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ASSIGNMENT NO. 10

- **Aggregation**

1. Creating and Inserting data into the collection

```
db.employees.insertMany([
  {
    "employee_id": 1,
    "first_name": "John",
    "last_name": "Doe",
    "department": "Engineering",
    "salary": 60000
  },
  {
    "employee_id": 2,
    "first_name": "Jane",
    "last_name": "Smith",
    "department": "Sales",
    "salary": 50000
  },
  {
    "employee_id": 3,
    "first_name": "Bob",
    "last_name": "Johnson",
    "department": "Engineering",
    "salary": 75000
  },
  {
    "employee_id": 4,
    "first_name": "Alice",
    "last_name": "Brown",
    "department": "Sales",
    "salary": 55000
  },
  {
    "employee_id": 5,
    "first_name": "Eve",
    "last_name": "Davis",
    "department": "HR",
    "salary": 45000
  }
]);
```

2. **Find the average salary for employees in the "Engineering" department.**

```
db.employees.aggregate([
{ $match: { department: "Engineering" } },
{ $group: { _id: null, averageSalary: { $avg: "$salary" } } }
]);
```

Output:-

```
{ "_id": null, "averageSalary": 67500 }
```

3. **Retrieve the first and last names of employees, sorted by salary in descending order.**

```
db.employees.aggregate([
{ $project: { _id: 0, first_name: 1, last_name: 1, salary: 1 } },
{ $sort: { salary: -1 } }
]);
```

Output:-

```
{ "first_name": "Bob", "last_name": "Johnson", "salary": 75000 }
{ "first_name": "John", "last_name": "Doe", "salary": 60000 }
{ "first_name": "Alice", "last_name": "Brown", "salary": 55000 }
{ "first_name": "Jane", "last_name": "Smith", "salary": 50000 }
{ "first_name": "Eve", "last_name": "Davis", "salary": 45000 }
```

4. **Find the department with the most employees and return the top three departments.**

```
db.employees.aggregate([
{ $group: { _id: "$department", totalEmployees: { $sum: 1 } } },
{ $sort: { totalEmployees: -1 } },
{ $limit: 3 }
]);
```

Output:-

```
{{ "_id": "Engineering", "totalEmployees": 2 }
{ "_id": "Sales", "totalEmployees": 2 }
{ "_id": "HR", "totalEmployees": 1 }
```

5. **Count the number of employees in the "Sales" department**.

```
db.employees.countDocuments({ department: "Sales" });
```

Output:-
2

- **Indexing**

1. Single-Key Index

```
db.employees.createIndex({ "employee_id": 1 });
```

Output:-
{ "createdCollectionAutomatically" : false, "numIndexesBefore" : 1,
"numIndexesAfter" : 2, "ok" : 1 }

2. Compound-Key Index

```
db.employees.createIndex({ "department": 1, "salary": 1 });
```

Output:-
{ "createdCollectionAutomatically" : false, "numIndexesBefore" : 2,
"numIndexesAfter" : 3, "ok" : 1 }

3. Unique Index

```
db.employees.createIndex({ "employee_id": 1 }, { unique: true });
```

Output:-
{ "createdCollectionAutomatically" : false, "numIndexesBefore" : 3,
"numIndexesAfter" : 4, "ok" : 1 }