Name: Diksha Utekar **D15A/63**

Experiment – 6: MongoDB

1) **Aim:** To study CRUD operations in MongoDB
2) **Problem Statement:**

A) Create a database, create a collection, insert data, query and manipulate data using various MongoDB operations.

1. Create a database named "inventory".
2. Create a collection named "products" with the fields: (ProductID, ProductName, Category, Price, Stock).
3. Insert 10 documents into the "products" collection.
4. Display all the documents in the "products" collection.
5. Display all the products in the "Electronics" category.
6. Display all the products in ascending order of their names.
7. Display the details of the first 5 products.
8. Display the categories of products with a specific name.
9. Display the number of products in the "Electronics" category.
10. Display all the products without showing the "_id" field.
11. Display all the distinct categories of products.
12. Display products in the "Electronics" category with prices greater than 50 but less than 100.
13. Change the price of a product.
14. Delete a particular product entry.

3) **Theory:**

A. Describe some of the features of MongoDB?

- **Flexible Schema:** MongoDB is schema-less, meaning it can store documents with different structures in the same collection.
- **Scalability:** It supports horizontal scaling using sharding.
- **High Performance:** Efficient for read and write operations.
- **Replication:** Provides data redundancy and high availability using replica sets.
- **Indexing:** Supports various types of indexes for efficient query execution.
- **Aggregation Framework:** Allows powerful data aggregation and transformation.

B. What are Documents and Collections in MongoDB?

- **Document:** A document in MongoDB is a JSON-like data structure called BSON (Binary JSON). It consists of field-value pairs, similar to a row in a relational database.
- **Collection:** A collection is a group of MongoDB documents, equivalent to a table in relational databases. Documents within a collection can have varying structures.

C. When to use MongoDB?

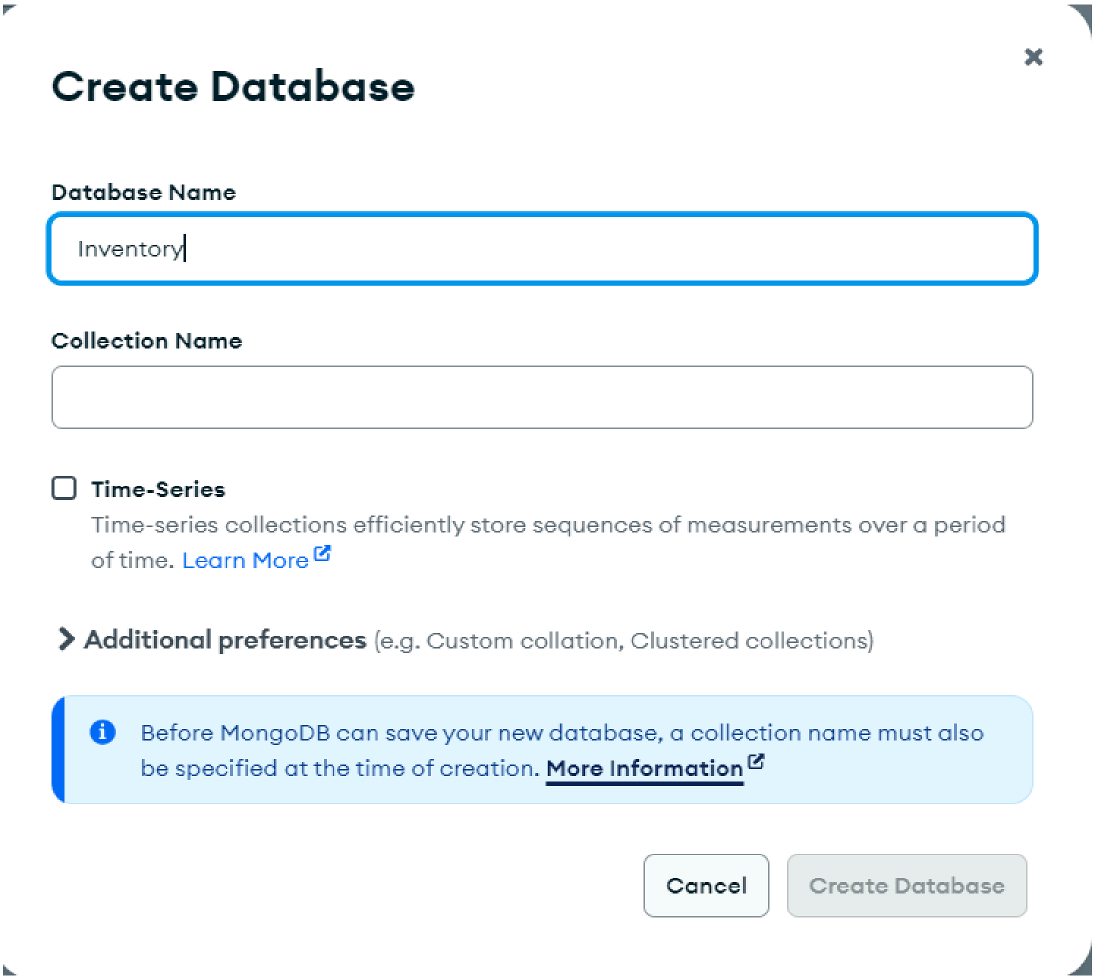
- When dealing with large volumes of unstructured or semi-structured data.
- For applications requiring horizontal scalability.
- When frequent schema changes are expected.
- For real-time analytics and content management systems.

D. What is Sharding in MongoDB?

- **Sharding** is a method of horizontally partitioning data across multiple servers to handle large datasets.
- MongoDB uses **shards** to store subsets of data, ensuring improved read and write performance.
- A **Shard Key** is used to distribute data evenly across shards.

4) Output:

1) Create a database and collection



Create Database

Database Name

Inventory

Collection Name

☐ Time-Series

Time-series collections efficiently store sequences of measurements over a period of time. Learn More

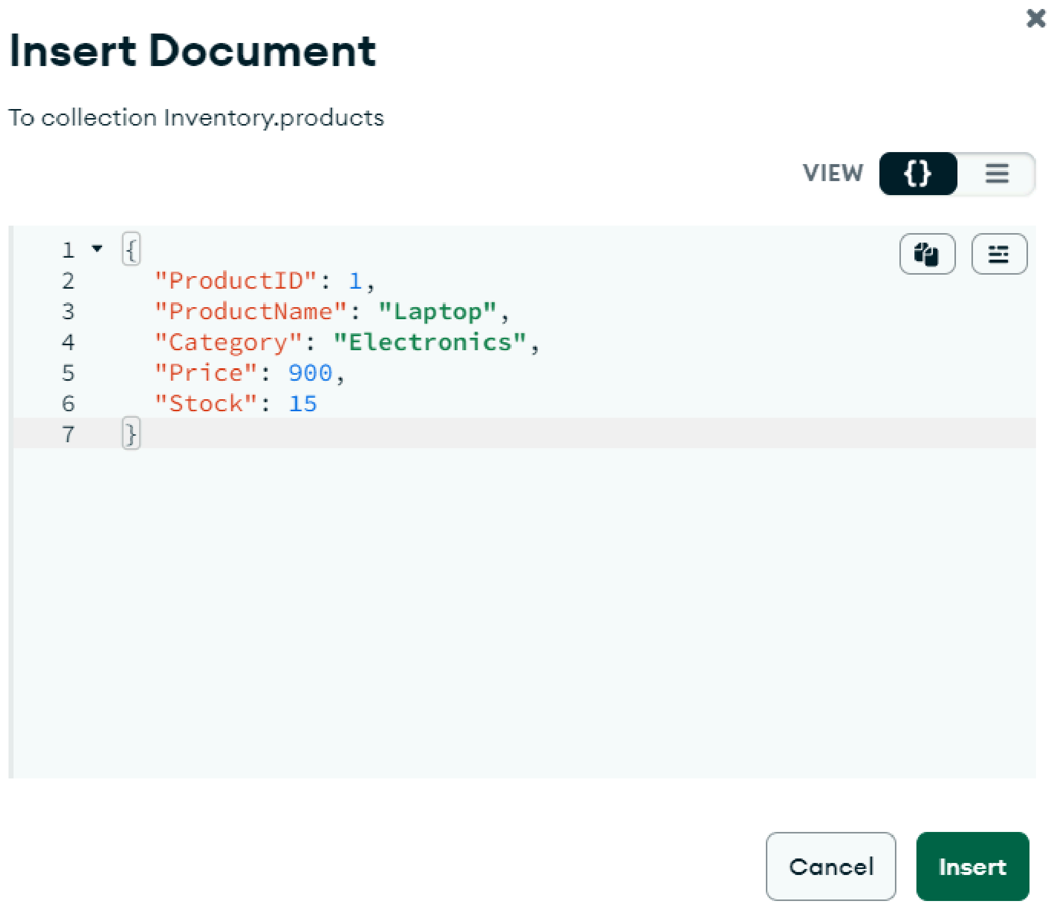
> Additional preferences (e.g. Custom collation, Clustered collections)

Before MongoDB can save your new database, a collection name must also be specified at the time of creation. More Information

Create Collection

Collection Name

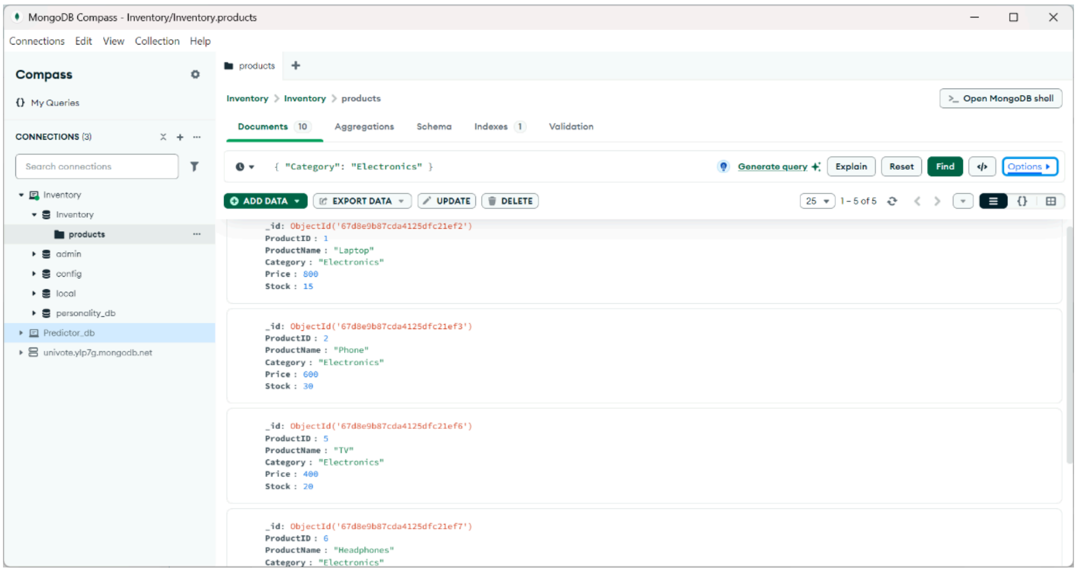
2) Insert Data



Insert Document

To collection Inventory.products

```
{
    "ProductID": 1,
    "ProductName": "Laptop",
    "Category": "Electronics",
    "Price": 900,
    "Stock": 15
}
```



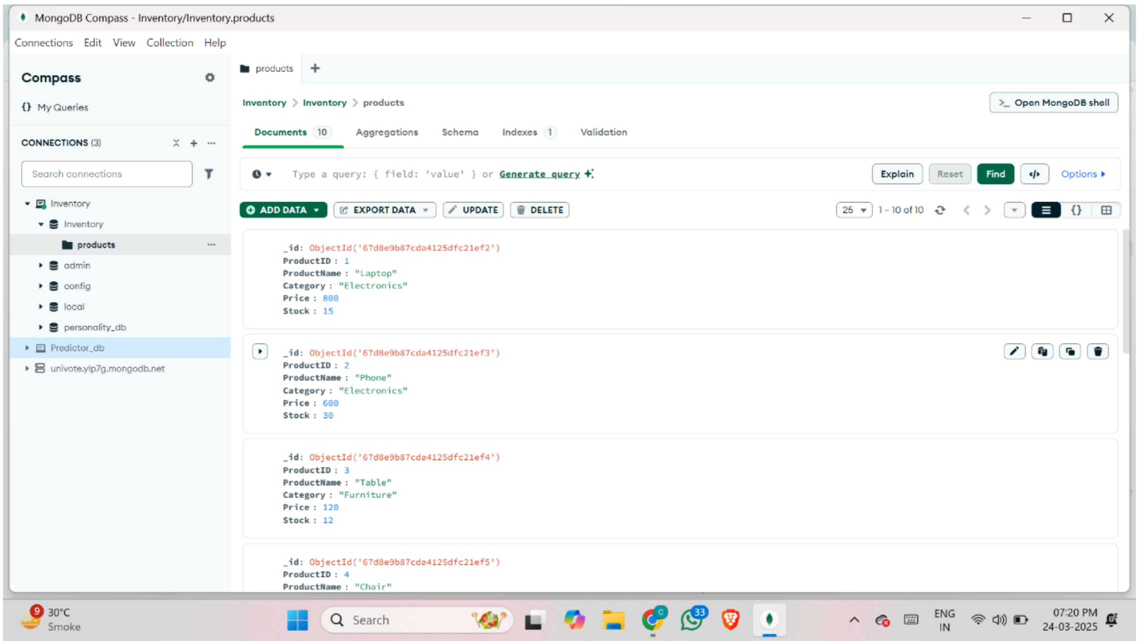
MongoDB Compass - Inventory/Inventory.products

```
{ "Category": "Electronics" }
```

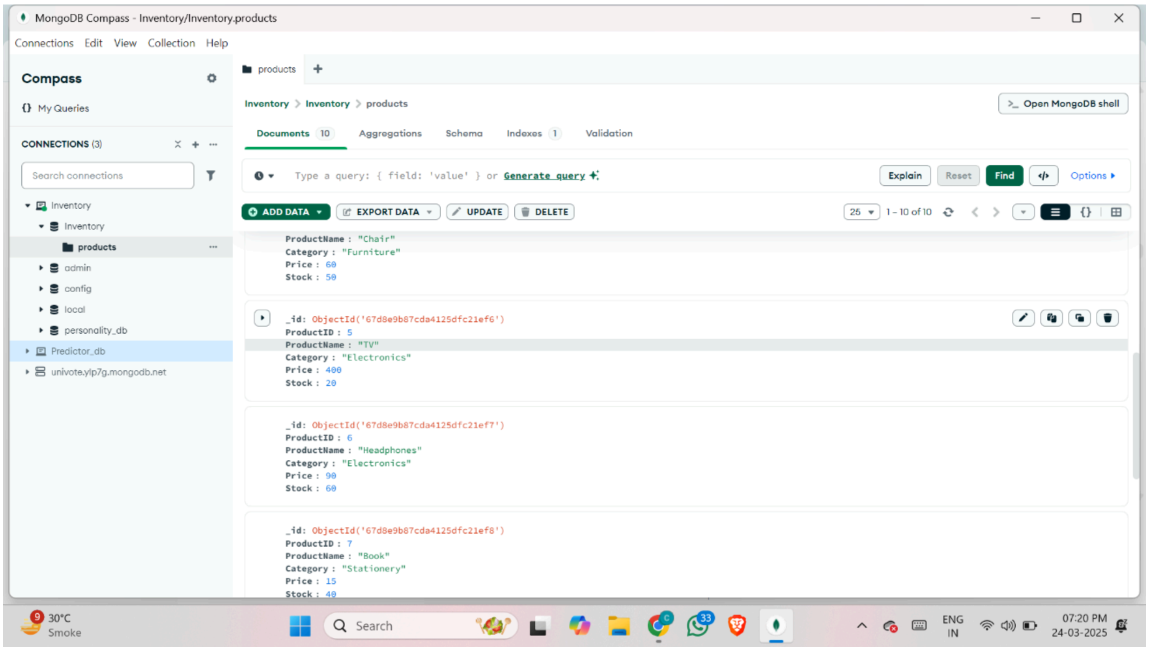
```
_id: ObjectId('67d8e9b87cda4125dfc21ef2')
ProductID : 1
ProductName : "Laptop"
Category : "Electronics"
Price : 800
Stock : 15

_id: ObjectId('67d8e9b87cda4125dfc21ef3')
ProductID : 2
ProductName : "Phone"
Category : "Electronics"
Price : 600
Stock : 30

_id: ObjectId('67d8e9b87cda4125dfc21ef6')
ProductID : 5
ProductName : "TV"
Category : "Electronics"
Price : 400
Stock : 20

_id: ObjectId('67d8e9b87cda4125dfc21ef7')
ProductID : 6
ProductName : "Headphones"
Category : "Electronics"
```

3) Display all Documents

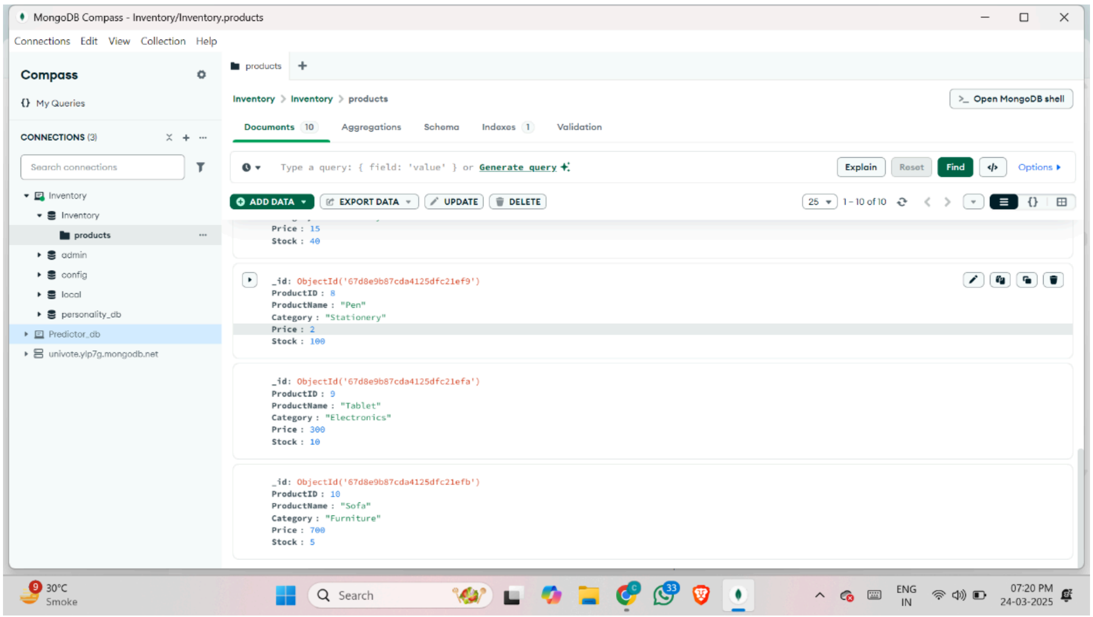
Name: Diksha Utekar **D15A/63**



```
_id: ObjectId('67d8e9b87cda4125dfc21ef2')
ProductID : 1
ProductName : "Laptop"
Category : "Electronics"
Price : 800
Stock : 15

_id: ObjectId('67d8e9b87cda4125dfc21ef3')
ProductID : 2
ProductName : "Phone"
Category : "Electronics"
Price : 600
Stock : 30

_id: ObjectId('67d8e9b87cda4125dfc21ef4')
ProductID : 3
ProductName : "Table"
Category : "Furniture"
Price : 120
Stock : 12

_id: ObjectId('67d8e9b87cda4125dfc21ef5')
ProductID : 4
ProductName : "Chair"
```



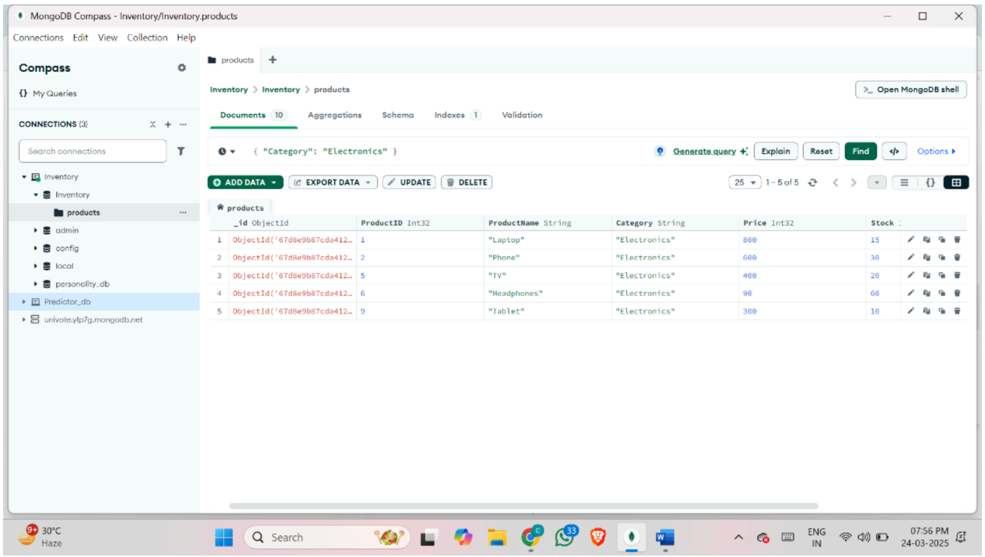
```
ProductName : "Chair"
Category : "Furniture"
Price : 60
Stock : 50

_id: ObjectId('67d8e9b87cda4125dfc21ef6')
ProductID : 5
ProductName : "TV"
Category : "Electronics"
Price : 400
Stock : 20

_id: ObjectId('67d8e9b87cda4125dfc21ef7')
ProductID : 6
ProductName : "Headphones"
Category : "Electronics"
Price : 90
Stock : 60

_id: ObjectId('67d8e9b87cda4125dfc21ef8')
ProductID : 7
ProductName : "Book"
Category : "Stationery"
Price : 15
Stock : 40
```



```
Price : 15
Stock : 40

_id: ObjectId('67d8e9b87cda4125dfc21ef9')
ProductID : 8
ProductName : "Pen"
Category : "Stationery"
Price : 2
Stock : 100

_id: ObjectId('67d8e9b87cda4125dfc21efa')
ProductID : 9
ProductName : "Tablet"
Category : "Electronics"
Price : 300
Stock : 10

_id: ObjectId('67d8e9b87cda4125dfc21efb')
ProductID : 10
ProductName : "Sofa"
Category : "Furniture"
Price : 700
Stock : 5
```

Name: Diksha Utekar **D15A/63**

4) Display all Products in the Electronics Category



```
{ "Category": "Electronics" }
```

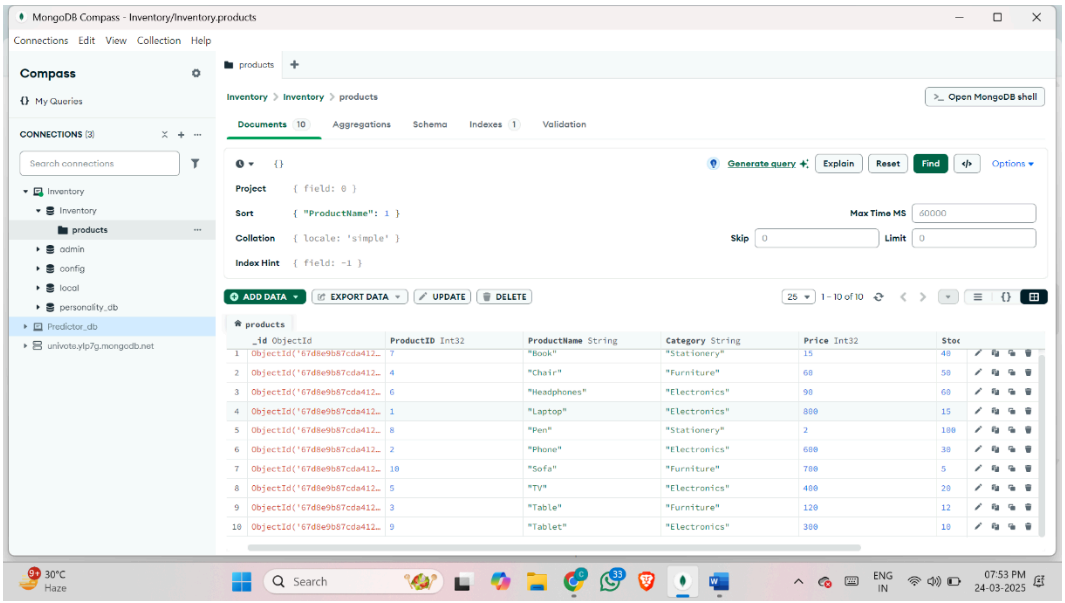
25 1 - 5 of 5

products

	_id ObjectId	ProductID Int32	ProductName String	Category String	Price Int32	Stock
1	ObjectId('67d8e9b87cda412…	1	"Laptop"	"Electronics"	800	15
2	ObjectId('67d8e9b87cda412…	2	"Phone"	"Electronics"	600	30
3	ObjectId('67d8e9b87cda412…	5	"TV"	"Electronics"	400	20
4	ObjectId('67d8e9b87cda412…	6	"Headphones"	"Electronics"	90	60
5	ObjectId('67d8e9b87cda412…	9	"Tablet"	"Electronics"	300	10

30°C Haze 07:56 PM 24-03-2025

5) Display Products in Ascending Order of Names



```
{}
Project     { field: 0 }
Sort        { "ProductName": 1 }
Collation   { locale: 'simple' }
Index Hint  { field: -1 }
```

Max Time MS 60000
Skip 0
Limit 0

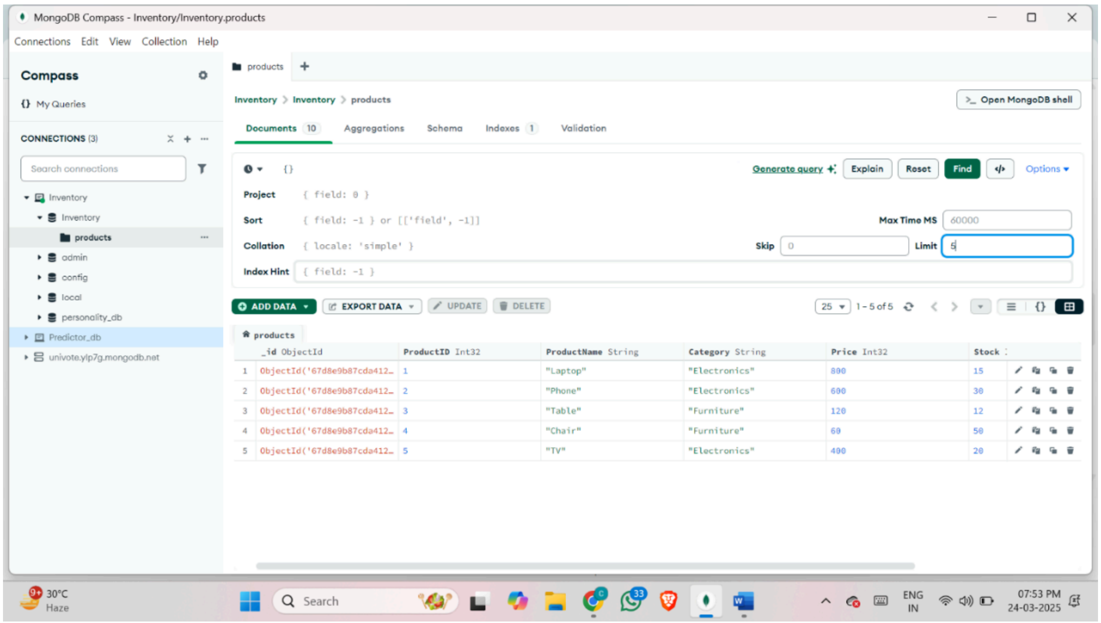
25 1 - 10 of 10

products

	_id ObjectId	ProductID Int32	ProductName String	Category String	Price Int32	Stoc
1	ObjectId('67d8e9b87cda412…	7	"Book"	"Stationery"	15	40
2	ObjectId('67d8e9b87cda412…	4	"Chair"	"Furniture"	60	50
3	ObjectId('67d8e9b87cda412…	6	"Headphones"	"Electronics"	90	60
4	ObjectId('67d8e9b87cda412…	1	"Laptop"	"Electronics"	800	15
5	ObjectId('67d8e9b87cda412…	8	"Pen"	"Stationery"	2	100
6	ObjectId('67d8e9b87cda412…	2	"Phone"	"Electronics"	600	30
7	ObjectId('67d8e9b87cda412…	10	"Sofa"	"Furniture"	700	5
8	ObjectId('67d8e9b87cda412…	5	"TV"	"Electronics"	400	20
9	ObjectId('67d8e9b87cda412…	3	"Table"	"Furniture"	120	12
10	ObjectId('67d8e9b87cda412…	9	"Tablet"	"Electronics"	300	10

30°C Haze 07:53 PM 24-03-2025

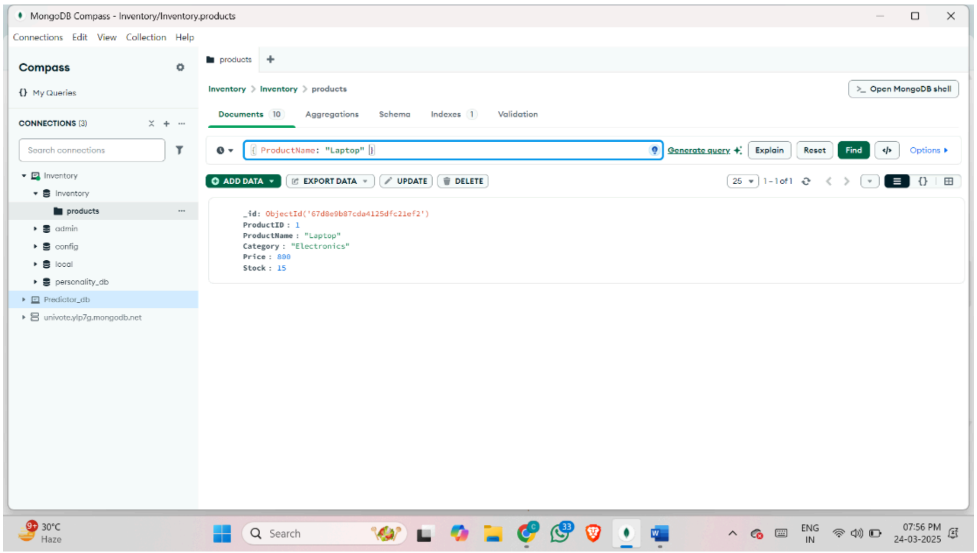
6) Display First 5 Products



```
{}
Project     { field: 0 }
Sort        { field: -1 } or [['field', -1]]          Max Time MS  60000
Collation   { locale: 'simple' }          Skip  0     Limit  5
Index Hint  { field: -1 }
```

	_id ObjectId	ProductID Int32	ProductName String	Category String	Price Int32	Stock
1	ObjectId('67d8e9b87cda412…	1	"Laptop"	"Electronics"	800	15
2	ObjectId('67d8e9b87cda412…	2	"Phone"	"Electronics"	600	30
3	ObjectId('67d8e9b87cda412…	3	"Table"	"Furniture"	120	12
4	ObjectId('67d8e9b87cda412…	4	"Chair"	"Furniture"	60	50
5	ObjectId('67d8e9b87cda412…	5	"TV"	"Electronics"	400	20

7) Display Products with a Specific Name

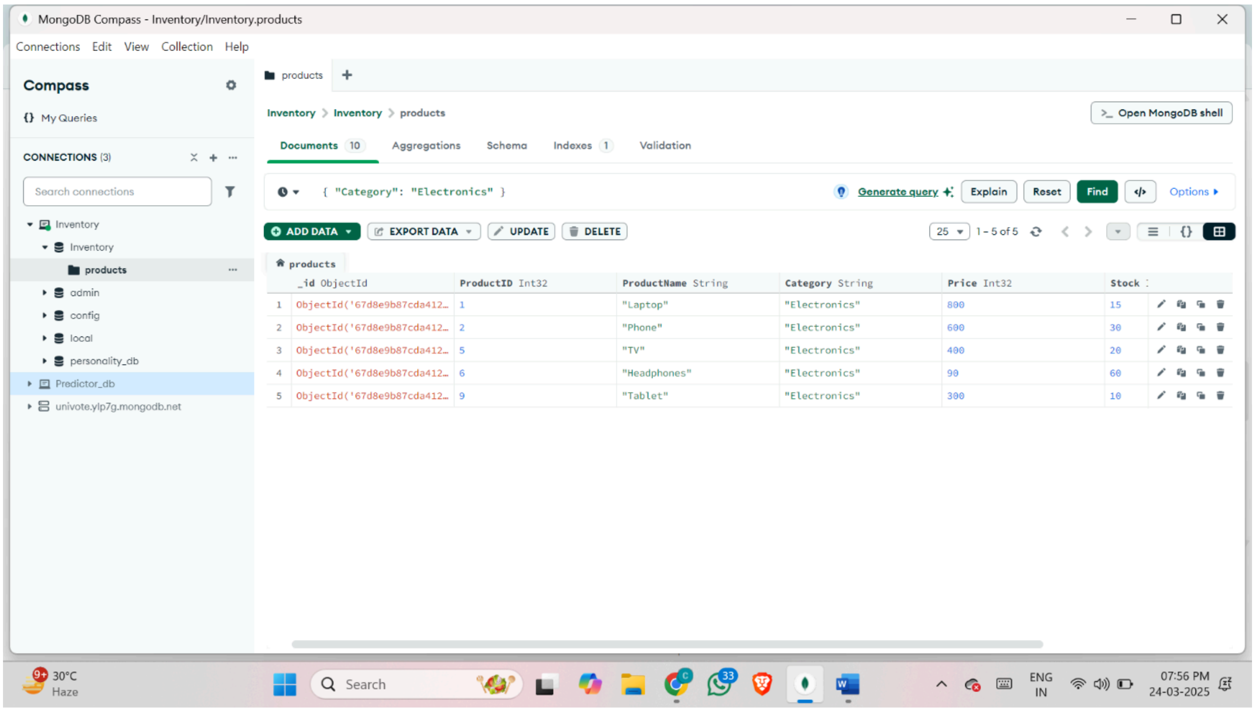


```
{ ProductName: "Laptop" }
```

```
_id: ObjectId('67d8e9b87cda4125dfc21ef2')
ProductID : 1
ProductName : "Laptop"
Category : "Electronics"
Price : 800
Stock : 15
```

Name: Diksha Utekar **D15A/63**

8) Count Products in Electronics Category

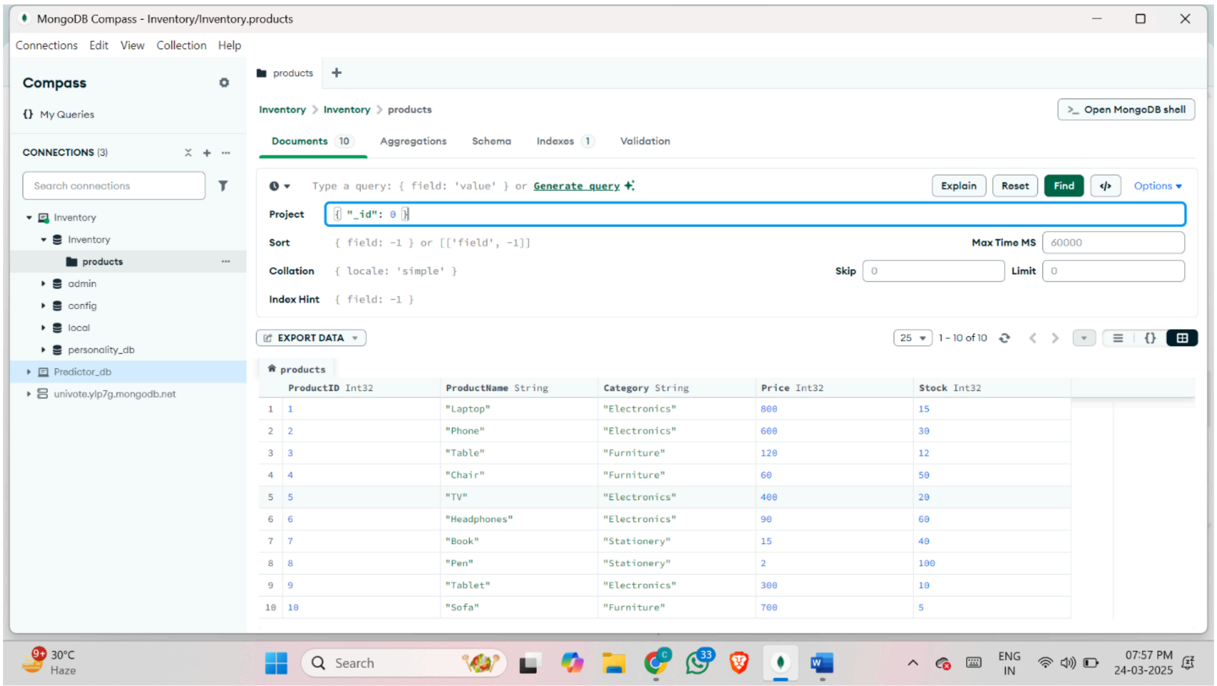


```
{ "Category": "Electronics" }
```

products

	_id ObjectId	ProductID Int32	ProductName String	Category String	Price Int32	Stock
1	ObjectId('67d8e9b87cda412…	1	"Laptop"	"Electronics"	800	15
2	ObjectId('67d8e9b87cda412…	2	"Phone"	"Electronics"	600	30
3	ObjectId('67d8e9b87cda412…	5	"TV"	"Electronics"	400	20
4	ObjectId('67d8e9b87cda412…	6	"Headphones"	"Electronics"	90	60
5	ObjectId('67d8e9b87cda412…	9	"Tablet"	"Electronics"	300	10

9) Hide the "_id" Field



Project `{ "_id": 0 }`

Sort `{ field: -1 } or [['field', -1]]`

Max Time MS 60000

Collation `{ locale: 'simple' }`

Skip 0

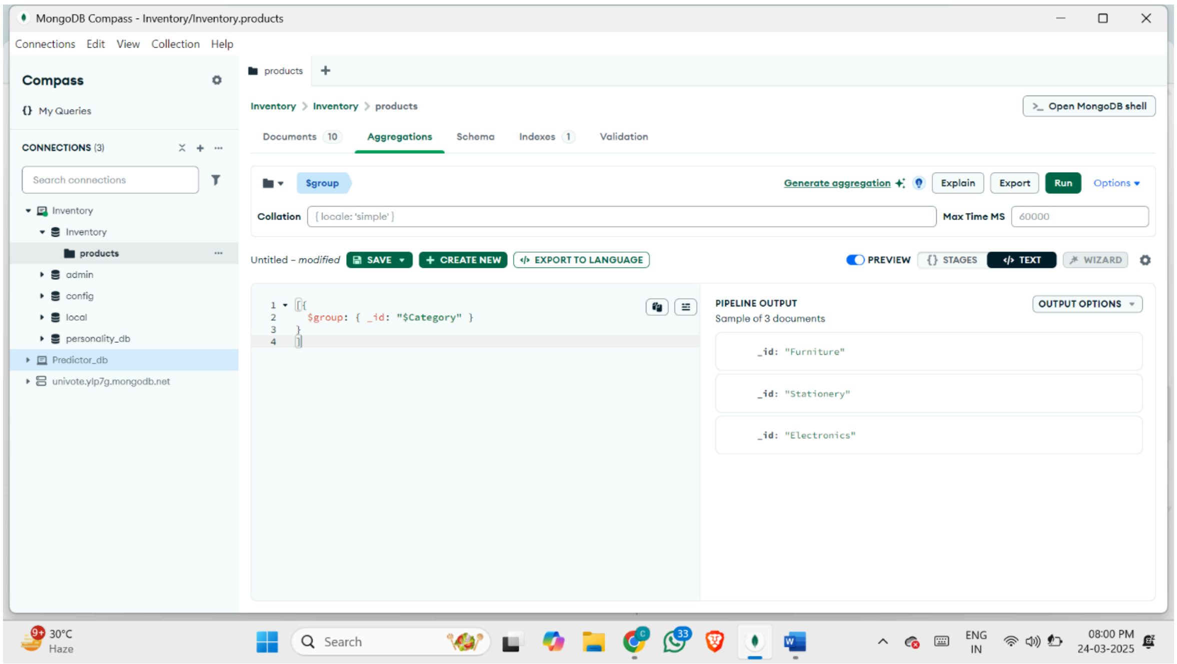
Limit 0

Index Hint `{ field: -1 }`

products

	ProductID Int32	ProductName String	Category String	Price Int32	Stock Int32
1	1	"Laptop"	"Electronics"	800	15
2	2	"Phone"	"Electronics"	600	30
3	3	"Table"	"Furniture"	120	12
4	4	"Chair"	"Furniture"	60	50
5	5	"TV"	"Electronics"	400	20
6	6	"Headphones"	"Electronics"	90	60
7	7	"Book"	"Stationery"	15	40
8	8	"Pen"	"Stationery"	2	100
9	9	"Tablet"	"Electronics"	300	10
10	10	"Sofa"	"Furniture"	700	5

10) Display Distinct Categories

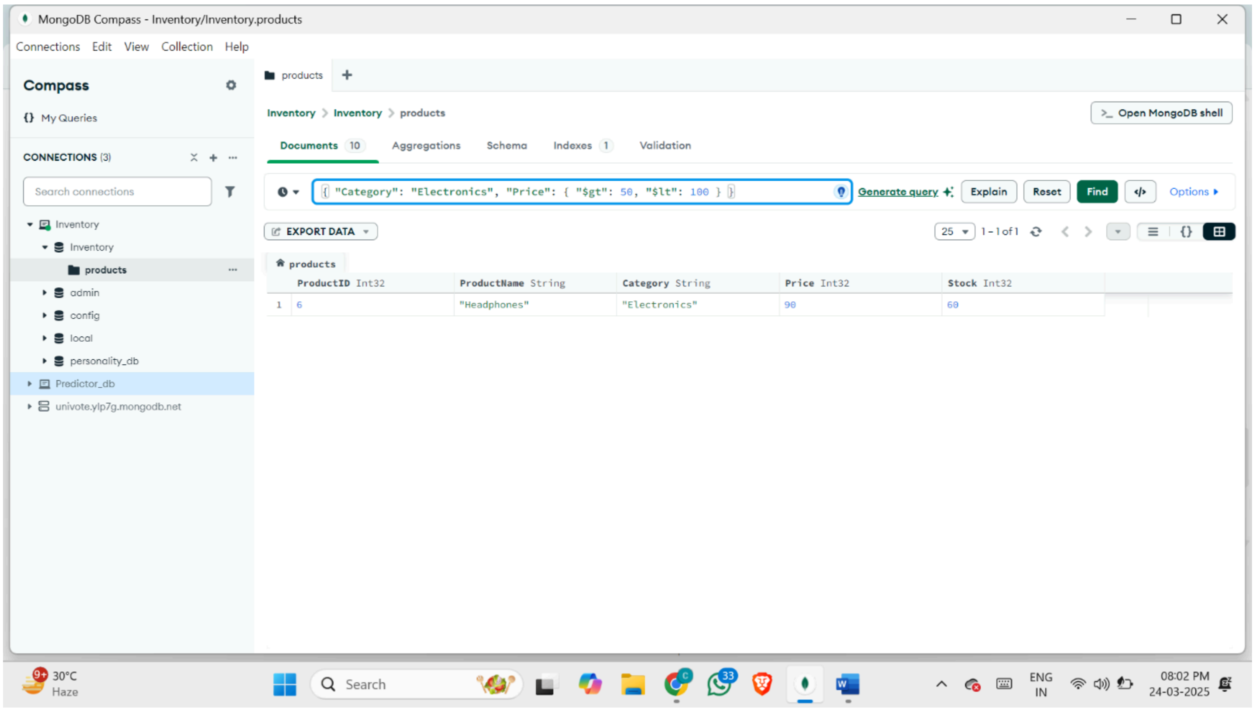


```
[{
  $group: { _id: "$Category" }
}
]
```

PIPELINE OUTPUT
Sample of 3 documents

```
_id: "Furniture"
_id: "Stationery"
_id: "Electronics"
```

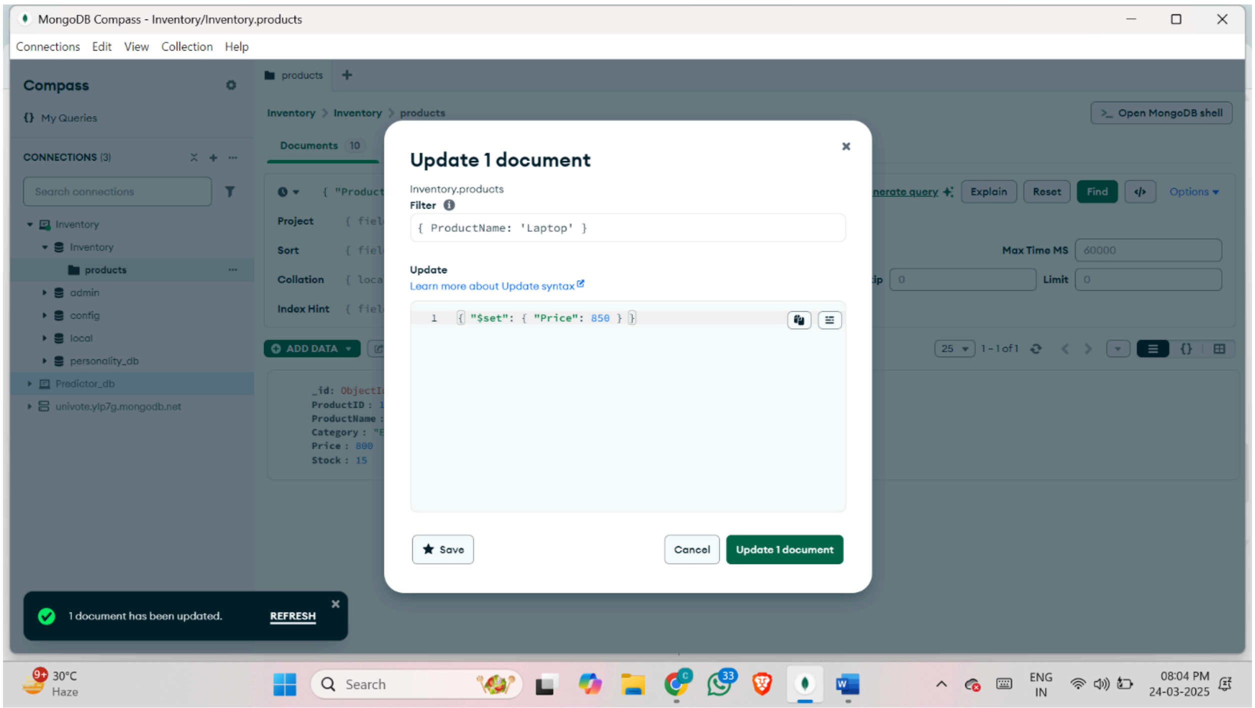
11) Display Products in Electronics Category with Price > 50 and < 100



```
{ "Category": "Electronics", "Price": { "$gt": 50, "$lt": 100 } }
```

	ProductID Int32	ProductName String	Category String	Price Int32	Stock Int32
1	6	"Headphones"	"Electronics"	90	60

12) Change the Price of a Product



Update 1 document

Inventory.products

Filter

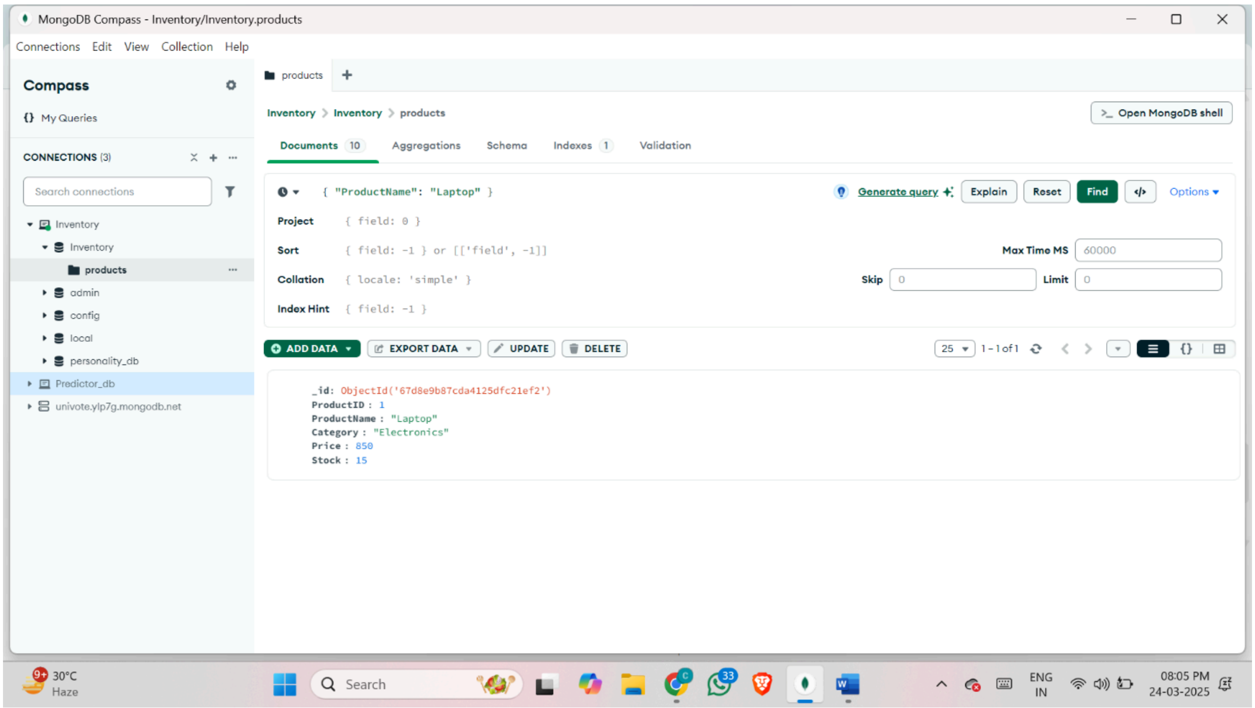
```
{ ProductName: 'Laptop' }
```

Update

Learn more about Update syntax

```
{ "$set": { "Price": 850 } }
```

1 document has been updated. REFRESH



```
{ "ProductName": "Laptop" }
```

Project { field: 0 }

Sort { field: -1 } or [['field', -1]]

Collation { locale: 'simple' }

Index Hint { field: -1 }

Max Time MS 60000

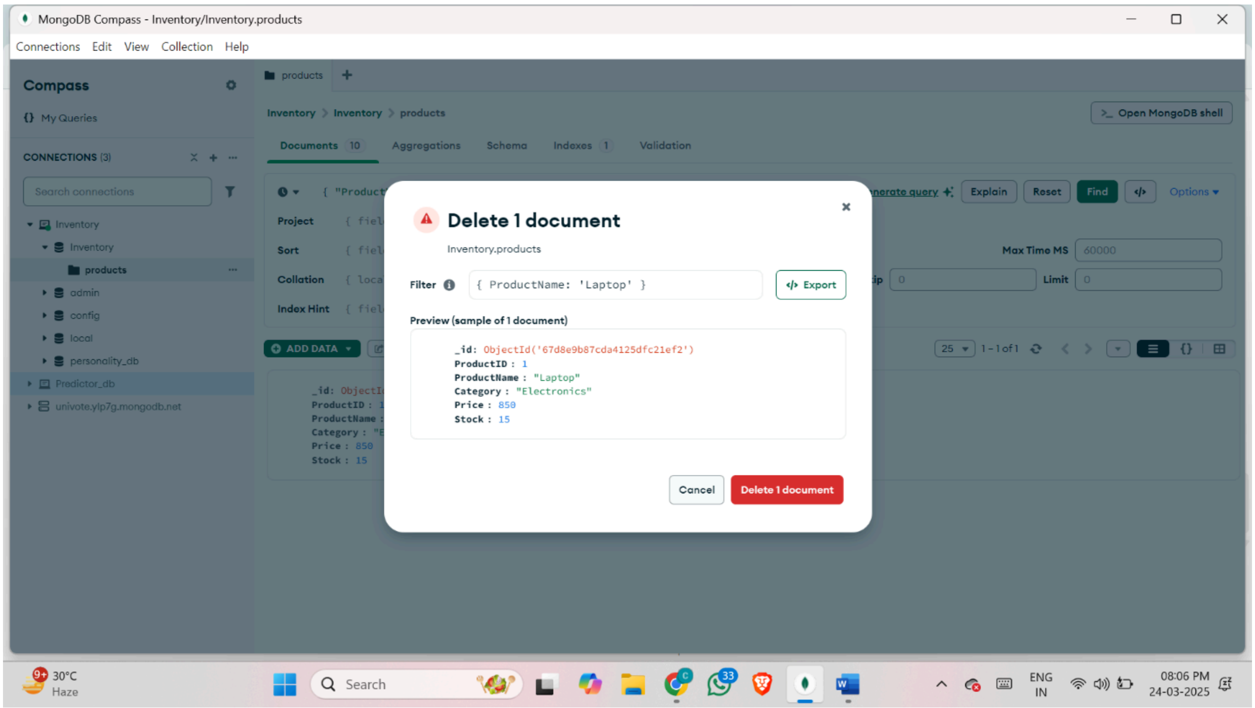
Skip 0

Limit 0

```
_id: ObjectId('67d8e9b87cda4125dfc21ef2')
ProductID : 1
ProductName : "Laptop"
Category : "Electronics"
Price : 850
Stock : 15
```

Name: Diksha Utekar **D15A/63**

13) Delete a Product



MongoDB Compass - Inventory/Inventory.products

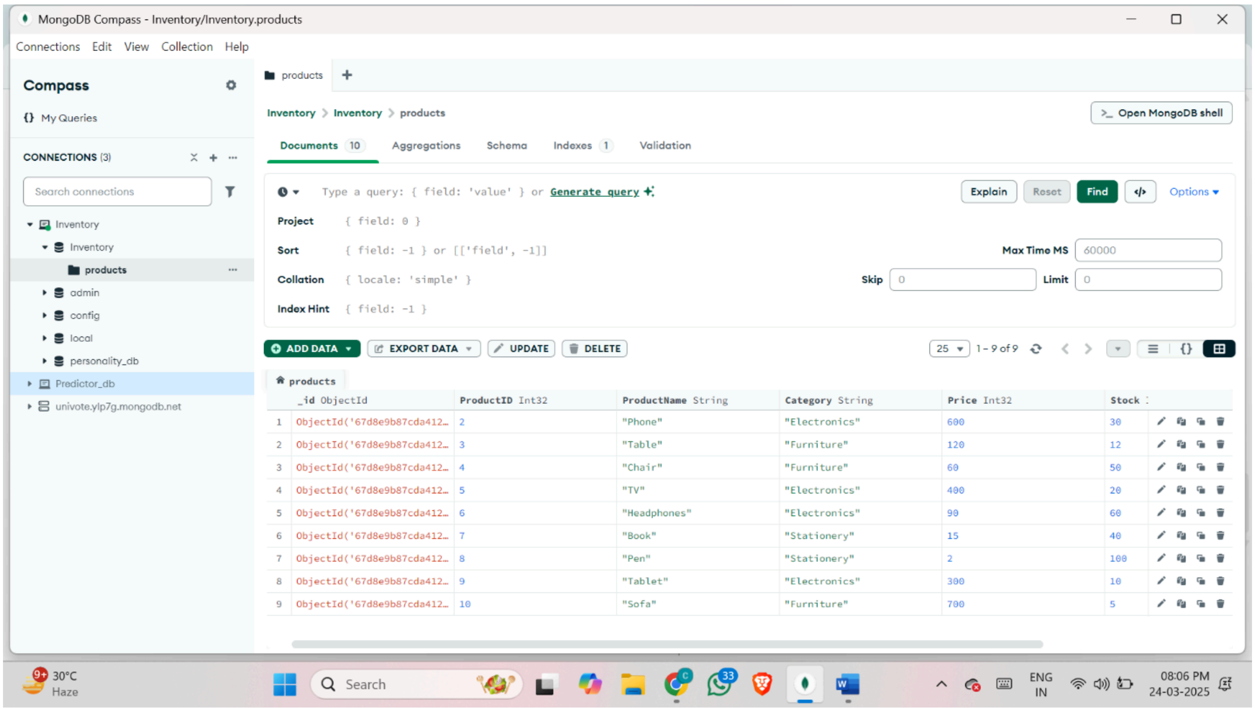
Delete 1 document

Inventory.products

Filter `{ ProductName: 'Laptop' }`

Preview (sample of 1 document)

```
_id: ObjectId('67d8e9b87cda4125dfc21ef2')
ProductID : 1
ProductName : "Laptop"
Category : "Electronics"
Price : 850
Stock : 15
```



MongoDB Compass - Inventory/Inventory.products

Inventory > Inventory > products

Project `{ field: 0 }`
Sort `{ field: -1 } or [['field', -1]]`
Collation `{ locale: 'simple' }`
Index Hint `{ field: -1 }`
Max Time MS 60000
Skip 0
Limit 0

1 - 9 of 9

products

	_id ObjectId	ProductID Int32	ProductName String	Category String	Price Int32	Stock
1	ObjectId('67d8e9b87cda412…	2	"Phone"	"Electronics"	600	30
2	ObjectId('67d8e9b87cda412…	3	"Table"	"Furniture"	120	12
3	ObjectId('67d8e9b87cda412…	4	"Chair"	"Furniture"	60	50
4	ObjectId('67d8e9b87cda412…	5	"TV"	"Electronics"	400	20
5	ObjectId('67d8e9b87cda412…	6	"Headphones"	"Electronics"	90	60
6	ObjectId('67d8e9b87cda412…	7	"Book"	"Stationery"	15	40
7	ObjectId('67d8e9b87cda412…	8	"Pen"	"Stationery"	2	100
8	ObjectId('67d8e9b87cda412…	9	"Tablet"	"Electronics"	300	10
9	ObjectId('67d8e9b87cda412…	10	"Sofa"	"Furniture"	700	5