

Problem Statement: Design & Develop MongoDB Queries using Aggregation and Indexing with suitable example using MongoDB.

```
test> show dbs;
```

```
Abhi    8.00 KiB
```

```
Data   208.00 KiB
```

```
GG     264.00 KiB
```

```
TE     220.00 KiB
```

```
admin  40.00 KiB
```

```
config 96.00 KiB
```

```
local  40.00 KiB
```

```
test> use TEA;
```

```
switched to db TEA
```

```
TEA> db.createCollection('staff1');
```

```
{ ok: 1 }
```

```
TEA> db.staff1.insert({tid:01,tname:"neha",dname:"comp",salary:30000,hiredate:new Date('2014-04-05'),bonus:100,dob:new DDate('1987-09-08')});
```

DeprecationWarning: Collection.insert() is deprecated. Use insertOne, insertMany, or bulkWrite.

```
{
```

```
  acknowledged: true,
```

```
  insertedIds: { '0': ObjectId("6715068ac8eae763a41d974a") }
```

```
}
```

```
TEA> db.staff1.insert({tid:02,tname:"minal",dname:"it",salary:45000,hiredate:new Date('2013-03-05'),bonus:100,dob:new DaDate('1984-08-09')});
```

```
{
```

```
  acknowledged: true,
```

```
  insertedIds: { '0': ObjectId("671506a0c8eae763a41d974b") }
```

```
}
```

```
TEA> db.staff1.insert({tid:03,tname:"shubhda",dname:"entc",salary:40000,hiredate:new Date('2011-08-08'),bonus:100,dob:nenew Date('1985-08-07')});
```

```
{
```

```
  acknowledged: true,
```

```

    insertedIds: { '0': ObjectId("671506b1c8eae763a41d974c") }
  }
TEA> db.staff1.insert({tid:04,tname:"ketan",dname:"comp",salary:30000,hiredate:new Date('2011-07-08'),bonus:100,dob:new Date('1988-07-07')})
{
  acknowledged: true,
  insertedIds: { '0': ObjectId("671506c7c8eae763a41d974d") }
}
TEA> db.staff1.find().pretty();
[
  {
    _id: ObjectId("6715068ac8eae763a41d974a"),
    tid: 1,
    tname: 'neha',
    dname: 'comp',
    salary: 30000,
    hiredate: ISODate("2014-04-05T00:00:00.000Z"),
    bonus: 100,
    dob: ISODate("1987-09-08T00:00:00.000Z")
  },
  {
    _id: ObjectId("671506a0c8eae763a41d974b"),
    tid: 2,
    tname: 'minal',
    dname: 'it',
    salary: 45000,
    hiredate: ISODate("2013-03-05T00:00:00.000Z"),
    bonus: 100,
    dob: ISODate("1984-08-09T00:00:00.000Z")
  },
  {

```

```

    _id: ObjectId("671506b1c8eae763a41d974c"),
    tid: 3,
    tname: 'shubhda',
    dname: 'entc',
    salary: 40000,
    hiredate: ISODate("2011-08-08T00:00:00.000Z"),
    bonus: 100,
    dob: ISODate("1985-08-07T00:00:00.000Z")
  },
  {
    _id: ObjectId("671506c7c8eae763a41d974d"),
    tid: 4,
    tname: 'ketan',
    dname: 'comp',
    salary: 30000,
    hiredate: ISODate("2011-07-08T00:00:00.000Z"),
    bonus: 100,
    dob: ISODate("1988-07-07T00:00:00.000Z")
  }
]

```

*for loop

TEA>

```

for(i=5;i<=2500;i++){db.staff1.insert({tid:i,tname:'teacher'+i,age:Math.floor(Math.random()*120),doj:
new Date()});}

```

```

{
  acknowledged: true,
  insertedIds: { '0': ObjectId("67150715c8eae763a41da10d") }
}

```

TEA> db.staff1.find({tname:'teacher1001'}).explain();

```

{

```

```
explainVersion: '2',
queryPlanner: {
  namespace: 'TEA.staff1',
  indexFilterSet: false,
  parsedQuery: { tname: { '$eq': 'teacher1001' } },
  queryHash: '552EEEDA',
  planCacheKey: 'EDC9597A',
  maxIndexedOrSolutionsReached: false,
  maxIndexedAndSolutionsReached: false,
  maxScansToExplodeReached: false,
  winningPlan: {
    queryPlan: {
      stage: 'COLLSCAN',
      planNodeId: 1,
      filter: { tname: { '$eq': 'teacher1001' } },
      direction: 'forward'
    },
    slotBasedPlan: {
      slots: '$$RESULT=s5 env: { s3 = 1729431341652 (NOW), s2 = Nothing (SEARCH_META), s7 =
"teacher1001", s1 = TimeZoneDatabase(ROK...Asia/Yangon) (timeZoneDB) }',
      stages: '[1] filter {traverseF(s4, lambda(l1.0) { ((l1.0 == s7)?: false) }, false)} \n' +
'[1] scan s5 s6 none none none none lowPriority [s4 = tname] @"88d84624-1c7b-4187-8f49-
4e8992bf04a2" true false '
    }
  },
  rejectedPlans: []
},
command: { find: 'staff1', filter: { tname: 'teacher1001' }, '$db': 'TEA' },
serverInfo: {
  host: 'LAPTOP-LHTCK2MG',
  port: 27017,
  version: '7.0.2',
```

```

    gitVersion: '02b3c655e1302209ef046da6ba3ef6749dd0b62a'
  },
  serverParameters: {
    internalQueryFacetBufferSizeBytes: 104857600,
    internalQueryFacetMaxOutputDocSizeBytes: 104857600,
    internalLookupStageIntermediateDocumentMaxSizeBytes: 104857600,
    internalDocumentSourceGroupMaxMemoryBytes: 104857600,
    internalQueryMaxBlockingSortMemoryUsageBytes: 104857600,
    internalQueryProhibitBlockingMergeOnMongoS: 0,
    internalQueryMaxAddToSetBytes: 104857600,
    internalDocumentSourceSetWindowFieldsMaxMemoryBytes: 104857600,
    internalQueryFrameworkControl: 'trySbeEngine'
  },
  ok: 1
}

//creating index
TEA> db.staff1.ensureIndex({"tname":1})

[ 'tname_1' ]

TEA> db.staff1.getIndexes();

[
  { v: 2, key: { _id: 1 }, name: '_id_' },
  { v: 2, key: { tname: 1 }, name: 'tname_1' }
]

TEA> db.staff1.dropIndex("tname_1")

{ nIndexesWas: 2, ok: 1 }

TEA> db.staff1.ensureIndex({"age":1,"tname":1})

[ 'age_1_tname_1' ]

TEA> db.staff1.find({"age":40,"tname":{"$gt:"Teacher5",$lt:"Teacher10"}}).explain()

```

```
{
  explainVersion: '2',
  queryPlanner: {
    namespace: 'TEA.staff1',
    indexFilterSet: false,
    parsedQuery: {
      '$and': [
        { age: { '$eq': 40 } },
        { tname: { '$lt': 'Teacher10' } },
        { tname: { '$gt': 'Teacher5' } }
      ]
    },
    queryHash: '13C36A8C',
    planCacheKey: '0AE99321',
    maxIndexedOrSolutionsReached: false,
    maxIndexedAndSolutionsReached: false,
    maxScansToExplodeReached: false,
    winningPlan: {
      queryPlan: {
        stage: 'FETCH',
        planNodeId: 2,
        inputStage: {
          stage: 'IXSCAN',
          planNodeId: 1,
          keyPattern: { age: 1, tname: 1 },
          indexName: 'age_1_tname_1',
          isMultiKey: false,
          multiKeyPaths: { age: [], tname: [] },
          isUnique: false,
          isSparse: false,
          isPartial: false,
```

```

    indexVersion: 2,

    direction: 'forward',

    indexBounds: { age: [ '[40, 40]' ], tname: [] }

  }

},

slotBasedPlan: {

  slots: '$$RESULT=s11 env: { s3 = 1729431692143 (NOW), s6 = Nothing, s1 =
TimeZoneDatabase(ROK...Asia/Yangon) (timeZoneDB), s10 = {"age" : 1, "tname" : 1}, s2 = Nothing
(SEARCH_META), s5 = Nothing }',

  stages: '[2] nlj inner [] [s4, s7, s8, s9, s10] \n' +

    '  left \n' +

    '    [1] cfilter {(exists(s5) && exists(s6))} \n' +

    '    [1] ixseek s5 s6 s9 s4 s7 s8 [] @"88d84624-1c7b-4187-8f49-4e8992bf04a2"
@"age_1_tname_1" true \n' +

    '  right \n' +

    '    [2] limit 1 \n' +

    '    [2] seek s4 s11 s12 s7 s8 s9 s10 [] @"88d84624-1c7b-4187-8f49-4e8992bf04a2" true false
\n'

  }

},

rejectedPlans: []

},

command: {

  find: 'staff1',

  filter: { age: 40, tname: { '$gt': 'Teacher5', '$lt': 'Teacher10' } },

  '$db': 'TEA'

},

serverInfo: {

  host: 'LAPTOP-LHTCK2MG',

  port: 27017,

  version: '7.0.2',

  gitVersion: '02b3c655e1302209ef046da6ba3ef6749dd0b62a'

```

```

},
serverParameters: {
  internalQueryFacetBufferSizeBytes: 104857600,
  internalQueryFacetMaxOutputDocSizeBytes: 104857600,
  internalLookupStageIntermediateDocumentMaxSizeBytes: 104857600,
  internalDocumentSourceGroupMaxMemoryBytes: 104857600,
  internalQueryMaxBlockingSortMemoryUsageBytes: 104857600,
  internalQueryProhibitBlockingMergeOnMongoS: 0,
  internalQueryMaxAddToSetBytes: 104857600,
  internalDocumentSourceSetWindowFieldsMaxMemoryBytes: 104857600,
  internalQueryFrameworkControl: 'trySbeEngine'
},
ok: 1
}
TEA> db.staff.find({"$or":[{"age":48},{"tname":"Teacher5"}, {"dname":"comp"}]})

TEA> db.staff1.find({"$or":[{"age":48},{"tname":"Teacher5"}, {"dname":"comp"}]})
[
  {
    _id: ObjectId("6715068ac8eae763a41d974a"),
    tid: 1,
    tname: 'neha',
    dname: 'comp',
    salary: 30000,
    hiredate: ISODate("2014-04-05T00:00:00.000Z"),
    bonus: 100,
    dob: ISODate("1987-09-08T00:00:00.000Z")
  },
  {
    _id: ObjectId("671506c7c8eae763a41d974d"),
    tid: 4,

```



```
tname: 'ketan',
dname: 'comp',
salary: 30000,
hiredate: ISODate("2011-07-08T00:00:00.000Z"),
bonus: 100,
dob: ISODate("1988-07-07T00:00:00.000Z")
},
{
  _id: ObjectId("6715070cc8eae763a41d9829"),
  tid: 224,
  tname: 'teacher224',
  age: 48,
  doj: ISODate("2024-10-20T13:35:08.665Z")
},
{
  _id: ObjectId("6715070dc8eae763a41d98c7"),
  tid: 382,
  tname: 'teacher382',
  age: 48,
  doj: ISODate("2024-10-20T13:35:09.346Z")
},
{
  _id: ObjectId("6715070ec8eae763a41d995e"),
  tid: 533,
  tname: 'teacher533',
  age: 48,
  doj: ISODate("2024-10-20T13:35:10.052Z")
},
{
  _id: ObjectId("6715070ec8eae763a41d99fb"),
  tid: 690,
```

```
tname: 'teacher690',
age: 48,
doj: ISODate("2024-10-20T13:35:10.769Z")
},
{
  _id: ObjectId("67150710c8eae763a41d9bb9"),
  tid: 1136,
  tname: 'teacher1136',
  age: 48,
  doj: ISODate("2024-10-20T13:35:12.546Z")
},
{
  _id: ObjectId("67150711c8eae763a41d9c51"),
  tid: 1288,
  tname: 'teacher1288',
  age: 48,
  doj: ISODate("2024-10-20T13:35:13.119Z")
},
{
  _id: ObjectId("67150711c8eae763a41d9cb5"),
  tid: 1388,
  tname: 'teacher1388',
  age: 48,
  doj: ISODate("2024-10-20T13:35:13.532Z")
},
{
  _id: ObjectId("67150711c8eae763a41d9cff"),
  tid: 1462,
  tname: 'teacher1462',
  age: 48,
  doj: ISODate("2024-10-20T13:35:13.812Z")
}
```

```
},
{
  _id: ObjectId("67150712c8eae763a41d9d69"),
  tid: 1568,
  tname: 'teacher1568',
  age: 48,
  doj: ISODate("2024-10-20T13:35:14.202Z")
},
{
  _id: ObjectId("67150712c8eae763a41d9dd7"),
  tid: 1678,
  tname: 'teacher1678',
  age: 48,
  doj: ISODate("2024-10-20T13:35:14.641Z")
},
{
  _id: ObjectId("67150712c8eae763a41d9dec"),
  tid: 1699,
  tname: 'teacher1699',
  age: 48,
  doj: ISODate("2024-10-20T13:35:14.722Z")
},
{
  _id: ObjectId("67150713c8eae763a41d9e98"),
  tid: 1871,
  tname: 'teacher1871',
  age: 48,
  doj: ISODate("2024-10-20T13:35:15.395Z")
},
{
  _id: ObjectId("67150713c8eae763a41d9ed3"),
```

```
tid: 1930,  
tname: 'teacher1930',  
age: 48,  
doj: ISODate("2024-10-20T13:35:15.621Z")  
},  
{  
  _id: ObjectId("67150713c8eae763a41d9f1e"),  
  tid: 2005,  
  tname: 'teacher2005',  
  age: 48,  
  doj: ISODate("2024-10-20T13:35:15.920Z")  
},  
{  
  _id: ObjectId("67150715c8eae763a41da08a"),  
  tid: 2369,  
  tname: 'teacher2369',  
  age: 48,  
  doj: ISODate("2024-10-20T13:35:17.122Z")  
}
```

```
TEA> db.staff1.getIndexes()  
  
[  
  { v: 2, key: { _id: 1 }, name: '_id_' },  
  { v: 2, key: { age: 1, tname: 1 }, name: 'age_1_tname_1' },  
  { v: 2, key: { dname: 1 }, name: 'dname_1' }  
]
```

```
TEA> db.staff1.createIndex( {tname: 1 } )
```

```
tname_1
```

```
TEA> db.staff1.getIndexes()
```

```
[
```

```
{ v: 2, key: { _id: 1 }, name: '_id_' },  
{ v: 2, key: { age: 1, tname: 1 }, name: 'age_1_tname_1' },  
{ v: 2, key: { dname: 1 }, name: 'dname_1' },  
{ v: 2, key: { tname: 1 }, name: 'tname_1' }  
]
```

****//Aggregate functions**

```
TEA> db.createCollection('website');
```

```
{ ok: 1 }
```

```
TEA> db.website.insert({'roll':'1','name':'Somes','amount':1000,'url':'www.yahoo.com'});
```

```
{  
  acknowledged: true,  
  insertedIds: { '0': ObjectId("67151005c8eae763a41da10e") }  
}
```

```
TEA> db.website.insert({'roll':'2','name':'hariom','amount':2000,'url':'www.yahoo.com '});
```

```
{  
  acknowledged: true,  
  insertedIds: { '0': ObjectId("67151013c8eae763a41da10f") }  
}
```

```
TEA> db.website.insert({'roll':'3','name':'rina','amount':3000,'url':'www.google.com'  
... });
```

```
{  
  acknowledged: true,  
  insertedIds: { '0': ObjectId("67151021c8eae763a41da110") }  
}
```

```
TEA> db.website.insert({'roll':'4','name':'ash','amount':4000,'url':'www.gmail.com'})
```

```
{  
  acknowledged: true,  
  insertedIds: { '0': ObjectId("67151033c8eae763a41da111") }  
}
```

```
TEA> ;
```

```
TEA> db.website.insert({'roll':'5','name':'ash','amount':1000,'url':'www.pvg.com'});

{
  acknowledged: true,
  insertedIds: { '0': ObjectId("67151047c8eae763a41da112") }
}
```

//SUM AGGREGATE

```
TEA> db.website.aggregate({$group:{_id:"$name","total":{$sum:"$amount"}}});

[
  { _id: 'rina', total: 3000 },
  { _id: 'hariom', total: 2000 },
  { _id: 'ash', total: 5000 },
  { _id: 'Somesh', total: 1000 }
]
```

//AVG AGGREGATE 2

```
TEA> db.website.aggregate({$group:{_id:"$name","total":{$avg:"$amount"}}});

[
  { _id: 'rina', total: 3000 },
  { _id: 'Somesh', total: 1000 },
  { _id: 'ash', total: 2500 },
  { _id: 'hariom', total: 2000 }
]
```

////MIN AGGREGATION

```
TEA> db.website.aggregate({$group:{_id:"$name","total":{$min:"$amount"}}});

[
  { _id: 'Somesh', total: 1000 },
  { _id: 'hariom', total: 2000 },
  { _id: 'rina', total: 3000 },
  { _id: 'ash', total: 1000 }
]
```

//MAX AGGREGATION

```
TEA> db.website.aggregate({$group:{_id:"$name","total":{$max:"$amount"}}});
```

```
[
  { _id: 'rina', total: 3000 },
  { _id: 'Somesh', total: 1000 },
  { _id: 'ash', total: 4000 },
  { _id: 'hariom', total: 2000 }
]
```

//FIRST AGGREGATION

```
TEA> db.website.aggregate({$group:{_id:"$name","total":{$first:"$amount"}}});
```

```
[
  { _id: 'hariom', total: 2000 },
  { _id: 'Somesh', total: 1000 },
  { _id: 'ash', total: 4000 },
  { _id: 'rina', total: 3000 }
]
```

//LAST AGGREGATION

```
TEA> db.website.aggregate({$group:{_id:"$name","total":{$last:"$amount"}}});
```

```
[
  { _id: 'Somesh', total: 1000 },
  { _id: 'hariom', total: 2000 },
  { _id: 'rina', total: 3000 },
  { _id: 'ash', total: 1000 }
]
```

//PUSH AGGREGATION

```
TEA> db.website.aggregate({$group:{_id:"$name","total":{$push:"$amount"}}});
```

```
[
  { _id: 'Somesh', total: [ 1000 ] },
  { _id: 'hariom', total: [ 2000 ] },
  { _id: 'rina', total: [ 3000 ] },
  { _id: 'ash', total: [ 4000, 1000 ] }
]
```

//COUNT AGGREGATION

```
TEA> db.website.aggregate({$group:{_id:"$name","total": {$sum:1}}});
```

```
[
  { _id: 'Somesh', total: 1 },
  { _id: 'hariom', total: 1 },
  { _id: 'rina', total: 1 },
  { _id: 'ash', total: 2 }
]
```

//ADDTOSET AGGREGATE

```
TEA> db.website.aggregate({$group:{_id:"$name","total":{$addToSet:"$amount"}}});
```

```
[
  { _id: 'Somesh', total: [ 1000 ] },
  { _id: 'hariom', total: [ 2000 ] },
  { _id: 'rina', total: [ 3000 ] },
  { _id: 'ash', total: [ 4000, 1000 ] }
]
```

// Count the Number of Documents for Each Name

```
TEA> db.website.aggregate([
```

```
...   {
...     $group: {
...       _id: "$name",
...       count: { $sum: 1 }
...     }
...   }
... ]);
```

```
[
  { _id: 'hariom', count: 1 },
  { _id: 'ash', count: 2 },
  { _id: 'rina', count: 1 },
  { _id: 'Somesh', count: 1 }
]
```

//Group by Name and Count Unique URLs


```
TEA> db.website.aggregate([{$group: { _id: "$name",uniqueUrls: { $addToSet: "$url" },count: { $sum: 1 }}}]);
```

```
[
  { _id: 'Somesh', uniqueUrls: [], count: 1 },
  { _id: 'hariom', uniqueUrls: [ 'www.yahoo.com ' ], count: 1 },
  { _id: 'rina', uniqueUrls: [ 'www.google.com' ], count: 1 },
  {
    _id: 'ash',
    uniqueUrls: [ 'www.gmail.com', 'www.pvg.com' ],
    count: 2
  }
]
```

// retrieve **the last recorded amount for each name.**

```
TEA> db.website.aggregate([{$sort: { _id: 1 }},{$group: { _id: "$name",lastAmount: { $last:"$amount" }}}]);
```

```
[
  { _id: 'Somesh', lastAmount: 1000 },
  { _id: 'hariom', lastAmount: 2000 },
  { _id: 'rina', lastAmount: 3000 },
  { _id: 'ash', lastAmount: 1000 }
]
```