

MongoDB

Learning MongoDB

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Introduction to MongoDB

MongoDB is a document database.

MongoDB is a non-relational, non-tabular database.

Relational data is stored differently.

Instead of having multiple tables all the related data are stored together.

In MongoDB, tables are called collections.

MongoDB can be installed locally or in cloud called MongoDB Atlas

Mongosh or Compass can be used to query MongoDB

Advantages of MongoDB

Flexibility: MongoDB is schema-less, meaning you don't need to design a schema for the database.

Scalability: MongoDB can be horizontally scaled by distributing data across multiple servers, a process called sharding.

Performance: MongoDB is fast at inserting or updating large numbers of records. It also supports geospatial efficiently.

MongoDB Community Server

<https://www.mongodb.com/try/download/community>

Choose MSI

MongoDB Shell Download

<https://www.mongodb.com/try/download/shell>

Choose MSI

Connect to local mongodb

Type mongosh -version

Type mongosh to get prompt

show dbs

use myproj to create or access new db

db.dropDatabase("dbname") to delete database (or db.dropDatabase())

show collections

db.createCollection("employees")

db.employees.drop() to delete collection

db.restaurant.renameCollection('restaurants') //rename collection

Inserting Data

```
db.employees.insertOne({  
  name: "John Smith",  
  email: "john@gmail.com",  
  department: "IT",  
  salary: 1456,  
  location: ["FL", "OH"],  
  date: Date()  
})
```

```
db.employees.find()
```

Inserting Multiple Data

```
db.employees.insertMany([{
  name: "Mike Joseph",
  email: "mike@gmail.com",
  department: "IT",
  salary: 2456,
  location: ["FL", "TX"],
  date: Date()
},
{ name: "Cathy G",
  email: "cathy@gmail.com",
  department: "IT",
  salary: 3456,
  location: ["AZ", "TX"],
  date: Date()
}])
```


Find Data – part 1

```
db.employees.find() //returns first 20, then type it for more documents
db.employees.find().skip(2)
db.employees.findOne()
db.users.find().sort({name:1}) //sorting -1 for reverse
  db.users.find().limit(1) //returns 1 document sort by object id
db.users.find().sort({name:1}).limit(3)
db.employees.find( {department: "IT"} )
db.users.find({name:"Cathy",pass:"1234"}) //two condition
db.employees.find({}, {_id: 0, salary: 1, date: 1}) //cannot give 0
db.users.find({}, {_id:false,name:true}) //cannot give false
db.employees.find({}, {_id: 0, salary: 0, date: 1}) //either use 0 or 1, can't use both
```

Find Data – part 2

```
db.users.find({'address.city':'Gwenborough'}) //query nested documents
db.users.find({'address.geo.lat':'-37.3159'})
db.employees.find({'location':'TX'}) //where location : ['FL','TX']
db.users.find().count()
db.employees.find({},{"dept":"$department",email:1,salary:1}) //dept is alias
db.users.find({'address.city':'Gwenborough'}) //query nested documents
db.users.find({'address.geo.lat':'-37.3159'})
db.employees.find({'location':'TX'}) //where location : ['FL','TX']
```

returns first 20, then type it for more documents

Query Operators – part 1

```
db.employees.find({department:{$eq:'HR'}})
```

```
db.users.find({email:{$ne:'cathy@gmail.com'}})
```

```
db.employees.find({salary:{$gt:3000}})
```

```
db.employees.find({salary:{$gte:3000}})
```

```
db.employees.find({salary:{$gte:3000,$lt:5000}})
```

```
db.employees.find({salary:{$gt:1000},department:{$eq:'HR'}})
```

```
db.employees.find({salary:{$gt:2000},department:{$in:['HR','IT']}})
```

Query Operators – part 2

```
db.employees.find({salary:{$gt:2000},department:{$nin:['HR','IT']}})
db.employees.find({$or:[{salary:{$gt:2000}},{department:{$eq:'HR'}}]})
db.employees.find({$and:[{salary:{$gt:2000}},{department:{$eq:'HR'}}]})
db.employees.find({$nor:[{salary:{$gt:2000}},{department:{$eq:'HR'}}]})
//like and but both should be false
db.employees.find({department:{$not:{$eq:'HR'}}})
db.users.find({email1:{$exists:false}})
```

Update Document

```
db.employees.updateOne({email:'cathy@gmail.com'},{$set:{department:'HR'}})
```

```
db.employees.updateOne(  
  { email: "ria@gmail.com" },  
  {  
    $set:  
    {  
      name: "Ria K",  
      email: "ria@gmail.com",  
      department: "HR",  
      salary: 5000,  
      location: ["FL", "LA"],  
      date: Date()  
    }  
  },  
  { upsert: true }  
)
```

```
db.employees.updateMany({}, { $set: { date: Date() } })
```

Delete Document

```
db.employees.deleteOne({email:'ria@gmail.com'})
```

```
db.employees.deleteMany({email:'ria@gmail.com'})
```

Update Operators(fields)

```
db.employees.updateOne({email:'cathy@gmail.com'},{$set:{email:'cathy@hotmail.com'}})
```

```
db.employees.updateMany({},{$set:{points:0}})  -- new field
```

```
db.employees.updateMany({},{$inc:{points:70}})
```

```
db.employees.updateMany({},{$rename:{points:'score'}})
```

```
db.employees.updateMany({},{$unset:{score:''}}) //deletes the field
```

Misc – skip and limit

```
db.employees.find().skip(2)
```

```
db.employees.find().skip(2).limit(1)
```

Used for pagination

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Query Operators - 3

```
db.employees.find(  
  {department:{$in:["HR","Admin"]}}  
)
```

```
db.employees.find(  
  {department:{$nin:["HR","Admin"]}}  
)
```

Update Operators (arrays)

```
db.employees.updateOne({email:'cathy@hotmail.com'},{$addToSet:{location:'FL'}}) //duplicates won't be added, use push instead
```

```
db.employees.updateOne({email:'cathy@hotmail.com'},{$pop:{location:1}}) -try  
-1
```

```
db.employees.updateMany({email:'cathy@hotmail.com'},{$pull:{points:{$gt:1}}}  
)
```

```
db.employees.updateMany({email:'cathy@hotmail.com'},{$push:{points:5}})
```

Indexes (improves search but slows insert, update)

```
db.users.find({email:'cathy@gmail.com'}).explain("executionStats")
totalDocsExamined: 13,
```

```
db.users.createIndex({email:1}) //ascending
totalDocsExamined: 3,
```

```
db.users.getIndexes()
```

```
db.users.createIndex({'email':1},{unique:true})
```

```
db.users.dropIndex("email_1")
```

Aggregation pipeline

```
db.employees.aggregate([  
  {pipeline1 or stage 1 },  
  {pipeline2 or stage 2},  
])
```

Aggregation - \$match

```
db.employees.aggregate([
  {
    $match: {} //stage 1
  },
  {
    $group: { _id: "$department", total: { $sum: "$salary" } } //stage 2
  },
  {
    $sort: { "department": -1 }
  },
])
```

Sorting - collation

```
Product.find()
```

```
.collation({ locale: 'en', strength: 2 }) // strength: 2 = case-insensitive
```

```
.sort({ name: 1 });
```

Aggregation - \$sort

```
db.employees.aggregate([
  {
    $sort: { "name": -1 }
  },
  {
    $project: {
      "name": 1,
      "email": 1,
      "salary": 1
    }
  },
  {
    $limit: 5
  }
])
```


Aggregation - \$match

```
db.employees.aggregate([
  {
    $match: { salary: { $gt: 1000 } } //state 1
  },
  {
    $group: { _id: "$department", total: { $sum: "$salary" } } //stage 2
  }
])
```

Aggregation - \$group

An aggregation pipeline return results for groups of documents. For example, return the total, average, maximum, and minimum values.

```
db.employees.aggregate([
  {
    $group: {
      _id: "$department",
      Total: { $sum: "$salary" },
      Hightest: { $max: "$salary" },
      Lowest: { $min: "$salary" },
      Average: { $avg: "$salary" },
    },
  },
]);
```

Aggregation - \$limit

```
db.employees.aggregate([  
  { $group: { _id: "$department", Total: { $sum: "$salary" } } },  
  { $limit: 1 },  
]);
```

Aggregation - \$project

```
db.employees.aggregate([
```

```
  {  
    $project: {  
      "name": 1,  
      "email": 1,  
      "salary": 1  
    }  
  },
```

```
  {  
    $limit: 2  
  }
```

```
])
```

\$project – remove field

```
db.employees.aggregate([ { $project: { _id: 0, name: 0 } } ] );
```

\$project – rename & add calc

```
db.employees.aggregate([
  {
    $project: {
      empname: "$name",
      email: 1,
      salary: 1,
      AnnualSalary: { $multiply: [12, "$salary"] },
    },
  },
]);
```

\$rename field (object)

```
db.profile.insertOne({
  _id:ObjectId("6980326a71d308ebb027caa2"),
  address:{line1:"3356 Lane 1",city:"Columbus",State:"OH"},
  phone:7564555
})

db.profile.find(
  {},
  {address1:"$address.line1",city:"$address.city"}
)
```

\$unwind – Convert Array to Object

```
db.empSkills.insertOne({  
  skills:["Java","Python",".NET"]  
})  
  
db.empSkills.aggregate([  
  {$unwind:"$skills"}  
])
```


Aggregation - \$cond

```
{ $cond: [ <boolean-expression>, <true-case>, <false-case> ] }
```

```
.....  
db.employees.aggregate([  
  {  
    $project: {  
      _id: 0,  
      name: 1,  
      salary: 1,  
      grade: { $cond: [{ $gte: ["$salary", 2000] }, "Grade A", "Grade B"] },  
    },  
  },  
]);
```

Aggregation - \$cond-if

```
{ $cond: { if: <boolean-expression>, then: <true-case>, else: <false-case> } }
```

```
.....  
db.employees.aggregate([  
  {  
    $project: {  
      _id: 0,  
      name: 1,  
      salary: 1,  
      grade: {  
        $cond: {  
          if: { $gte: ["$salary", 2000] },  
          then: "Grade A",  
          else: "Grade B",  
        },  
      },  
    },  
  },  
]);
```

Switch case - syntax

```
Grade: {  
  $switch: {  
    branches: [  
      { case: <boolean-expression>, then: <result> },  
      { case: <boolean-expression>, then: <result> }  
      // more branches...  
    ],  
    default: <result>  
  }  
}
```

Switch case

```
db.users.aggregate([
{
  $project: {
    name: 1,
    level: {
      $switch: {
        branches: [
          { case: { $gte: ["$score", 90] }, then: "A" },
          { case: { $gte: ["$score", 75] }, then: "B" },
          { case: { $gte: ["$score", 60] }, then: "C" }
        ],
        default: "Fail"
      }
    }
  }
}]
])
```

Aggregation - \$lookup prep

```
db.createCollection("orders")
```

```
db.orders.insertOne({'empid':ObjectId('65fc6dd2198f1b870853d26e'),'date':  
Date(),'orderValue':5000})
```

Aggregation - \$lookup

```
db.orders.aggregate([
  {
    $lookup: {
      from: "employees",
      localField: "empid",
      foreignField: "_id",
      as: "employee_details",
    },
  },
])
```

Aggregation - \$lookup – pipeline

```
db.orders.aggregate([
  {$lookup:{
    from:"employees",
    let:{uid:"$empid"},
    pipeline:[
      {$match:{$expr:{$eq:["$_id","$$uid"]}}}
    ],
    as:"users"
  }}
])
```

Aggregation - \$lookup – pipeline - project

```
db.orders.aggregate([
  {
    $lookup: {
      from: "employees",
      let: { uid: "$empid" },
      pipeline: [
        { $match: { $expr: { $eq: ["$_id", "$$uid"] } } },
        {
          $project: {
            _id: 0,
            name: 1,
          },
        },
      ],
      as: "users",
    },
    { $unwind: "$users" },
    { $project: {
      name: "$users.name",
      orderValue: 1
    } }
  ]
});
```