PART 2:

- **Add - Update – Delete:**

Let's load the document:

- Download the student csv from this link
- Import the data to the collection created link
- You should be able to see the uploaded data in mongo compass.

Installation of mango shell:

- Mongo Shell download link
- All the work is expected to do it in mongo shell not in mongo compass

Few commands to check after download od mango shell:

Command	Expected Output	Notes
show dbs	admin 40.00 KiB config 72.00 KiB db 128.00 KiB local 40.00 KiB	All Databases are shown
use db	switched to db db	Connect and use db
show collections	Students	Show all tables
db.foo.insert({"bar": "baz"})		Insert a record to collection. Create Collection if not exists

Command	Notes
db.foo.batchInsert([{"_id": 0}, {"_id": 1}, {"_id": 2}])	Insert more than one document
db.foo.find()	Print all rows
db.foo.remove()	Remove foo table

❖ **Key points**

- **Document:** A record in MongoDB is a document and are stored in BSON (Binary JSON) format, which allows for a rich set of data types and structures.
- **Collections:** A collection is a group of documents. MongoDB automatically creates the collections when the first document is inserted if it does not already exist.
- **Database:** A database is a container for collections.
- **Datatype:** each document will be in JSON format which will be as follows. Where each attributes inside can be of multiple data types.

```
{
    "name" : "John Doe",
    "address" : {
        "street" : "123 Park Street",
        "city" : "Anytown",
        "state" : "NY"
    }
}
```

[A database contains a set of collections each collection contains a set of documents]

❖ **AND Operator:**

```
db> db.stu.find({
... $and:[
... {home_city:"City 3"},
... {blood_group:"B+"}
... ]
... })
```

Let' see the output:


```
{
  _id: ObjectId('665759022abe60278b88a01b'),
  name: 'Student 165',
  age: 20,
  courses: "['English', 'History', 'Mathematics', 'Computer Science']",
  gpa: 2.92,
  home_city: 'City 3',
  blood_group: 'B+',
  is_hotel_resident: true
},
{
  _id: ObjectId('665759022abe60278b88a167'),
  name: 'Student 237',
  age: 19,
  courses: "['Physics', 'Mathematics', 'English', 'Computer Science']",
  gpa: 2.65,
  home_city: 'City 3',
  blood_group: 'B+',
  is_hotel_resident: false
},
```


Here, the $and operator checks for students belonging to "City 3" and having a blood group "B+" in that specified home city.

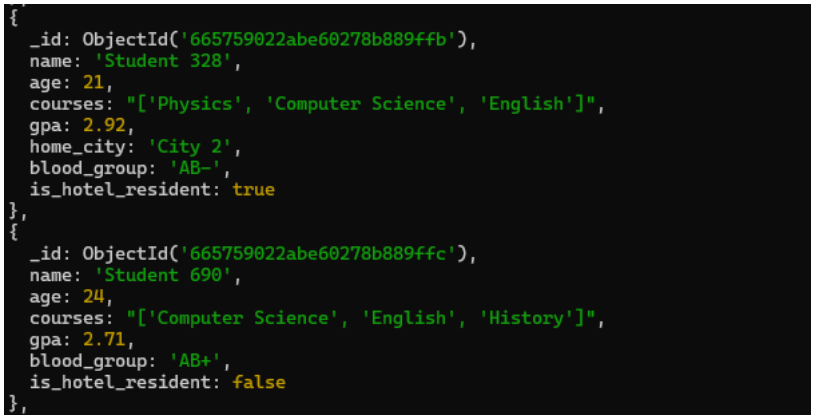
```
db> db.stu.find({ $and: [ { home_city: "City 3" }, {blood_group:"B+"} ] }).count()
5
db>
```

Here , only 5 students from City 3 having a blood group "B+"

❖ **OR:**

```
// Find all students who are hotel residents OR have a GPA less than 3.
db.students.find({
  $or: [
    { is_hotel_resident: true },
    { gpa: { $lt: 3.0 } }
  ]
});
```

Let' see the output:



Here the $or operator checks for students either belonging to "hotel resident" or checks for student having a "gpa less than 3.0"

```
db> db.stu.find({ $or: [ { is_hotel_resident: true }, { gpa: { $lt: 3.0 } }] }).count()
374
db>
```

Here the output of 374 students having either gpa less than 3.0 or present in hotel resident.

- **Add - Update -Delete:**

CRUD:

- C-create/insert
- R-remove
- U-update
- D-delete

This is applicable for a Collection (Table) or a Document (Row)

- **INSERT:**

```
db> const stuData={
... "name":"Chandana",
... "age":20,
... "courses":["Mathematics","Computer Science","English"],
... "gpa":3.8,
... "home_city":"New York",
... "blood_group":"B+",
... "is_hostel_resident":true
... };

db> db.stu.insertOne(stuData);
{
  acknowledged: true,
  insertedId: ObjectId('6661d7bd48f9e36487cdcdf6')
}
db> db.stu.find().count()
501
```

Here, we are inserting a new student data into a collection.

And after mentioning the details of student we are using the command called insertOne to insert one student details.

After it has successfully uploaded, we can check the count for confirmation.

To insert the data into the collection we use the following command:

Const stuData= {

“name”: ”Chandana”,

“age”:”20”,

“course”: [“Mathematics” “Computer Science” “English”],

“gpa”:3.8,

‘home_city’: ”New York”,

“blood_group”: ”B+”,

“is_hotel_resident”: true

}

And after mentioning the details of the student, we use the

‘insertOne’ command to insert a single student's details.

After it has successfully uploaded, we can check the count for confirmation.

- **Update:**

Here, we can update any data that are present in the collections.

To update we use ‘$set’ command.

```
db> db.stu.updateOne({name:"Chandana"},{$set:{gpa:2.8}});
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}
```

- **Delete:**

  The delete operation is used to delete the data present in the given collection.

```
db> db.stu.deleteOne({name:"Chandana"})
{ acknowledged: true, deletedCount: 1 }
db>
```

- **Projection:**

  - This is used when we don't need all columns or attributes.
  - The projection document is used as the second argument to the find method.
  - Include field names with a value of 1 to specify fields to be returned.

Get Selected Attributes

```
db> db.stu.find({},{name:1,gpa:1})
[
  {
    _id: ObjectId('665759022abe60278b889fe7'),
    name: 'Student 948',
    gpa: 3.44
  },
  {
    _id: ObjectId('665759022abe60278b889fe8'),
    name: 'Student 157',
    gpa: 2.27
  },
  {
    _id: ObjectId('665759022abe60278b889fe9'),
    name: 'Student 316',
    gpa: 2.32
  },
```

In the above example it shows only the name and gpa , because the command is given as 'name:1' and 'gpa:1'.

Ignore Attributes:

Here, we have ignored the Id and home city of a student.

```
db> db.stu.find({},{_id:0,home_city:0});
[
  {
    name: 'Student 948',
    age: 19,
    courses: "['English', 'Computer Science', 'Physics', 'Mathematics']",
    gpa: 3.44,
    blood_group: 'O+',
    is_hotel_resident: true
  },
  {
    name: 'Student 157',
    age: 20,
    courses: "['Physics', 'English']",
    gpa: 2.27,
    blood_group: 'O-',
    is_hotel_resident: true
  },
```

- **Benefits of Projection:**

  - Reduced data transferred between the database and your application.
  - Simplifies your code by focusing on the specific information you need.
  - Improve query performance by retrieving only necessary data.

- **Limit And Selectors:**

  - **Limit:**

    The limit operator is used with the find method. It's chained after the filter criteria or any sorting operations.

    - Syntax:

```
db.collection.find({filter},
{projection}).limit(number);
```

```
db> db.stu.find({},{_id:0,home_city:0}).limit(1)
[
  {
    name: 'Student 948',
    age: 19,
    courses: "['English', 'Computer Science', 'Physics', 'Mathematics']",
    gpa: 3.44,
    blood_group: 'O+',
    is_hotel_resident: true
  }
]
db>
```

Here, to get only first document we have used the limit(1);

➢ Selectors:

- **Comparison greater than(gt) and less than(lt):**

To find all the students with age greater then 20

```
db> db.stu.find({age:{$gt:20}});
[
  {
    _id: ObjectId('665759022abe60278b889fea'),
    name: 'Student 346',
    age: 25,
    courses: "['Mathematics', 'History', 'English']",
    gpa: 3.31,
    home_city: 'City 8',
    blood_group: 'O-',
    is_hotel_resident: true
  },
  {
    _id: ObjectId('665759022abe60278b889feb'),
    name: 'Student 930',
    age: 25,
    courses: "['English', 'Computer Science', 'Mathematics', 'History']",
    gpa: 3.63,
    home_city: 'City 3',
    blood_group: 'A-',
    is_hotel_resident: true
  },
```

```
db> db.stu.find({age:{$lt:20}}).count()
124
db> db.stu.find({age:{$gt:20}}).count()
310
db>
```

Here, we have 310 students who are older than 20 and 124 students who are elder than 20.

- **AND operator:**

AND operation is used to find the specific details about the collection.Here is some Examples on AND operation. To find students from “city 2” with blood group “B+”.

```
db> db.stu.find({
... $and:[
... {home_city:"City 2"},
... {blood_group:"B+"}
... ]
... });
[
  {
    _id: ObjectId('665759022abe60278b889fff'),
    name: 'Student 504',
    age: 21,
    courses: "['Physics', 'Computer Science', 'English', 'Mathematics']",
    gpa: 2.42,
    home_city: 'City 2',
    blood_group: 'B+',
    is_hotel_resident: true
  },
  {
    _id: ObjectId('665759022abe60278b88a036'),
    name: 'Student 367',
    age: 19,
    courses: "['English', 'Physics', 'History', 'Mathematics']",
    gpa: 2.81,
    home_city: 'City 2',
    blood_group: 'B+',
    is_hotel_resident: false
  },
  {
    _id: ObjectId('665759022abe60278b88a0c2'),
    name: 'Student 255',
    age: 21,
    courses: "['English', 'Physics']",
    gpa: 2.85,
    home_city: 'City 2',
    blood_group: 'B+',
    is_hotel_resident: false
  },
```

In the above given example shows the collections of the students who are from the city 2 and the blood group are of type B+. This can be easily done by using the AND operation.

- **OR operation:**

The OR operation can be explained by using the following example, here we take a example to find the Student who are hostel residents OR have a GPA less than 3.0 It means it takes either the students how are hostel residents or the students whose gpa is less than 3.0.

```
db> db.stu.find({
... $or:[
... {is_hostel_resident:true},
... {gpa:{$lt:3.0}}
... ]
... });
[
  {
    _id: ObjectId('665759022abe60278b889fe8'),
    name: 'Student 157',
    age: 20,
    courses: "['Physics', 'English']",
    gpa: 2.27,
    home_city: 'City 4',
    blood_group: 'O-',
    is_hotel_resident: true
  },
  {
    _id: ObjectId('665759022abe60278b889fe9'),
    name: 'Student 316',
    age: 20,
    courses: "['Physics', 'Computer Science', 'Mathematics', 'History']",
    gpa: 2.32,
    blood_group: 'B+',
    is_hotel_resident: true
  },
```

The above example gives the correct conclusion about the OR operation. Here we take the example that wants to give the output as the students who are hostel residents OR the students whose gpa is less than 3.0

❖Bitwise operator:

- In our example it's a 32 bit each bit representing different things
- Bitwise value 7 means all access 7 -> 111

Bit 3	Bit 2	Bit 1
cafe	campus	lobby

❖Bitwise type:

Name	Description
`$bitsAllClear`	Matches numeric or binary values in which a set of bit positions *all* have a value of `0`.
`$bitsAllSet`	Matches numeric or binary values in which a set of bit positions *all* have a value of `1`.
`$bitsAnyClear`	Matches numeric or binary values in which *any* bit from a set of bit positions has a value of `0`.
`$bitsAnySet`	Matches numeric or binary values in which *any* bit from a set of bit positions has a value of `1`.

❖Query:

In MongoDB, a query is a way to search for and retrieve documents from a collection that match specified criteria. Queries are typically performed using the find() method, which allows you to define filters and conditions to narrow down the results.

Here is a basic example of a MongoDB query:

JavaScript

db. collections.find({field: value })

This query searches for documents in the specified collection where field equals value.

CONST
LOBBY_PERMISSIO
N=1; CONST
CAMPUS_PERMIS
SION=2;

Two constants are defined: LOOBY_PERMISSION with a value 1 and

CAMPUS_PERMISSION WITH A VALUE 2.

To find students with both lobby and campus permission we use

db.students_permission.find({

permission :{$bitsAllSets:[LOBBY_PERMISSION,CAMPUS_PERMISSION]}

});

```
b> db.students_permission.find({permissions:{$bitsAllSet:[LOBBY_PERMISS
ON,CAMPUS_PERMISSION]}});
[
  {
    _id: ObjectId('6663ff4286ef416122dcfcd5'),
    name: 'George',
    age: 21,
    permissions: 6
  },
  {
    _id: ObjectId('6663ff4286ef416122dcfcd6'),
    name: 'Henry',
    age: 27,
    permissions: 7
  },
  {
    _id: ObjectId('6663ff4286ef416122dcfcd7'),
    name: 'Isla',
    age: 18,
    permissions: 6
  }
]
b>
```

To find all the students in the collections we use

db.students_permission.find({permission:

{$bitsAllSets:[LOBBY_PERMISSION,CAMPUS_PERMISSION]}}).count()

```
db> db.students_permission.find({permissions:{$bitsAllSet:[LOBBY_PERMISS
ION]}}).count();
9
```

❖ $bitsAllSets:

In MongoDB, **$bitsAllSet** is an operator that matches documents where all of the bit positions given by the query are set (i.e. 1) in a specified field. The field value must be either numeric or a BinData instance for the operator to work.

❖Geospatial Query:

A geospatial query involves retrieving information from a database based on geographic locations and spatial relationships. These queries are used in Geographic Information Systems (GIS) to analyse and visualize spatial data.

_id:1

name: “Coffee Shop A”

location: Object

type: “Point”

coordinates: Array (2)

db. locations.

find({
locations:{

@geoWithin:{

$centerSphere:[[-74.005,40.712],0.00621376]

}

}

});