Tractors" ],  
    Entry_Fee: 250,  
    Venue: { Capacity: 867 },  
    Auctioneer: { Qualification: "Law" },  
    Online_Bidder_Location: [ "England", "Scotland", "Ireland" ]  
  },  
  {  
    Category: [ "Cattle", "Cars", "Horses" ],  
    Entry_Fee: 100,  
    Venue: { Capacity: 710 },  
    Auctioneer: { Qualification: "Law" },  
    Online_Bidder_Location: [ "England", "Australia" ]  
  }]  
Auction_db> db.Auction.countDocuments({ "Venue.Capacity": { $gt: 500 }, Category: "Horses", "Auctioneer.Qualification": "Law", Entry_Fee: { $gt: 50 }, Online_Bidder_Location: "England"})  
7  
Auction_db> |
```

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"})
```



```
[ mongo shell ] - mongosh mongodb://127.0.0.1:27017
Auction_db> 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})
[
  {
    Entry_Fee: 50,
    Bidder_Activity: 'Good',
    Venue: { Type: 'Farmyard' },
    Auctioneer_Fees: 3500,
    Online_Bidder_Location: [ 'Australia', 'USA' ]
  },
  {
    Entry_Fee: 100,
    Bidder_Activity: 'Good',
    Venue: { Type: 'Farmyard' },
    Auctioneer_Fees: 5200,
    Online_Bidder_Location: [ 'Ireland', 'USA', 'Scotland' ]
  },
  {
    Entry_Fee: 100,
    Bidder_Activity: 'Good',
    Venue: { Type: 'Farmyard' },
    Auctioneer_Fees: 2900,
    Online_Bidder_Location: [ 'Spain', 'USA', 'Australia' ]
  },
  {
    Entry_Fee: 100,
    Bidder_Activity: 'Good',
    Venue: { Type: 'Farmyard' },
    Auctioneer_Fees: 8550,
    Online_Bidder_Location: [ 'USA' ]
  },
  {
    Entry_Fee: 100,
    Bidder_Activity: 'Good',
    Venue: { Type: 'Farmyard' },
    Auctioneer_Fees: 7900,
    Online_Bidder_Location: [ 'France', 'USA', 'Ireland' ]
  },
  {
    Entry_Fee: 50,
    Bidder_Activity: 'Good',
    Venue: { Type: 'Farmyard' },
    Auctioneer_Fees: 8950,
    Online_Bidder_Location: [ 'Australia', 'USA' ]
  },
  {
    Entry_Fee: 100,
    Bidder_Activity: 'Good',
    Venue: { Type: 'Farmyard' },
    Auctioneer_Fees: 7050,
    Online_Bidder_Location: [ 'Australia', 'Ireland', 'USA' ]
  }
]
Auction_db> db.Auction.countDocuments({ Entry_Fee: { $lt: 150 }, Auctioneer_Fees: { $gt: 1000 }, "Venue.Type": "Farmyard", Bidder_Activity: "Good", Online_Bidder_Location: "USA"})
7
Auction_db>
```

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] }] }})
```



```
[mongosh mongodb://127.0.0.1:27017/]
Auction_db> 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})
[
  {
    Auction_Month: 'August',
    Num_Lots: 101,
    Num_Lots_Sold: 164,
    Auctioneer: { Specialism: 'Cars' },
    Online_Bidder_Location: [ 'Scotland', 'Australia', 'USA' ]
  },
  {
    Auction_Month: 'August',
    Num_Lots: 113,
    Num_Lots_Sold: 119,
    Auctioneer: { Specialism: 'Cars' },
    Online_Bidder_Location: [ 'USA', 'Spain', 'Scotland' ]
  },
  {
    Auction_Month: 'August',
    Num_Lots: 101,
    Num_Lots_Sold: 117,
    Auctioneer: { Specialism: 'Cars' },
    Online_Bidder_Location: [ 'Scotland', 'France', 'Australia' ]
  }
]
Auction_db> 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] }] }})
3
Auction_db> |
```

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 }})
```



```
mongosh mongodb://127.0.0.1:27017
Auction_db> 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})
[
  {
    Auction_Month: 'May',
    Num_Lots: 100,
    Entry_Fee: 250,
    Venue: { Type: 'Garage Forecourt', Cost: 2800 }
  },
  {
    Auction_Month: 'May',
    Num_Lots: 170,
    Entry_Fee: 150,
    Venue: { Type: 'Garage Forecourt', Cost: 3750 }
  }
]
Auction_db> db.Auction.countDocuments({ "Venue.Type": "Garage Forecourt", Auction_Month: "May", "Venue.Cost": { $gt: 500 }, Entry_Fee: { $gt: 60 }, Num_Lots: { $gt: 80 }})
2
Auction_db>
```

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 } })
```



```
Auction_db> 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 })
[
  {
    Auction_Month: "February",
    Venue: { Type: 'Community Centre' },
    Auctioneer_Fees: 4350,
    Auctioneer: { Qualification: 'Law' },
    Online_Bidder_Location: [ 'England', 'Spain', 'Scotland' ]
  }
]
Auction_db> |
```

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
}})
```



```
Auction_db> 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})
[
  {
    Auction_Year: 2023,
    Duration: 63,
    Category: [ 'Cars', 'Horses', 'Cattle' ],
    Num_Lots_Sold: 179,
    Venue: { Type: 'School Hall' },
    Num_Online_Bidders: 159
  },
  {
    Auction_Year: 2023,
    Duration: 72,
    Category: [ 'Antique Furniture', 'Horses', 'Lorries' ],
    Num_Lots_Sold: 102,
    Venue: { Type: 'School Hall' },
    Num_Online_Bidders: 199
  }
]
Auction_db> 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 }})
2
Auction_db> |
```

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"})
```

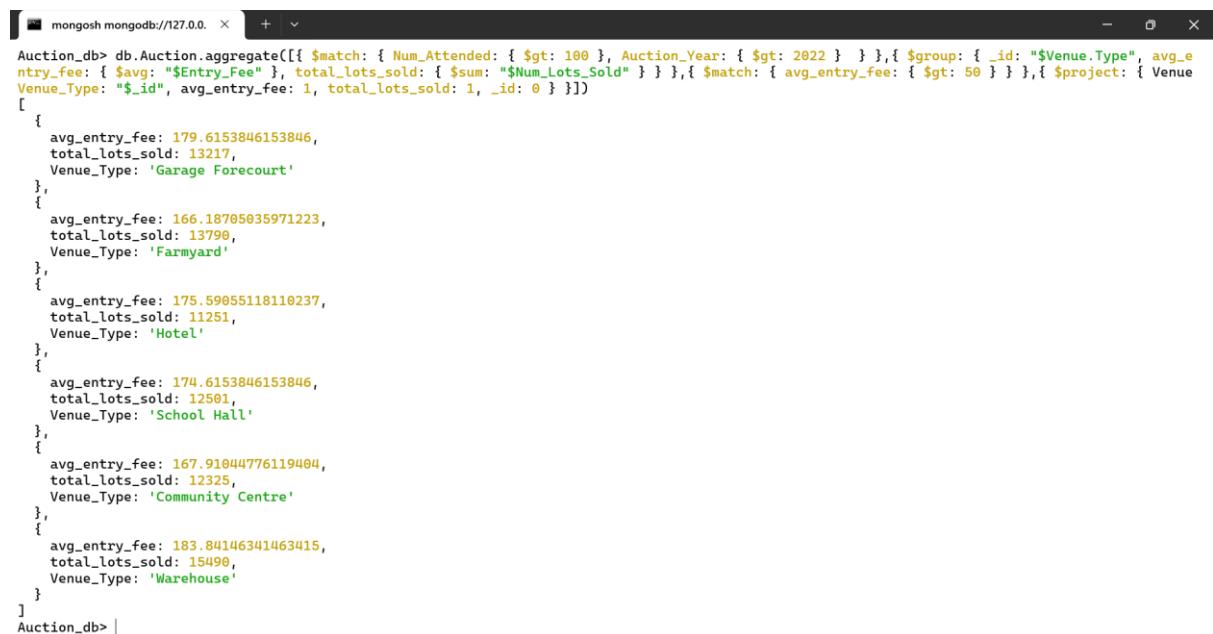


```
[mongosh mongodb://127.0.0.1:27017]  +  -  ×
Auction_db> db.Auction.find({"Auctioneer.Specialism": "Artworks", "Venue.Capacity": { $gt: 100 }, Num_Lots_Sold: { $gt: 80 }, Online_Bidder_Location: "Scotland", Bidder_Activity: "Excellent"}, {"Auctioneer.Specialism": 1, "Venue.Capacity": 1, Num_Lots_Sold: 1, Online_Bidder_Location: 1, Bidder_Activity: 1, _id: 0})
[
  {
    Num_Lots_Sold: 99,
    Bidder_Activity: "Excellent",
    Venue: { Capacity: 227 },
    Auctioneer: { Specialism: 'Artworks' },
    Online_Bidder_Location: [ 'Scotland' ]
  },
  {
    Num_Lots_Sold: 102,
    Bidder_Activity: "Excellent",
    Venue: { Capacity: 489 },
    Auctioneer: { Specialism: 'Artworks' },
    Online_Bidder_Location: [ 'England', 'Spain', 'Scotland' ]
  },
  {
    Num_Lots_Sold: 94,
    Bidder_Activity: "Excellent",
    Venue: { Capacity: 926 },
    Auctioneer: { Specialism: 'Artworks' },
    Online_Bidder_Location: [ 'Australia', 'France', 'Scotland' ]
  },
  {
    Num_Lots_Sold: 165,
    Bidder_Activity: "Excellent",
    Venue: { Capacity: 977 },
    Auctioneer: { Specialism: 'Artworks' },
    Online_Bidder_Location: [ 'Scotland' ]
  }
]
1
Auction_db> db.Auction.countDocuments({"Auctioneer.Specialism": "Artworks", "Venue.Capacity": { $gt: 100 }, Num_Lots_Sold: { $gt: 80 }, Online_Bidder_Location: "Scotland", Bidder_Activity: "Excellent"})
4
```

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 }}])
```



```
Auction_db> 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 }}])  
[ {  
    _id: "Garage Forecourt",  
    avg_entry_fee: 179.6153846153846,  
    total_lots_sold: 13217,  
    Venue_Type: "Garage Forecourt"  
,  
    {  
        _id: "Farmyard",  
        avg_entry_fee: 166.18705035971223,  
        total_lots_sold: 13790,  
        Venue_Type: "Farmyard"  
,  
        {  
            _id: "Hotel",  
            avg_entry_fee: 175.59055118110237,  
            total_lots_sold: 11251,  
            Venue_Type: "Hotel"  
,  
            {  
                _id: "School Hall",  
                avg_entry_fee: 174.6153846153846,  
                total_lots_sold: 12501,  
                Venue_Type: "School Hall"  
,  
                {  
                    _id: "Community Centre",  
                    avg_entry_fee: 167.91044776119404,  
                    total_lots_sold: 12325,  
                    Venue_Type: "Community Centre"  
,  
                    {  
                        _id: "Warehouse",  
                        avg_entry_fee: 183.84146341463415,  
                        total_lots_sold: 15490,  
                        Venue_Type: "Warehouse"  
                }  
            }  
        }  
    }  
]  
Auction_db> |
```

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 }}])
```



```
[ mongoDB:~ mongosh mongodb://127.0.0.1:27017/Auction_db> 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 }}])
```

```
[{"Qualification": "Economics", "auction_count": 18, "max_attendees": 367, "total_fees": 93750}, {"Qualification": "Engineering", "auction_count": 8, "max_attendees": 391, "total_fees": 41150}, {"Qualification": "Accounting", "auction_count": 7, "max_attendees": 477, "total_fees": 27850}, {"Qualification": "Law", "auction_count": 6, "max_attendees": 491, "total_fees": 30100}, {"Qualification": "Marketing", "auction_count": 11, "max_attendees": 500, "total_fees": 54350}]]
```

```
Auction_db> |
```

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:

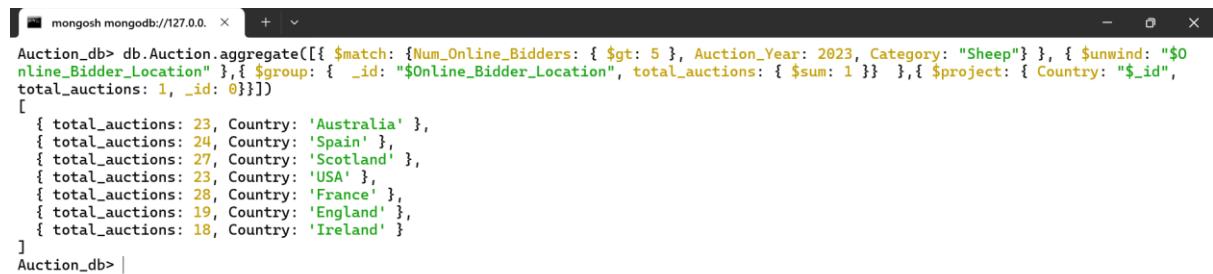
- auction_count: the number of auctions using \$count,
- max_attendees: the maximum value of Num_Attended using \$max,
- total_fees: the total sum of Auctioneer_Fees.

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}}])
```



```
Auction_db> 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}}])
[{"total_auctions": 23, "Country": "Australia"}, {"total_auctions": 24, "Country": "Spain"}, {"total_auctions": 27, "Country": "Scotland"}, {"total_auctions": 23, "Country": "USA"}, {"total_auctions": 28, "Country": "France"}, {"total_auctions": 19, "Country": "England"}, {"total_auctions": 18, "Country": "Ireland"}]
Auction_db> |
```

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}}])
```



```
Auction_db> 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}}])
[
  {
    total_auctions: 188,
    Qualification: 'Marketing',
    avg_online_bidders: 102.34
  },
  {
    total_auctions: 197,
    Qualification: 'Law',
    avg_online_bidders: 104.54
  },
  {
    total_auctions: 194,
    Qualification: 'Engineering',
    avg_online_bidders: 98.6
  },
  {
    total_auctions: 199,
    Qualification: 'Accounting',
    avg_online_bidders: 101.65
  },
  {
    total_auctions: 201,
    Qualification: 'Economics',
    avg_online_bidders: 108.03
  }
]
Auction_db> |
```

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 } } ])
```

```
[ mongosh mongoDB://127.0.0.1:27017/Auction_db > + | x - o x
Auction_db> db.Auction.aggregate([ { $group: { _id: "$Venue.Type", max_fees: { $max: "$Auctioneer_Fees" } } }, { $project: { Venue_Type: "$_id", max_fees: { $round: ["$max_fees", 2] }, _id: 0 } } ])
[ { Venue_Type: 'Warehouse', max_fees: 10000 },
{ Venue_Type: 'Garage Forecourt', max_fees: 10000 },
{ Venue_Type: 'Hotel', max_fees: 9700 },
{ Venue_Type: 'Farmyard', max_fees: 9850 },
{ Venue_Type: 'Community Centre', max_fees: 9950 },
{ Venue_Type: 'School Hall', max_fees: 10000 }
]
Auction_db> |
```

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] } }}, { $sort: { avg_fee: -1 } }])
```



```
Auction_db> 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] } }}, { $sort: { avg_fee: -1 } }])  
[  
  {Category: 'Horses', total_fee: 11850, avg_fee: 193.86},  
  {Category: 'Tractors', total_fee: 18800, 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.

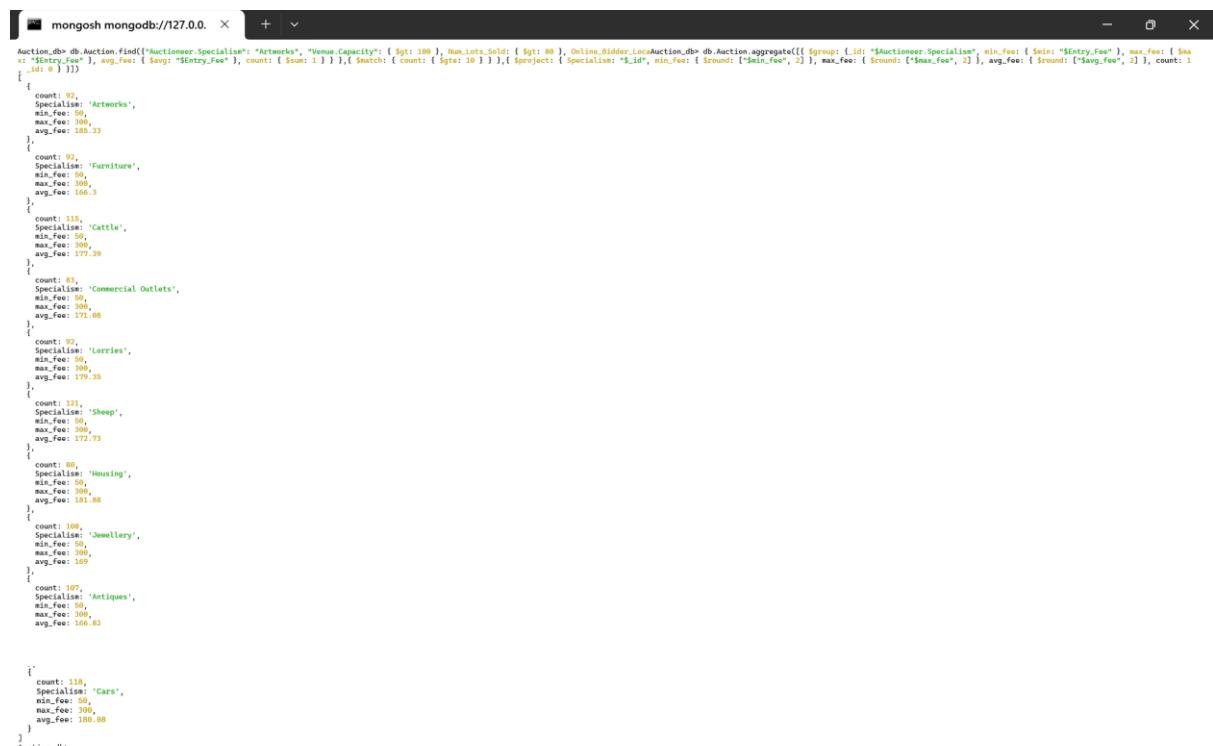
\$project: Formats the output, rounding the fees for readability.

\$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 }])
```



```
Auction_db> db.Auction.find({Auctioneer.Specialism: 'Artworks', "Venue.Capacity": { $gt: 100 }, NumLots.Sold: { $gt: 80 }, Online.Bidders.LotsAuction_db> db.Auction.aggregate([{$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 }])
```

```
[{"count": 92, "Specialism": "Artworks", "min_fee": 50, "max_fee": 300, "avg_fee": 189.33}, {"count": 92, "Specialism": "Furniture", "min_fee": 50, "max_fee": 300, "avg_fee": 166.3}, {"count": 115, "Specialism": "Cattle", "min_fee": 50, "max_fee": 300, "avg_fee": 177.39}, {"count": 81, "Specialism": "Commercial Outlets", "min_fee": 50, "max_fee": 300, "avg_fee": 171.68}, {"count": 92, "Specialism": "Llamas", "min_fee": 50, "max_fee": 300, "avg_fee": 179.35}, {"count": 131, "Specialism": "Sheep", "min_fee": 50, "max_fee": 300, "avg_fee": 172.73}, {"count": 80, "Specialism": "Housing", "min_fee": 50, "max_fee": 300, "avg_fee": 181.88}, {"count": 100, "Specialism": "Jewellery", "min_fee": 50, "max_fee": 300, "avg_fee": 169}, {"count": 107, "Specialism": "Antiques", "min_fee": 50, "max_fee": 300, "avg_fee": 166.82}, {"count: 118, "Specialism": "Cars", "min_fee": 50, "max_fee": 300, "avg_fee": 180.88}]
```

Auction_db>

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 } } ])
```

```
Auction_db> 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 } } ])
[ {
    max_online_bidders: 198,
    min_online_bidders: 1,
    Location: 'Australia'
},
{
    max_online_bidders: 197,
    min_online_bidders: 0,
    Location: 'England'
},
{
    max_online_bidders: 199,
    min_online_bidders: 0,
    Location: 'Scotland'
},
{
    max_online_bidders: 193,
    min_online_bidders: 0,
    Location: 'Ireland'
},
{
    max_online_bidders: 199,
    min_online_bidders: 4,
    Location: 'USA'
},
{
    max_online_bidders: 193,
    min_online_bidders: 7,
    Location: 'Spain'
},
{
    max_online_bidders: 199,
    min_online_bidders: 0,
    Location: 'France'
}
]
Auction_db> |
```

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.

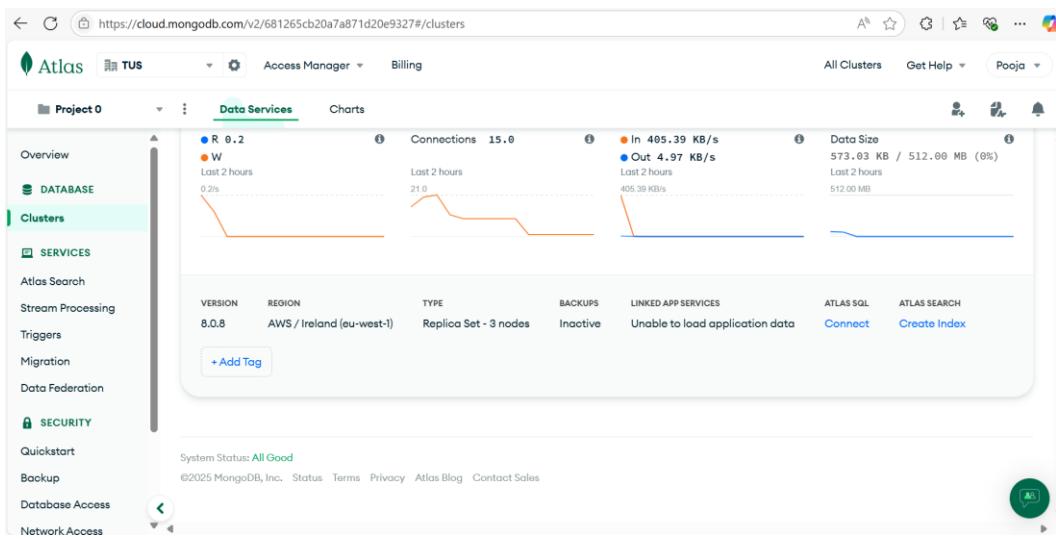


Figure 1: Screenshot of cluster creation complete

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.

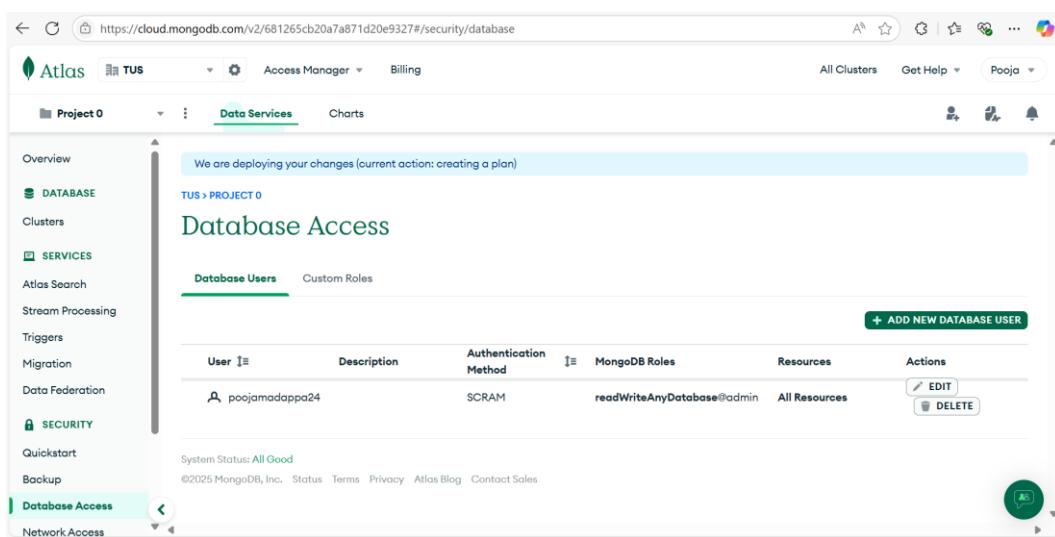


Figure 2: Screenshot of user creation form

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**

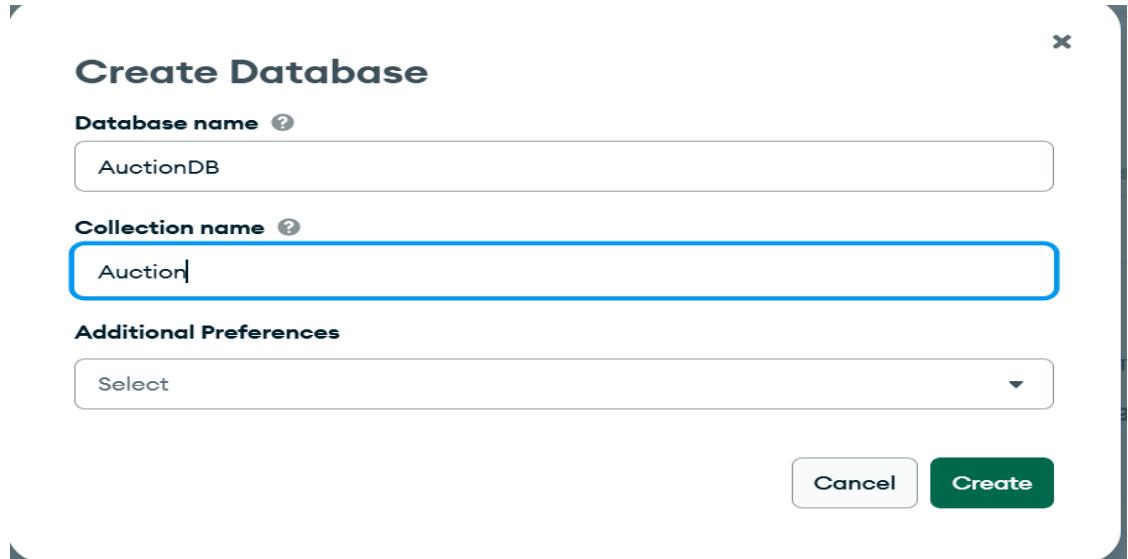


Figure 3: Screenshot of creating a new database and collection

The screenshot shows the MongoDB Compass interface for the 'Auction' database. The left sidebar shows 'Project 0' and 'Clusters'. The main area shows the 'Auction' database with tabs for Overview, Real Time, Metrics, Collections (selected), Atlas Search, Query Insights, Performance Advisor, and Online Ar. Under 'Collections', it shows 'Auction_Db' with 'Auction' as the collection. A table provides detailed statistics:

Collection Name	Documents	Logical Data Size	Avg Document Size	Storage Size	Indexes	Index Size	Avg Index Size
Auction	1001	513.05KB	525B	200KB	1	60KB	60KB

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.

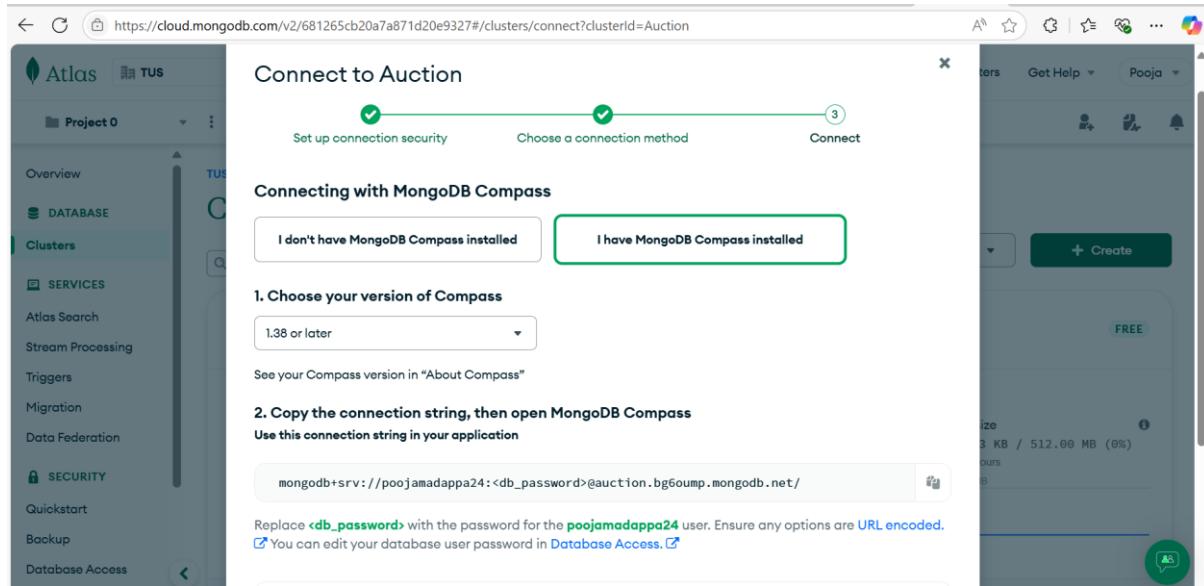


Figure 5: Screenshot showing the connection string copy dialog

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.

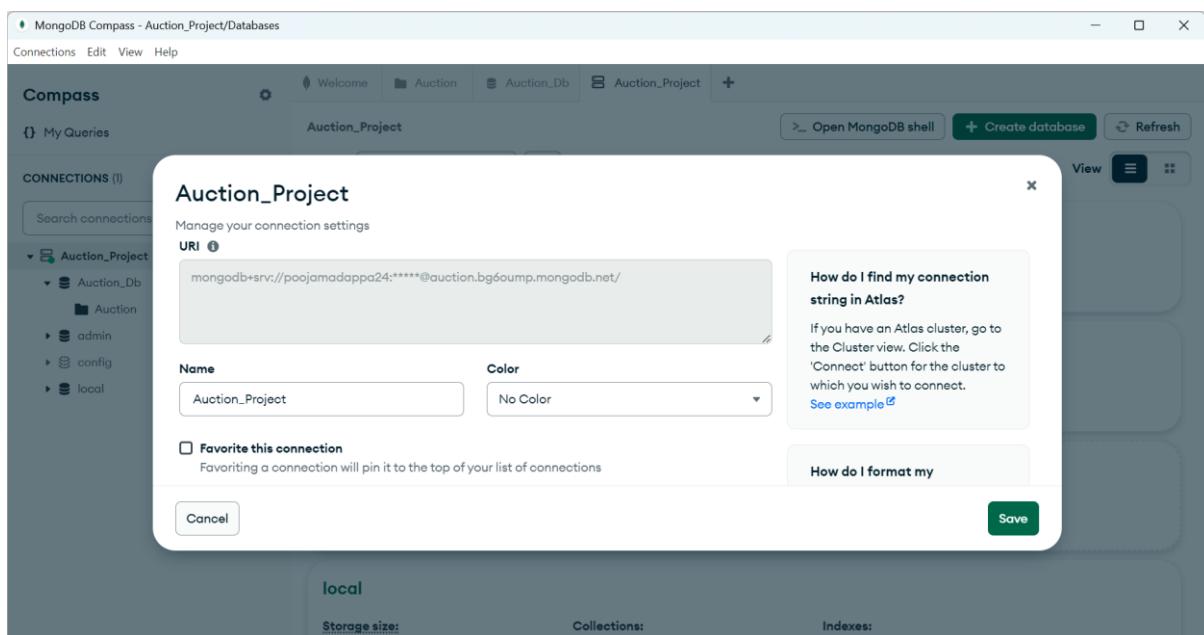


Figure6: Screenshot of Compass connected to Atlas cluster

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

The screenshot shows the MongoDB Compass interface connected to an 'Auction_Project' cluster. On the left, the 'CONNECTIONS' sidebar lists 'Auction_Project' (selected), 'Auction_Db' (selected), and 'local'. Under 'Auction_Db', the 'Auction' collection is selected. The main pane displays the 'Documents' tab with 1K documents. A query builder at the top allows for filtering, sorting, and querying. Below it, a table shows document details, with one row expanded to show its full JSON structure:

```
_id: ObjectId('681268004e20d0181d92bdca')
Auction_Year : 2025
Auction_Month : "October"
Duration : 106
Category : Array (3)
  Num_Lots : 174
  Entry_Fee : 100
  Num_Lots_Sold : 122
  Num_Attended : 496
  Bidder_Activity : "Poor"
  Venue : Object
    Auctioneer_Fees : 7650
  Auctioneer : Object
    Num_Online_Bidders : 199
  Online_Bidder_Location : Array (2)
```

Below this, another document is partially visible:

```
_id: ObjectId('681268004e20d0181d92bdca')
Auction_Year : 2025
Auction_Month : "April"
```

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.

The screenshot shows the MongoDB Atlas Data Services interface. On the left, the sidebar displays 'Project 0' and 'Auction_Db' with 'Auction' selected. In the center, the 'Find' tab is active under the 'Data Services' section. A 'Filter' box contains the query code:

```
{  
  "Auction_Year": 2024,  
  "Venue.Type": "Community Centre",  
  "Bidder_Activity": "Poor",  
  "Num_Attended": { "$gt": 400 }  
}
```

Below the filter box, the 'QUERY RESULTS: 1-5 OF 5' section shows one document:

```
_id: ObjectId('681268004e20d0181d92bef6')  
Auction_Year : 2024  
Auction_Month : "October"  
Duration : 149  
Category : Array (1)  
  Num_Lots : 36  
  Entry_Fee : 200  
  Num_Lots_Sold : 31  
  Num_Attended : 476  
  Bidder_Activity : "Poor"
```

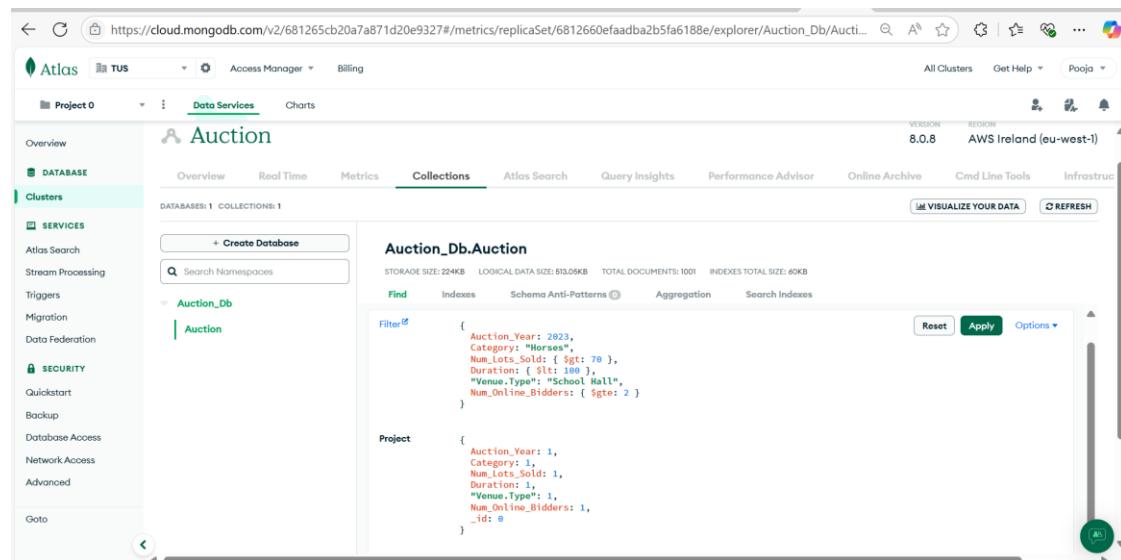
At the bottom of the interface, there is a footer with links: System Status, All Good, ©2025 MongoDB, Inc., Status, Terms, Privacy, Atlas Blog, Contact Sales.

Question 2

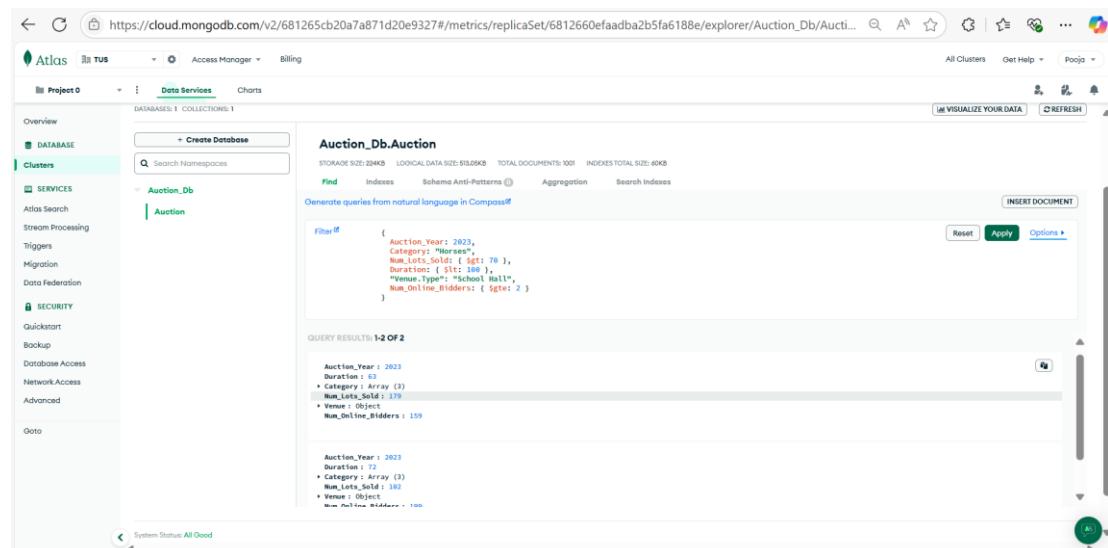
List auctions from 2023, with Category as Horses, more than 70 lots sold, duration under 100 minutes, held in a School Hall, and at least 2 online bidders.

```
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** dropdown icon beside the box and add this to the **Project** field:



```
Auction_Db.Auction
STORAGE SIZE: 224KB LOGICAL DATA SIZE: 513.09KB TOTAL DOCUMENTS: 1001 INDEXES TOTAL SIZE: 60KB
Find Indexes Schema Anti-Patterns Aggregation Search Indexes
Filter:
{
  Auction_Year: 2023,
  Category: "Horses",
  Num_Lots_Sold: { $gt: 70 },
  Duration: { $lt: 100 },
  "Venue.Type": "School Hall",
  Num_Online_Bidders: { $gte: 2 }
}
Project:
{
  Auction_Year: 1,
  Category: 1,
  Num_Lots_Sold: 1,
  Duration: 1,
  "Venue.Type": 1,
  Num_Online_Bidders: 1,
  _id: 0
}
```



```
Auction_Db.Auction
STORAGE SIZE: 224KB LOGICAL DATA SIZE: 513.09KB TOTAL DOCUMENTS: 1001 INDEXES TOTAL SIZE: 60KB
Find Indexes Schema Anti-Patterns Aggregation Search Indexes
Generate queries from natural language in Compose
Filter:
{
  Auction_Year: 2023,
  Category: "Horses",
  Num_Lots_Sold: { $gt: 70 },
  Duration: { $lt: 100 },
  "Venue.Type": "School Hall",
  Num_Online_Bidders: { $gte: 2 }
}
QUERY RESULTS: 1-2 OF 2
Auction_Year: 2023
Duration: 72
Category: [array (3)]
Num_Lots_Sold: 179
Venue: [object]
Num_Online_Bidders: 179
Auction_Year: 2023
Duration: 72
Category: [array (3)]
Num_Lots_Sold: 182
Venue: [object]
Num_Online_Bidders: 180
```

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 Stage and the stages such as \$match, \$group, \$match, \$project

The screenshot shows the MongoDB Atlas interface for the 'Auction_Db' database and 'Auction' collection. The 'Aggregation' tab is selected. A single stage is currently defined in the pipeline:

```
1
```

Below the pipeline, there is a preview section showing the output of the aggregation stage. The output documents are as follows:Venue_Type : "School Hall"
avg_entry_fee : 174.4553846133846
total_lots_sold : 12381

```
Venue_Type : "Hotel"  
avg_entry_fee : 175.0965118138237  
total_lots_sold : 31251
```

```
avg_entry_fee  
total_lots_sold  
Venue_Type : "
```

After adding the stages we can see the output

The screenshot shows the MongoDB Atlas interface for the 'Auction_Db' database and 'Auction' collection. The 'Aggregation' tab is selected. The pipeline now contains four stages:

```
+ [Stage 1] $match  
+ [Stage 2] $group  
+ [Stage 3] $match  
+ [Stage 4] $project
```

The fourth stage, '\$project', is expanded to show its configuration:

```
1 * {  
2   "Venue_Type": "$_id"  
3   "avg_entry_fee": 1,  
4   "total_lots_sold": 1,  
5   "_id": 0  
6 }  
7
```

Below the stages, there is a preview section showing the output of the aggregation pipeline. The output documents are as follows:

```
Venue_Type : "School Hall"  
avg_entry_fee : 174.4553846133846  
total_lots_sold : 12381
```

```
Venue_Type : "Hotel"  
avg_entry_fee : 175.0965118138237  
total_lots_sold : 31251
```

```
avg_entry_fee  
total_lots_sold  
Venue_Type : "
```

A tooltip for the '\$project' stage explains its purpose:

Filters the document stream to allow only needed documents to be returned to subsequent stages.

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 } } ])
```

The screenshot shows the MongoDB Atlas interface for creating an aggregation pipeline. The left sidebar shows 'Project 0' with 'Auction_Db' selected under 'DATABASE'. The main area is titled 'Auction_Db.Auction' and shows the aggregation pipeline. Stage 1 is '\$group' with the pipeline stage code:

```
{ $group: { _id: "$Venue.Type", max_fees: { $max: "$Auctioneer_Fees" } } }
```

Stage 2 is '\$project' with the pipeline stage code:

```
{ $project: { Venue_Type: "$_id", max_fees: { $round: ["$max_fees", 2] }, _id: 0 } }
```

The 'PREVIEW' tab is selected, showing the output of the pipeline. It displays two documents:

- One document for 'Warehouse' with max_fees: 9859
- One document for 'Farmyard' with max_fees: 18698

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.

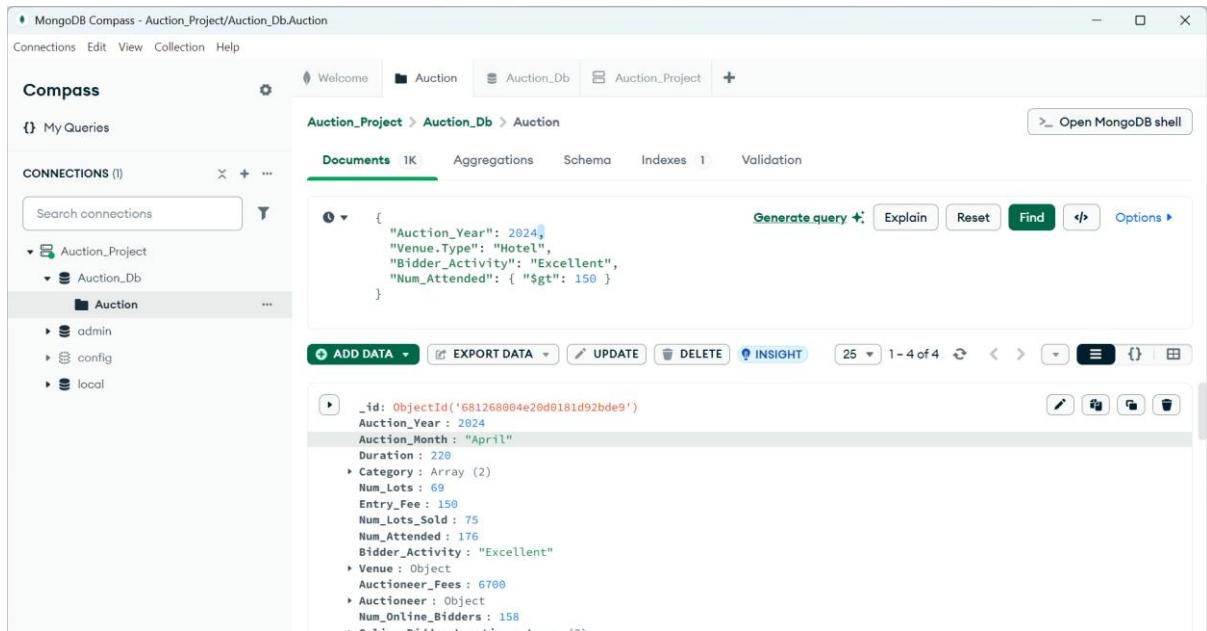


Figure1: Entering and run the query in Compass.

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

Welcome Auction Auction_Db Auction_Project

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

num_Online_Bidders: 150
▶ Online_Bidder_Location: Array (3)

MongoDB Compass - Auction_Project/Auction_Db.Auction

Connections Edit View Collection Help

Welcome Auction Auction_Db Auction_Project

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": {
      "q": [
        {
          "$and": [
            {
              "Auction_Year": { "$eq": 2024 }
            },
            {
              "Bidder_Activity": {
                "$eq": "Excellent"
              }
            },
            {
              "Venue_Type": { "$eq": "Hotel" }
            },
            {
              "Num_Attended": { "$gt": 150 }
            }
          ]
        },
        {
          "indexFilterSet": false,
          "queryHash": "B88CE316",
          "nscanned": 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

num_Online_Bidders: 150
▶ Online_Bidder_Location: Array (3)

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** dropdown icon beside the box and add this to the **Project** field:

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

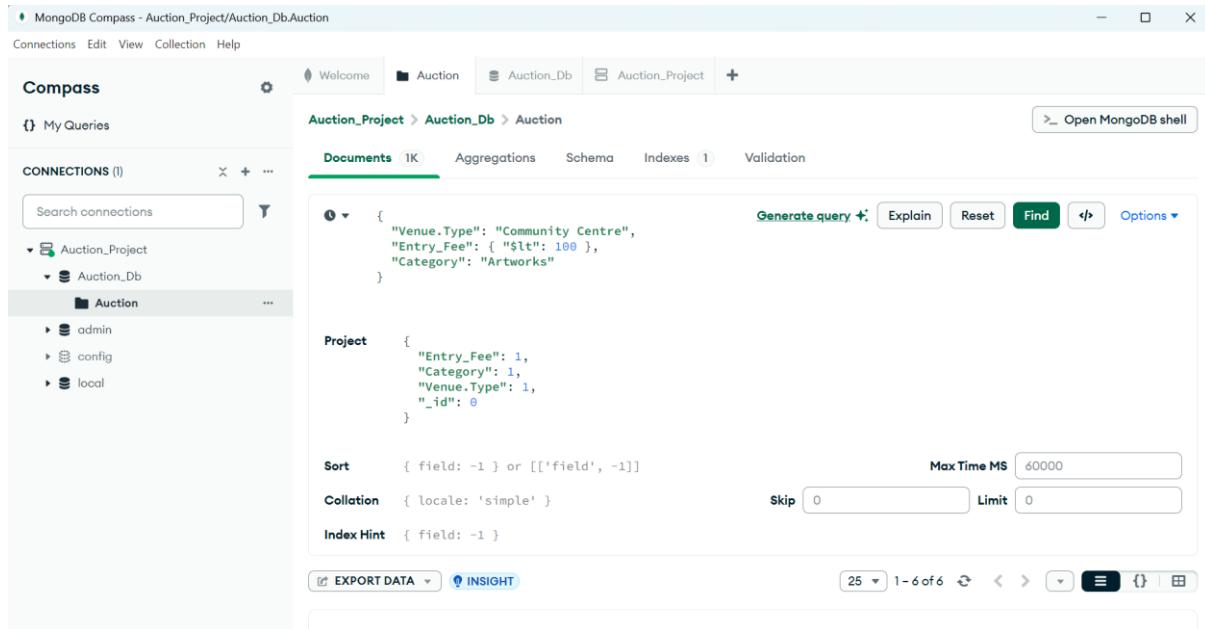


Figure 1: Options expanded to add projection fields

The screenshot shows the MongoDB Compass interface. The top navigation bar includes 'MongoDB Compass - Auction_Project/Auction_Db.Auction', 'Connections', 'Edit', 'View', 'Collection', and 'Help'. Below the navigation is a toolbar with 'Welcome', 'Auction', 'Auction_Db', 'Auction_Project', and a '+' button. The main area is titled 'Auction_Project > Auction_Db > Auction' and shows 'Documents 1K'. The results pane displays two JSON documents. The first document includes fields like 'Venue.Type', 'Entry_Fee', and 'Category'. The second document also includes 'Category' and 'Entry_Fee' fields. A sidebar on the left lists 'CONNECTIONS' with 'Auction_Project', 'Auction_Db', and 'Auction' selected. A bottom toolbar includes 'EXPORT DATA', 'INSIGHT', and various navigation and search buttons.

Figure 2: Results area displaying the filtered documents

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

The screenshot shows the MongoDB Compass interface with the 'Explain Plan' dialog open. The title bar says 'Explain Plan' and includes a note: 'Explain provides key execution metrics that help diagnose slow queries and optimize index usage. Learn more'. Below this are tabs for 'Visual Tree' (selected) and 'Raw Output'. The 'Visual Tree' section shows a tree structure of the query plan. The root node is 'PROJECTION_DEFAULT' with 'Returned 6' documents and '0 ms' execution time. This node has an arrow pointing up to the 'COLLSCAN' node, which also has 'Returned 6' documents and '0 ms' execution time, with 'Documents Examined: 1000' listed. To the right of the tree is a 'Query Performance Summary' box containing the following data:

- 6 documents returned
- 1000 documents examined
- 1 ms execution time
- Is not sorted in memory
- 0 index keys examined
- No index available for this query.

A 'Close' button is at the bottom right of the dialog.

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

The screenshot shows the MongoDB Compass interface with the 'Aggregations' tab selected for the 'Auction' collection. The pipeline area is currently empty, indicated by the message 'Your pipeline is currently empty. [Generate aggregation](#)'. Below the pipeline, there is a preview section showing a single document with the value '1'. A green button at the bottom left says '+ Add Stage'. The top navigation bar includes 'Connections', 'Edit', 'View', 'Collection', 'Help', and tabs for 'Welcome', 'Auction', 'Auction_Db', 'Auction_Project', and '+'. The left sidebar shows connections like 'Auction_Project', 'Auction_Db', and 'Auction'.

Figure 1: Aggregation Tab Opened in Compass

The screenshot shows the MongoDB Compass interface with the following details:

- Connections:** Auction_Project, Auction_Db, Auction
- Collection:** Auction
- Compass:** Welcome, Auction, Auction_Db, Auction_Project
- Aggregations Tab:** Active, showing 1K documents.
- Stages:**
 - Stage 1: \$match**

```
1 //*
2 * query: The query in MQL.
3 */
4 {
5   Num_Attended: { $gt: 100 },
6   Auction_Year: { $gt: 2022 }
7 }
```
 - Stage 2: \$group**

```
1 /**
2 * _id: The id of the group.
3 * fieldN: The first field name.
4 */
5 {
6   _id: "$Venue.Type",
7   avg_entry_fee: { $avg: "$Entry_Fee" },
8   total_lots_sold: { $sum: "$Num_Lots_Sold" }
9 }
10
```
- Output after \$match Stage:** Sample of 10 documents.

_id	Auction_Year	Auction_Month	Duration	Category	Num_Lots_Sold	Entry_Fee	Num_Lots_Sold	Num_Attended
681268004e20d0181d92bdca	2025	October	106	Array (3)	1	100	99	496
681268004e20d0181d92bdca	2025	April	132	Array (3)	1	390	99	459
681268004e20d0181d92bdca	2025	January	155	Array (1)	146	59	56	392
681268004e20d0181d92bdca	2023	January	155	Array (1)	146	59	56	392
681268004e20d0181d92bdca	2023	February	132	Array (3)	13798	175.59855118110237	12251	11251
681268004e20d0181d92bdca	2023	March	132	Array (3)	13798	174.61E3	12250	11250
681268004e20d0181d92bdca	2023	April	132	Array (3)	13798	174.61E3	12250	11250
681268004e20d0181d92bdca	2023	May	132	Array (3)	13798	174.61E3	12250	11250
681268004e20d0181d92bdca	2023	June	132	Array (3)	13798	174.61E3	12250	11250
- Output after \$group Stage:** Sample of 6 documents.

_id	avg_entry_fee	total_lots_sold
Farmard	166.18706035871223	13798
Hotel	175.59855118110237	12251
School Hall	174.61E3	12250
School Hall	174.61E3	12250
School Hall	174.61E3	12250

Figure 2: Adding Stages

The screenshot shows the MongoDB Compass interface with the following details:

- Left Sidebar (Connections):** Shows 'Auction_Project' as the selected database, with sub-databases 'Auction', 'Auction_Db', and 'Auction_Project' listed.
- Top Bar:** 'MongoDB Compass - Auction_Project/Auction_Db.Auction' is displayed. The menu bar includes 'Connections', 'Edit', 'View', 'Collection', and 'Help'.
- Header:** 'Compass' logo, 'Welcome' button, and tabs for 'Auction', 'Auction_Db', 'Auction_Project', and a '+' button.
- Current Path:** 'Auction_Project > Auction_Db > Auction'
- Toolbar:** 'Open MongoDB shell' button.
- Aggregation Pipeline:** \$match, \$group, \$match, \$project, Edit, Explain, Export, Run, Options.
- Results Section:** 'ALL RESULTS' table showing four rows of aggregated data:
 - avg_entry_fee : 166.18705035971223
total_lots_sold : 13798
Venue_Type : "Farmyard"
 - avg_entry_fee : 175.59055118110237
total_lots_sold : 11251
Venue_Type : "Hotel"
 - avg_entry_fee : 174.6153846153846
total_lots_sold : 12591
Venue_Type : "School Hall"
 - avg_entry_fee : 183.84146341463415
total_lots_sold : 15498
Venue_Type : "Warehouse"
- Bottom Right:** 'Showing 1 - 6 count results' and navigation icons.

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 } } ])
```

The screenshot shows the MongoDB Compass interface with the following details:

- Connections:** Auction_Project/Auction_Db/Auction
- Collection:** Auction
- Aggregations:** The aggregation pipeline is displayed at the top.
- Results:** The results are grouped under "ALL RESULTS". Each group corresponds to a location and contains the following fields:
 - max_online_bidders: 199
 - min_online_bidders: 0
 - Location: "Scotland"
 - max_online_bidders: 193
 - min_online_bidders: 7
 - Location: "Spain"
 - max_online_bidders: 193
 - min_online_bidders: 0
 - Location: "Ireland"
 - max_online_bidders: 199
 - min_online_bidders: 4
 - Location: "USA"
 - max_online_bidders: 198
 - min_online_bidders: 1
 - Location: "Australia"
 - max_online_bidders: 197
 - min_online_bidders: 0
 - Location: "England"

Figure 3: Final Aggregation Results in Compass

9. YOUTUBE LINKS

1. <https://youtu.be/TUtUQ-U3EVc>
2. <https://youtu.be/Md3cSsTzNil>