

DBMSL

Assignment B3: MongoDB Map-Reducer operations

PROBLEM STATEMENT:

Implement Map reduces operation with suitable example using MongoDB.

```
pict@pict-OptiPlex-SFF-Plus-7010:~$ mongosh 10.10.11.156/te31485db -u te31485
Enter password: *****
Current Mongosh Log ID:      653a05f6ac146e64ffcb02ec
Connecting to:
mongodb://<credentials>@10.10.11.156:27017/te31485db?directConnection=true&appName=mongosh+2.0.1
Using MongoDB:      7.0.2
Using Mongosh:      2.0.1
mongosh 2.0.2 is available for download: https://www.mongodb.com/try/download/shell
```

For mongosh info see: <https://docs.mongodb.com/mongodb-shell/>

The server generated these startup warnings when booting

2023-10-26T08:59:52.884+05:30: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine. See <http://dochub.mongodb.org/core/prodnotes-filesystem>

2023-10-26T08:59:55.653+05:30: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted

2023-10-26T08:59:55.654+05:30: vm.max_map_count is too low

```
te31485db> show collections
```

```
sample
teachers
```

```
te31485db>
```

```
te31485db> db.teachers.insertMany([
... {
...   name: "Alice Johnson",
...   qualifications: "M.Sc. in Mathematics",
...   deptno: 102,
...   deptname: "Mathematics",
...   designation: "Assistant Professor",
...   experience: { industry: 3, teaching: 6 },
...   salary: { basic: 65000, TA: 4000, DA: 2500, HRA: 6000 },
...   date_of_joining: ISODate("2019-08-20"),
...   appointment_nature: "Permanent",
...   area_of_expertise: "Statistics, Calculus",
```

```

... },
... {
...   name: "David Lee",
...   qualifications: "M.Tech in Electronics",
...   deptno: 103,
...   deptname: "E&TC",
...   designation: "Lecturer",
...   experience: { industry: 2, teaching: 4 },
...   salary: { basic: 60000, TA: 3500, DA: 2000, HRA: 5500 },
...   date_of_joining: ISODate("2021-03-10"),
...   appointment_nature: "Adhoc",
...   area_of_expertise: "Digital Signal Processing",
... }
... ])
{
  acknowledged: true,
  insertedIds: {
    '0': ObjectId("653a063dac146e64ffcb02ed"),
    '1': ObjectId("653a063dac146e64ffcb02ee")
  }
}
te31485db>

te31485db>

te31485db> var mapFunction = function() {
...   emit(this.deptname, this.experience.teaching);
... };

te31485db>

te31485db> var reduceFunction = function(department, experiences) {
...   return Array.avg(experiences);
... };

te31485db>

te31485db> db.teachers.mapReduce(mapFunction, reduceFunction, { out: "avgTeachingExperience" })
DeprecationWarning: Collection.mapReduce() is deprecated. Use an aggregation instead.
See https://docs.mongodb.com/manual/core/map-reduce for details.
{ result: 'avgTeachingExperience', ok: 1 }

te31485db> db.avgTeachingExperience.find()
[
  { _id: 'Computer Science', value: 8 },
  { _id: 'Civil Engineering', value: 4 },
  { _id: 'Chemistry', value: 12 },
  { _id: 'Physics', value: 14 },
  { _id: 'English', value: 4 },
  { _id: 'Psychology', value: 11 },
  { _id: 'Mathematics', value: 6 },
  { _id: 'E&TC', value: 4 },
  { _id: 'History', value: 5 },
  { _id: 'Biology', value: 8 },
  { _id: 'Chemical Engineering', value: 10 },
  { _id: 'Mechanical Engineering', value: 10 },
  { _id: 'Electrical Engineering', value: 5 }
]
te31485db>

```

te31485db>

te31485db>

```
te31485db> var mapFunction = function() {  
...   emit(this.deptname, this.salary.basic);  
... };
```

te31485db>

```
te31485db> var reduceFunction = function(department, salaries) {  
...   return Array.sum(salaries);  
... };
```

te31485db>

```
te31485db> db.teachers.mapReduce(mapFunction, reduceFunction, { out: "totalBasicSalary" });  
{ result: 'totalBasicSalary', ok: 1 }  
te31485db>
```

```
te31485db> db.totalBasicSalary.find();  
[  
  { _id: 'Civil Engineering', value: 60000 },  
  { _id: 'Computer Science', value: 75000 },  
  { _id: 'Physics', value: 95000 },  
  { _id: 'Chemistry', value: 90000 },  
  { _id: 'English', value: 72000 },  
  { _id: 'Psychology', value: 92000 },  
  { _id: 'Mathematics', value: 65000 },  
  { _id: 'E&TC', value: 60000 },  
  { _id: 'Biology', value: 80000 },  
  { _id: 'History', value: 70000 },  
  { _id: 'Chemical Engineering', value: 82000 },  
  { _id: 'Mechanical Engineering', value: 85000 },  
  { _id: 'Electrical Engineering', value: 61000 }  
]
```

te31485db>

te31485db>

```
te31485db> var mapFunction = function() {  
...   emit("Total", { industry: this.experience.industry, teaching: this.experience.teaching });  
... };
```

te31485db>

```
te31485db> var reduceFunction = function(key, experiences) {  
...   var totalExperience = { industry: 0, teaching: 0 };  
...   experiences.forEach(function(exp) {  
...     totalExperience.industry += exp.industry;  
...     totalExperience.teaching += exp.teaching;  
...   });  
...   return totalExperience;  
... };
```

te31485db>

```
te31485db> db.teachers.mapReduce(mapFunction, reduceFunction, { out: "totalExperience" });  
{ result: 'totalExperience', ok: 1 }  
te31485db>
```

```
te31485db> db.totalExperience.find();
[ { _id: 'Total', value: { industry: 81, teaching: 101 } } ]
te31485db>
```

```
te31485db>
```

```
te31485db> var mapFunction = function() {
...   emit(this.deptname, this.salary.basic);
... };
```

```
te31485db>
```

```
te31485db> var reduceFunction = function(department, salaries) {
...   var totalSalary = Array.sum(salaries);
...   var averageSalary = totalSalary / salaries.length;
...   return averageSalary;
... };
```

```
te31485db>
```

```
te31485db> db.teachers.mapReduce(mapFunction, reduceFunction, { out: "averageSalaryByDepartment" });
{ result: 'averageSalaryByDepartment', ok: 1 }
te31485db>
```

```
te31485db> db.averageSalaryByDepartment.find();
[
  { _id: 'Biology', value: 80000 },
  { _id: 'Electrical Engineering', value: 61000 },
  { _id: 'Chemistry', value: 90000 },
  { _id: 'Physics', value: 95000 },
  { _id: 'Computer Science', value: 75000 },
  { _id: 'English', value: 72000 },
  { _id: 'Psychology', value: 92000 },
  { _id: 'Civil Engineering', value: 60000 },
  { _id: 'Mathematics', value: 65000 },
  { _id: 'E&TC', value: 60000 },
  { _id: 'Chemical Engineering', value: 82000 },
  { _id: 'Mechanical Engineering', value: 85000 },
  { _id: 'History', value: 70000 }
]
te31485db>
```

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te31485db>
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te31485db>
```

31485 Ashwin Taras