

MongoDB Lab Report

DengFeng Qiao Yi He MingYi Wang

1 Basic Tasks

1.1 1. MongoDB Document Relationships

MongoDB handles relationships between documents by using *embedded documents* or *references*. Embedded documents store related data within a single document, reducing the need for joins. References allow relations across collections by referencing other documents' `_id`.

1.2 2. MongoDB as a Schema-less Database

MongoDB is considered schema-less as it does not require predefined document structure. For instance:

- **SQL:**

```
CREATE TABLE Customers (  
  custId VARCHAR(6) PRIMARY KEY,  
  contact INT NOT NULL,  
  loan INT  
);
```

```
INSERT INTO Customers(custId, contact, loan)  
VALUES ('zxc456', 3355, 2000);
```

- **MongoDB:**

```
db.customers.insertOne({  
  custId: 'zxc456',  
  contact: 3355,  
  loan: 2000  
});
```

1.3 3. Dynamic Schema in MongoDB

MongoDB supports a *dynamic schema* allowing documents with different structures in the same collection. Example documents:

```
{ custId: "abc123", contact: 4422, loan: 1000 }
{ custId: "aa33", contact: 1335, credit: "high" }
{ custId: "abc123", Profession: "IT_specialist" }
```

2 Medium Tasks

2.1 4. SQL to MongoDB Equivalent Statements

2.1.1 a. CREATE / INSERT Statements

- SQL:

```
CREATE TABLE employee (
empNo CHAR(9) PRIMARY KEY NOT NULL,
lastName CHAR(25) NOT NULL,
firstName VARCHAR(25) NOT NULL,
hours INT,
gender CHAR
);
```

```
INSERT INTO employee (empNo, lastName, firstName, ho
VALUES ( 'E55', 'Carmen', 'Silva', 450, 'F');
```

- MongoDB:

```
db.employee.insertOne({
    empNo: 'E55',
    lastName: 'Carmen',
    firstName: 'Silva',
    hours: 450,
    gender: 'F'
});
```

2.1.2 b. SELECT / Find Statements

- SQL:

```
SELECT firstName, lastName FROM employee;
```

- MongoDB:

```
db.employee.find({}, {firstName: 1, lastName: 1, _id
```

2.2 5. Big Data Characteristics and Variety

- **V(s) Characteristics of Big Data:** Volume, Velocity, Variety, and Veracity.
- **Variety:** Refers to the diversity of data formats and sources.
- **MongoDB's Approach to Variety:** MongoDB handles variety through its schema-less nature, allowing different document structures in a single collection.

3 Advanced Tasks

3.1 6. MongoDB find Operations

- Find books published between 2019 and 2024:

```
db.books.find({ year: { $gte: 2019, $lte: 2024 } });
```

- Find books with book_id not equal to 552020:

```
db.books.find({ book_id: { $ne: '552020' } });
```

- Find books by D. Sullivan or ISBN equal to 9780134023212:

```
db.books.find({
  $or: [
    { author: "D. Sullivan" },
    { ISBN: "9780134023212" }
  ]
});
```