

DBMS FISAC

MongoDB

Dataset:

Dataset chooses, various observatories, with every document containing the Field Name, LaunchDate, Organization and submitted_by, with optional field Age.

Dataset Chosen (in JSON format):

```
[
  {
    Name: "Chandra",
    LaunchDate: "1999-07-23T00:00:00Z",
    submitted_by: "230953450_priyanshnandan"
  },
  {
    Name: "Euclid",
    LaunchDate: "2023-07-01T00:00:00Z",
    Organization: "ESA",
    Age: 2,
    submitted_by: "230953450_priyanshnandan"
  },
  {
    Name: "Fermin Gamma-Ray space telescope",
    LaunchDate: "2008-06-11T00:00:00Z",
    Organization: "NASA",
    Age: 17,
    submitted_by: "230953450_priyanshnandan"
  },
  {
    Name: "XMM Newton",
    LaunchDate: "1999-12-10T00:00:00Z",
    Organization: "ESA",
    Age: 25,
    submitted_by: "230953450_priyanshnandan"
  },
  {
    Name: "TESS",
    LaunchDate: "2018-04-18T00:00:00Z",
    Organization: "NASA",
    Age: 7,
    submitted_by: "230953450_priyanshnandan"
  },
  {
    Name: "NEOWISE",
    LaunchDate: "2009-12-14T00:00:00Z",
    Organization: "NASA",
    submitted_by: "230953450_priyanshnandan"
  },
  {
    Name: "NICER",
    LaunchDate: "2017-06-03T00:00:00Z",
    Age: 7,
    Organization: "NASA",
    submitted_by: "230953450_priyanshnandan"
  },
  {
    Name: "XRISM",
    LaunchDate: "2023-09-06T00:00:00Z",
    Age: 2,
    Organization: "NASA",
    submitted_by: "230953450_priyanshnandan"
  }
]
```

```
},
{
  Name: "NuSTAR",
  LaunchDate: "2012-06-13T00:00:00Z",
  Age: 13,
  Organization: "NASA",
  submitted_by: "230953450_priyanshnandan"
},
{
  Name: "James Webb Telescope",
  LaunchDate: "2021-12-25T00:00:00Z",
  Age: 4,
  Organization: "NASA",
  submitted_by: "230953450_priyanshnandan"
}
]
```

Creating Database and Collection

Using the command

```
use 230953450_DB
```

We create the database, since the database is not available, it creates a database for the same, and switches to it

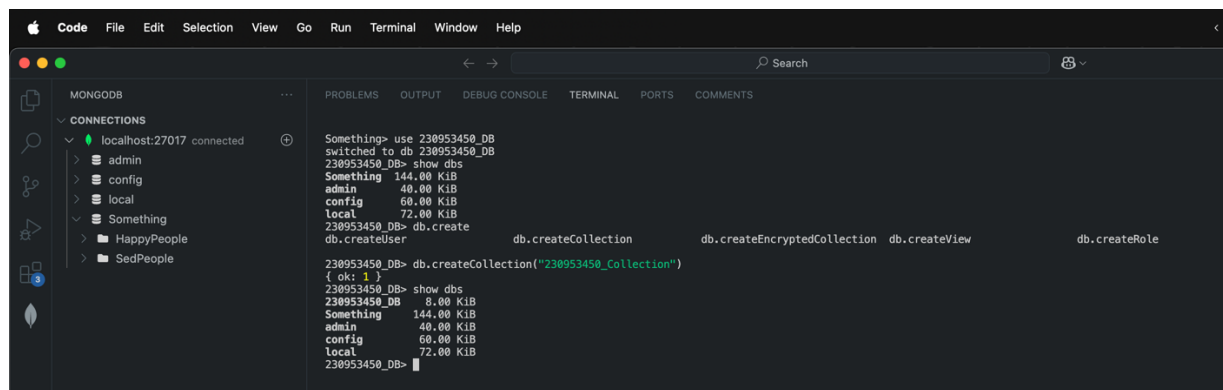
Now, we create the collection using the command

```
db.createCollection("230953450_Collection")
```

Using the command,

```
Show dbs
```

We can see, the new database created



Note: MongoDB will not display an empty database, that's why only after creating the collection, we can see the database.

Inserting Documents into the collection

We insert 10 documents, using `insertOne` and `insertMany` commands

Note: Current insertion lacks the field `submitted_by`, it will be update later

insertOne

```
db.getCollection("230953450_Collection").insertOne({Name: "Chandra", LaunchDate: new Date("1999-07-23")})
```

```
db.getCollection("230953450_Collection").insertOne({Name: "NICER", LaunchDate: new Date("2017-06-03"), Age: 7, Organization: "NASA"})
```

```
db.getCollection("230953450_Collection").insertOne({Name: "XRISM", LaunchDate: new Date("2023-09-06"), Age: 2, Organization: "NASA"})
```

```
db.getCollection("230953450_Collection").insertOne({Name: "NuSTAR", LaunchDate: new Date("2012-06-13"), Age: 13, Organization: "NASA"})
```

```
db.getCollection("230953450_Collection").insertOne({Name: "James Webb Telescope", LaunchDate: new Date("2021-12-25"), Age: 4, Organization: "NASA"})
```

insertMany

```
db.getCollection("230953450_Collection").insertMany([
  {Name: "Euclid", LaunchDate: new Date("2023-07-01"), Organization: "ESA", Age: 2},
  {Name: "Fermin Gamma-Ray space telescope", LaunchDate: new Date("2008-06-11"), Organization: "NASA", Age: 17},
  {Name: "XMM Newton", LaunchDate: new Date("1999-12-10"), Organization: "ESA", Age: 25},
  {Name: "TESS", LaunchDate: new Date("2018-04-18"), Organization: "NASA", Age: 7},
  {Name: "NEOWISE", LaunchDate: new Date("2009-12-14"), Organization: "NASA"}
])
```

Note: here, we use

```
db.getCollection("230953450_Collection")
```

for accessing the collections as we cannot use special characters in the naming convention generally, if it was not the case, we would have accessed the collection using the command

```
db.CollectionName
```

```
Go Run Terminal Window Help
< -> Search
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS COMMENTS
MongoDB Shell + - - - - - x

230953450_DB> db.getCollection("230953450_Collection").insertOne({Name: "Chandra", LaunchDate: new Date("1999-07-23")})
{
  acknowledged: true,
  insertedId: ObjectId('67e5b6a918a3e5deec82648')
}
230953450_DB>
230953450_DB>
230953450_DB> db.getCollection("230953450_Collection").insertMany([
  {Name: "Euclid", LaunchDate: new Date("2023-07-01"), Organization: "ESA", Age: 2},
  {Name: "Fermi Gamma-Ray space telescope", LaunchDate: new Date("2008-06-11"), Organization: "NASA", Age: 17},
  {Name: "Hubble Space Telescope", LaunchDate: new Date("1990-12-15"), Organization: "ESA", Age: 25},
  {Name: "TESS", LaunchDate: new Date("2018-04-18"), Organization: "NASA", Age: 7},
  {Name: "NICER", LaunchDate: new Date("2017-06-03"), Organization: "NASA", Age: 7},
  {Name: "XMM-Newton", LaunchDate: new Date("2000-12-14"), Organization: "NASA", Age: 25}
])
{
  acknowledged: true,
  insertedIds: {
    0: ObjectId('67e5ba82918a3e5deec82641'),
    1: ObjectId('67e5ba82918a3e5deec82642'),
    2: ObjectId('67e5ba82918a3e5deec82643'),
    3: ObjectId('67e5ba82918a3e5deec82644'),
    4: ObjectId('67e5ba82918a3e5deec82645')
  }
}
230953450_DB> db.getCollection("230953450_Collection").insertOne({Name: "NICER", LaunchDate: new Date("2017-06-03"), Age: 7, Organization: "NASA"})
{
  acknowledged: true,
  insertedId: ObjectId('67e5bc30918a3e5deec82646')
}
230953450_DB> db.getCollection("230953450_Collection").insertOne({Name: "XMM-Newton", LaunchDate: new Date("2000-12-14"), Age: 2, Organization: "NASA"})
{
  acknowledged: true,
  insertedId: ObjectId('67e5bc43918a3e5deec82647')
}
230953450_DB> db.getCollection("230953450_Collection").insertOne({Name: "NuSTAR", LaunchDate: new Date("2012-06-13"), Age: 13, Organization: "NASA"})
{
  acknowledged: true,
  insertedId: ObjectId('67e5bc49918a3e5deec82648')
}
230953450_DB> db.getCollection("230953450_Collection").insertOne({Name: "James Webb Telescope", LaunchDate: new Date("2021-12-25"), Age: 4, Organization: "NASA"})
{
  acknowledged: true,
  insertedId: ObjectId('67e5bc51918a3e5deec82649')
}
230953450_DB>
```

Query Execution

- Retrieve all the information

```
db.getCollection("230953450_Collection").find()
```

```
Code File Edit Selection View Go Run Terminal Window Help
< -> Search
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS COMMENTS
MongoDB Shell + - - - - - x

230953450_DB> db.getCollection("230953450_Collection").find()
{
  "_id": ObjectId("67e5b6a918a3e5deec82648"),
  "Name": "Chandra",
  "LaunchDate": ISODate("1999-07-23T00:00:00.000Z")
},
{
  "_id": ObjectId("67e5ba82918a3e5deec82641"),
  "Name": "Euclid",
  "LaunchDate": ISODate("2023-07-01T00:00:00.000Z"),
  "Organization": "ESA",
  "Age": 2
},
{
  "_id": ObjectId("67e5ba82918a3e5deec82642"),
  "Name": "Fermi Gamma-Ray space telescope",
  "LaunchDate": ISODate("2008-06-11T00:00:00.000Z"),
  "Organization": "NASA",
  "Age": 17
},
{
  "_id": ObjectId("67e5ba82918a3e5deec82643"),
  "Name": "Hubble Space Telescope",
  "LaunchDate": ISODate("1990-12-15T00:00:00.000Z"),
  "Organization": "ESA",
  "Age": 25
},
{
  "_id": ObjectId("67e5ba82918a3e5deec82644"),
  "Name": "NICER",
  "LaunchDate": ISODate("2017-06-03T00:00:00.000Z"),
  "Organization": "NASA",
  "Age": 7
},
{
  "_id": ObjectId("67e5ba82918a3e5deec82645"),
  "Name": "XMM-Newton",
  "LaunchDate": ISODate("2000-12-14T00:00:00.000Z"),
  "Organization": "NASA",
  "Age": 25
},
{
  "_id": ObjectId("67e5bc30918a3e5deec82646"),
  "Name": "NICER",
  "LaunchDate": ISODate("2017-06-03T00:00:00.000Z"),
  "Age": 7,
  "Organization": "NASA"
},
{
  "_id": ObjectId("67e5bc43918a3e5deec82647"),
  "Name": "XMM-Newton",
  "LaunchDate": ISODate("2000-12-14T00:00:00.000Z"),
  "Age": 2,
  "Organization": "NASA"
},
{
  "_id": ObjectId("67e5bc49918a3e5deec82648"),
  "Name": "NuSTAR",
  "LaunchDate": ISODate("2012-06-13T00:00:00.000Z"),
  "Age": 13,
  "Organization": "NASA"
},
{
  "_id": ObjectId("67e5bc51918a3e5deec82649"),
  "Name": "James Webb Telescope",
  "LaunchDate": ISODate("2021-12-25T00:00:00.000Z"),
  "Age": 4,
  "Organization": "NASA"
}
```

- **Filtering**

Question-> Display all the Telescopes belonging to ESA.

```
db.getCollection("230953450_Collection").find({Organization: "ESA"})
```

```
230953450_DB> db.getCollection("230953450_Collection").find({Organization: "ESA"})
[
  {
    _id: ObjectId('67e5ba82910a3e5deec82d41'),
    Name: 'Euclid',
    LaunchDate: ISODate('2023-07-01T00:00:00.000Z'),
    Organization: 'ESA',
    Age: 2
  },
  {
    _id: ObjectId('67e5ba82910a3e5deec82d43'),
    Name: 'XMM Newton',
    LaunchDate: ISODate('1999-12-10T00:00:00.000Z'),
    Organization: 'ESA',
    Age: 25
  }
]
```

- **Sorting**

Question-> Display all the Telescopes from newest to the oldest telescope

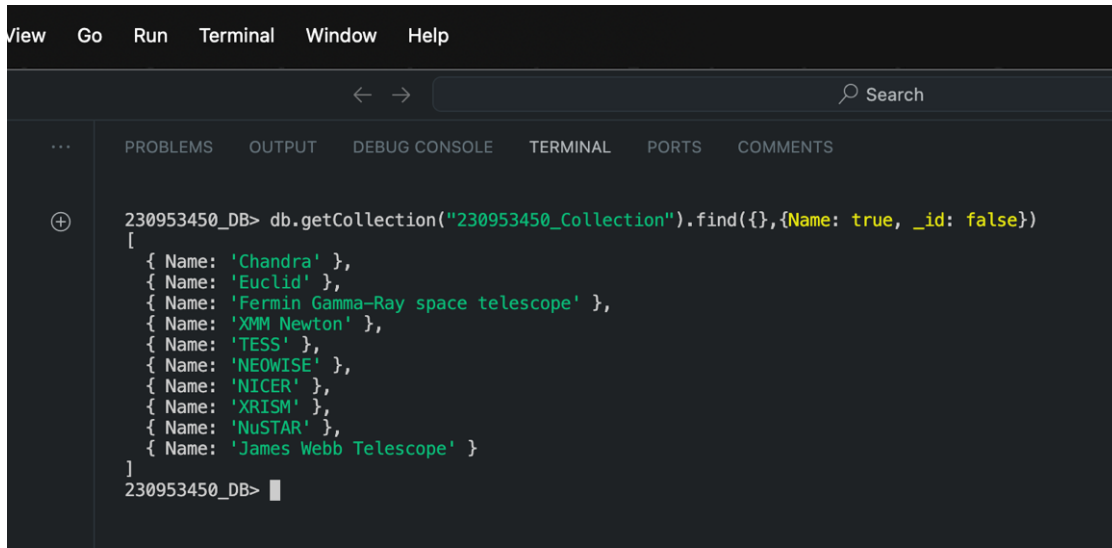
```
db.getCollection("230953450_Collection").find().sort({age: 1})
```

```
30 Run Terminal Window Help
239053458_db.collection('239053458_Collection').find().sort({age: 1})
{
  _id: ObjectId('67e5b6a018a3e5d0ec32440'),
  Name: 'Charles',
  LaunchDate: ISODate('1999-07-23T00:00:00.000Z'),
  Organization: 'ESA',
  Age: 2
}
{
  _id: ObjectId('67e5b6a2918a3e5d0ec32441'),
  Name: 'Jenssen',
  LaunchDate: ISODate('2023-07-01T00:00:00.000Z'),
  Organization: 'ESA',
  Age: 2
}
{
  _id: ObjectId('67e5b6a2918a3e5d0ec32442'),
  Name: 'Jenssen',
  LaunchDate: ISODate('2008-06-11T00:00:00.000Z'),
  Organization: 'NASA',
  Age: 17
}
{
  _id: ObjectId('67e5b6a2918a3e5d0ec32443'),
  Name: 'Jenssen',
  LaunchDate: ISODate('1999-12-18T00:00:00.000Z'),
  Organization: 'ESA',
  Age: 23
}
{
  _id: ObjectId('67e5b6a2918a3e5d0ec32444'),
  Name: 'Jenssen',
  LaunchDate: ISODate('2018-04-18T00:00:00.000Z'),
  Organization: 'NASA',
  Age: 7
}
{
  _id: ObjectId('67e5b6a2918a3e5d0ec32445'),
  Name: 'Jenssen',
  LaunchDate: ISODate('2009-12-14T00:00:00.000Z'),
  Organization: 'NASA'
}
{
  _id: ObjectId('67e5b6a3018a3e5d0ec32446'),
  Name: 'Jenssen',
  LaunchDate: ISODate('2017-06-03T00:00:00.000Z'),
  Age: 7,
  Organization: 'NASA'
}
{
  _id: ObjectId('67e5b6a3918a3e5d0ec32447'),
  Name: 'Jenssen',
  LaunchDate: ISODate('2023-05-06T00:00:00.000Z'),
  Age: 7,
  Organization: 'NASA'
}
{
  _id: ObjectId('67e5b6a3918a3e5d0ec32448'),
  Name: 'Jenssen',
  LaunchDate: ISODate('2012-06-13T00:00:00.000Z'),
  Age: 13,
  Organization: 'NASA'
}
{
  _id: ObjectId('67e5b6a3918a3e5d0ec32449'),
  Name: 'Jenssen',
  LaunchDate: ISODate('2021-12-25T00:00:00.000Z'),
  Age: 4,
  Organization: 'NASA'
}
```

- **Projection**

Question-> Display Names of all the telescopes

```
db.getCollection("230953450_Collection").find({}, {Name: true, _id: false})
```



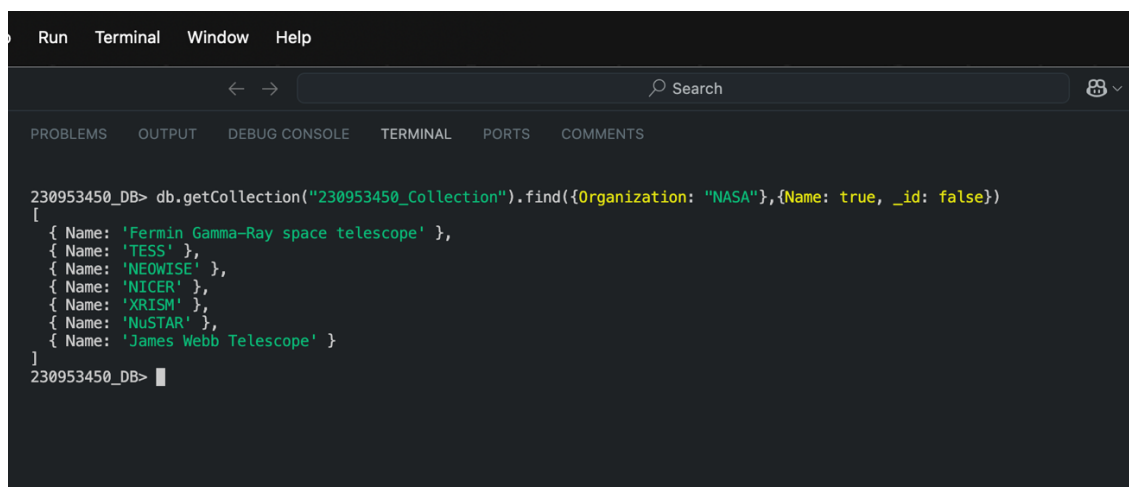
The screenshot shows a MongoDB terminal window with the following content:

```
230953450_DB> db.getCollection("230953450_Collection").find({}, {Name: true, _id: false})
[
  { Name: 'Chandra' },
  { Name: 'Euclid' },
  { Name: 'Fermin Gamma-Ray space telescope' },
  { Name: 'XMM Newton' },
  { Name: 'TESS' },
  { Name: 'NEOWISE' },
  { Name: 'NICER' },
  { Name: 'XRISM' },
  { Name: 'NuSTAR' },
  { Name: 'James Webb Telescope' }
]
230953450_DB> █
```

- **Aggregation Queries**

Question-> Display Names of all the telescopes belonging to NASA

```
db.getCollection("230953450_Collection").find({Organization: "NASA"}, {Name: true, _id: false})
```



The screenshot shows a MongoDB terminal window with the following content:

```
230953450_DB> db.getCollection("230953450_Collection").find({Organization: "NASA"}, {Name: true, _id: false})
[
  { Name: 'Fermin Gamma-Ray space telescope' },
  { Name: 'TESS' },
  { Name: 'NEOWISE' },
  { Name: 'NICER' },
  { Name: 'XRISM' },
  { Name: 'NuSTAR' },
  { Name: 'James Webb Telescope' }
]
230953450_DB> █
```

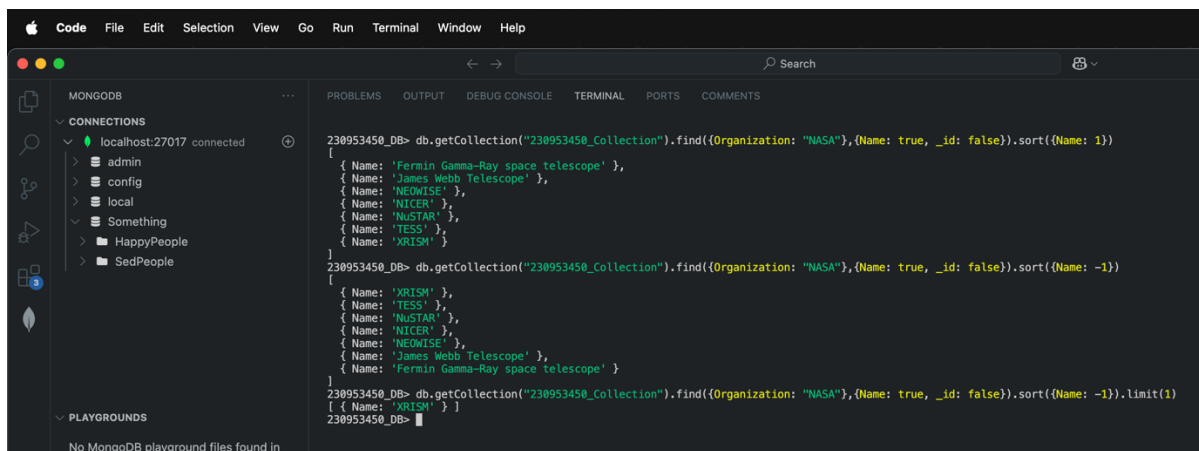
Question-> Display Names of all the telescopes belonging to NASA in descending order of their names

```
db.getCollection("230953450_Collection").find({Organization: "NASA"},{Name: true, _id: false}).sort({Name: -1})
```

```
230953450_DB> db.getCollection("230953450_Collection").find({Organization: "NASA"},{Name: true, _id: false}).sort({Name: -1})
[
  { Name: 'XRISM' },
  { Name: 'TESS' },
  { Name: 'NuSTAR' },
  { Name: 'NICER' },
  { Name: 'NEOWISE' },
  { Name: 'James Webb Telescope' },
  { Name: 'Fermin Gamma-Ray space telescope' }
]
230953450_DB> █
```

Question-> Display the NASA telescope with the name that comes last alphabetically

```
db.getCollection("230953450_Collection").find({Organization: "NASA"},{Name: true, _id: false}).sort({Name: -1}).limit(1)
```



The screenshot shows a MongoDB terminal window with the following commands and results:

```
230953450_DB> db.getCollection("230953450_Collection").find({Organization: "NASA"},{Name: true, _id: false}).sort({Name: 1})
[
  { Name: 'Fermin Gamma-Ray space telescope' },
  { Name: 'James Webb Telescope' },
  { Name: 'NEOWISE' },
  { Name: 'NICER' },
  { Name: 'NuSTAR' },
  { Name: 'TESS' },
  { Name: 'XRISM' }
]

230953450_DB> db.getCollection("230953450_Collection").find({Organization: "NASA"},{Name: true, _id: false}).sort({Name: -1})
[
  { Name: 'XRISM' },
  { Name: 'TESS' },
  { Name: 'NuSTAR' },
  { Name: 'NICER' },
  { Name: 'NEOWISE' },
  { Name: 'James Webb Telescope' },
  { Name: 'Fermin Gamma-Ray space telescope' }
]

230953450_DB> db.getCollection("230953450_Collection").find({Organization: "NASA"},{Name: true, _id: false}).sort({Name: -1}).limit(1)
[ { Name: 'XRISM' } ]
230953450_DB> █
```

- **Updating documents**

updateMany()

Question-> Add the field submitted_by if it doesn't exist already, set the value of the field to "230953450_priyanshnandan"

```
db.getCollection("230953450_Collection").updateMany({submitted_by: {$exists: false}},{$set: {submitted_by: "230953450_priyanshnandan"}})
```

```
230953450_DB> db.getCollection("230953450_Collection").updateMany({submitted_by: {$exists: false}},{$set: {submitted_by: "230953450_priyanshnandan"}})
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 10,
  modifiedCount: 10,
  upsertedCount: 0
}
230953450_DB> █
```

Before Updating

```
db.getCollection("230953450_Collection").find({}, {_id: false})
```

```
230953450_DB> db.getCollection("230953450_Collection").find({}, {_id: false})
{
  Name: 'Chandra', LaunchDate: ISODate('1999-07-23T00:00:00.000Z') },
{
  Name: 'Euclid',
  LaunchDate: ISODate('2023-07-01T00:00:00.000Z'),
  Organization: 'ESA',
  Age: 2
},
{
  Name: 'Fermi Gamma-Ray space telescope',
  LaunchDate: ISODate('2008-06-11T00:00:00.000Z'),
  Organization: 'NASA',
  Age: 17
},
{
  Name: 'XMM Newton',
  LaunchDate: ISODate('1999-12-10T00:00:00.000Z'),
  Organization: 'ESA',
  Age: 25
},
{
  Name: 'TESS',
  LaunchDate: ISODate('2018-04-18T00:00:00.000Z'),
  Organization: 'NASA',
  Age: 7
},
{
  Name: 'NEOWISE',
  LaunchDate: ISODate('2009-12-14T00:00:00.000Z'),
  Organization: 'NASA'
},
{
  Name: 'NICER',
  LaunchDate: ISODate('2017-06-03T00:00:00.000Z'),
  Age: 7,
  Organization: 'NASA'
},
{
  Name: 'XRISM',
  LaunchDate: ISODate('2023-09-06T00:00:00.000Z'),
  Age: 2,
  Organization: 'NASA'
},
{
  Name: 'NuSTAR',
  LaunchDate: ISODate('2012-06-13T00:00:00.000Z'),
  Age: 13,
  Organization: 'NASA'
},
{
  Name: 'James Webb Telescope',
  LaunchDate: ISODate('2021-12-25T00:00:00.000Z'),
  Age: 4,
  Organization: 'NASA'
}
230953450_DB>
```

After Updating

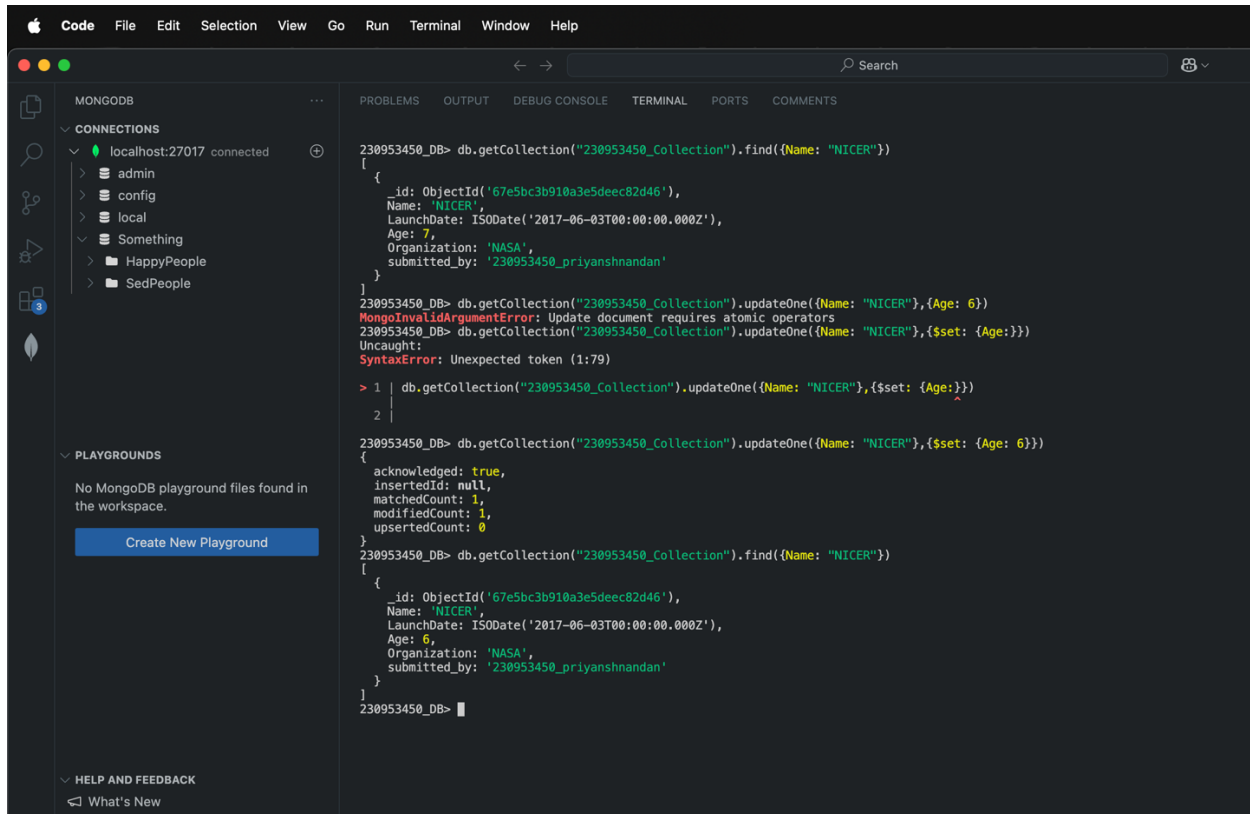
```
db.getCollection("230953450_Collection").find({}, {_id: false})
```

The screenshot shows the Visual Studio Code interface with the MongoDB Shell open. The left sidebar displays the 'MongoDB' connection to 'localhost:27017' and a list of databases including 'admin', 'config', 'local', 'Something', 'HappyPeople', and 'SedPeople'. The main editor area shows the output of the command `db.getCollection("230953450_Collection").find({}, {_id: false})`. The results are identical to the 'Before Updating' state, but each document now includes a `submitted_by` field with the value `'230953450_priyanshnandan'`. For example, the first document is: `{ Name: 'Chandra', LaunchDate: ISODate('1999-07-23T00:00:00.000Z'), submitted_by: '230953450_priyanshnandan' }`. The bottom status bar indicates the file is 'Go Live'.

updateOne()

Question-> Update the age of NICER telescope to 6.

```
db.getCollection("230953450_Collection").updateOne({Name: "NICER"},{$set: {Age: 6}})
```



The screenshot shows the MongoDB Shell interface with the following content:

```
230953450_DB> db.getCollection("230953450_Collection").find({Name: "NICER"})
[
  {
    _id: ObjectId('67e5bc3b910a3e5deec82d46'),
    Name: 'NICER',
    LaunchDate: ISODate('2017-06-03T00:00:00.000Z'),
    Age: 7,
    Organization: 'NASA',
    submitted_by: '230953450_priyanshnanan'
  }
]
230953450_DB> db.getCollection("230953450_Collection").updateOne({Name: "NICER"},{Age: 6})
MongoInvalidArgumentError: Update document requires atomic operators
230953450_DB> db.getCollection("230953450_Collection").updateOne({Name: "NICER"},{$set: {Age: 6}})
Uncaught:
SyntaxError: Unexpected token (1:79)

> 1 | db.getCollection("230953450_Collection").updateOne({Name: "NICER"},{$set: {Age: 6}})
    |                                                                                   ^
    |
    |
2
230953450_DB> db.getCollection("230953450_Collection").updateOne({Name: "NICER"},{$set: {Age: 6}})
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}
230953450_DB> db.getCollection("230953450_Collection").find({Name: "NICER"})
[
  {
    _id: ObjectId('67e5bc3b910a3e5deec82d46'),
    Name: 'NICER',
    LaunchDate: ISODate('2017-06-03T00:00:00.000Z'),
    Age: 6,
    Organization: 'NASA',
    submitted_by: '230953450_priyanshnanan'
  }
]
230953450_DB> 
```

- Deleting documents

deleteMany()

Question-> Delete all the Telescopes belonging to ESA.

```
db.getCollection("230953450_Collection").find({Organization: "ESA"},{_id: false, Name: true})
db.getCollection("230953450_Collection").deleteMany({Organization: "ESA"})
db.getCollection("230953450_Collection").find({Organization: "ESA"},{_id: false, Name: true})
```



The screenshot shows the MongoDB Shell interface with the following content:

```
230953450_DB> db.getCollection("230953450_Collection").find({Organization: "ESA"},{_id: false, Name: true})
[ { Name: 'Euclid' }, { Name: 'XMM Newton' } ]
230953450_DB> db.getCollection("230953450_Collection").deleteMany({Organization: "ESA"})
{ acknowledged: true, deletedCount: 2 }
230953450_DB> db.getCollection("230953450_Collection").find({Organization: "ESA"},{_id: false, Name: true})
[]
230953450_DB> 
```

deleteOne()

Question-> Delete TESS from the DB.

```
db.getCollection("230953450_Collection").deleteOne({Name: "TESS"})
```

```
230953450_DB> db.getCollection("230953450_Collection").find({}, {_id: false, Name: true})
[
  { Name: 'Chandra' },
  { Name: 'Fermin Gamma-Ray space telescope' },
  { Name: 'NEOWISE' },
  { Name: 'NICER' },
  { Name: 'XRISM' },
  { Name: 'NuSTAR' },
  { Name: 'James Webb Telescope' }
]
230953450_DB> db.getCollection("230953450_Collection").deleteOne({Name: "TESS"})
{ acknowledged: true, deletedCount: 0 }
230953450_DB> db.getCollection("230953450_Collection").find({}, {_id: false, Name: true})
[
  { Name: 'Chandra' },
  { Name: 'Fermin Gamma-Ray space telescope' },
  { Name: 'NEOWISE' },
  { Name: 'NICER' },
  { Name: 'XRISM' },
  { Name: 'NuSTAR' },
  { Name: 'James Webb Telescope' }
]
230953450_DB> █
```