SNS COLLEGE OF TECHNOLOGY

COIMBATORE

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Approved by AICTE New Delhi & affiliated to the Anna University, Chennai

DEPARTMENT OF MCA

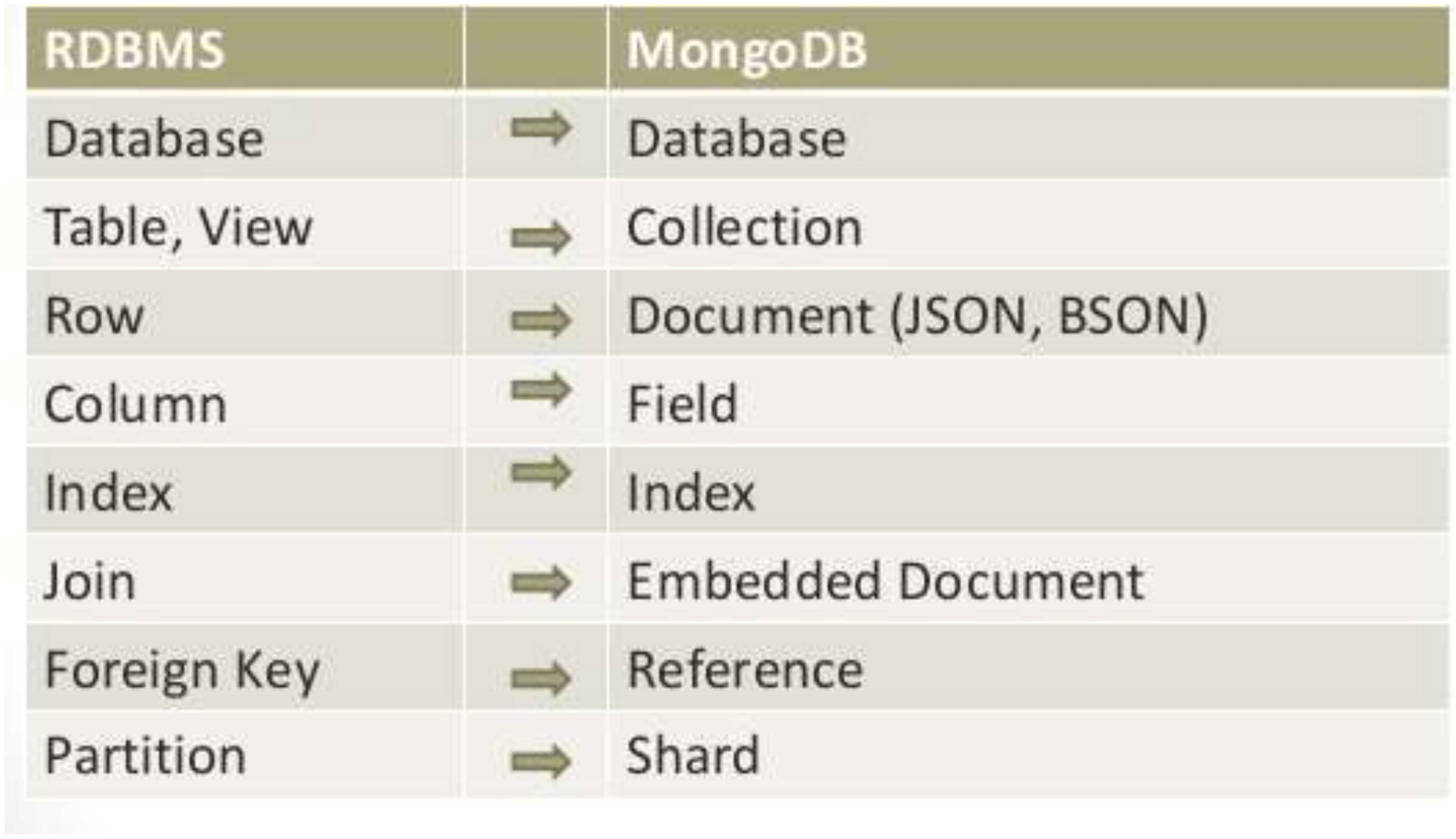
Course Name : 19CAT609 - DATA BASE MANAGEMENT SYSTEM

Class : I Year / II Semester

Unit V - COLUMN ORIENTED DATABASE

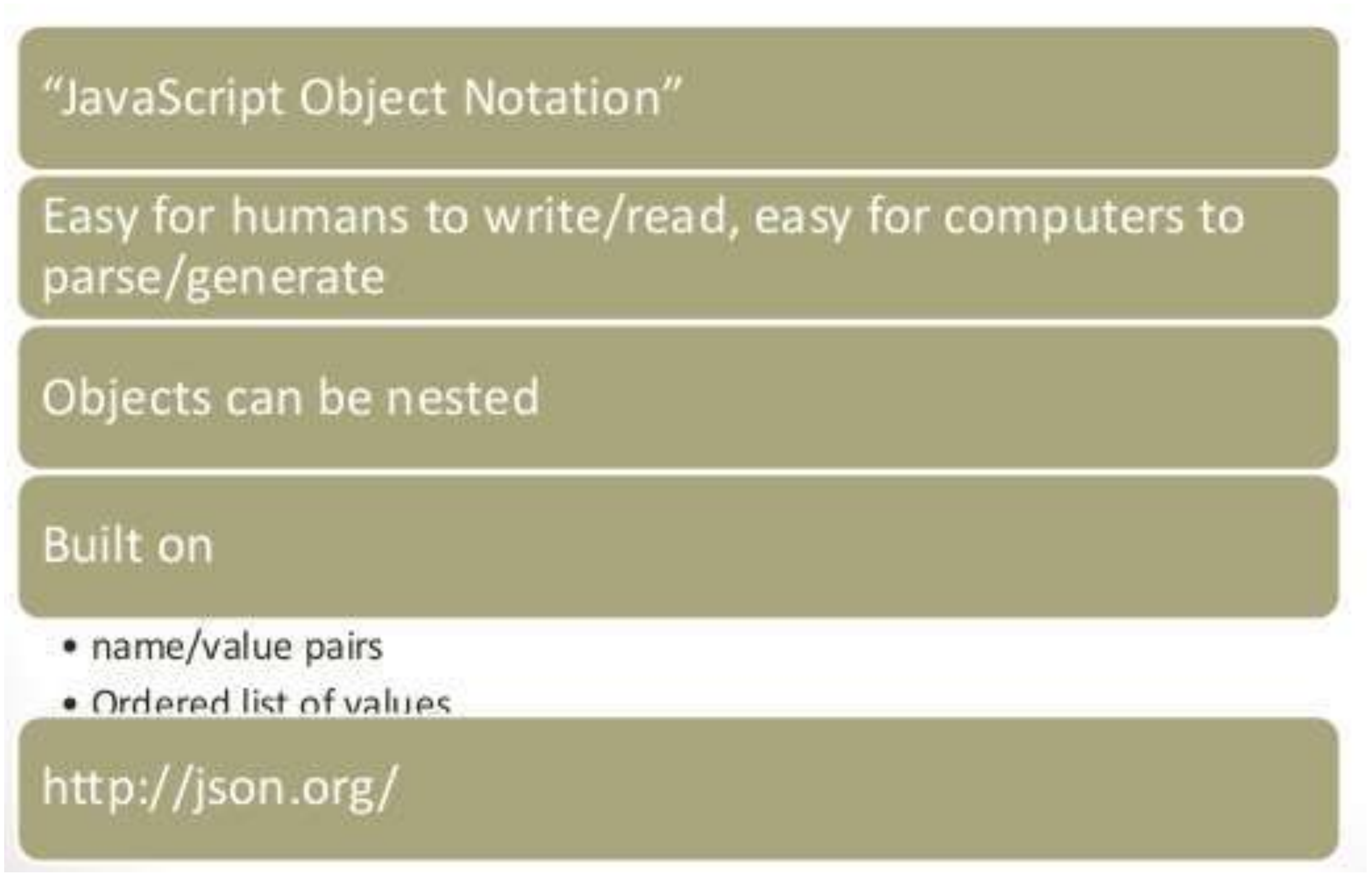
Topic II – CRUD operations with MongoDB

MongoDB Terminologies for RDBMS concepts



RDBMS		MongoDB
Database	⇨	Database
Table, View	⇨	Collection
Row	⇨	Document (JSON, BSON)
Column	⇨	Field
Index	⇨	Index
Join	⇨	Embedded Document
Foreign Key	⇨	Reference
Partition	⇨	Shard

JSON



"JavaScript Object Notation"

Easy for humans to write/read, easy for computers to parse/generate

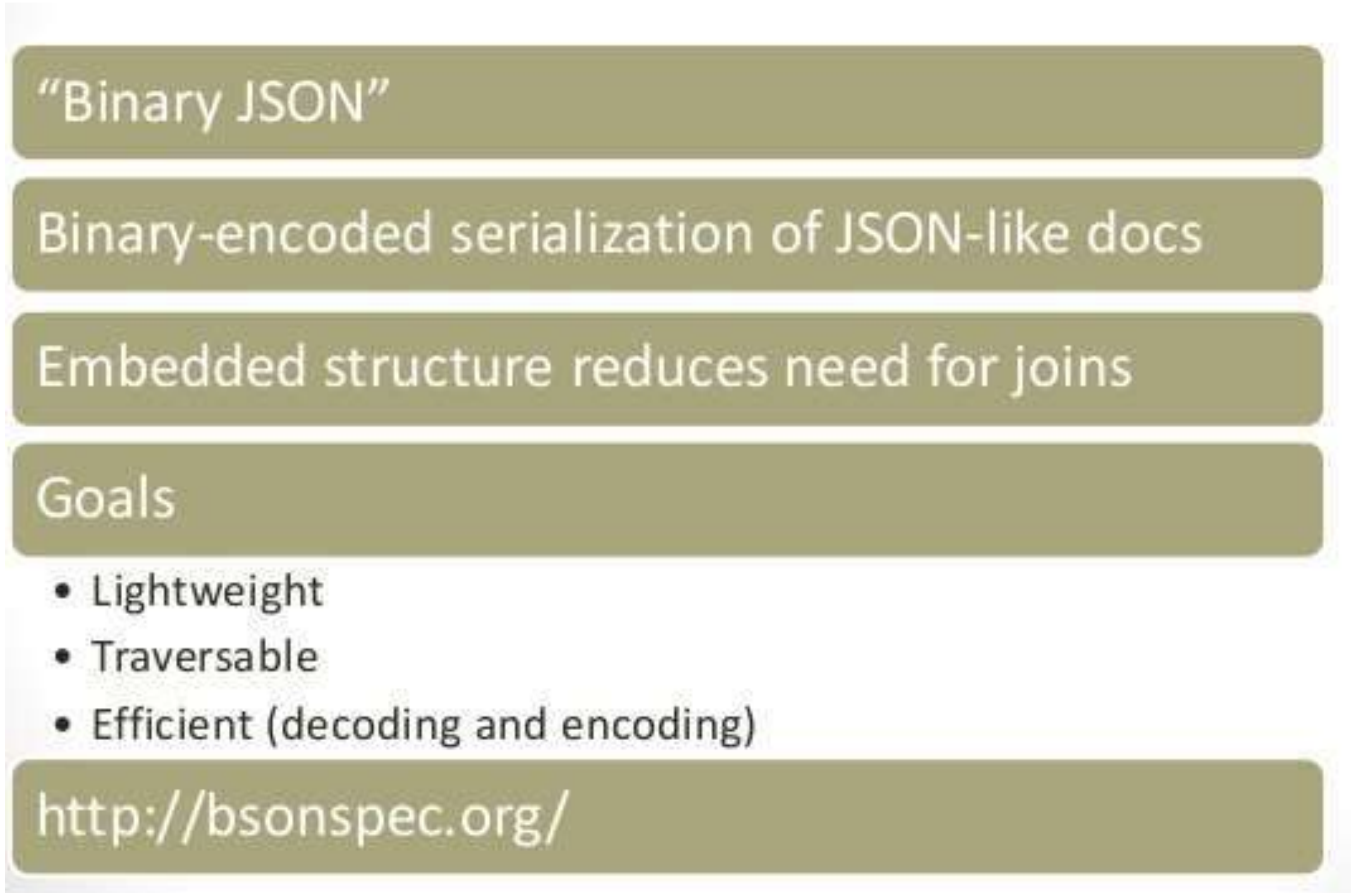
Objects can be nested

Built on

- name/value pairs
- Ordered list of values

http://json.org/

BSON



“Binary JSON”

Binary-encoded serialization of JSON-like docs

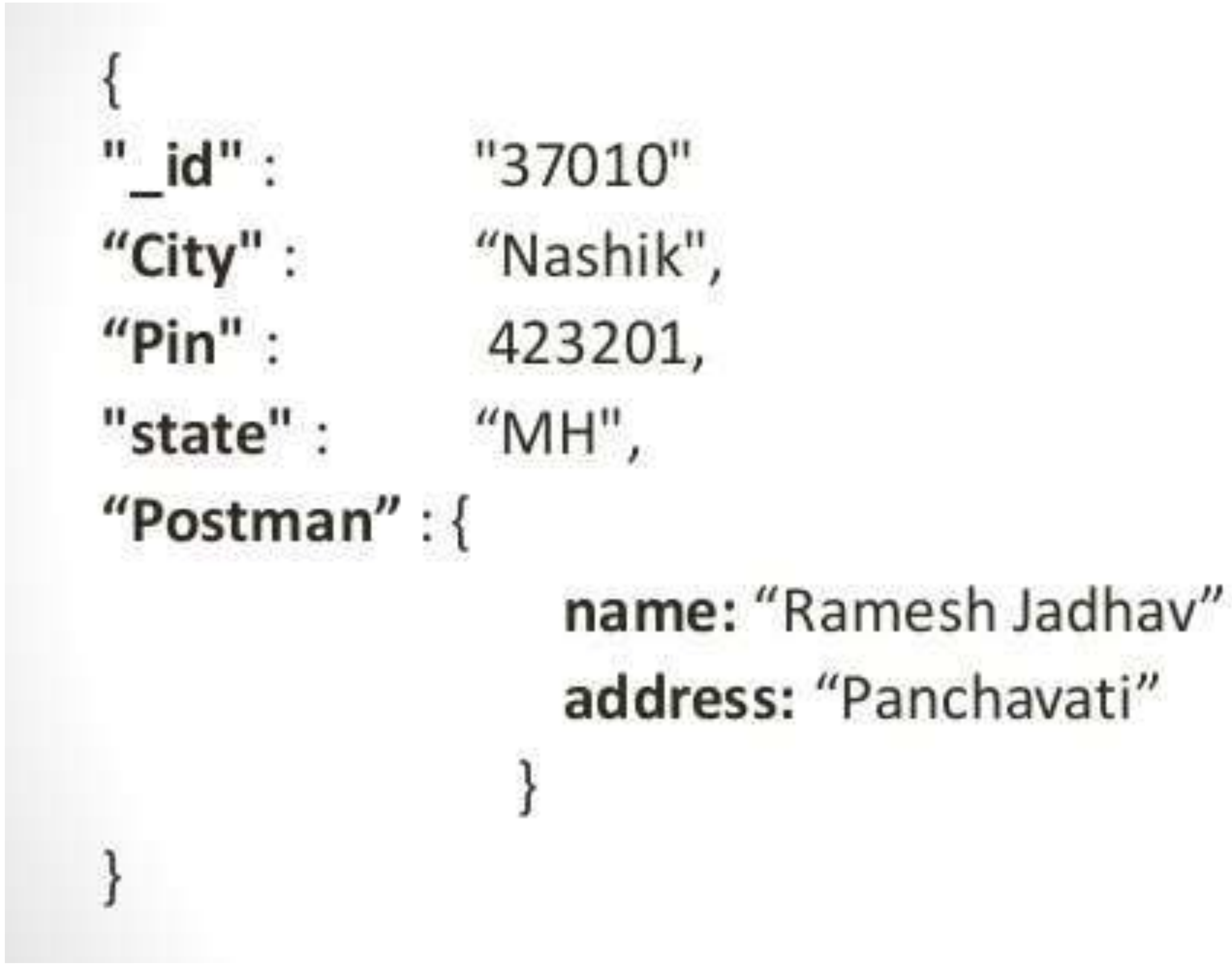
Embedded structure reduces need for joins

Goals

- Lightweight
- Traversable
- Efficient (decoding and encoding)

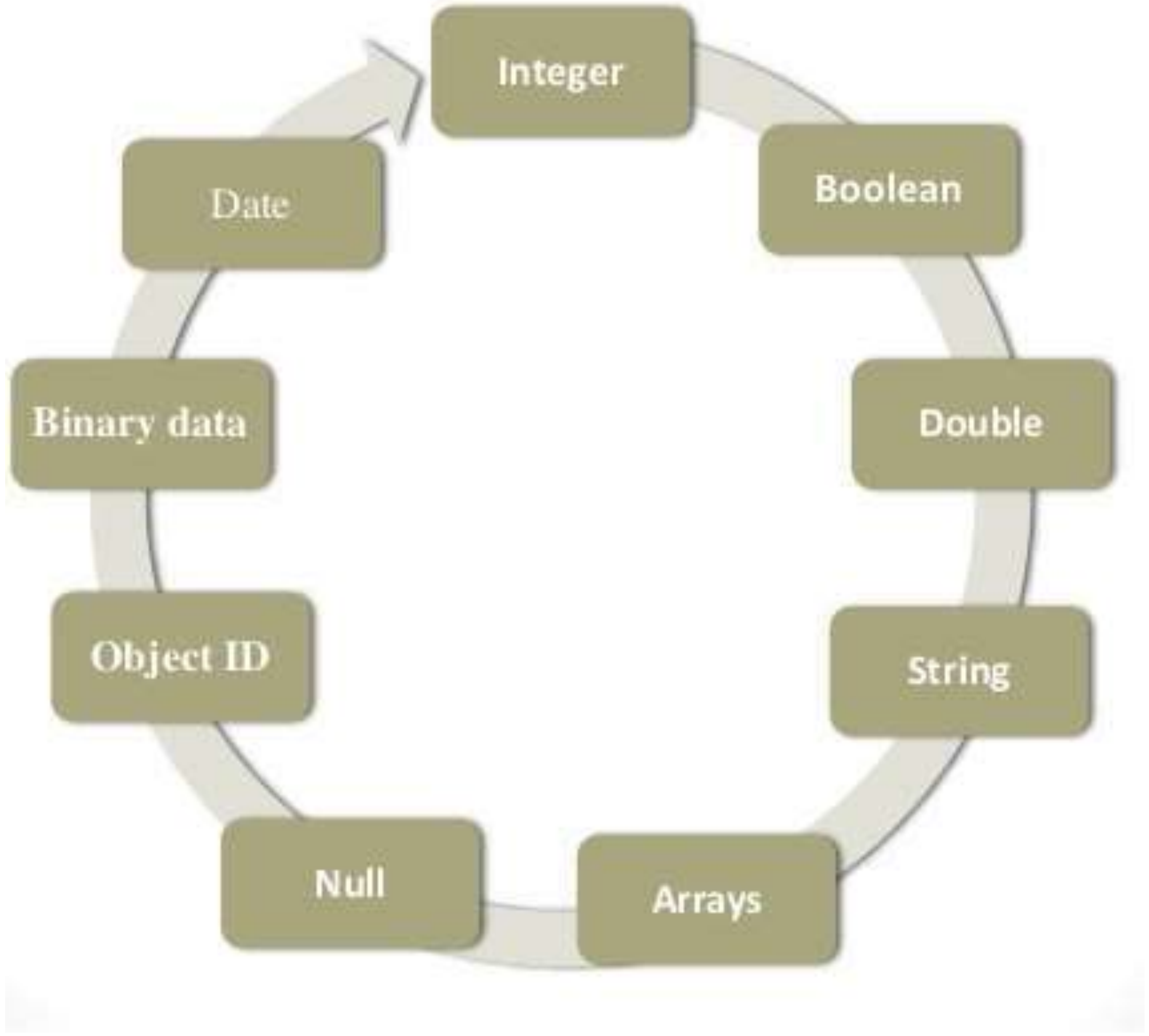
http://bsonspec.org/

BSON Example

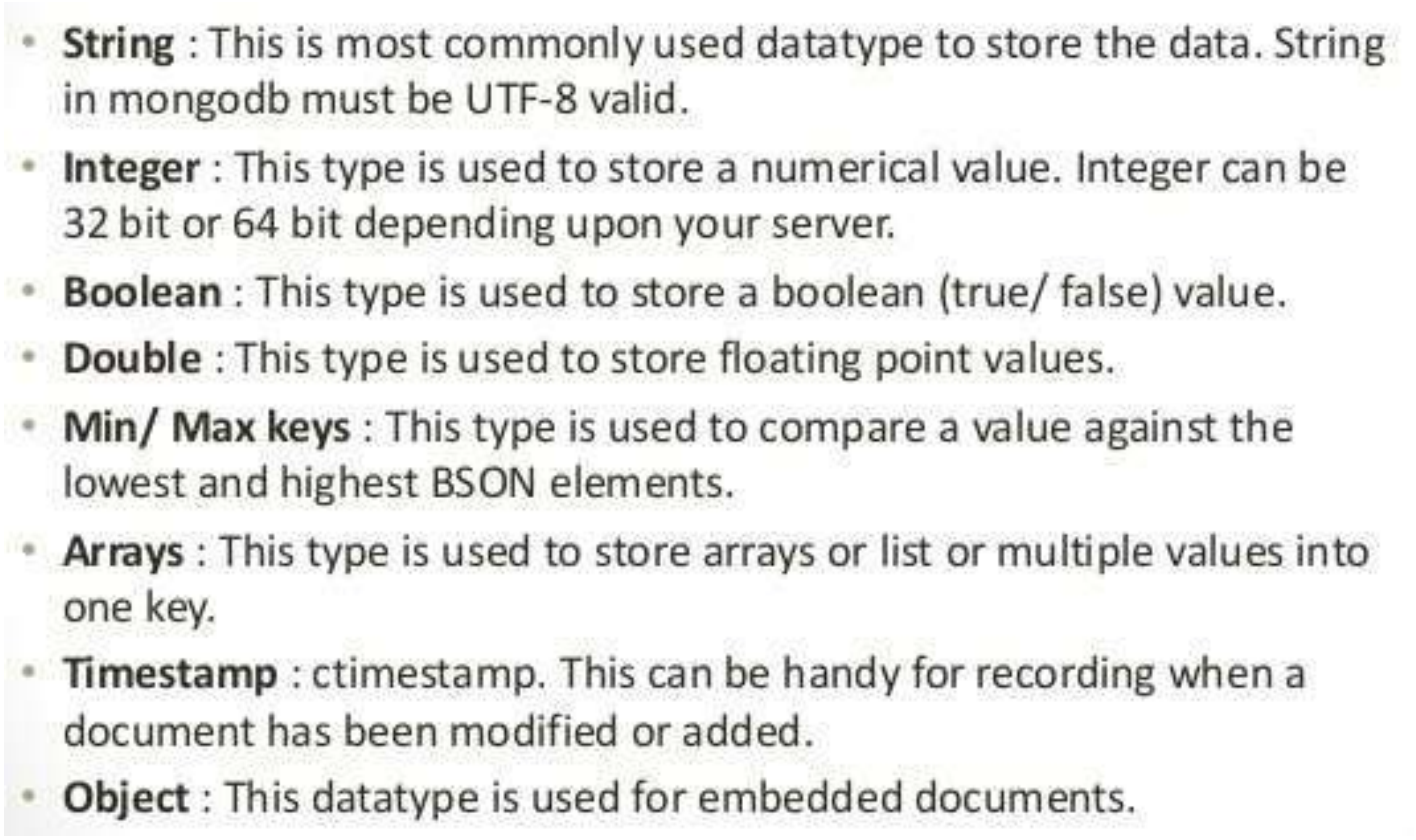


```
{
"_id" :          "37010"
“City" :         “Nashik",
“Pin" :           423201,
"state" :        “MH",
“Postman” : {
                    name: “Ramesh Jadhav”
                    address: “Panchavati”
                 }
}
```

Data Types of MongoDB

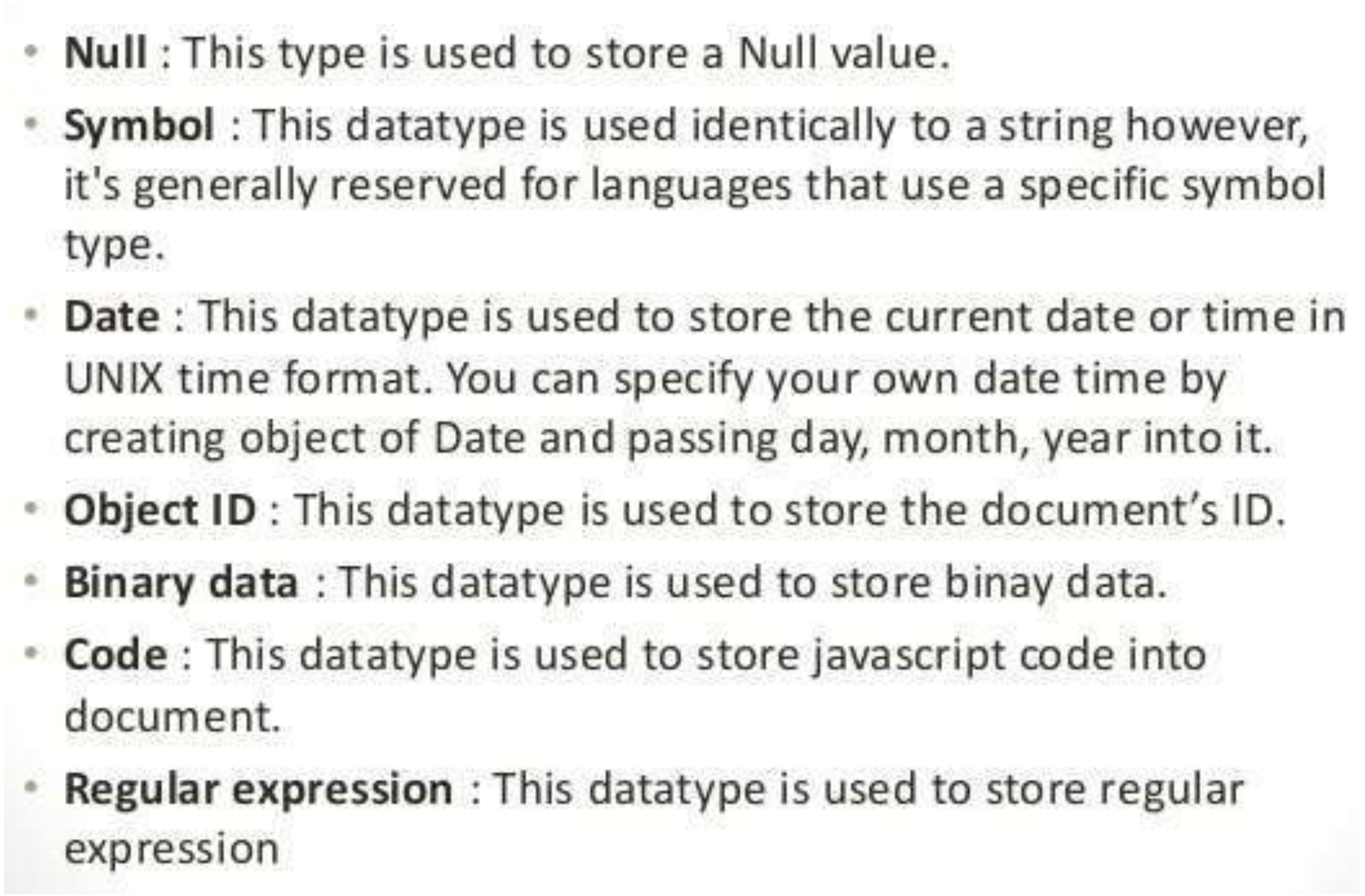


Data Types



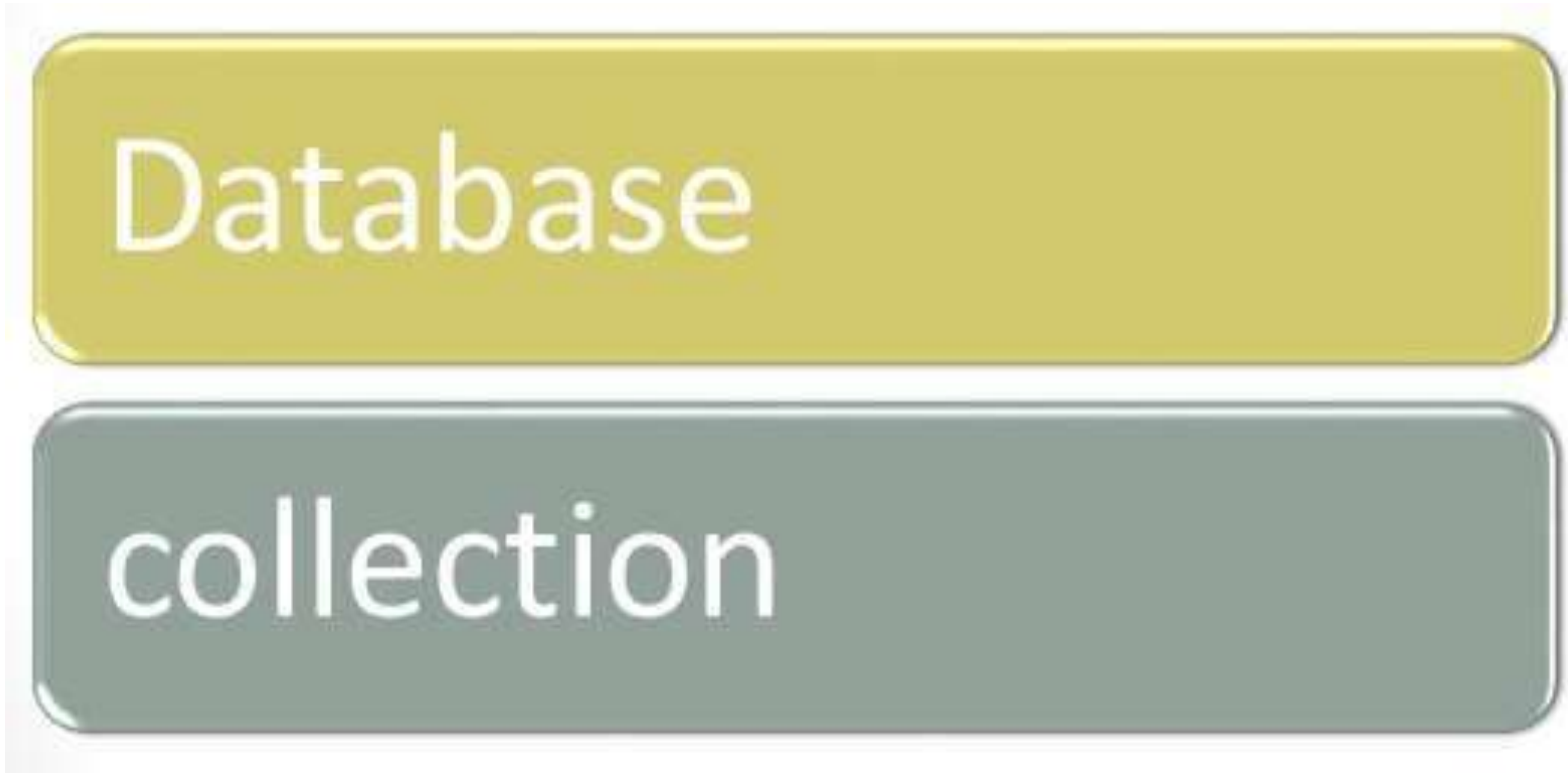
- **String** : This is most commonly used datatype to store the data. String in mongodb must be UTF-8 valid.
- **Integer** : This type is used to store a numerical value. Integer can be 32 bit or 64 bit depending upon your server.
- **Boolean** : This type is used to store a boolean (true/ false) value.
- **Double** : This type is used to store floating point values.
- **Min/ Max keys** : This type is used to compare a value against the lowest and highest BSON elements.
- **Arrays** : This type is used to store arrays or list or multiple values into one key.
- **Timestamp** : ctimestamp. This can be handy for recording when a document has been modified or added.
- **Object** : This datatype is used for embedded documents.

Data Types

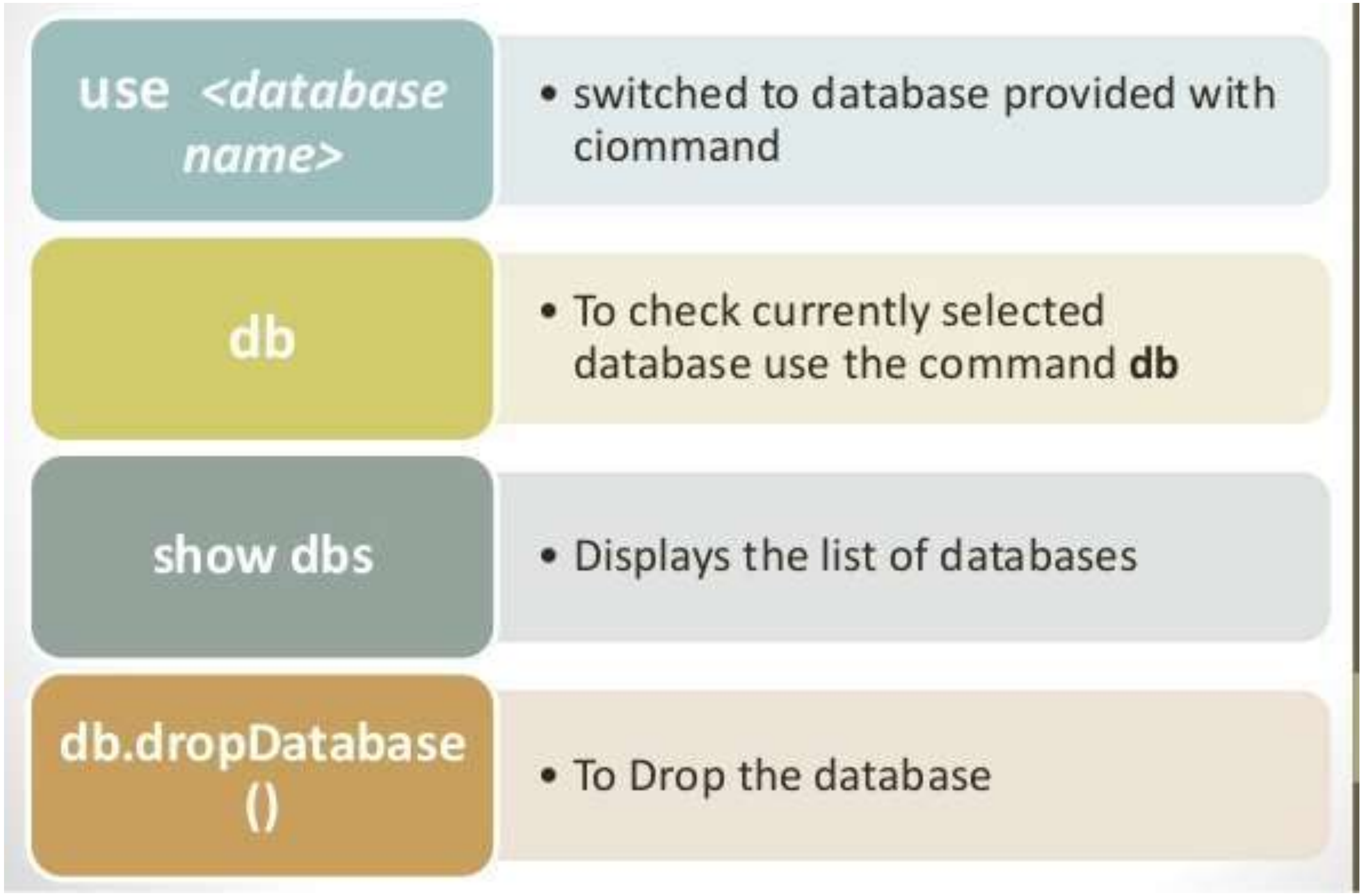


- **Null** : This type is used to store a Null value.
- **Symbol** : This datatype is used identically to a string however, it's generally reserved for languages that use a specific symbol type.
- **Date** : This datatype is used to store the current date or time in UNIX time format. You can specify your own date time by creating object of Date and passing day, month, year into it.
- **Object ID** : This datatype is used to store the document's ID.
- **Binary data** : This datatype is used to store binay data.
- **Code** : This datatype is used to store javascript code into document.
- **Regular expression** : This datatype is used to store regular expression

Basic Database Operations

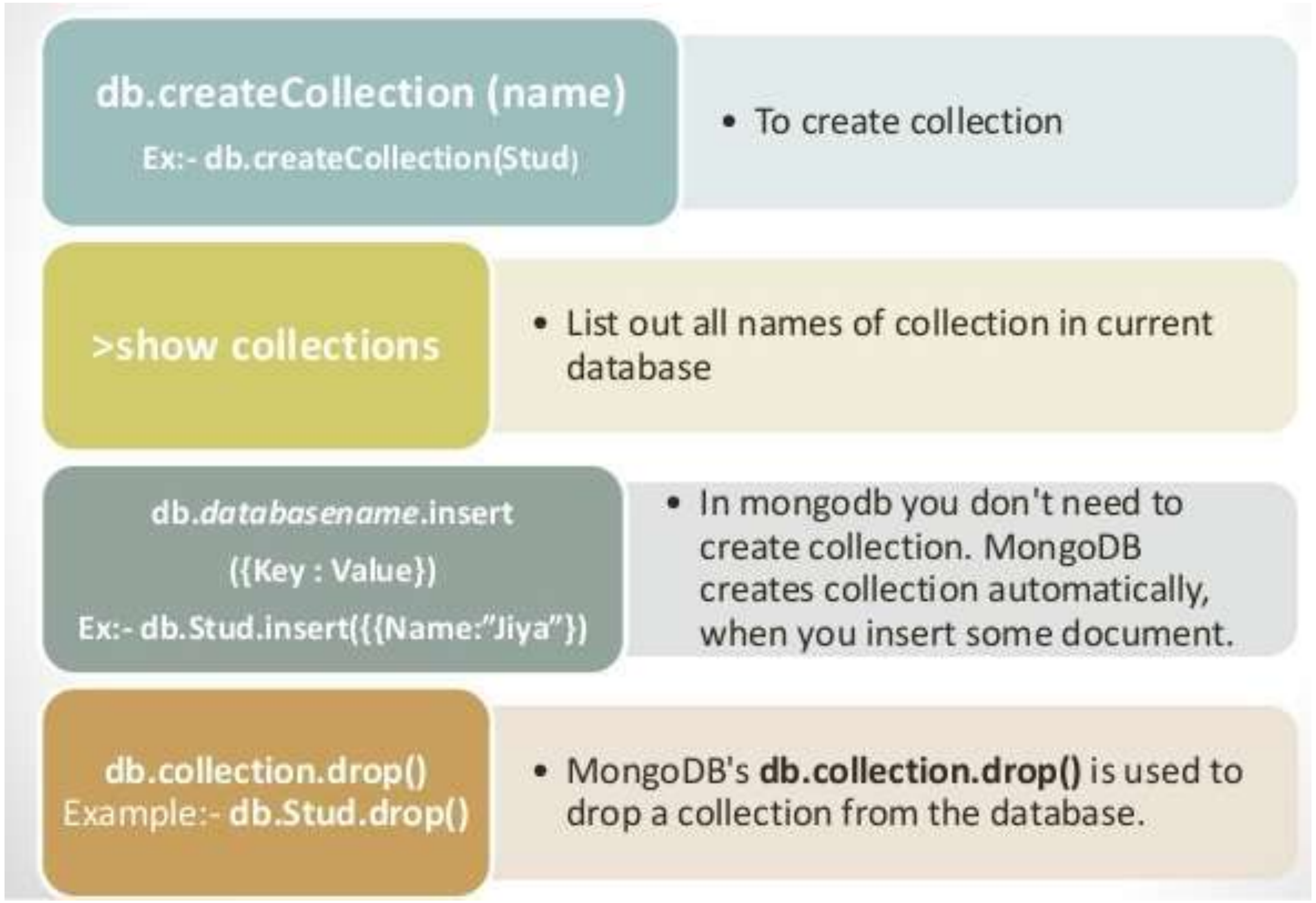


Basic Database Operations - Database



use *<database name>*	• switched to database provided with ciommand
db	• To check currently selected database use the command **db**
show dbs	• Displays the list of databases
db.dropDatabase ()	• To Drop the database

Basic Database Operations - Collection



db.createCollection (name)

Ex:- db.createCollection(Stud)

- To create collection

>show collections

- List out all names of collection in current database

db.*databasename*.insert

({Key : Value})

Ex:- db.Stud.insert({{Name:"Jiya"})

- In mongodb you don't need to create collection. MongoDB creates collection automatically, when you insert some document.

db.collection.drop()

Example:- db.Stud.drop()

- MongoDB's **db.collection.drop()** is used to drop a collection from the database.

CRUD Operations

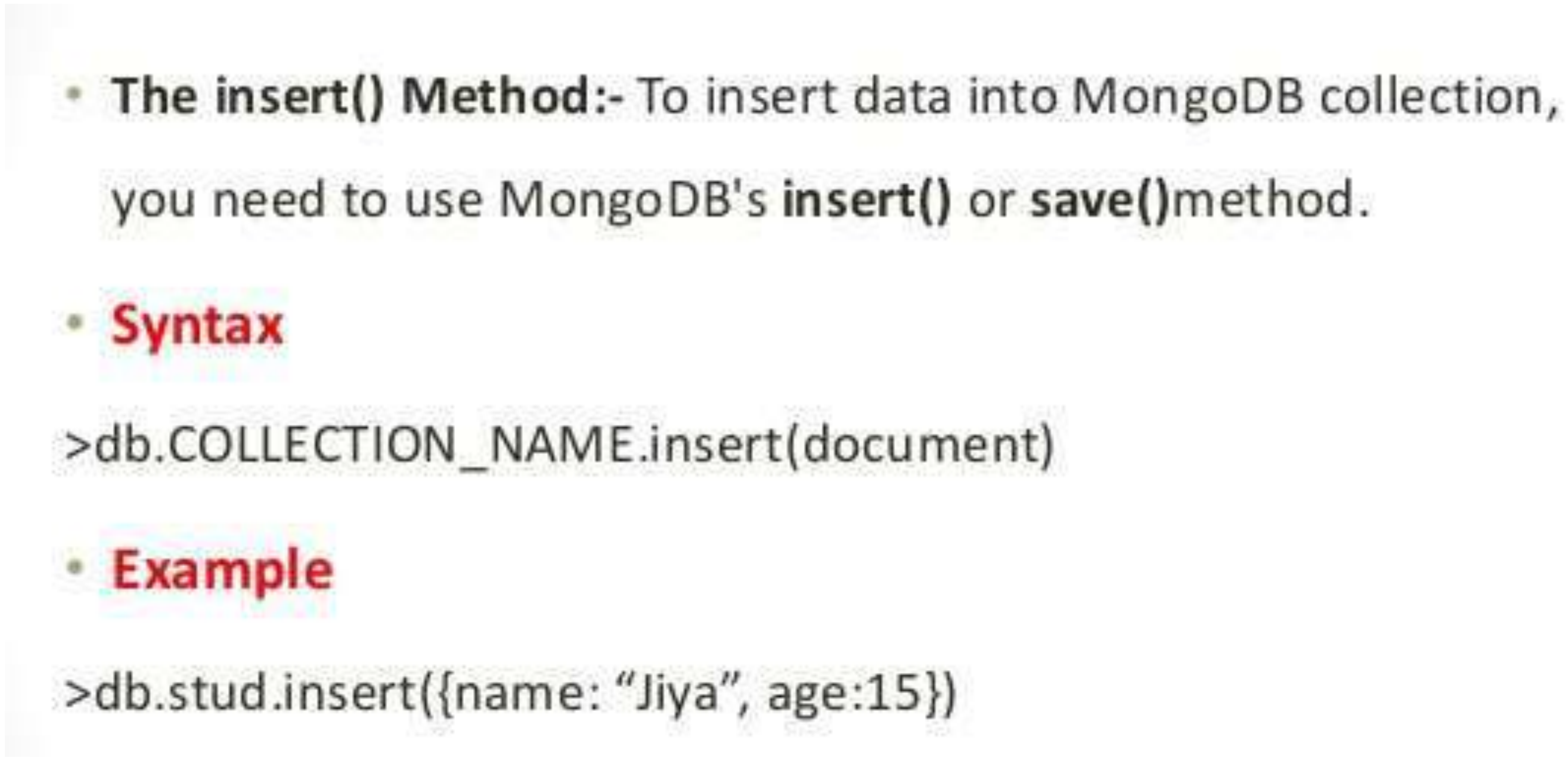
Insert

Find

Update

Delete

CRUD Operations - Insert



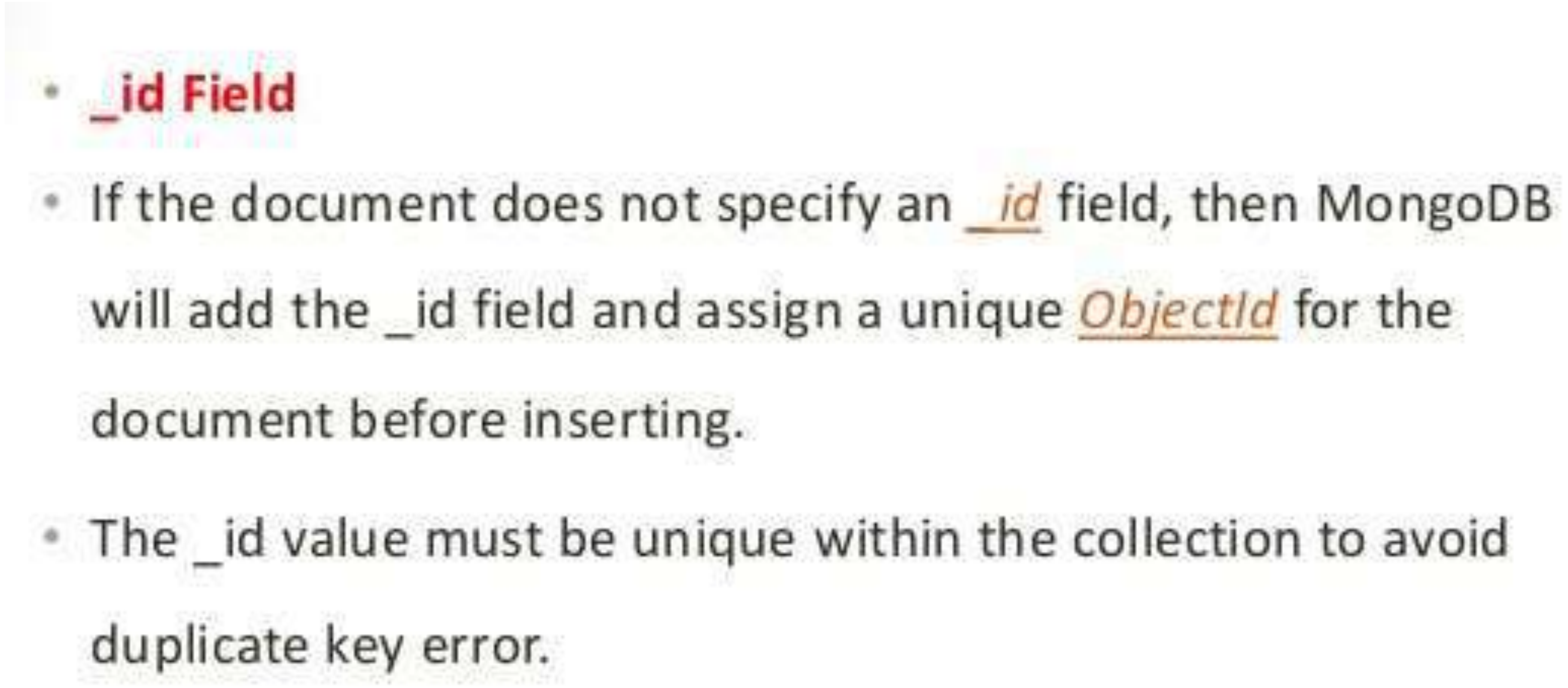
- **The insert() Method:-** To insert data into MongoDB collection, you need to use MongoDB's **insert()** or **save()**method.
- **Syntax**

```
>db.COLLECTION_NAME.insert(document)
```

- **Example**

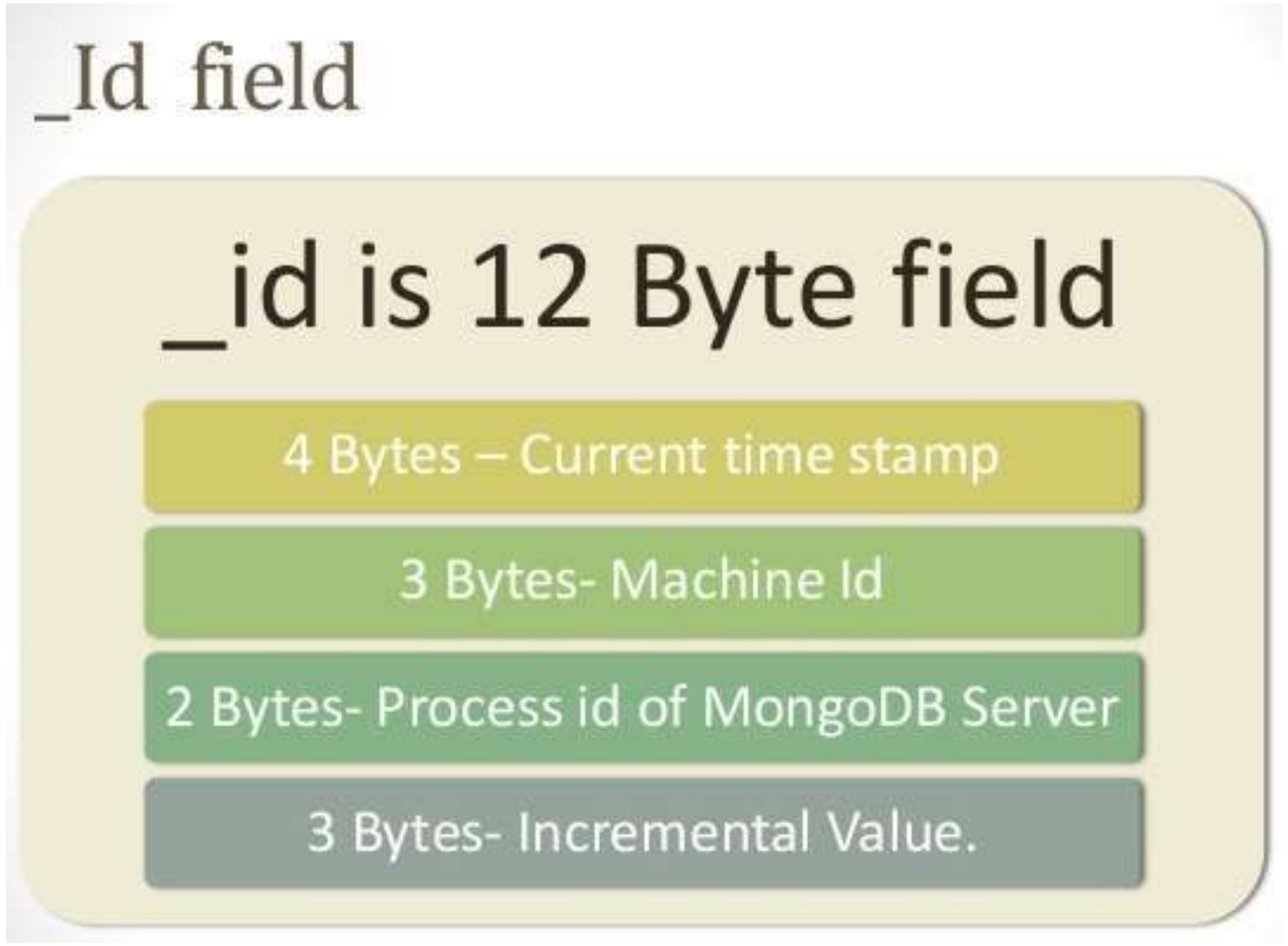
```
>db.stud.insert({name: “Jiya”, age:15})
```

CRUD Operations - Insert



- **_id Field**
- If the document does not specify an *_id* field, then MongoDB will add the _id field and assign a unique *ObjectId* for the document before inserting.
- The _id value must be unique within the collection to avoid duplicate key error.

CRUD Operations - Insert



_Id field

_id is 12 Byte field

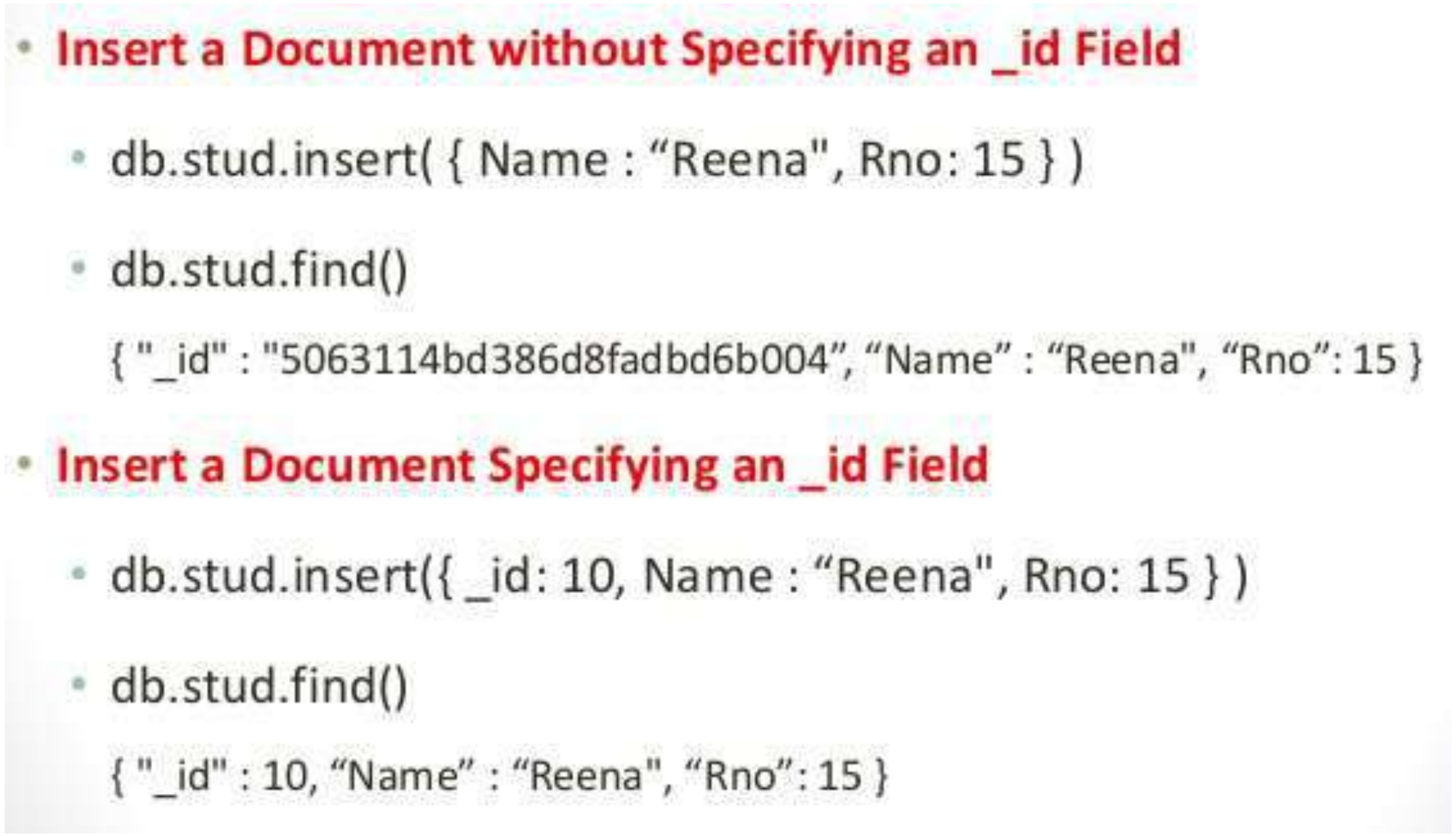
4 Bytes – Current time stamp

3 Bytes- Machine Id

2 Bytes- Process id of MongoDB Server

3 Bytes- Incremental Value.

CRUD Operations - Insert



- Insert a Document without Specifying an _id Field
  - db.stud.insert({ Name : “Reena", Rno: 15 })
  - db.stud.find()

    { "_id" : "5063114bd386d8fadbd6b004”, “Name” : “Reena", “Rno”: 15 }
- Insert a Document Specifying an _id Field
  - db.stud.insert({ _id: 10, Name : “Reena", Rno: 15 })
  - db.stud.find()

    { "_id" : 10, “Name” : “Reena", “Rno”: 15 }

CRUD Operations - Insert

- **Insert Single Documents**

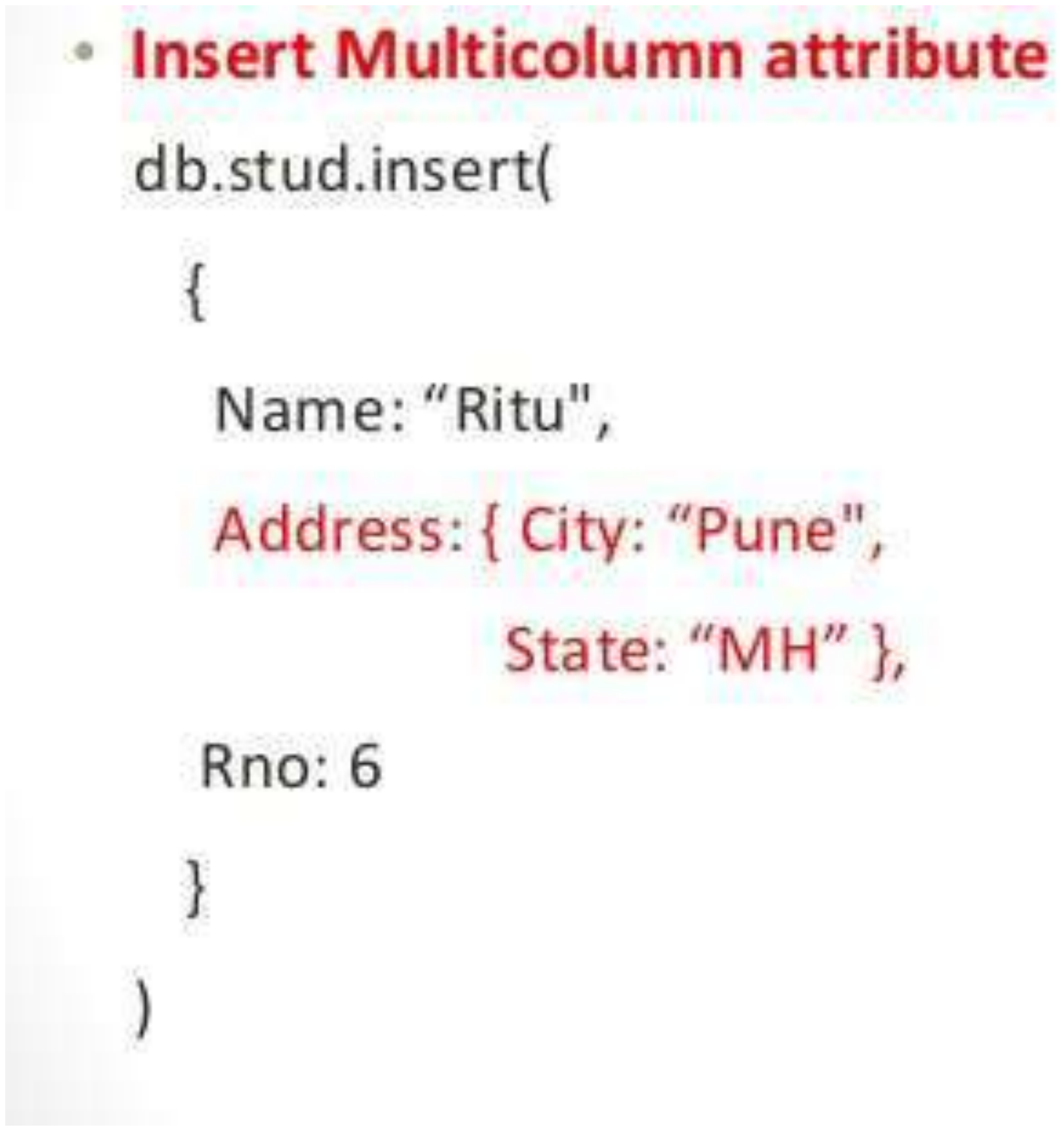
```
db.stud.insert
( {Name: “Ankit”, Rno:1, Address: “Pune”} )
```

CRUD Operations - Insert

- **Insert Multiple Documents**

```
db.stud.insert
( [
 { Name: “Ankit”, Rno:1, Address: “Pune”} ,
 { Name: “Sagar”, Rno:2},
 { Name: “Neha”, Rno:3}
 ] )
```

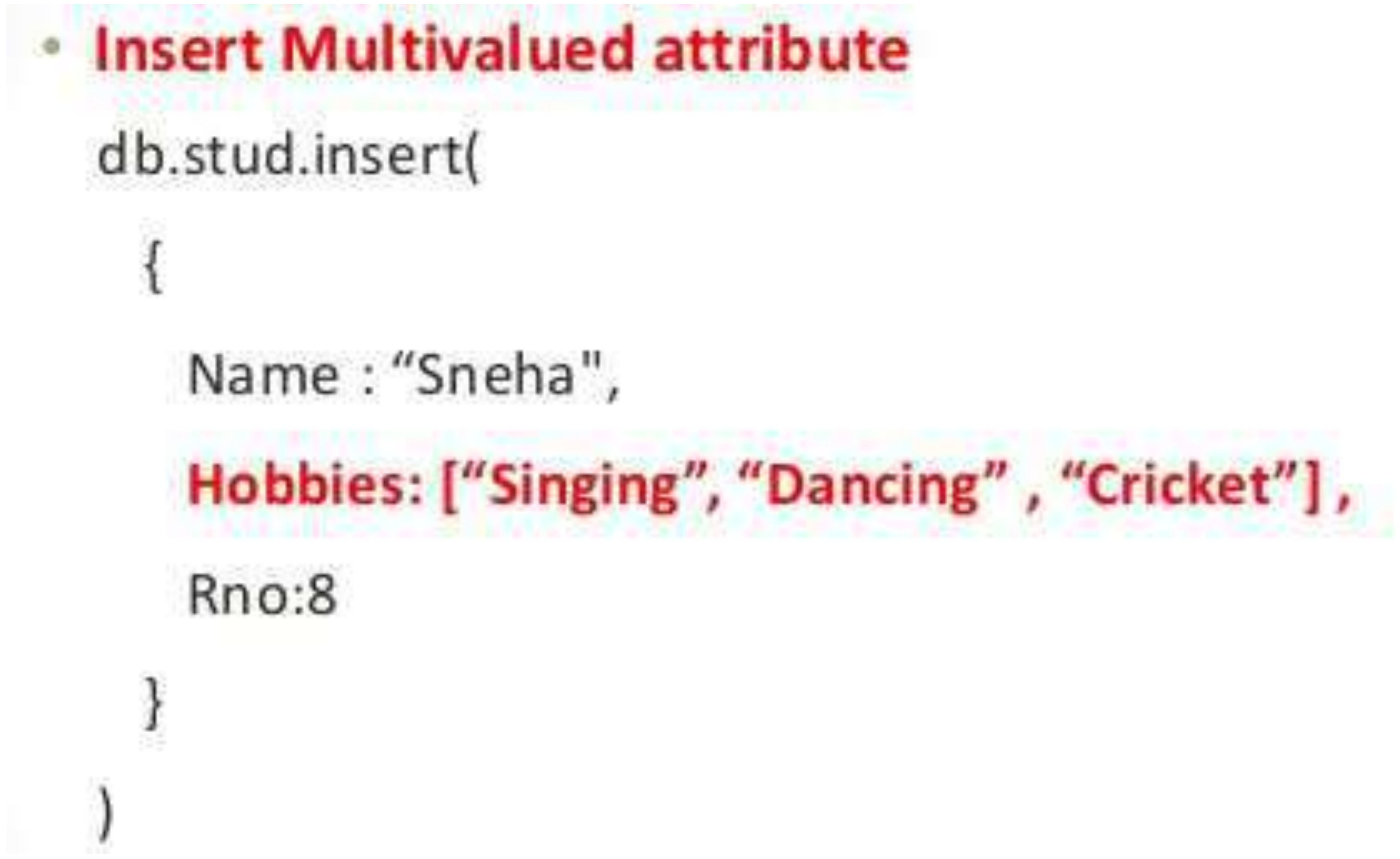
CRUD Operations - Insert



- **Insert Multicolumn attribute**

```
db.stud.insert(
  {
   Name: “Ritu",
   Address: { City: “Pune",
              State: “MH” },
  Rno: 6
  }
)
```

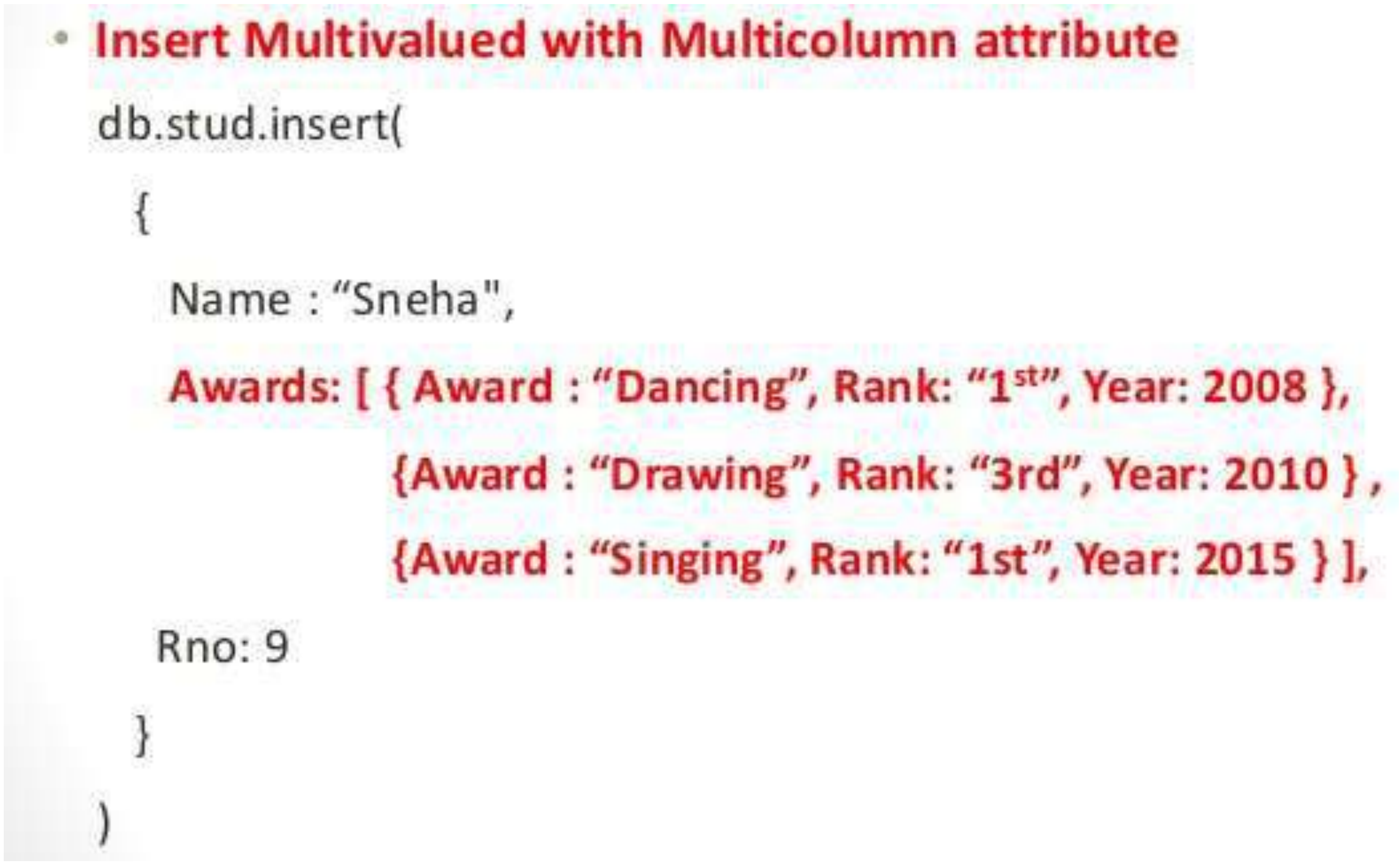
CRUD Operations - Insert



- **Insert Multivalued attribute**

```
db.stud.insert(
  {
    Name : “Sneha",
    Hobbies: [“Singing”, “Dancing” , “Cricket”] ,
    Rno:8
  }
)
```

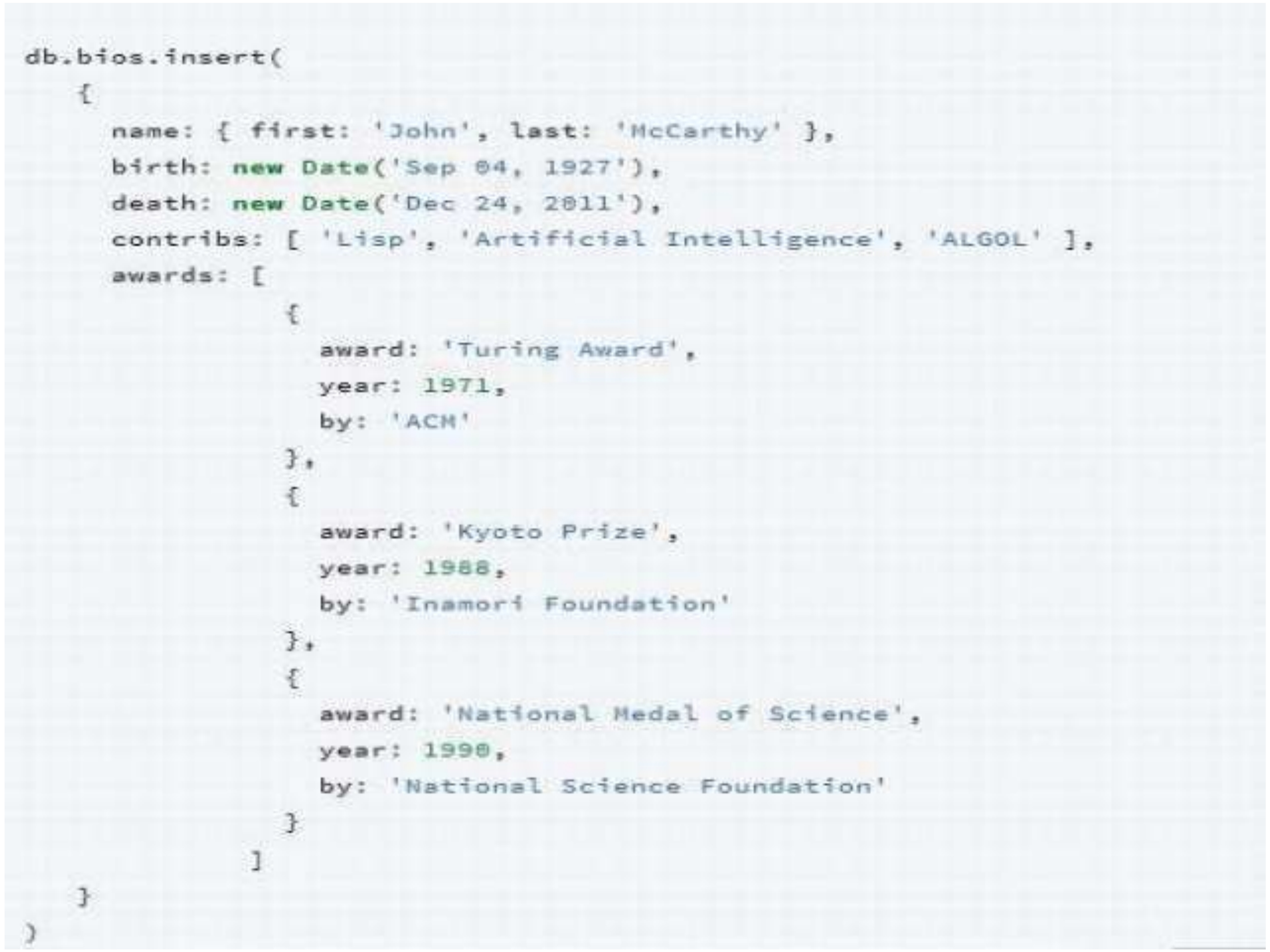
CRUD Operations - Insert



- **Insert Multivalued with Multicolumn attribute**

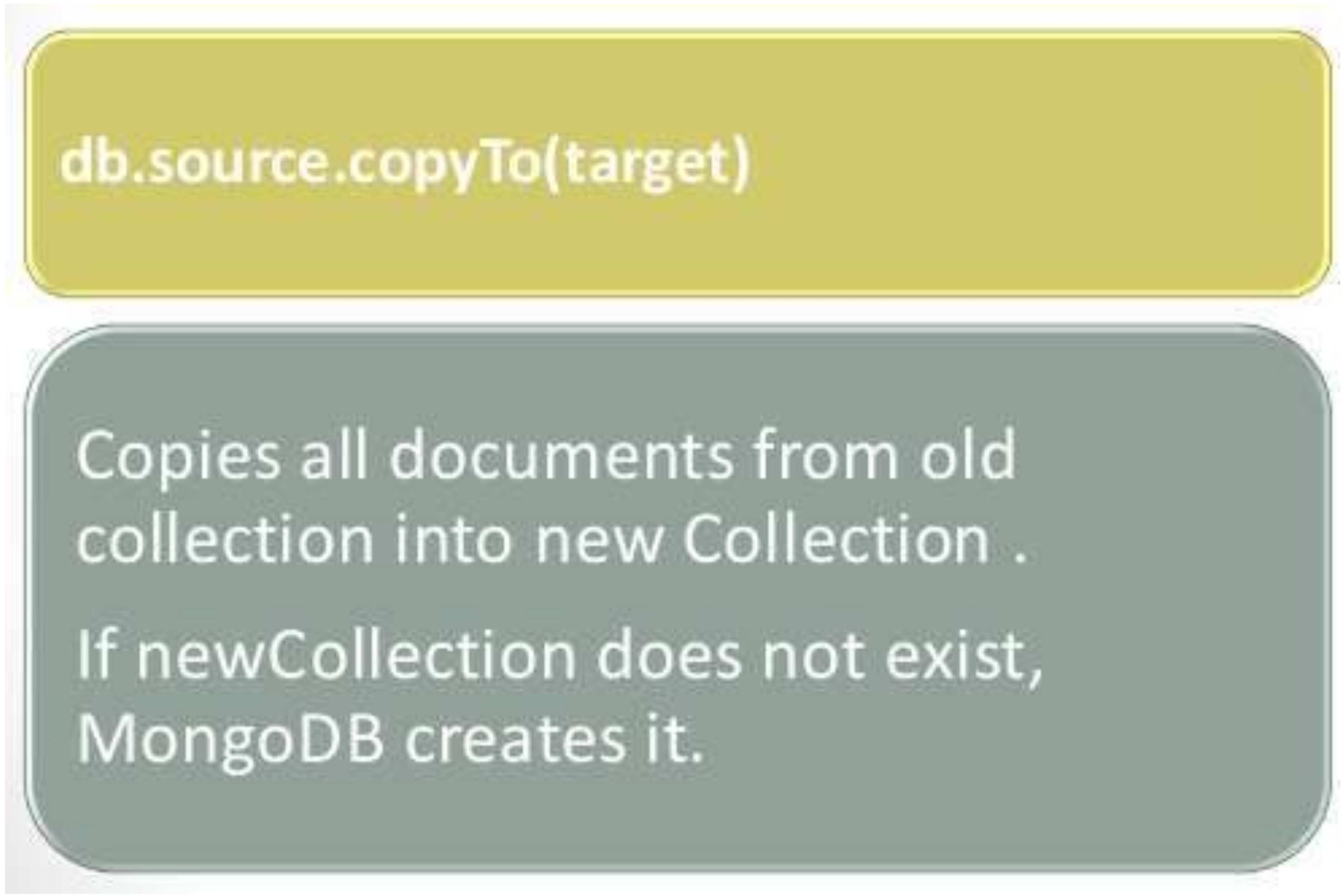
```
db.stud.insert(
  {
   Name : “Sneha",
   Awards: [ { Award : “Dancing”, Rank: “1st”, Year: 2008 },
                  {Award : “Drawing”, Rank: “3rd”, Year: 2010 } ,
                  {Award : “Singing”, Rank: “1st”, Year: 2015 } ],
  Rno: 9
  }
)
```

CRUD Operations - Insert



```
db.bios.insert(
   {
     name: { first: 'John', last: 'McCarthy' },
     birth: new Date('Sep 04, 1927'),
     death: new Date('Dec 24, 2011'),
     contribs: [ 'Lisp', 'Artificial Intelligence', 'ALGOL' ],
     awards: [
               {
                 award: 'Turing Award',
                 year: 1971,
                 by: 'ACM'
               },
               {
                 award: 'Kyoto Prize',
                 year: 1988,
                 by: 'Inamori Foundation'
               },
               {
                 award: 'National Medal of Science',
                 year: 1990,
                 by: 'National Science Foundation'
               }
             ]
   }
)
```

CRUD Operations - Insert

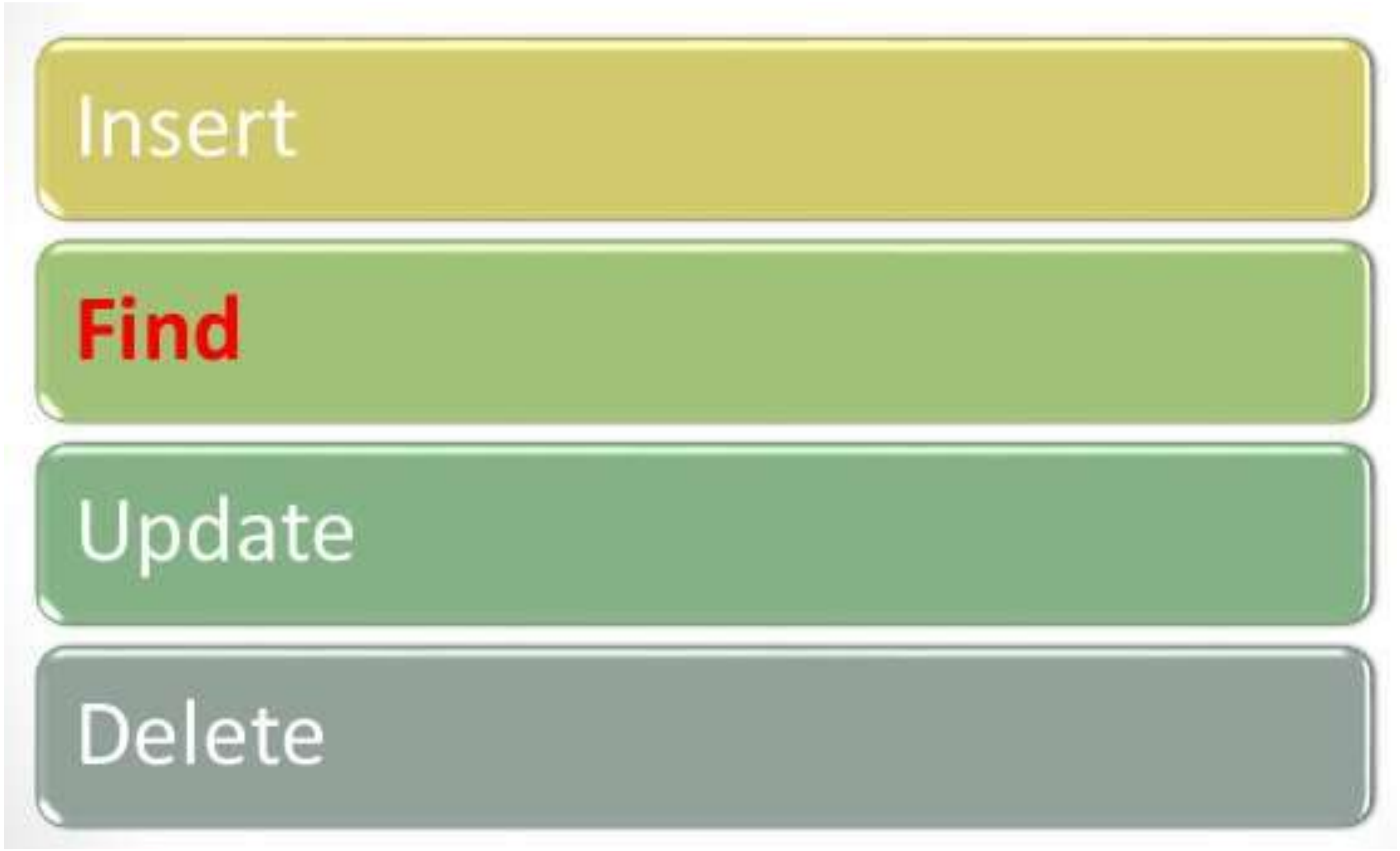


```
db.source.copyTo(target)
```

Copies all documents from old collection into new Collection .

If newCollection does not exist, MongoDB creates it.

CRUD Operations



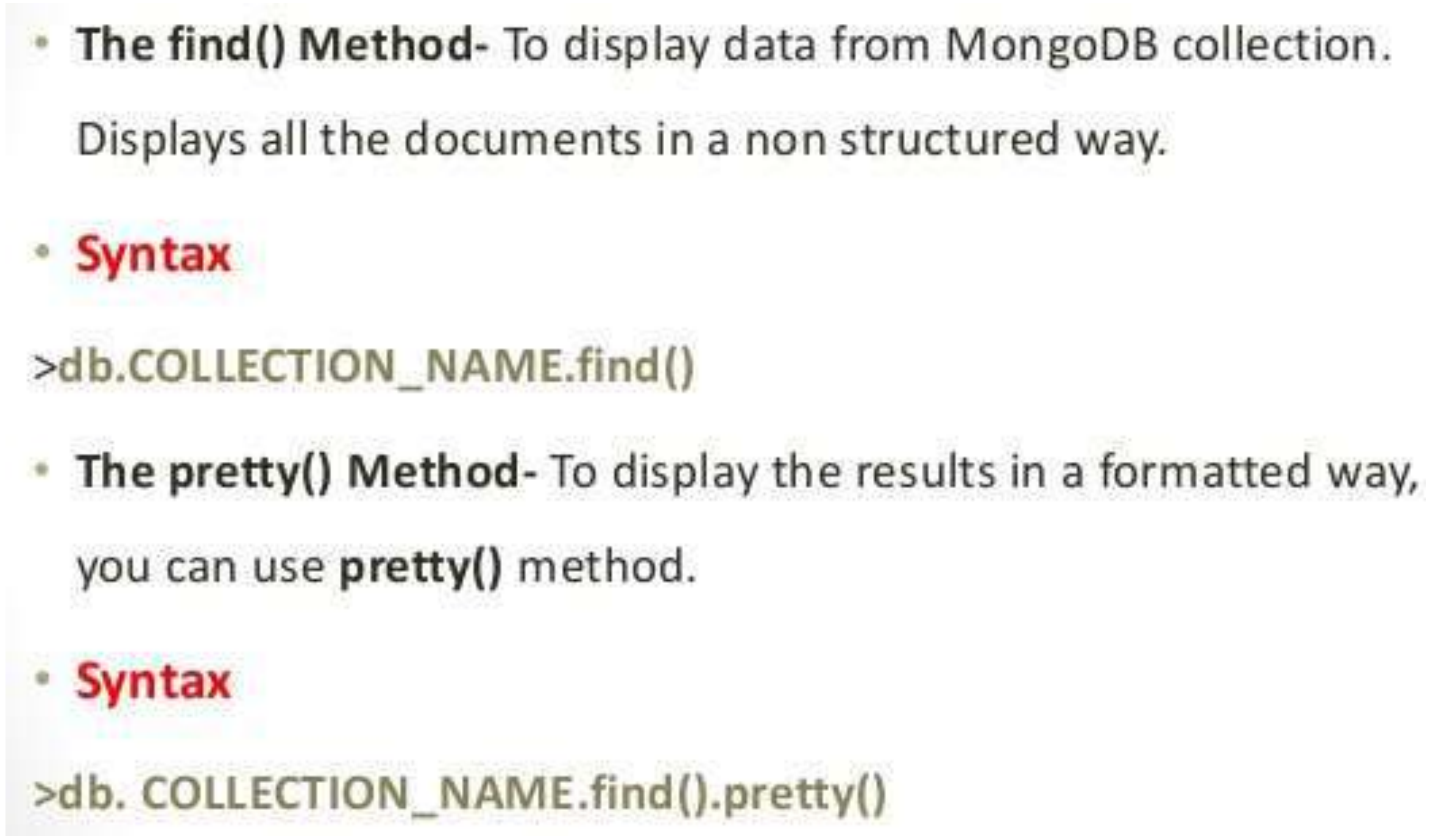
Insert

Find

Update

Delete

CRUD Operations - Find



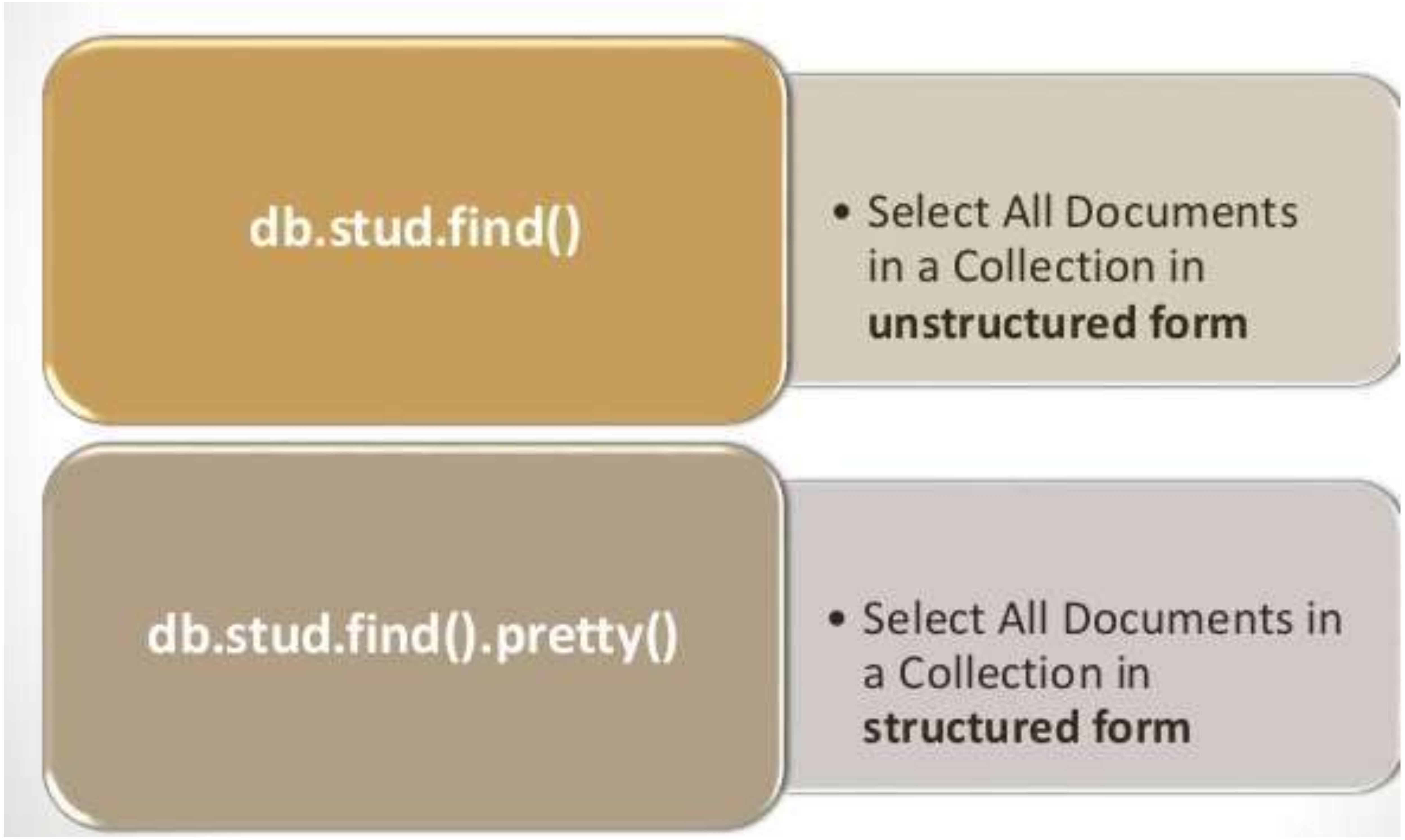
- **The find() Method-** To display data from MongoDB collection. Displays all the documents in a non structured way.
- Syntax

```
>db.COLLECTION_NAME.find()
```

- **The pretty() Method-** To display the results in a formatted way, you can use **pretty()** method.
- Syntax

```
>db. COLLECTION_NAME.find().pretty()
```

CRUD Operations - Find



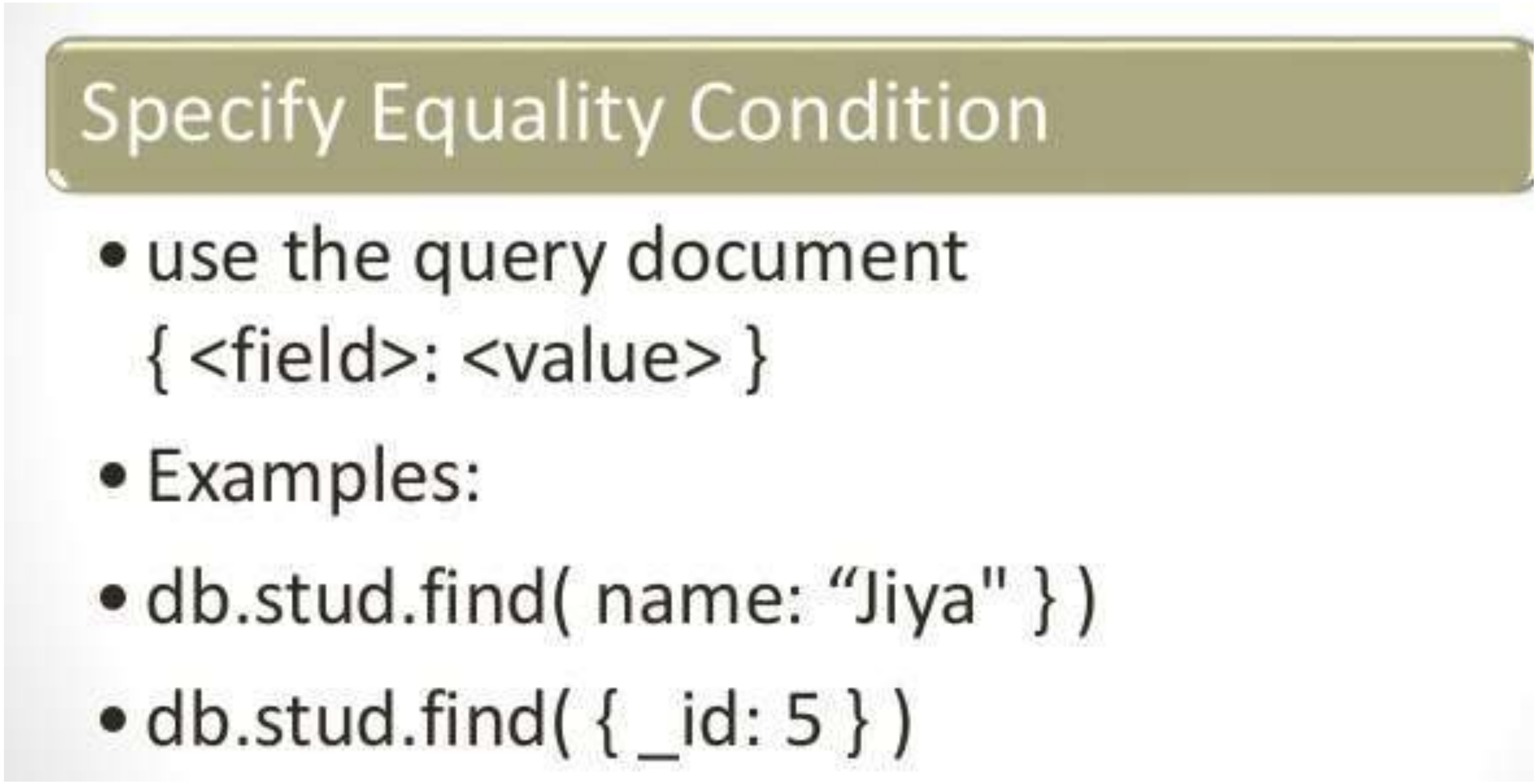
db.stud.find()

- Select All Documents in a Collection in **unstructured form**

db.stud.find().pretty()

- Select All Documents in a Collection in **structured form**

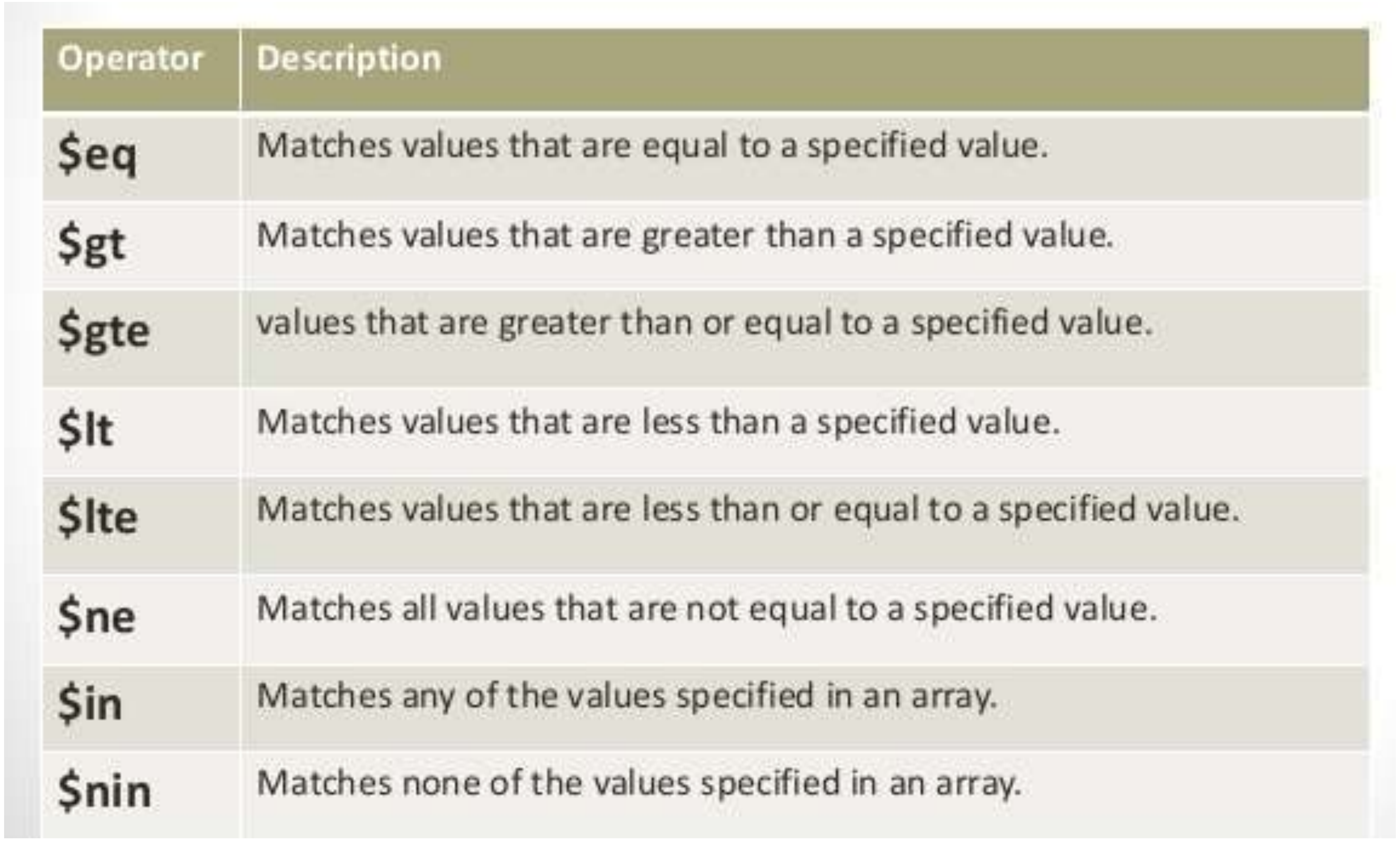
CRUD Operations - Find



Specify Equality Condition

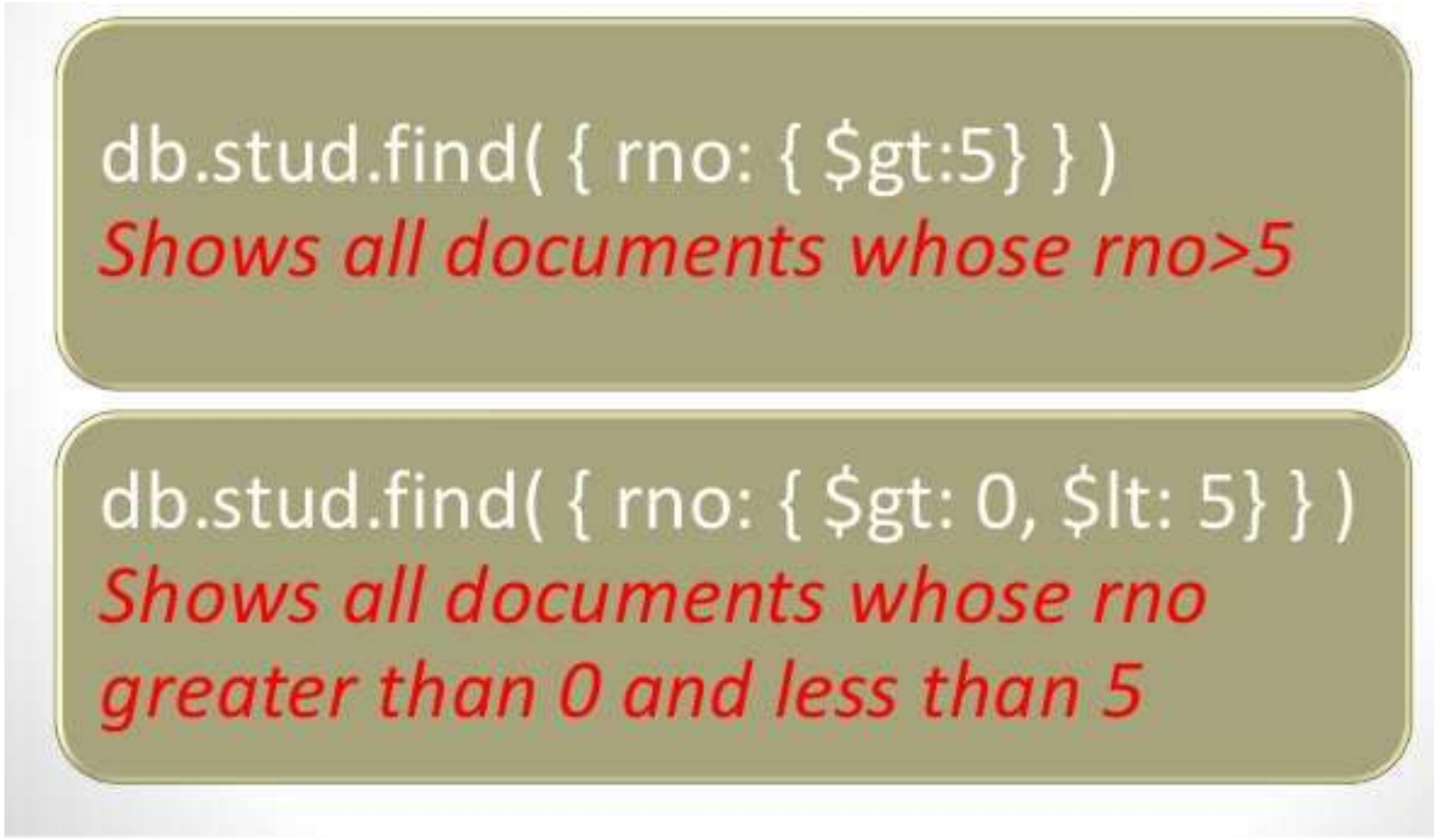
- use the query document
  { <field>: <value> }
- Examples:
- db.stud.find(name: “Jiya" })
- db.stud.find({ _id: 5 })

CRUD Operations – Find Comparison Operators



Operator	Description
$eq	Matches values that are equal to a specified value.
$gt	Matches values that are greater than a specified value.
$gte	values that are greater than or equal to a specified value.
$lt	Matches values that are less than a specified value.
$lte	Matches values that are less than or equal to a specified value.
$ne	Matches all values that are not equal to a specified value.
$in	Matches any of the values specified in an array.
$nin	Matches none of the values specified in an array.

CRUD Operations – Find Comparsion Operators



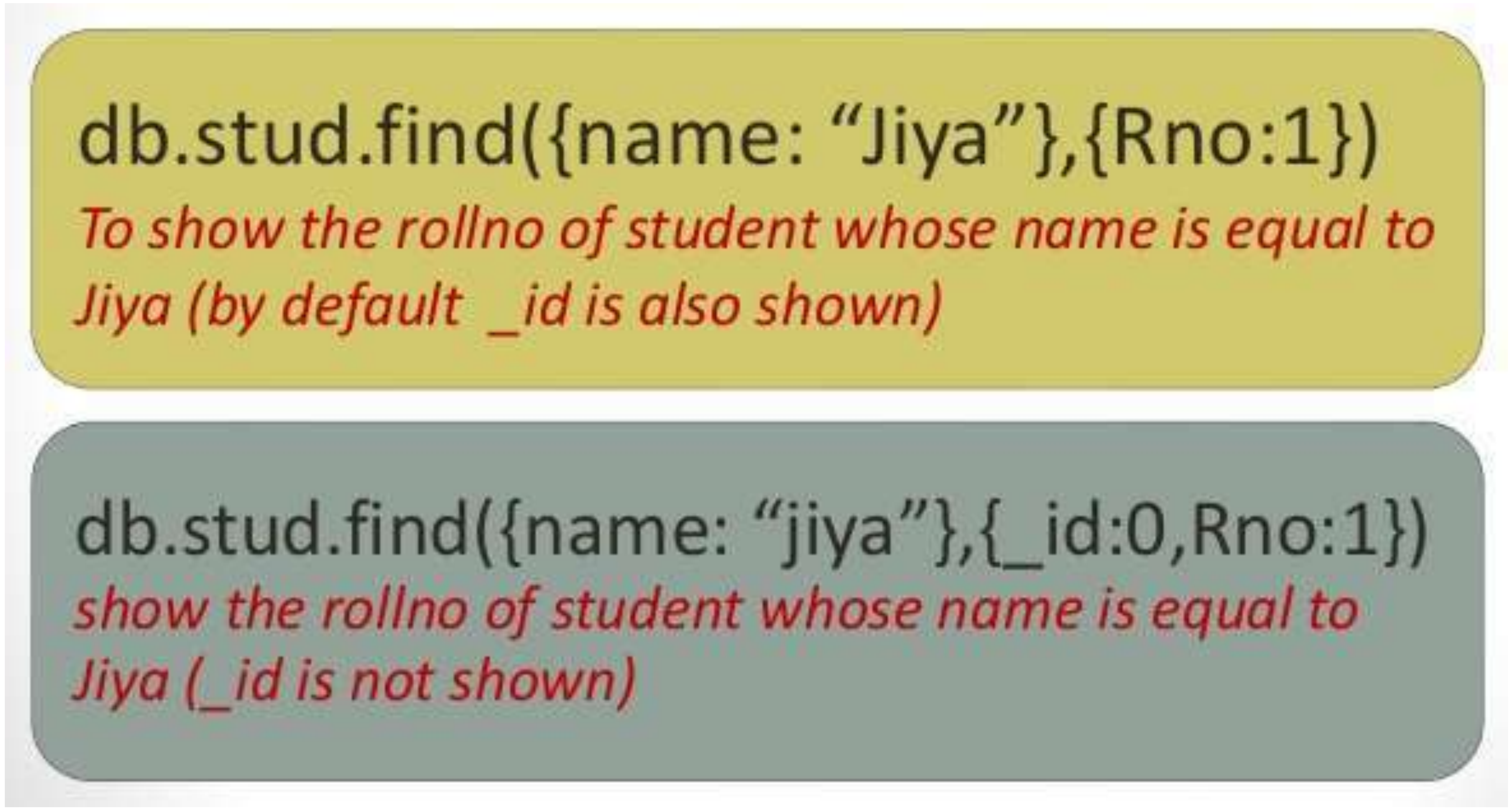
```
db.stud.find( { rno: { $gt:5} } )
```

Shows all documents whose rno>5

```
db.stud.find( { rno: { $gt: 0, $lt: 5} } )
```

Shows all documents whose rno greater than 0 and less than 5

CRUD Operations – Find to show only particular columns



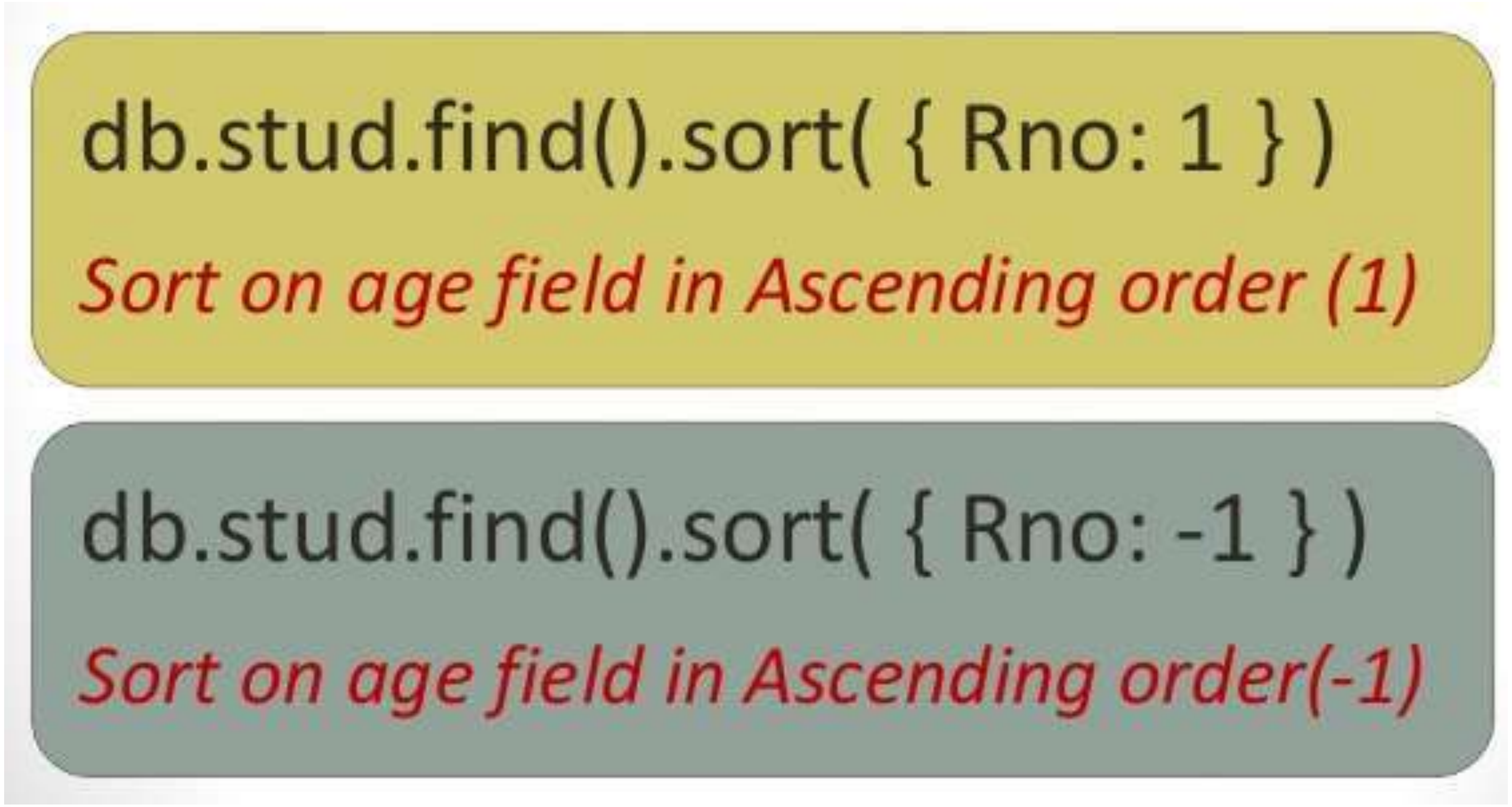
```
db.stud.find({name: “Jiya”},{Rno:1})
```

To show the rollno of student whose name is equal to Jiya (by default _id is also shown)

```
db.stud.find({name: “jiya”},{_id:0,Rno:1})
```

show the rollno of student whose name is equal to Jiya (_id is not shown)

CRUD Operations – Examples for Sort function



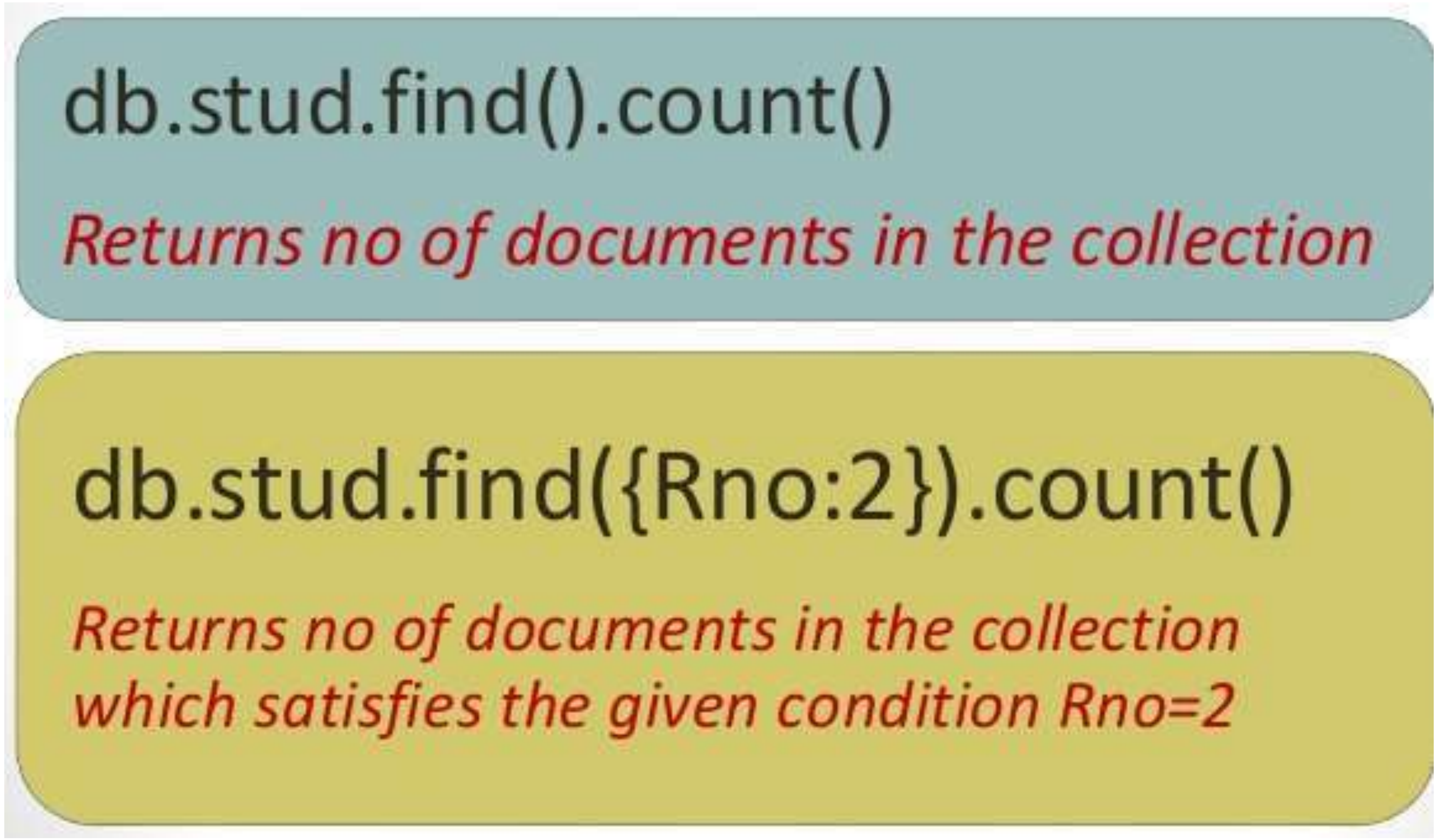
```
db.stud.find().sort( { Rno: 1 } )
```

Sort on age field in Ascending order (1)

```
db.stud.find().sort( { Rno: -1 } )
```

Sort on age field in Ascending order(-1)

CRUD Operations – Examples of Count function



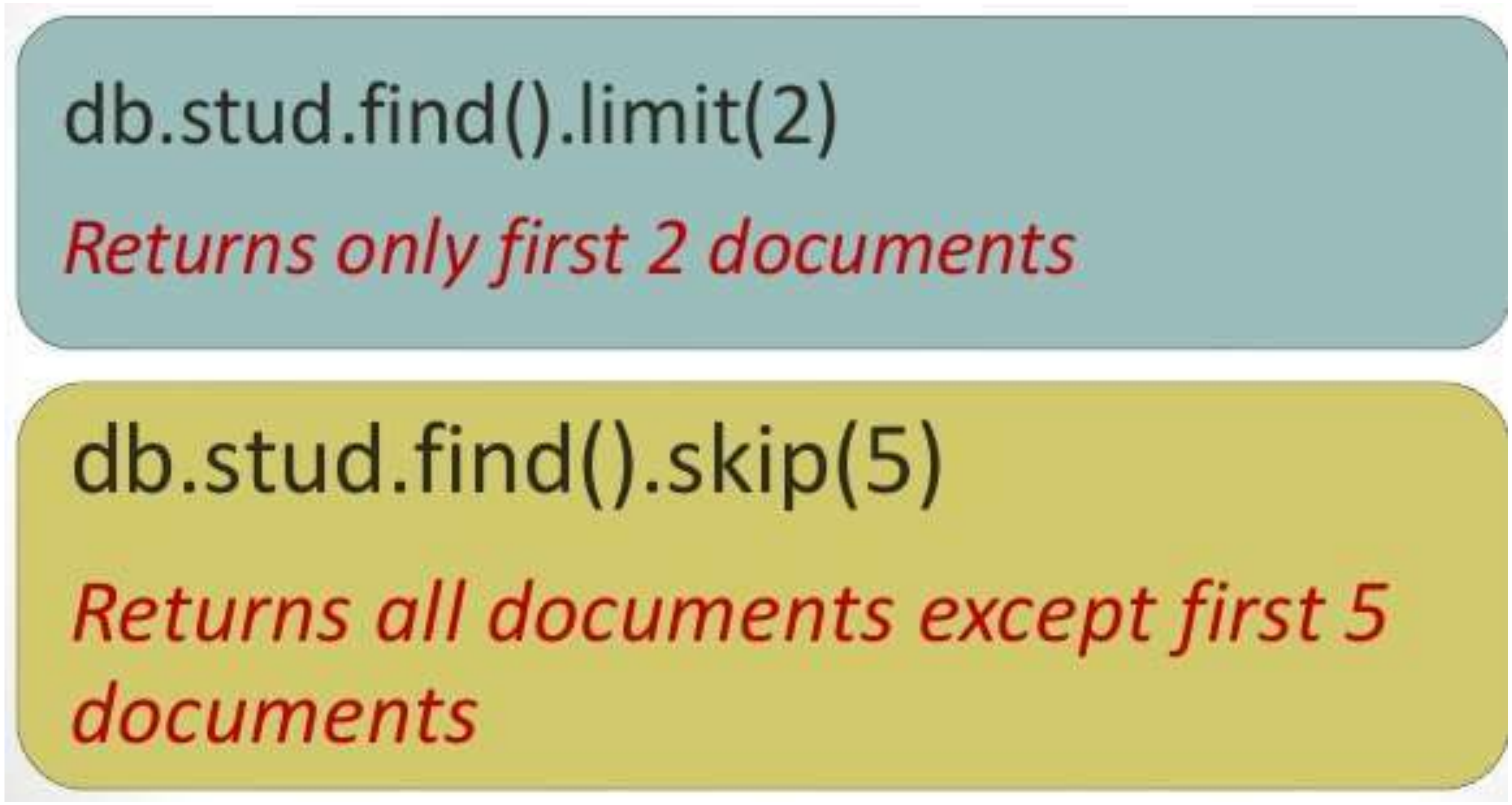
```
db.stud.find().count()
```

Returns no of documents in the collection

```
db.stud.find({Rno:2}).count()
```

Returns no of documents in the collection which satisfies the given condition Rno=2

CRUD Operations – Find Examples of limit and skip



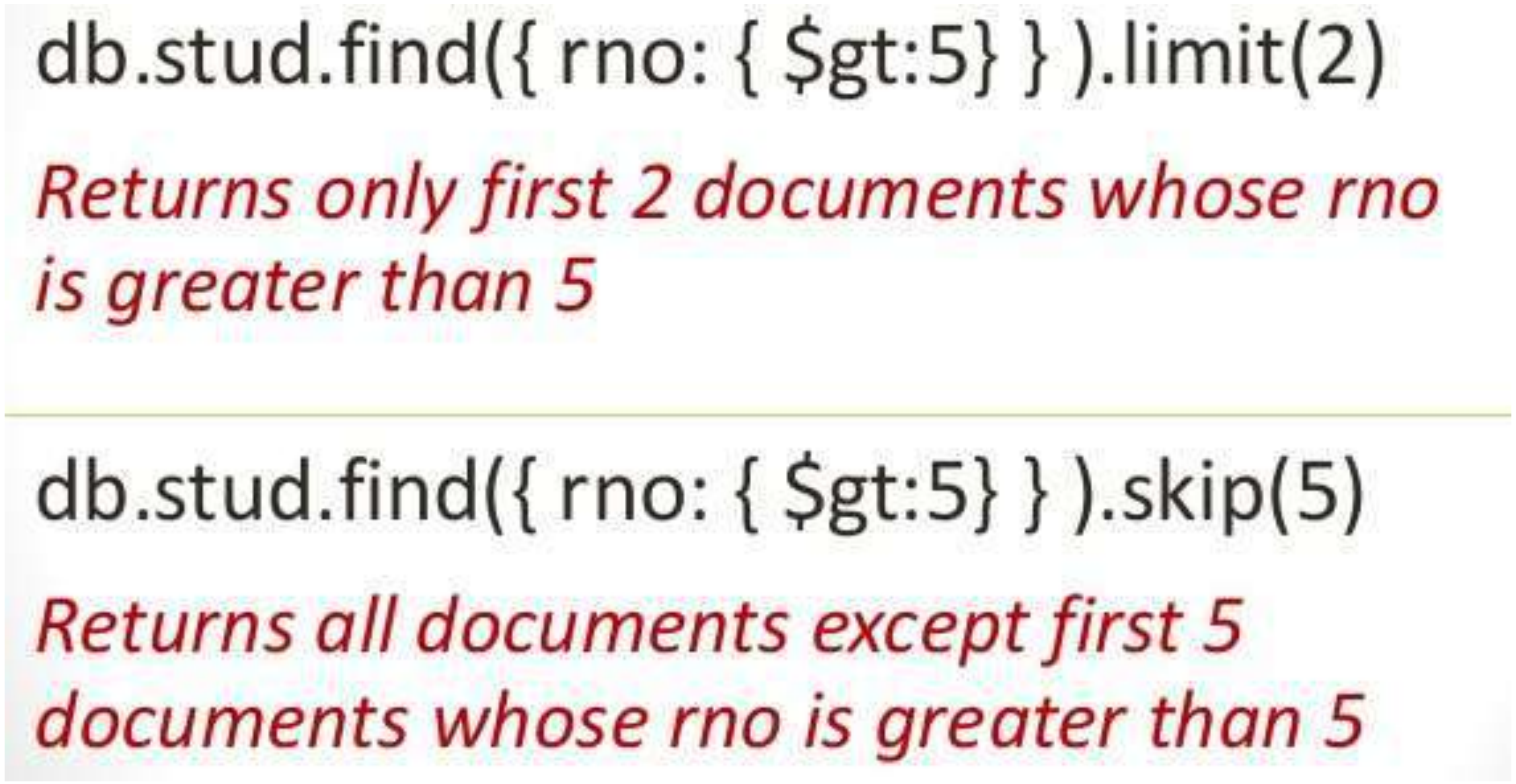
db.stud.find().limit(2)

Returns only first 2 documents

db.stud.find().skip(5)

Returns all documents except first 5 documents

CRUD Operations – Find Examples of limit and skip



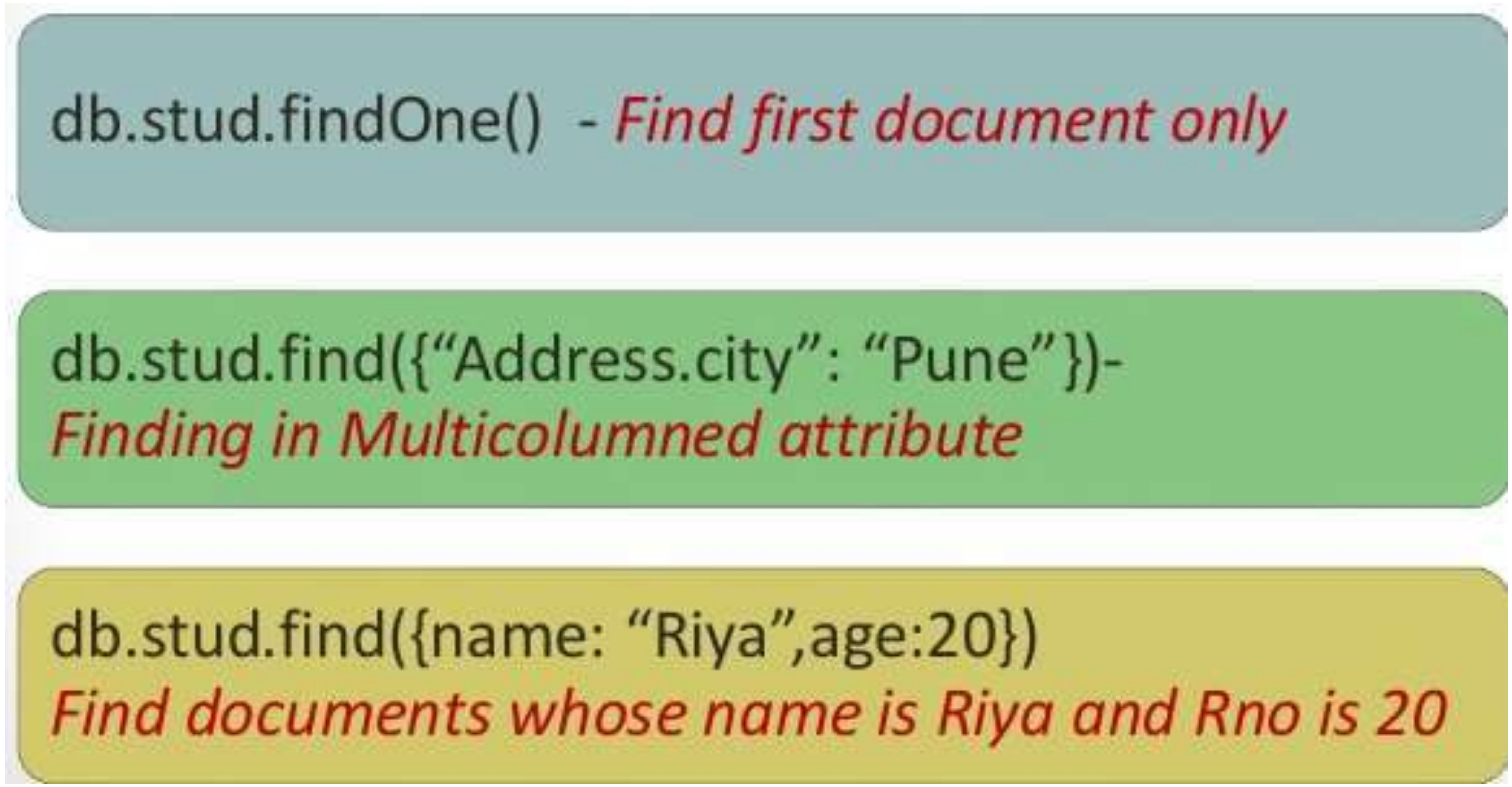
```
db.stud.find({ rno: { $gt:5} } ).limit(2)
```

Returns only first 2 documents whose rno is greater than 5

```
db.stud.find({ rno: { $gt:5} } ).skip(5)
```

Returns all documents except first 5 documents whose rno is greater than 5

CRUD Operations – Find Examples

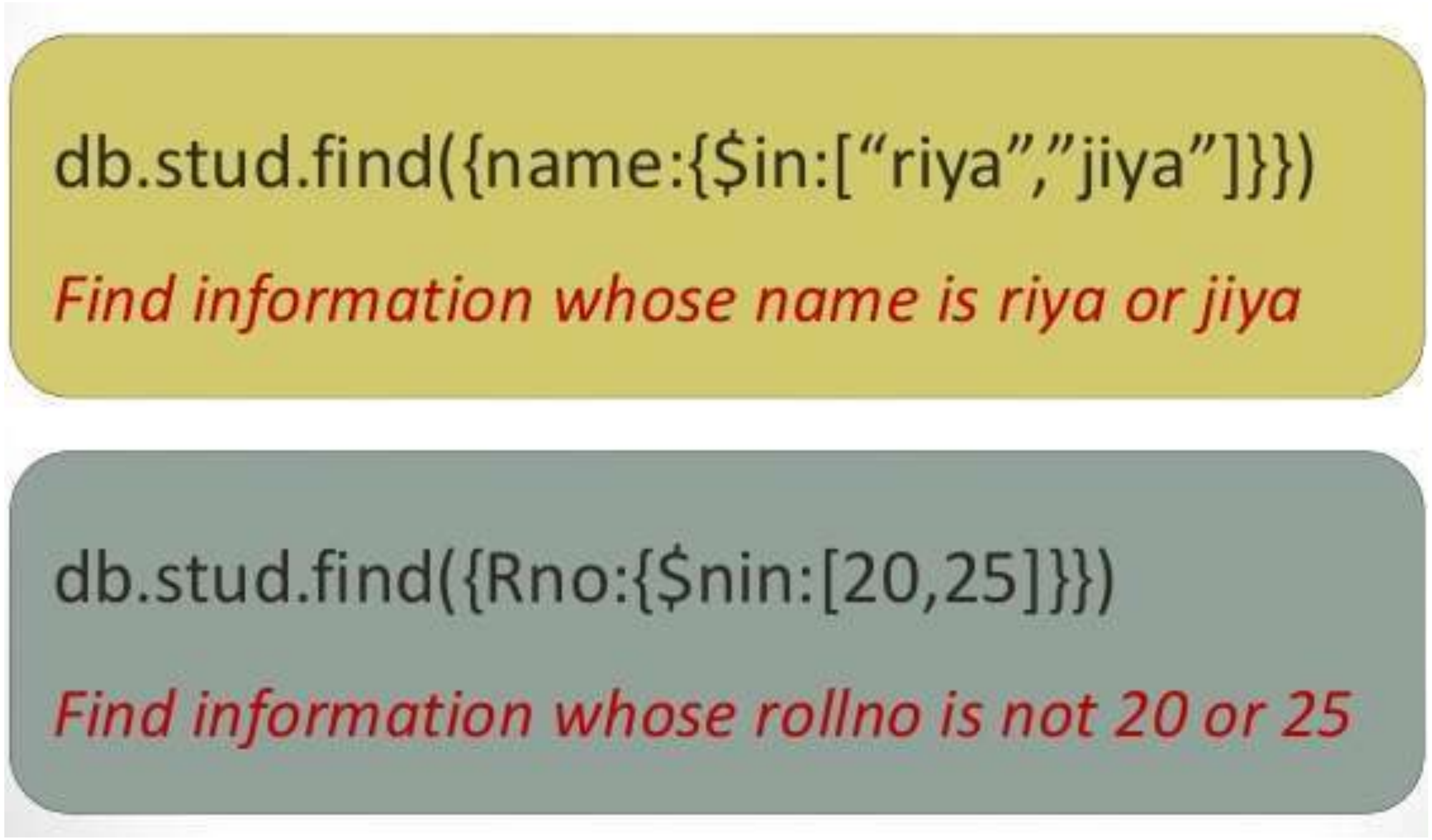


db.stud.findOne() - *Find first document only*

db.stud.find({“Address.city”: “Pune”})-
Finding in Multicolumned attribute

db.stud.find({name: “Riya”,age:20})
Find documents whose name is Riya and Rno is 20

CRUD Operations – Find Examples with in and not in operator



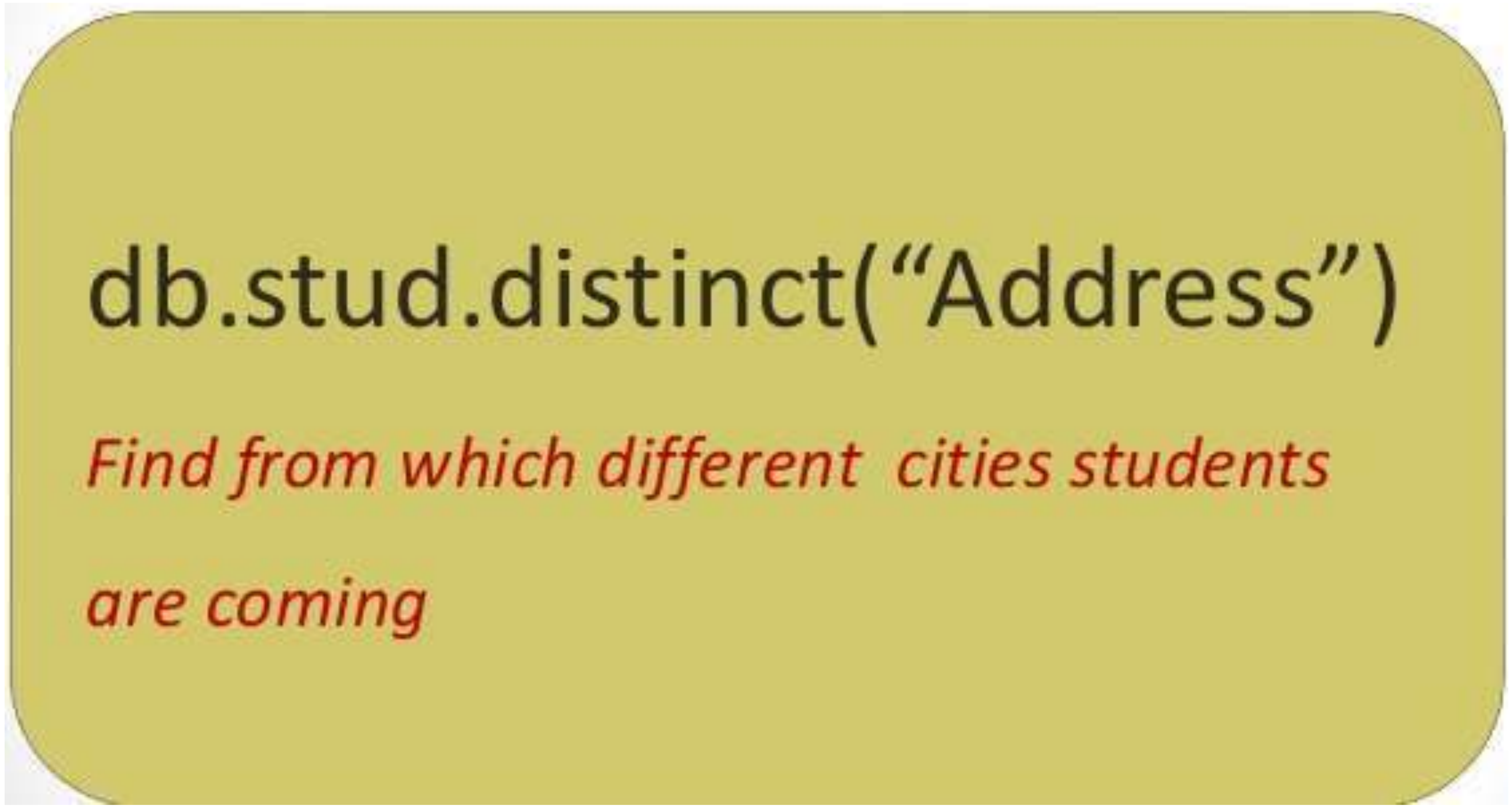
```
db.stud.find({name:{$in:["riya","jiya"]}})
```

Find information whose name is riya or jiya

```
db.stud.find({Rno:{$nin:[20,25]}})
```

Find information whose rollno is not 20 or 25

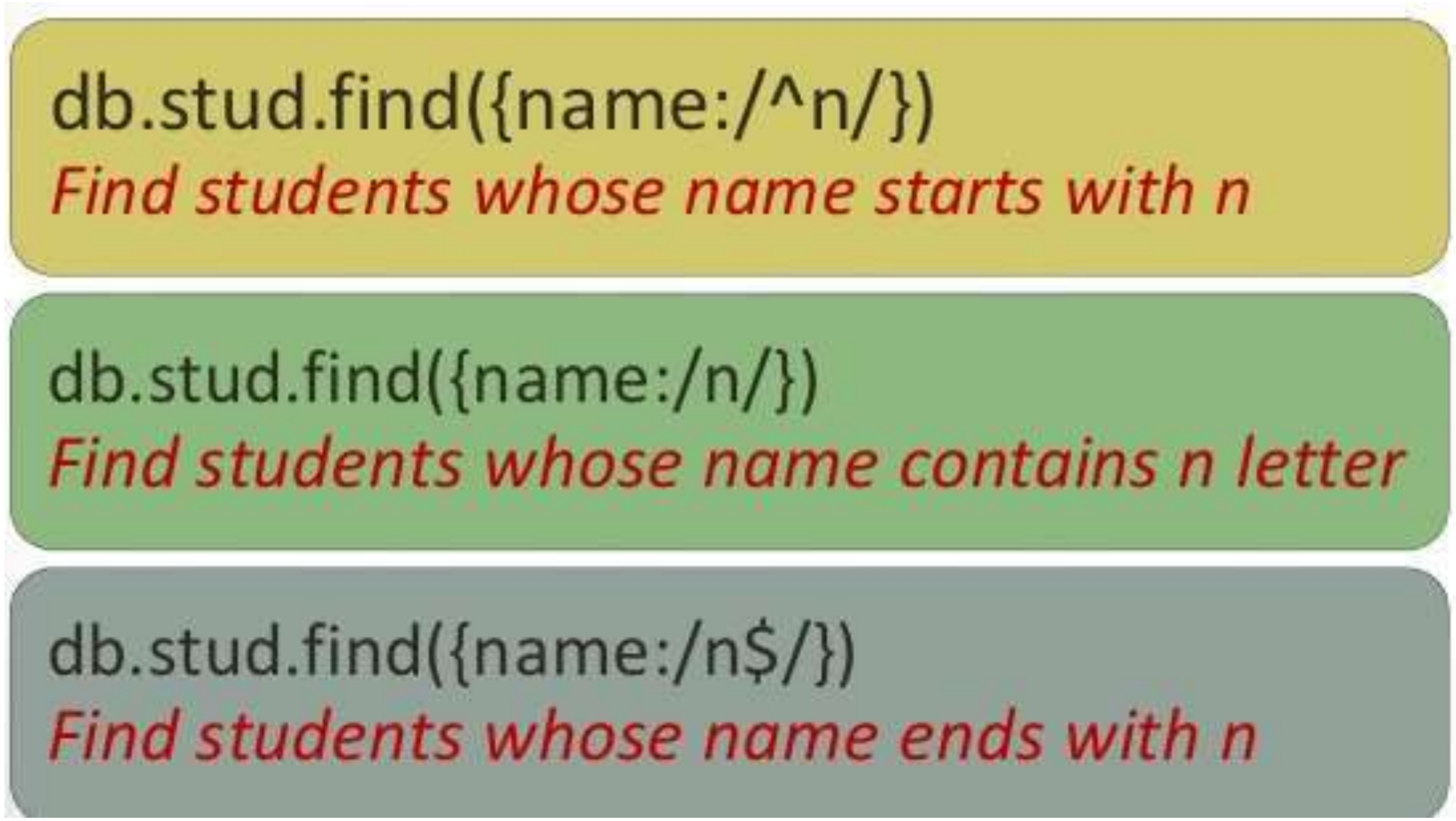
CRUD Operations – Find Examples for Distinct clause



```
db.stud.distinct("Address")
```

Find from which different cities students are coming

CRUD Operations – Find Examples similar to like operator

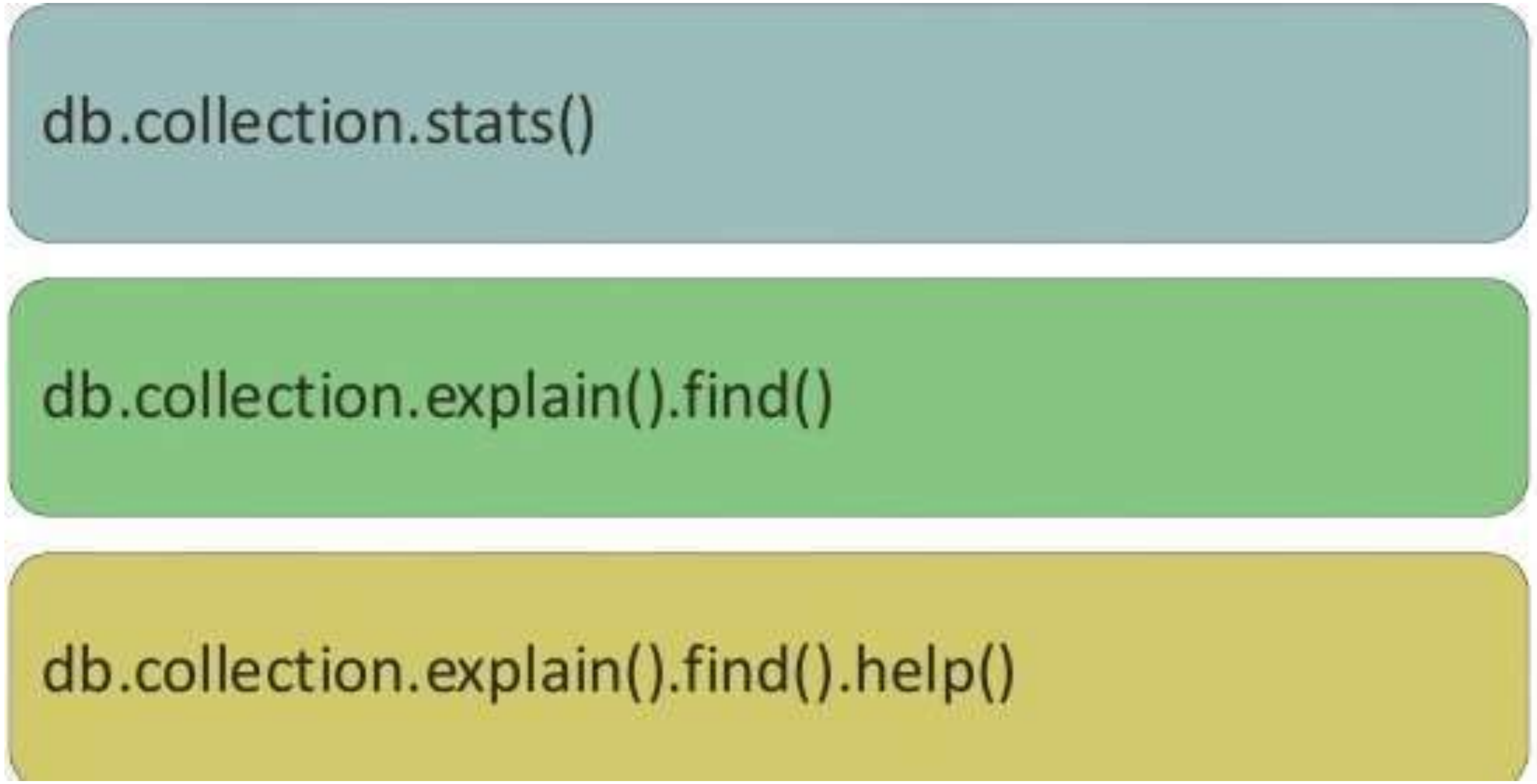


```
db.stud.find({name:/^n/})
```
Find students whose name starts with n

```
db.stud.find({name:/n/})
```
Find students whose name contains n letter

```
db.stud.find({name:/n$/})
```
Find students whose name ends with n

CRUD Operations – Find Examples

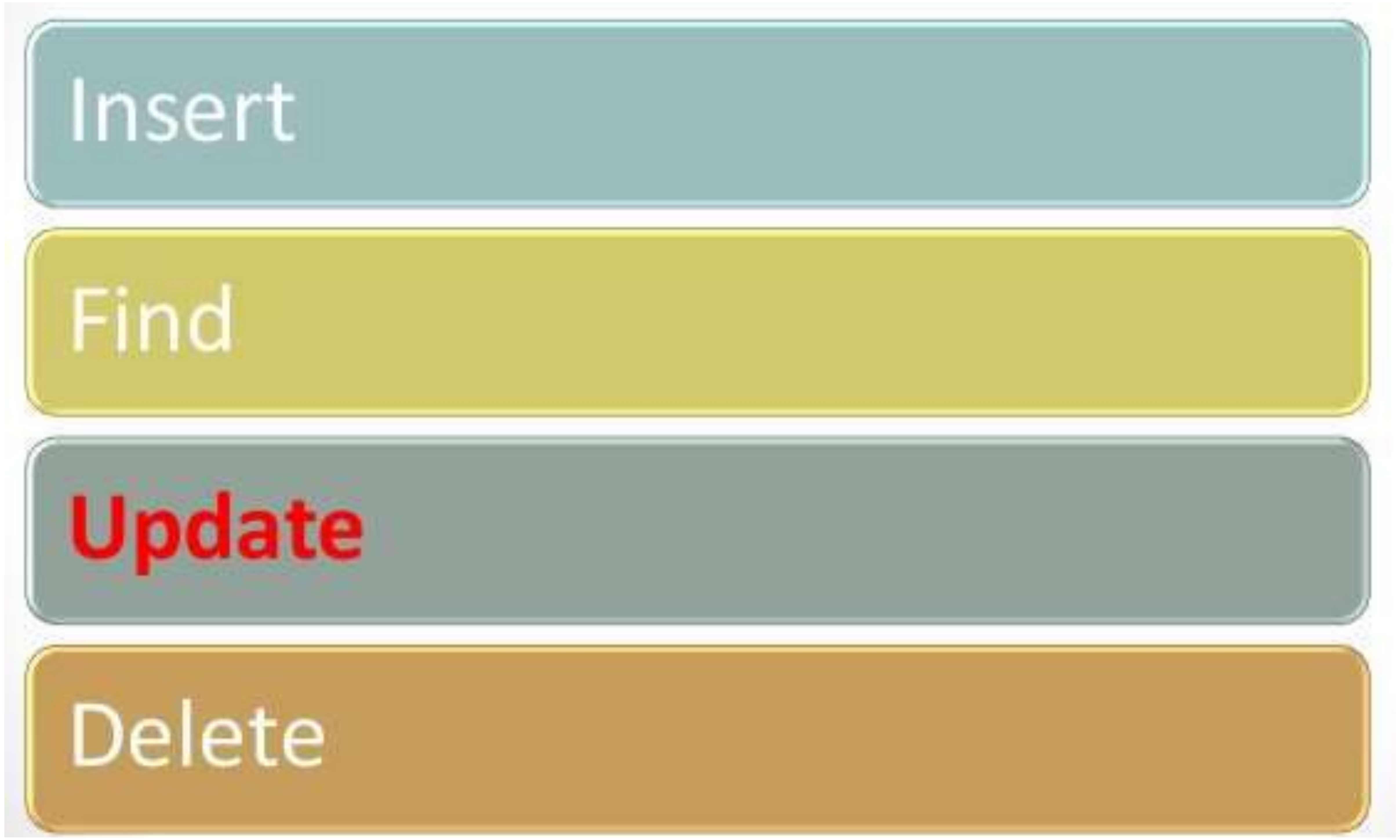


```
db.collection.stats()

db.collection.explain().find()

db.collection.explain().find().help()
```

CRUD Operations



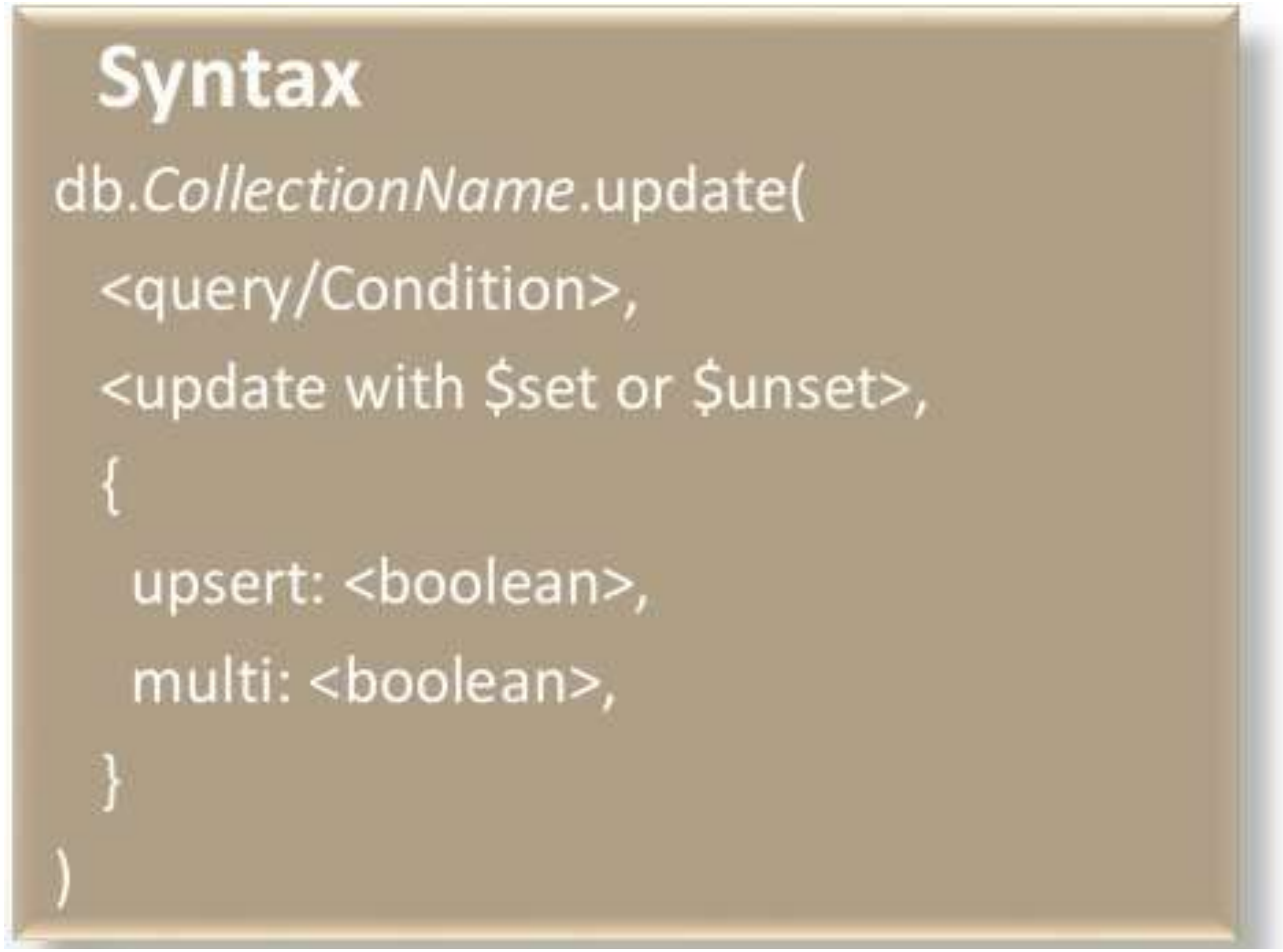
Insert

Find

Update

Delete

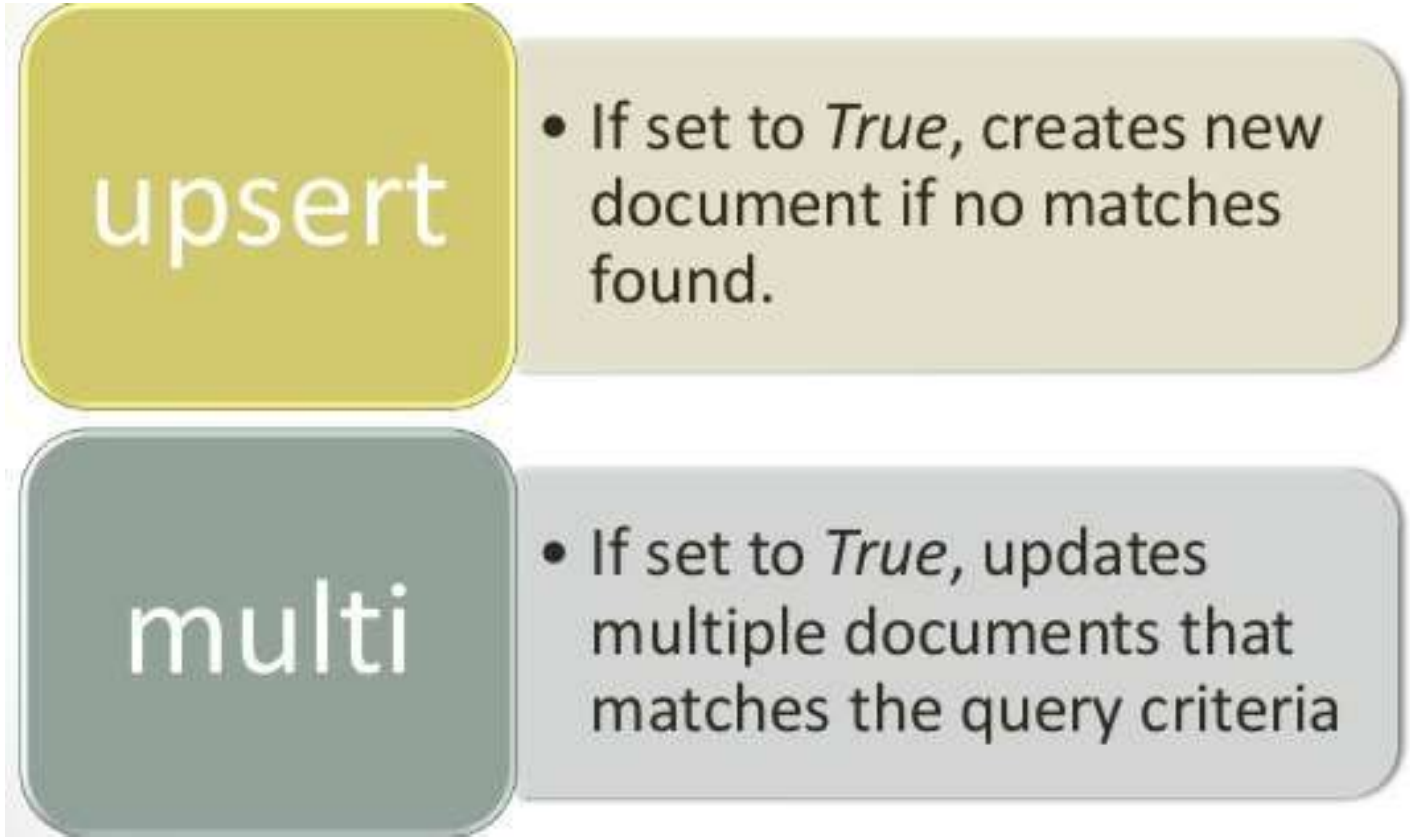
CRUD Operations – Update



Syntax

```
db.CollectionName.update(
  <query/Condition>,
  <update with $set or $unset>,
  {
   upsert: <boolean>,
   multi: <boolean>,
  }
)
```

CRUD Operations – Update



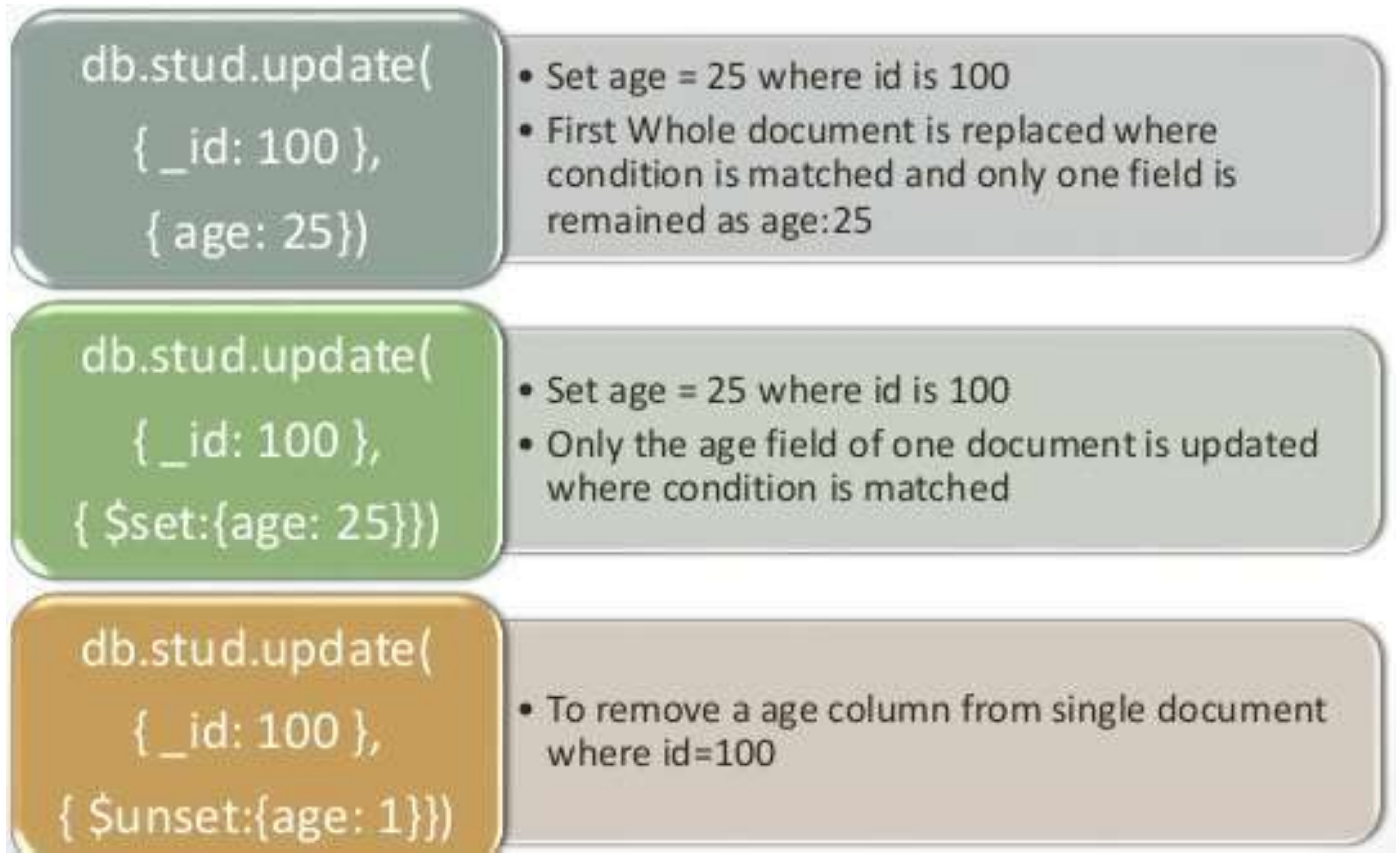
upsert

- If set to *True*, creates new document if no matches found.

multi

- If set to *True*, updates multiple documents that matches the query criteria

CRUD Operations – Update



```
db.stud.update(
{ _id: 100 },
{ age: 25})
```

- Set age = 25 where id is 100
- First Whole document is replaced where condition is matched and only one field is remained as age:25

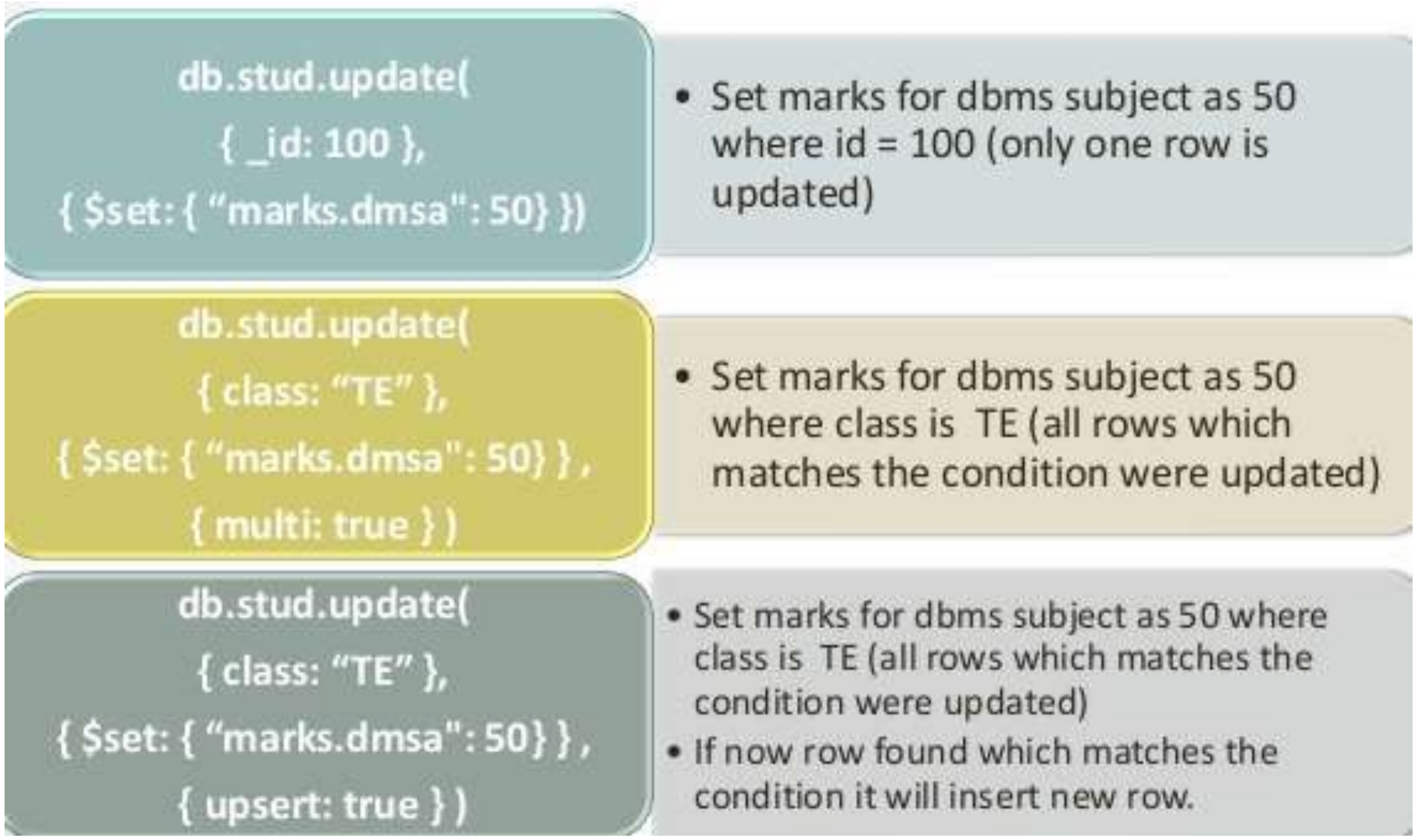
```
db.stud.update(
{ _id: 100 },
{ $set:{age: 25}})
```

- Set age = 25 where id is 100
- Only the age field of one document is updated where condition is matched

```
db.stud.update(
{ _id: 100 },
{ $unset:{age: 1}})
```

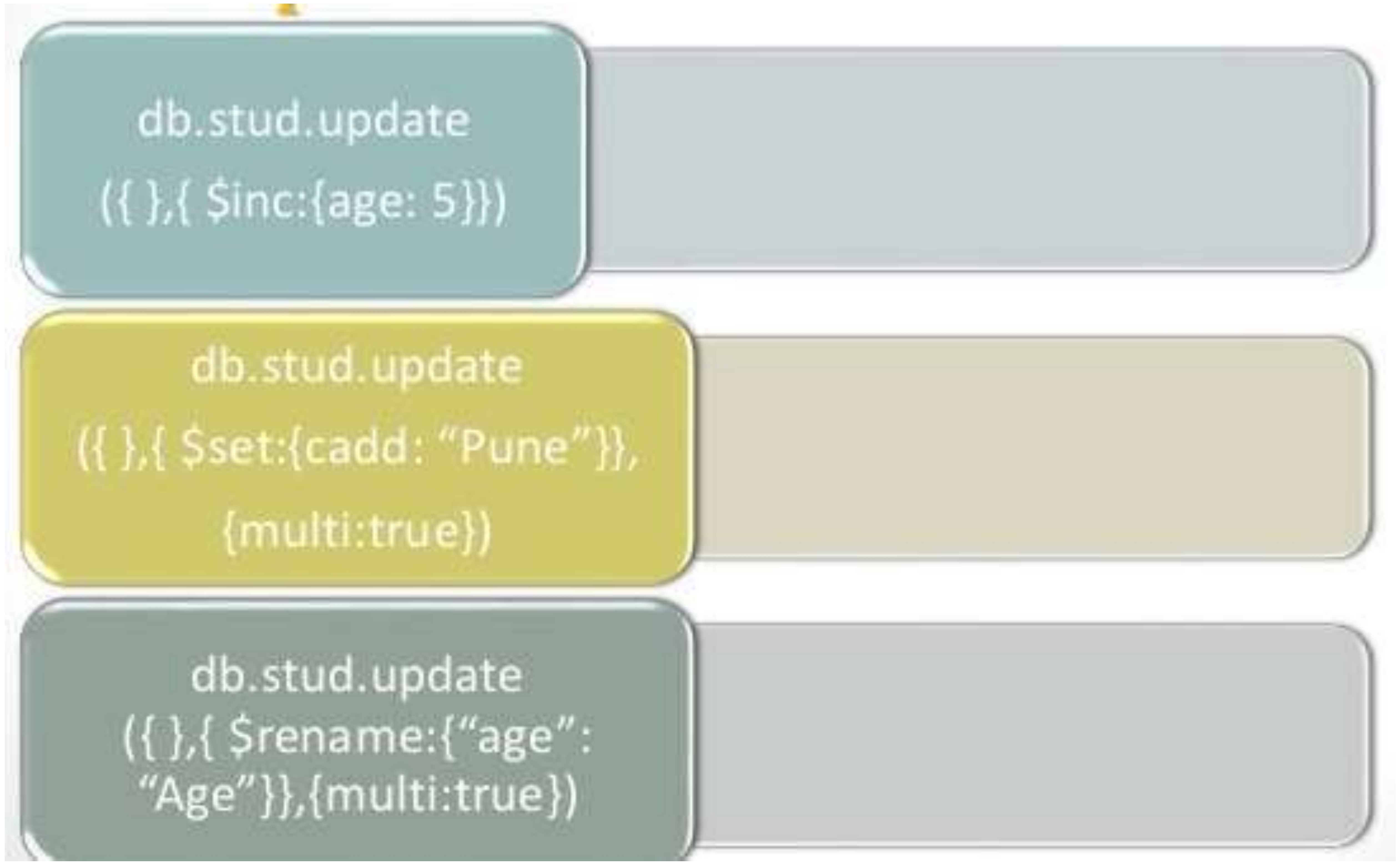
- To remove a age column from single document where id=100

CRUD Operations – Update Examples



db.stud.update({ _id: 100 }, { $set: { “marks.dmsa": 50} })	• Set marks for dbms subject as 50 where id = 100 (only one row is updated)
db.stud.update({ class: “TE” }, { $set: { “marks.dmsa": 50} } , { multi: true })	• Set marks for dbms subject as 50 where class is TE (all rows which matches the condition were updated)
db.stud.update({ class: “TE” }, { $set: { “marks.dmsa": 50} } , { upsert: true })	• Set marks for dbms subject as 50 where class is TE (all rows which matches the condition were updated) • If now row found which matches the condition it will insert new row.

CRUD Operations – Update Examples

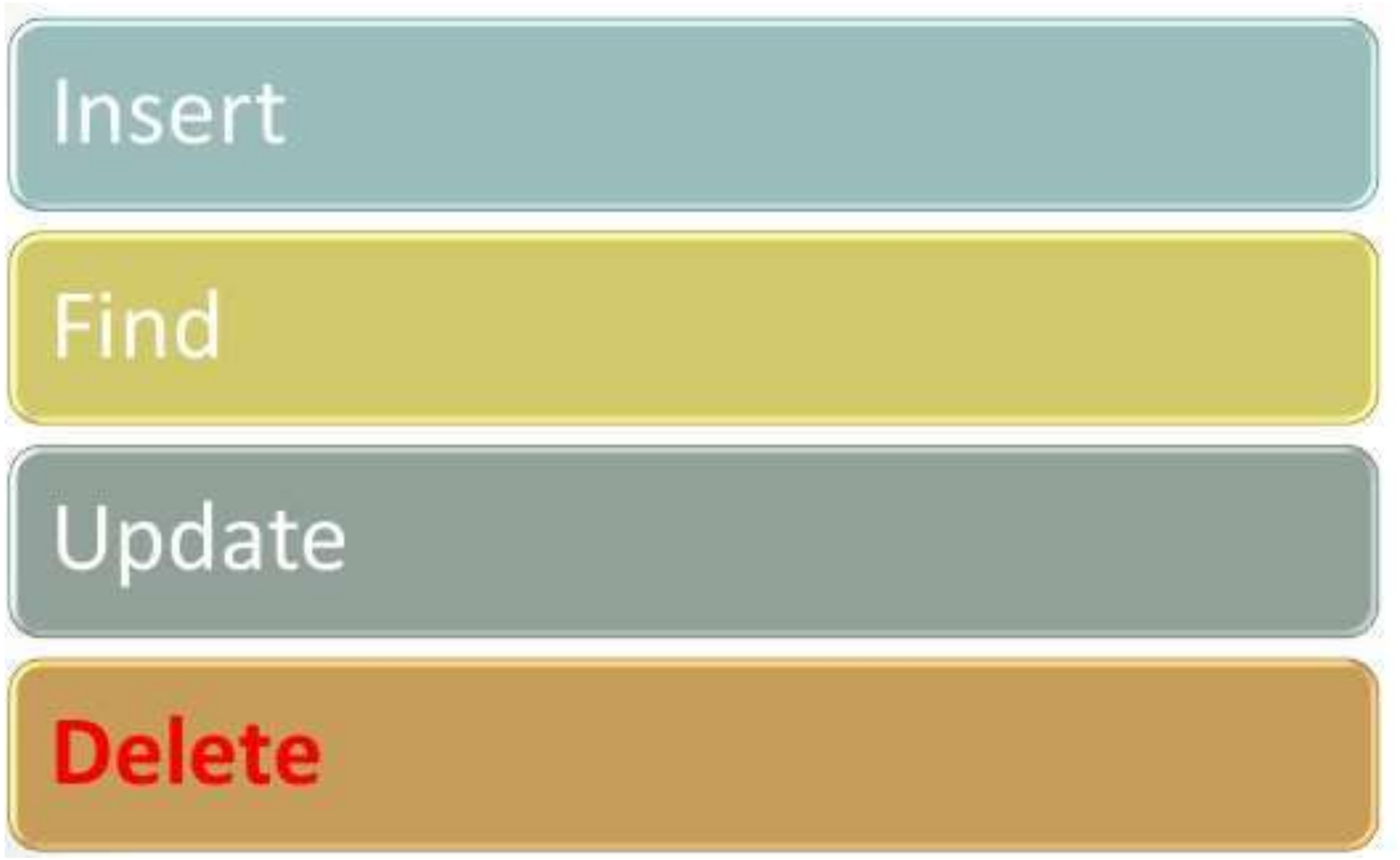


db.stud.update({ },{ $inc:{age: 5}})

db.stud.update({ },{ $set:{cadd: "Pune"}}, {multi:true})

db.stud.update({ },{ $rename:{"age": "Age"}},{multi:true})

CRUD Operations



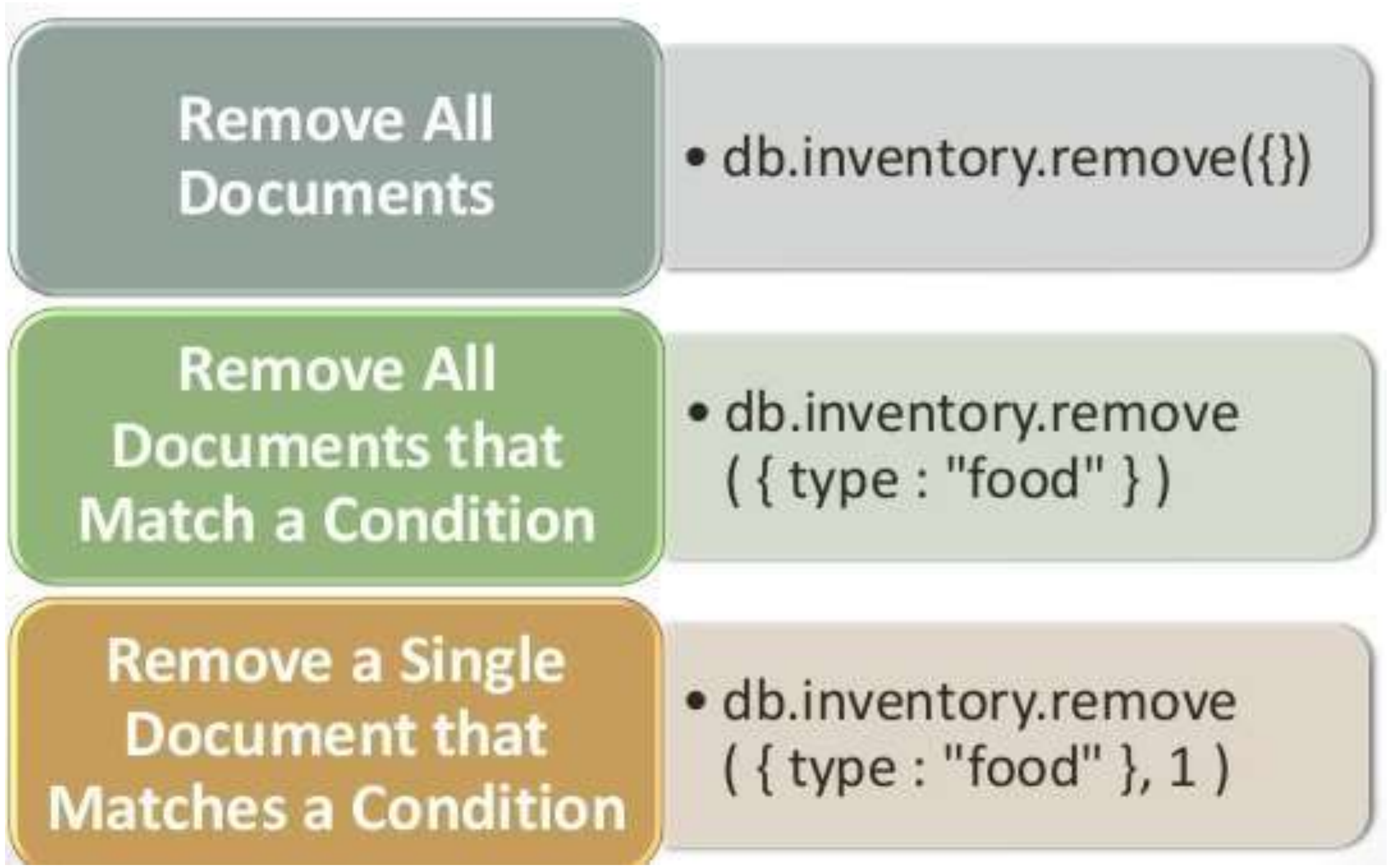
Insert

Find

Update

Delete

CRUD Operations - Remove



Remove All Documents

- db.inventory.remove({})

Remove All Documents that Match a Condition

- db.inventory.remove ({ type : "food" })

Remove a Single Document that Matches a Condition

- db.inventory.remove ({ type : "food" }, 1)

Reference

1. https://www.tutorialspoint.com/dbms/dbms_file_structure.htm#:~:text=Relative%20data%20and%20information%20is,blocks%20that%20can%20store%20records.
2. https://www.javatpoint.com/dbms-file-organization
3. https://www.tutorialspoint.com/dbms/dbms_storage_system.htm

THANK YOU