Class 5

Projection Operators ($, Selematch and $slice)

Projections in MongoDB are a powerful tool for controlling the data retrieved from queries. They allow you to specify exactly which fields you want to return from documents in a collection, offering several advantages:

- **Reduced Data Transfer**
- **Enhanced Performance**
- **Focused Results**
- **Data Confidentiality**

Using Projections with find and findone methods:

Projections are typically used with the find and findone methods in MongoDB. These methods accept two optional arguments:

1. **Query Document:** This document specifies the criteria for selecting documents (e.g., filtering based on specific field values).
2. **Projection Document:** This document defines which fields to include or exclude in the returned results.

Specifying Fields for Inclusion/Exclusion:

The projection document is a key-value structure where:

- **Keys:** Represent the field names in the documents.
- **Values:** Specify whether to include or exclude the corresponding field.

  Value of 1 (or `true`): Includes the field in the returned documents.

  Value of 0 (or `false`): Excludes the field from the returned documents.

Projection Operators for Advanced Control:

While including/excluding fields is the core functionality, MongoDB offers several projection operators for more complex scenarios:

- Sy$ **(Positional Operator):** Selects the first element from an array that matches a specific condition.
- **$elemMatch:** Filters and includes elements from an array that satisfy a specified criteria.
- **$slice:** Returns a limited portion (subset) of an array.

Introduction to projection operators :

Operator: $

Syntax: { <query> },{ <array type field>.$: 1 }

Operator: $elemMatch

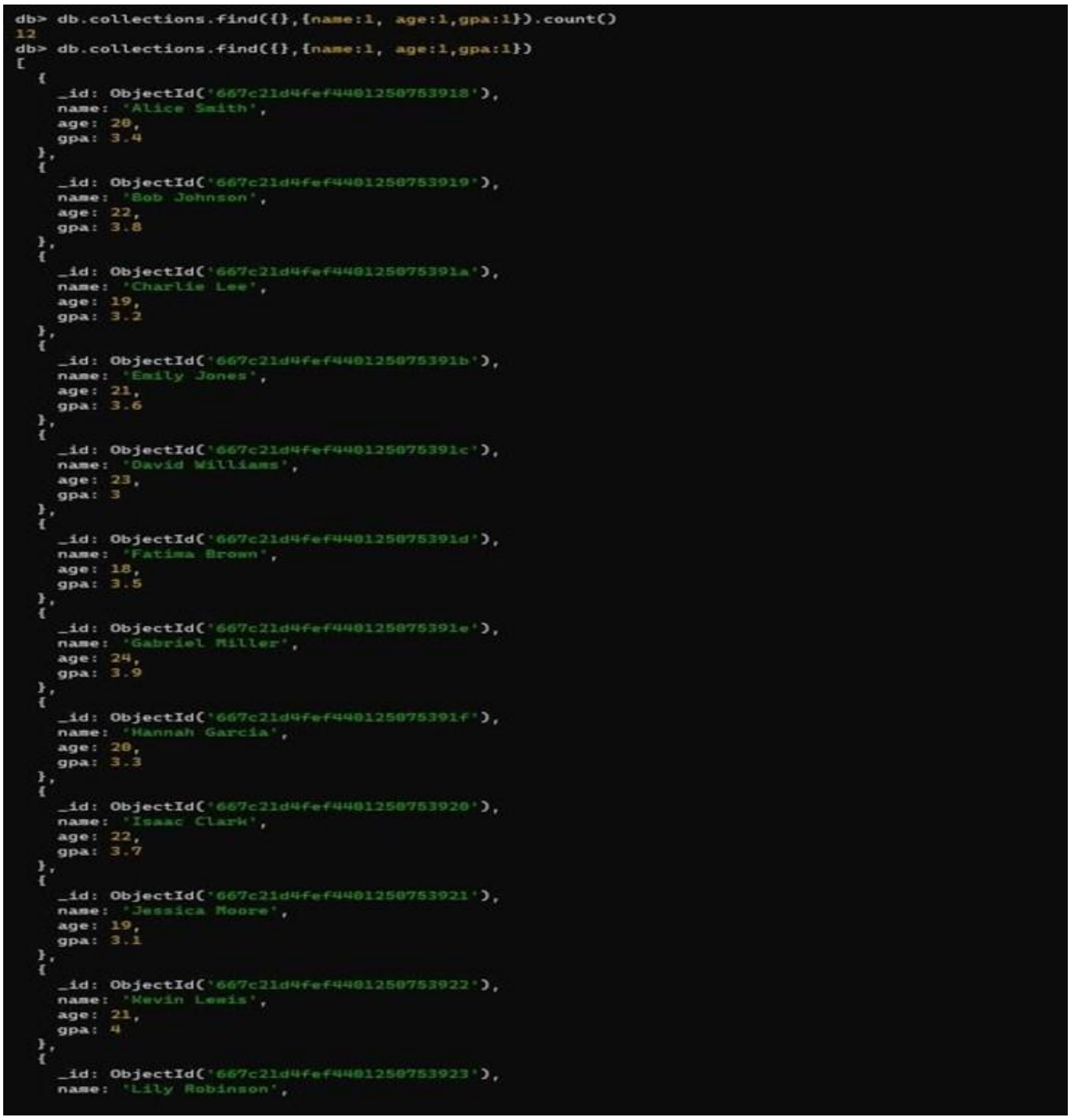
Syntax: { <array type field>: { $elemMatch: { <query> } }}

Operator: $slice

Syntax: { <array type field>: { $slice: <number of elements> }}

<u>Example 1</u>: Retrieve Name, Age, and GPA

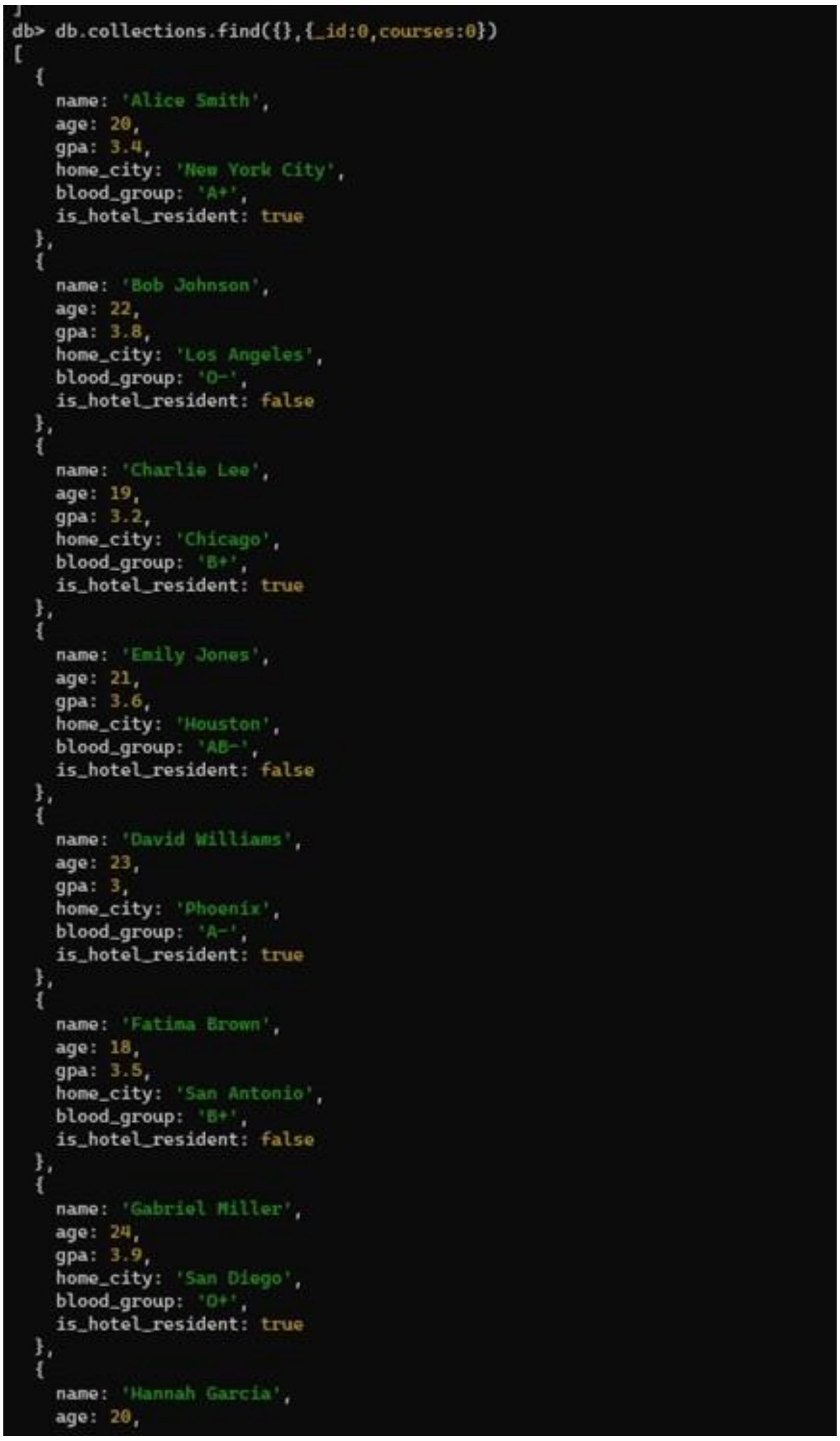
```
db.collections.find({},{ name: 1, age: 1, gpa: 1});
```



```
db> db.collections.find({},{name:1, age:1,gpa:1}).count()
12
db> db.collections.find({},{name:1, age:1,gpa:1})
[
  {
    _id: ObjectId('667c21d4fef4401250753918'),
    name: 'Alice Smith',
    age: 20,
    gpa: 3.4
  },
  {
    _id: ObjectId('667c21d4fef4401250753919'),
    name: 'Bob Johnson',
    age: 22,
    gpa: 3.8
  },
  {
    _id: ObjectId('667c21d4fef440125075391a'),
    name: 'Charlie Lee',
    age: 19,
    gpa: 3.2
  },
  {
    _id: ObjectId('667c21d4fef440125075391b'),
    name: 'Emily Jones',
    age: 21,
    gpa: 3.6
  },
  {
    _id: ObjectId('667c21d4fef440125075391c'),
    name: 'David Williams',
    age: 23,
    gpa: 3
  },
  {
    _id: ObjectId('667c21d4fef440125075391d'),
    name: 'Fatima Brown',
    age: 18,
    gpa: 3.5
  },
  {
    _id: ObjectId('667c21d4fef440125075391e'),
    name: 'Gabriel Miller',
    age: 24,
    gpa: 3.9
  },
  {
    _id: ObjectId('667c21d4fef440125075391f'),
    name: 'Hannah Garcia',
    age: 20,
    gpa: 3.3
  },
  {
    _id: ObjectId('667c21d4fef4401250753920'),
    name: 'Isaac Clark',
    age: 22,
    gpa: 3.7
  },
  {
    _id: ObjectId('667c21d4fef4401250753921'),
    name: 'Jessica Moore',
    age: 19,
    gpa: 3.1
  },
  {
    _id: ObjectId('667c21d4fef4401250753922'),
    name: 'Kevin Lewis',
    age: 21,
    gpa: 4
  },
  {
    _id: ObjectId('667c21d4fef4401250753923'),
    name: 'Lily Robinson',
```

Example 02: Variation: Exclude Fields

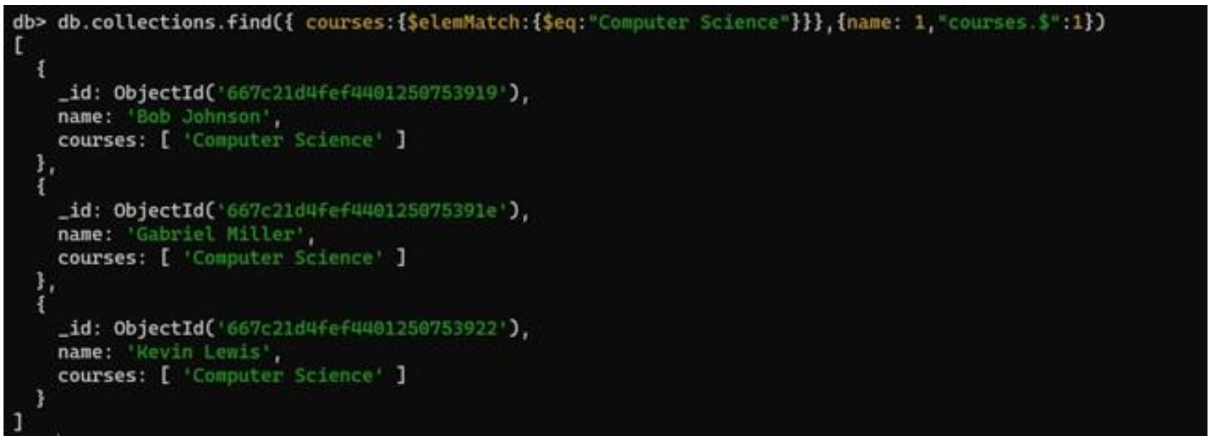
```
db.collections,find({}, { -id: 0, courses:0})
```



```
]
db> db.collections.find({},{_id:0,courses:0})
[
  {
    name: 'Alice Smith',
    age: 20,
    gpa: 3.4,
    home_city: 'New York City',
    blood_group: 'A+',
    is_hotel_resident: true
  },
  {
    name: 'Bob Johnson',
    age: 22,
    gpa: 3.8,
    home_city: 'Los Angeles',
    blood_group: 'O-',
    is_hotel_resident: false
  },
  {
    name: 'Charlie Lee',
    age: 19,
    gpa: 3.2,
    home_city: 'Chicago',
    blood_group: 'B+',
    is_hotel_resident: true
  },
  {
    name: 'Emily Jones',
    age: 21,
    gpa: 3.6,
    home_city: 'Houston',
    blood_group: 'AB-',
    is_hotel_resident: false
  },
  {
    name: 'David Williams',
    age: 23,
    gpa: 3,
    home_city: 'Phoenix',
    blood_group: 'A-',
    is_hotel_resident: true
  },
  {
    name: 'Fatima Brown',
    age: 18,
    gpa: 3.5,
    home_city: 'San Antonio',
    blood_group: 'B+',
    is_hotel_resident: false
  },
  {
    name: 'Gabriel Miller',
    age: 24,
    gpa: 3.9,
    home_city: 'San Diego',
    blood_group: 'O+',
    is_hotel_resident: true
  },
  {
    name: 'Hannah Garcia',
    age: 20,
```

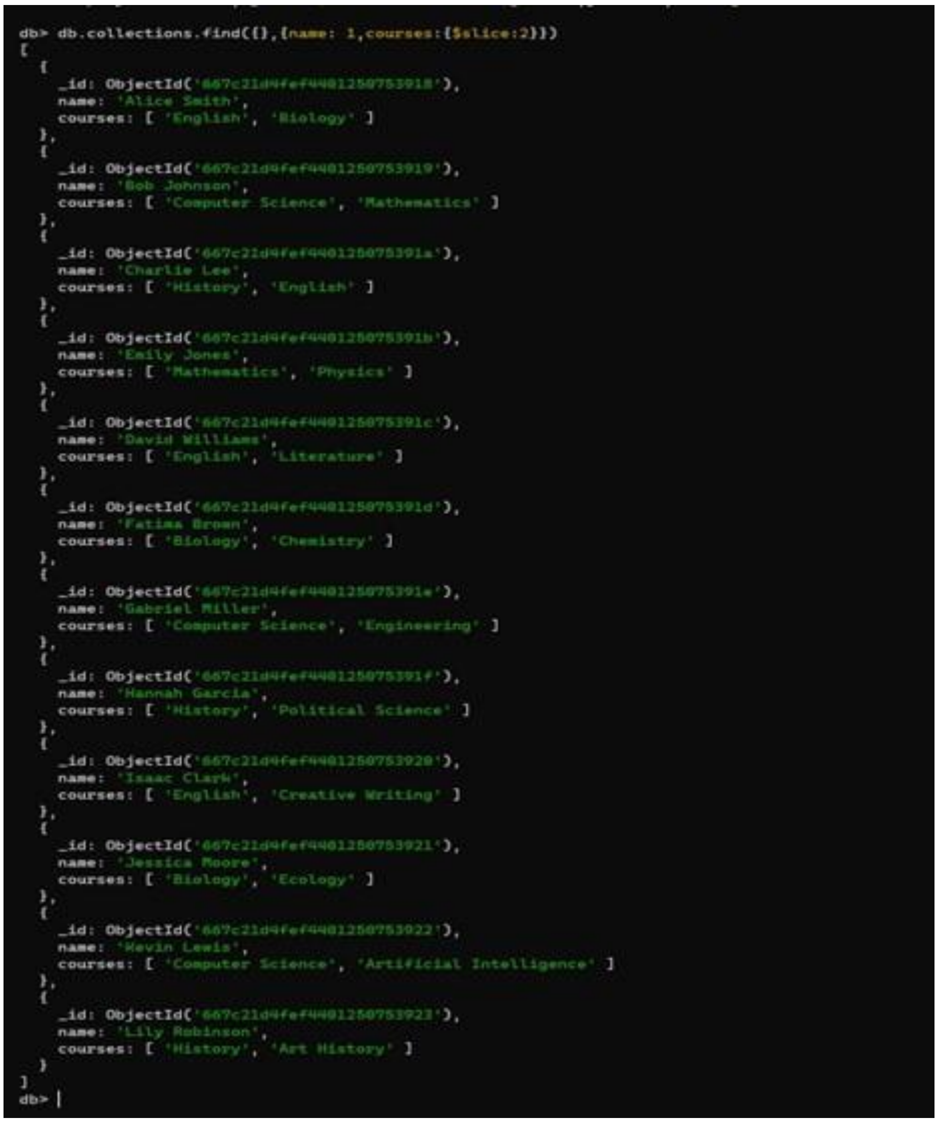
Example 03: Projection Operator($elemMatch)

Find Candidates enrolled in "Computer Science" with Specific Projection



```
db> db.collections.find({ courses:{$elemMatch:{$eq:"Computer Science"}}},{name: 1,"courses.$":1})
[
  {
    _id: ObjectId('667c21d4fef4401250753919'),
    name: 'Bob Johnson',
    courses: [ 'Computer Science' ]
  },
  {
    _id: ObjectId('667c21d4fef440125075391e'),
    name: 'Gabriel Miller',
    courses: [ 'Computer Science' ]
  },
  {
    _id: ObjectId('667c21d4fef4401250753922'),
    name: 'Kevin Lewis',
    courses: [ 'Computer Science' ]
  }
]
```

Example 04: Projection Operator($slice)



```
db> db.collections.find({},{name: 1,courses:{$slice:2}})
[
  {
    _id: ObjectId('667c21d4fef4401250753918'),
    name: 'Alice Smith',
    courses: [ 'English', 'Biology' ]
  },
  {
    _id: ObjectId('667c21d4fef4401250753919'),
    name: 'Bob Johnson',
    courses: [ 'Computer Science', 'Mathematics' ]
  },
  {
    _id: ObjectId('667c21d4fef440125075391a'),
    name: 'Charlie Lee',
    courses: [ 'History', 'English' ]
  },
  {
    _id: ObjectId('667c21d4fef440125075391b'),
    name: 'Emily Jones',
    courses: [ 'Mathematics', 'Physics' ]
  },
  {
    _id: ObjectId('667c21d4fef440125075391c'),
    name: 'David Williams',
    courses: [ 'English', 'Literature' ]
  },
  {
    _id: ObjectId('667c21d4fef440125075391d'),
    name: 'Fatima Brown',
    courses: [ 'Biology', 'Chemistry' ]
  },
  {
    _id: ObjectId('667c21d4fef440125075391e'),
    name: 'Gabriel Miller',
    courses: [ 'Computer Science', 'Engineering' ]
  },
  {
    _id: ObjectId('667c21d4fef440125075391f'),
    name: 'Hannah Garcia',
    courses: [ 'History', 'Political Science' ]
  },
  {
    _id: ObjectId('667c21d4fef4401250753920'),
    name: 'Isaac Clark',
    courses: [ 'English', 'Creative Writing' ]
  },
  {
    _id: ObjectId('667c21d4fef4401250753921'),
    name: 'Jessica Moore',
    courses: [ 'Biology', 'Ecology' ]
  },
  {
    _id: ObjectId('667c21d4fef4401250753922'),
    name: 'Kevin Lewis',
    courses: [ 'Computer Science', 'Artificial Intelligence' ]
  },
  {
    _id: ObjectId('667c21d4fef4401250753923'),
    name: 'Lily Robinson',
    courses: [ 'History', 'Art History' ]
  }
]
db> |
```