



Cloud Computing and Big Data

LIS 4102 SECTION 1

Dr. Genoveva Vargas-Solar

Assignment 1: Hands-On MongoDB Querying

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3.1 Querying the Database

```
db.Restaurants.find( { "name": { $ne: "" } }, { "name": 1 } ).sort( { "name": 1 } )
```

```
> db.Restaurants.find({ "name": { $ne: "" } }, { "name": 1 }).sort( { "name": 1 } )
< { _id: ObjectId("61f4c27e84ead6511f7b2d84"),
  name: '#1 Garden Chinese' }
{ _id: ObjectId("61f4c28384ead6511f7b55d8"),
  name: '#1 Me. Nick\'S' }
{ _id: ObjectId("61f4c27b84ead6511f7b1b60"),
  name: '#1 Sabor Latino Restaurant' }
{ _id: ObjectId("61f4c28084ead6511f7b3b9d"),
  name: '$1.25 Pizza' }
{ _id: ObjectId("61f4c27f84ead6511f7b33be"),
  name: '\'\\'UV\' Like Chinese Restaurant' }
{ _id: ObjectId("61f4c28384ead6511f7b5c3d"),
  name: '\'\\'UV\' Cafe' }
{ _id: ObjectId("61f4c27d84ead6511f7b28fb"),
  name: '\Wichcraft' }
{ _id: ObjectId("61f4c28184ead6511f7b4191"),
  name: '\Wichcraft' }
{ _id: ObjectId("61f4c27884ead6511f7b06a5"),
  name: '(Lewis Drug Store) Locanda Vini E Olii' }
{ _id: ObjectId("61f4c28284ead6511f7b4f31"),
  name: '(Library) Four & Twenty Blackbirds' }
{ _id: ObjectId("61f4c27c84ead6511f7b2125"),
  name: '(Public Fare) 81st Street And Central Park West (Delacorte Theatre)' }
{ _id: ObjectId("61f4c27b84ead6511f7b1c3f"),
  name: '/ L\'Ecole' }
{ _id: ObjectId("61f4c28384ead6511f7b5916"),
  name: '002 Mercury Tacos Llc' }
{ _id: ObjectId("61f4c27b84ead6511f7b1a9a"),
  name: '1 2 3 Burger Shot Beer' }
{ _id: ObjectId("61f4c27b84ead6511f7b1a43"),
  name: '1 Banana Queen' }
{ _id: ObjectId("61f4c27f84ead6511f7b35fb"),
  name: '1 Buen Sabor' }
{ _id: ObjectId("61f4c27884ead6511f7b0d98"),
  name: '1 Darbar' }
{ _id: ObjectId("61f4c27584ead6511f7fae22"),
  name: '1 East 66th Street Kitchen' }
{ _id: ObjectId("61f4c27a84ead6511f7b1908"),
  name: '1 Oak' }
{ _id: ObjectId("61f4c27c84ead6511f7b2419"),
  name: '1 Or 8' }
```

```
db.Restaurants.find( { "cuisine": "Italian" }, { "name": 1, "address.zipcode": 1, "address.coordinates": 1 }.sort( { "address.zipcode": 1, "name": -1 } ) )
```

```
> db.Restaurants.find({ "cuisine": "Italian" }, { "name": 1, "address.zipcode": 1, "address.coordinates": 1 }).sort( { "address.zipcode": 1, "name": -1 } )
< { _id: ObjectId("61f4c27984ead6511f7b0f6a"),
  address: { zipcode: '10001' },
  name: 'Tre Dici' }
{ _id: ObjectId("61f4c28084ead6511f7b403a"),
  address: { zipcode: '10001' },
  name: 'Stella 34' }
{ _id: ObjectId("61f4c27d84ead6511f7b29e8"),
  address: { zipcode: '10001' },
  name: 'Spinelli\'S Pizza/Gyro Ii' }
{ _id: ObjectId("61f4c27584ead6511f7afc70"),
  address: { zipcode: '10001' },
  name: 'Salumeria Beillesse_ Bircchino Rest' }
{ _id: ObjectId("61f4c27784ead6511f7b03f2"),
  address: { zipcode: '10001' },
  name: 'Pepe Giallo' }
{ _id: ObjectId("61f4c28084ead6511f7b3cf5"),
  address: { zipcode: '10001' },
  name: 'Fb8020 Pizza Concession' }
{ _id: ObjectId("61f4c27e84ead6511f7b2d4f"),
  address: { zipcode: '10001' },
  name: 'Famous Famiglia' }
{ _id: ObjectId("61f4c27c84ead6511f7ble12"),
  address: { zipcode: '10001' },
  name: 'Company' }
{ _id: ObjectId("61f4c27784ead6511f7b02e9"),
  address: { zipcode: '10001' },
  name: 'Bottino' }
{ _id: ObjectId("61f4c27f84ead6511f7b3576"),
  address: { zipcode: '10002' },
  name: 'Via Tribunali' }
{ _id: ObjectId("61f4c27a84ead6511f7b1566"),
  address: { zipcode: '10002' },
  name: 'Tre' }
{ _id: ObjectId("61f4c27d84ead6511f7b251a"),
  address: { zipcode: '10002' },
  name: 'The Meatball Shop' }
{ _id: ObjectId("61f4c27e84ead6511f7b3075"),
```

```
db.Restaurants.find( { $and: [ { "address.zipcode": "10075" }, { "telephoneNumber": { $exists : true } } ] }, { "name": 1, "address.zipcode": 1, "telephoneNumber": 1 } )
```

```
> db.Restaurants.find({$and: [ { "address.zipcode" : "10075" }, { "telephoneNumber" : { $exists : true } } ]}, { "name" : 1, "address.zipcode" : 1, "telephoneNumber" : 1 })
< { _id: ObjectId("61f4c27584ead6511f7afc9b"),
  address: { zipcode: '10075' },
  name: 'Due',
  telephoneNumber: '24680356' }
{ _id: ObjectId("61f4c28284ead6511f7b4d1b"),
  address: { zipcode: '10075' },
  name: 'Spigolo',
  telephoneNumber: '67895432' }
```

```
db.Restaurants.find ( { "grades.score": { $gte: 50 } }, { "name": 1, "grades.score": 1 } )
```

```
> db.Restaurants.find({ "grades.score" : { $gte: 50 }}, {"name" : 1, "grades.score" : 1})  
< { _id: ObjectId("61f4c27584ead6511f7afbeb"),  
  grades:  
    [ { score: 7 },  
      { score: 5 },  
      { score: 12 },  
      { score: 56 },  
      { score: 10 } ],  
  name: 'Kosher Hut Of Brooklyn' }  
{ _id: ObjectId("61f4c27584ead6511f7afb9a"),  
  grades:  
    [ { score: 12 },  
      { score: 24 },  
      { score: 27 },  
      { score: 23 },  
      { score: 68 } ],  
  name: 'Victoria Pizza' }  
{ _id: ObjectId("61f4c27584ead6511f7afa55"),  
  grades: [ { score: 2 }, { score: 3 }, { score: 6 }, { score: 54 } ],  
  name: 'Polish National Home' }  
{ _id: ObjectId("61f4c27584ead6511f7afa21"),  
  grades:  
    [ { score: 21 },  
      { score: 7 },  
      { score: 56 },  
      { score: 27 },  
      { score: 27 } ],  
  name: 'May May Kitchen' }  
{ _id: ObjectId("61f4c27584ead6511f7afaa0"),  
  grades:  
    [ { score: 11 },  
      { score: 53 },  
      { score: 12 },  
      { score: 45 },  
      { score: 34 } ],  
  name: '18' }  
{ _id: ObjectId("61f4c27584ead6511f7afbe53"),  
  grades: [ { score: 52 } ],  
  name: 'Nanni Restaurant' }
```

```
db.Restaurants.find ( { $or: [ { "cuisine": "Italian" }, { "address.zipcode": 10075 } ] }, { "address.zipcode": 1 } )
```

```
> db.Restaurants.find({$or: [{"cuisine": "Italian"}, {"address.zipcode": 10075}]}, {"address.zipcode": 1})  
< { _id: ObjectId("61f4c27584ead6511f7afaa4"),  
  address: { zipcode: '11420' } }  
{ _id: ObjectId("61f4c27584ead6511f7afb58"),  
  address: { zipcode: '11230' } }  
{ _id: ObjectId("61f4c27584ead6511f7afbd9"),  
  address: { zipcode: '11231' } }  
{ _id: ObjectId("61f4c27584ead6511f7afa8d"),  
  address: { zipcode: '10065' } }  
{ _id: ObjectId("61f4c27584ead6511f7afb8c"),  
  address: { zipcode: '10022' } }  
{ _id: ObjectId("61f4c27584ead6511f7afbb1"),  
  address: { zipcode: '11235' } }  
{ _id: ObjectId("61f4c27584ead6511f7afbe3"),  
  address: { zipcode: '10003' } }  
{ _id: ObjectId("61f4c27584ead6511f7afa70"),  
  address: { zipcode: '10013' } }  
{ _id: ObjectId("61f4c27584ead6511f7afafe"),  
  address: { zipcode: '11211' } }  
{ _id: ObjectId("61f4c27584ead6511f7afb3b"),  
  address: { zipcode: '11211' } }  
{ _id: ObjectId("61f4c27584ead6511f7afbd3"),  
  address: { zipcode: '11365' } }  
{ _id: ObjectId("61f4c27584ead6511f7afbf8"),  
  address: { zipcode: '10021' } }  
{ _id: ObjectId("61f4c27584ead6511f7afa6c"),  
  address: { zipcode: '10305' } }  
{ _id: ObjectId("61f4c27584ead6511f7afa61"),  
  address: { zipcode: '10016' } }  
{ _id: ObjectId("61f4c27584ead6511f7afa7c"),  
  address: { zipcode: '10012' } }  
{ _id: ObjectId("61f4c27584ead6511f7afb2a"),  
  address: { zipcode: '11231' } }  
{ _id: ObjectId("61f4c27584ead6511f7afb79"),  
  address: { zipcode: '11357' } }  
{ _id: ObjectId("61f4c27584ead6511f7afb81"),  
  address: { zipcode: '10012' } }  
{ _id: ObjectId("61f4c27584ead6511f7afa53"),  
  address: { zipcode: '11211' } }
```

```
db.Restaurants.find ( { $and: [ { $and: [ {$or: [ { "address.zipcode": "10075" }, { "address.zipcode": "10098" } ] }, { $or: [ { cuisine: "Italian" }, { cuisine: "American" } ] } ] }, { "grades.score" : { $gte : 50 } } ] }, { _id: 0, name: 1, cuisine: 1, "address.zipcode": 1, "grades.score": 1 } )
```

```
> db.Restaurants.find({$and: [{$or: [{"address.zipcode": "10075"}, {"address.zipcode": "10098"}]}, {$or: [{"cuisine": "Italian"}, {"cuisine": "American"}]}, {"grades.score": {$gte: 50}}]}, {_id: 0, name: 1, cuisine: 1, "address.zipcode": 1})  
< { _id: ObjectId("61f4c27984ead6511f7b0f5b"),  
  address: { zipcode: '10075' },  
  cuisine: 'American',  
  name: 'Three Star Diner' }  
Atlas atlas-xiwb9m-shard-0 [primary] MongoDB >
```

```
db.Restaurants.find ( { $or: [ { "grades.grade": "C" }, { "grades.grade": "P" }, { "grades.grade": "Q" } ] }, { "name": 1, "cuisine": 1, "address.zipcode": 1 } )
```

```
> db.Restaurants.find({$or: [{"grades.grade": "C"}, {"grades.grade": "P"}, {"grades.grade": "Q"}]}, {"name": 1, "cuisine": 1, "address.zipcode": 1})  
< { _id: ObjectId("61f4c27584ead6511f7afaa4"),  
  address: { zipcode: '11420' },  
  cuisine: 'Italian',  
  name: 'Don Peppe' }  
{ _id: ObjectId("61f4c27584ead6511f7afb58"),  
  address: { zipcode: '11230' },  
  cuisine: 'Italian',  
  name: 'Mama Lucia' }  
{ _id: ObjectId("61f4c27584ead6511f7afa48"),  
  address: { zipcode: '11371' },  
  cuisine: 'American',  
  name: 'Terminal Cafe/Yankee Clipper' }  
{ _id: ObjectId("61f4c27584ead6511f7afa87"),  
  address: { zipcode: '11366' },  
  cuisine: 'Chinese',  
  name: 'King Yum Restaurant' }  
{ _id: ObjectId("61f4c27584ead6511f7afaa8"),  
  address: { zipcode: '10065' },  
  cuisine: 'American',  
  name: 'Dangerfield\'S Night Club' }  
{ _id: ObjectId("61f4c27584ead6511f7afab1"),  
  address: { zipcode: '10006' },  
  cuisine: 'Irish',  
  name: 'Blarney Stone' }  
{ _id: ObjectId("61f4c27584ead6511f7afb22"),  
  address: { zipcode: '10462' },  
  cuisine: 'American',  
  name: 'Bronx Grill' }  
{ _id: ObjectId("61f4c27584ead6511f7afb53"),  
  address: { zipcode: '11004' },  
  cuisine: 'Hamburgers',  
  name: 'Burger King' }  
{ _id: ObjectId("61f4c27584ead6511f7afb72"),  
  address: { zipcode: '11106' },  
  cuisine: 'Greek',  
  name: 'Omania Cafe' }  
{ _id: ObjectId("61f4c27584ead6511f7afb7a")},
```

3.2 Updating the Database

```
db.Restaurants.updateOne ( { "name": "Juni" }, { $set: {"cuisine": "American (New)"}, $currentDate: { "lastModified": true } } )
```

```
> db.Restaurants.updateOne({ "name": "Juni"},{$set: {"cuisine": "American (New)"},$currentDate: {"lastModified": true}})  
< { acknowledged: true,  
  insertedId: null,  
  matchedCount: 1,  
  modifiedCount: 1,  
  upsertedCount: 0 }  
> db.restaurants.find( { "cuisine": "American (New)" } )  
<  
> db.Restaurants.find( { "cuisine": "American (New)" } )  
< { _id: ObjectId("61f4c27984ead6511f7b119e"),  
  address:  
    { building: '12',  
     coord: [ -73.9852329, 40.745971 ],  
     street: 'East 31 Street',  
     zipcode: '10016' },  
  cuisine: 'American (New)',  
  grades:  
    [ { date: 2014-09-19T00:00:00.000Z, grade: 'A', score: 12 },  
      { date: 2013-08-05T00:00:00.000Z, grade: 'A', score: 5 },  
      { date: 2012-06-07T00:00:00.000Z, grade: 'A', score: 0 } ],  
  name: 'Juni',  
  restaurant_id: '41156888',  
  lastModified: 2022-02-05T20:59:40.012Z }
```

```
db.Restaurants.update ( { "restaurant_id": "41156888" }, { $set: { "address.street": "East 31st Street" } } )
```

```
> db.Restaurants.update({ "restaurant_id": "41156888"},{$set: { "address.street": "East 31st Street" }})  
< { acknowledged: true,  
  insertedId: null,  
  matchedCount: 1,  
  modifiedCount: 1,  
  upsertedCount: 0 }
```

```
db.Restaurants.update ( { "address.zipcode": "10016", cuisine: "Other" }, { $set: { cuisine: "Category to be determined" }, $currentDate: { "lastModified": true } }, { multi: true } )
```

```
> db.Restaurants.update({ "address.zipcode": "10016", cuisine: "Other"},{$set: {cuisine: "Category to be determined"},$currentDate: {"lastModified": true }},{multi: true})  
< { acknowledged: true,  
  insertedId: null,  
  matchedCount: 20,  
  modifiedCount: 20,  
  upsertedCount: 0 }
```

```
db.Restaurants.replaceOne/updateOne ( { "restaurant_id": "41154403" }, { "name": "Vella 2", "address": { "city": "1480", "street": "2 Avenue", "zipcode": "10075" } } )
```

```
> db.Restaurants.replaceOne({ "restaurant_id": "41154403"},{ "name": "Vella 2", "address": { "city": "1480", "street": "2 Avenue", "zipcode": "10075" }})  
< { acknowledged: true,  
  insertedId: null,  
  matchedCount: 1,  
  modifiedCount: 1,  
  upsertedCount: 0 }
```

3.3 Complex querying (aggregation)

```
db.Restaurant.aggregate ( [ { $group: { _id: "$cuisine", restaurants: { $sum: 1 } } }, { $sort: { restaurants: -1 } } ] )
```

```
> db.Restaurant.aggregate([{$group: {_id: "$cuisine",restaurants: {$sum: 1}}},{$sort: {restaurants: -1}}])
<
Atlas atlas-xiwb9m-shard-0 [primary] MongoDB>
```

```
db.Restaurants.aggregate ( [ { $match: { "cuisine": "Italian" } }, { $group: { _id: "$address.zipcode", cuisines: { $sum : 1 } } }, { $sort: { cuisines: -1 } } ] )
```

```
> db.Restaurants.aggregate([{$match: {"cuisine" : "Italian"}},{$group: {_id: "$address.zipcode",cuisines: { $sum : 1}}},{$sort: {cuisines: -1}}])
< { _id: '10013', cuisines: 51 }
{ _id: '10012', cuisines: 45 }
{ _id: '10014', cuisines: 43 }
{ _id: '10019', cuisines: 42 }
{ _id: '10003', cuisines: 40 }
{ _id: '10011', cuisines: 37 }
{ _id: '10036', cuisines: 35 }
{ _id: '10022', cuisines: 32 }
{ _id: '10028', cuisines: 22 }
{ _id: '11215', cuisines: 22 }
{ _id: '10016', cuisines: 21 }
{ _id: '10017', cuisines: 20 }
{ _id: '10021', cuisines: 20 }
{ _id: '10024', cuisines: 19 }
{ _id: '11201', cuisines: 19 }
{ _id: '10023', cuisines: 18 }
{ _id: '10010', cuisines: 17 }
{ _id: '10065', cuisines: 17 }
{ _id: '10458', cuisines: 17 }
{ _id: '10009', cuisines: 17 }
Type "it" for more
Atlas atlas-xiwb9m-shard-0 [primary] MongoDB>
```

```
db.Restaurants.aggregate([{$match: {$and: [{cuisine : 'Italian'}, {restaurant_id: {$gte: '41205309'}}]},{$averagePrice: {$exists: true}} ]},{$group: {_id : null,averagePrices:{$avg: "$averagePrice"},averageZips:{$avg:{$toInt: '$address.zipcode'}}}}],)
```

```
> db.Restaurants.aggregate([{$match: {$and: [{cuisine : 'Italian'}, {restaurant_id: {$gte: '41205309'}}],{$averagePrice: {$exists: true}} ]}},{$group: {_id : null,averagePrices:{$avg: "$averagePrice"},averageZips:{$avg:{$toInt: '$address.zipcode'}}}}],)
< { _id: null, averagePrices: 25, averageZips: 10023.5 }
Atlas atlas-xiwb9m-shard-0 [primary] MongoDB>
```

3.4 References between collections and join

```
db.createCollection( "comments" )
```

```
> db.createCollection("comments")
< { ok: 1 }
Atlas atlas-xiwb9m-shard-0 [primary] MongoDB >
```

```
db.comments.insertMany ( [ { restaurant_id: "30075445", client_id: "124781426", comment: "Excellent service!", date: new Date ( "2014-12-03" ), type: "positive" }, { restaurant_id: "30112340", client_id: "475732110", comment: "The best food I ever had!", date: new Date ( "2015-01-21" ), type: "positive" },{ restaurant_id: "30191841", client_id: "626141589", comment: "I hated it, never returning.", date: new Date ( "2020-05-13" ), type: "negative" } ] )
```

```
> db.comments.insertMany([
  {restaurant_id: "30075445", client_id: "124781426", comment: "Excellent service!", date: new Date("2014-12-03"), type: "positive"},
  {restaurant_id: "30112340", client_id: "475732110", comment: "The best food I ever had!", date: new Date("2015-01-21"), type: "positive"},
  {restaurant_id: "30191841", client_id: "626141589", comment: "I hated it, never returning.", date: new Date("2020-05-13"), type: "negative"}
])
< { acknowledged: true,
  insertedIds:
  { '0': ObjectId("6200aa1c6e54af2ec1ddd0b7"),
    '1': ObjectId("6200aa1c6e54af2ec1ddd0b8"),
    '2': ObjectId("6200aa1c6e54af2ec1ddd0b9") } }
```

```
db.Restaurants.aggregate ( [ { $lookup: { from: "comments", localField: "restaurant_id", foreignField: "restaurant_id", as: "restaurant_comments" } }, { $match: { "restaurant_comments": { $ne: [ ] } } }, { $project: { restaurant_comments: { comment: 1 }, name: 1, cuisine: 1, restaurant_id: 1, address: 1 } } ] )
```

```
> db.Restaurants.aggregate([{$lookup:{from: "comments",localField: "restaurant_id",foreignField: "restaurant_id",as: "restaurant_comments"}},
  {$match: {"restaurant_comments": {$ne: []}}},{$project: { restaurant_comments:{comment: 1}, name: 1, cuisine: 1, restaurant_id: 1, address: 1}},])
< { _id: ObjectId("61f4c27584ead6511f7afa15"),
  address:
  { building: '1007',
    coord: [ -73.856077, 40.848447 ],
    street: 'Morris Park Ave',
    zipcode: '10462' },
  cuisine: 'Bakery',
  name: 'Morris Park Bake Shop',
  restaurant_id: '30075445',
  restaurant_comments:
  [ { comment: 'Excellent service!' },
    { comment: 'Excellent service!' } ] },
  { _id: ObjectId("61f4c27584ead6511f7afa16"),
  address:
  { building: '469',
    coord: [ -73.961704, 40.662942 ],
    street: 'Flatbush Avenue',
    zipcode: '11225' },
  cuisine: 'Hamburgers',
  name: 'Wendy\'s',
  restaurant_id: '30112340',
  restaurant_comments:
  [ { comment: 'I hated it, never returning.' },
    { comment: 'I hated it, never returning.' } ] },
  { _id: ObjectId("61f4c27584ead6511f7afa17"),
  address:
  { building: '351',
    coord: [ -73.98513559999999, 40.7676919 ],
    street: 'West 57 Street',
    zipcode: '10019' },
  cuisine: 'Irish',
  name: 'Dj Reynolds Pub And Restaurant',
  restaurant_id: '30191841',
  restaurant_comments:
  [ { comment: 'I hated it, never returning.' },
    { comment: 'I hated it, never returning.' } ] }
```

```
db.comments.insertMany ( [ { "restaurant_id": "40356649", "client_id": "00001", "comment": "", "date": ISODate("2022-01-30T01:00:00-06:00"), "type": "positive" }, { "restaurant_id": "40359480", "client_id": "00002", "comment": "", "date": ISODate("2022-01-31T01:00:00-06:00" ), "type": "negative" }, { "restaurant_id" : "40360076", "client_id" : "00003", "comment": "", "date": ISODate ("2022-02-01T01:00:00-06:00" ), "type": "positive"}, { "restaurant_id" : "40358429", "client_id": "00004", "comment": "", "date": ISODate ("2022-02-02T01:00:00-06:00" ), "type": "positive" }, { "restaurant_id" : "40360045", "client_id": "00005", "comment": "", "date": ISODate ("2022-02-03T01:00:00-06:00" ), "type": "negative" }, ] )
```

```
> db.comments.insertMany( [
  { "restaurant_id" : "40356649", "client_id" : "00001", "comment": "", "date": ISODate("2022-01-30T01:00:00-06:00"), "type": "positive" },
  { "restaurant_id" : "40359480", "client_id" : "00002", "comment": "", "date": ISODate("2022-01-31T01:00:00-06:00" ), "type": "negative" },
  { "restaurant_id" : "40360076", "client_id" : "00003", "comment": "", "date": ISODate("2022-02-01T01:00:00-06:00" ), "type": "positive" },
  { "restaurant_id" : "40358429", "client_id": "00004", "comment": "", "date": ISODate("2022-02-02T01:00:00-06:00" ), "type": "positive" },
  { "restaurant_id" : "40360045", "client_id": "00005", "comment": "", "date": ISODate("2022-02-03T01:00:00-06:00" ), "type": "negative" },
] )
< { acknowledged: true,
  insertedIds:
  { '0': ObjectId("62015881236c5b1c04a084b6"),
    '1': ObjectId("62015881236c5b1c04a084b7"),
    '2': ObjectId("62015881236c5b1c04a084b8"),
    '3': ObjectId("62015881236c5b1c04a084b9"),
    '4': ObjectId("62015881236c5b1c04a084ba") } }
```

Atlas atlas-xiwb9m-shard-0 [primary] MongoDB>

```
db.Restaurants.aggregate ( [ { $lookup:{from: "comments",localField: "restaurant_id",foreignField: "restaurant_id",as: "restaurants_n_comments" } }, { $unwind: "$restaurants_n_comments" }, { $match: { "restaurants_n_comments.comment": { $exists: true, $ne: "" } } }, { $project: { "name": 1,"comments": "$restaurants_n_comments.comment" } } ] )
```

```
> db.Restaurants.aggregate([{$lookup:{from: "comments",localField: "restaurant_id",foreignField: "restaurant_id",as: "restaurants_n_comments"}}, {$unwind: "$restaurants_n_comments" },{$match: {"restaurants_n_comments.comment": { $exists: true, $ne: ""}}},{$project:
{"name": 1,"comments": "$restaurants_n_comments.comment"} }])
< { _id: ObjectId("61f4c27584ead6511f7afa15"),
  name: 'Morris Park Bake Shop',
  comments: 'Excellent service!' }
{ _id: ObjectId("61f4c27584ead6511f7afa15"),
  name: 'Morris Park Bake Shop',
  comments: 'Excellent service!' }
{ _id: ObjectId("61f4c27584ead6511f7afa16"),
  name: 'Wendy\S',
  comments: 'The best food I ever had!' }
{ _id: ObjectId("61f4c27584ead6511f7afa16"),
  name: 'Wendy\S',
  comments: 'The best food I ever had!' }
{ _id: ObjectId("61f4c27584ead6511f7afa17"),
  name: 'Dj Reynolds Pub And Restaurant',
  comments: 'I hated it, never returning.' }
{ _id: ObjectId("61f4c27584ead6511f7afa17"),
  name: 'Dj Reynolds Pub And Restaurant',
  comments: 'I hated it, never returning.' }
```

3.4 Indexing

```
db.Restaurants.createIndex({"cuisine": 1})
```

```
> db.Restaurants.createIndex({"cuisine": 1})  
< 'cuisine_1'  
Atlas atlas-xiwb9m-shard-0 [primary] MongoDB>
```

```
db.Restaurants.createIndex ( { "cuisine": 1, "address.zipcode": -1 } )
```

```
> db.Restaurants.createIndex({ "cuisine": 1, "address.zipcode": -1 })  
< 'cuisine_1_address.zipcode_-1'  
Atlas atlas-xiwb9m-shard-0 [primary] MongoDB>
```

```
db.Restaurants.getIndexes()
```

```
> db.Restaurants.getIndexes()  
< [  
  { v: 2, key: { _id: 1 }, name: '_id_' },  
  { v: 2, key: { cuisine: 1 }, name: 'cuisine_1' },  
  {  
    v: 2,  
    key: { cuisine: 1, 'address.zipcode': -1 },  
    name: 'cuisine_1_address.zipcode_-1'  
  }  
]  
Atlas atlas-xiwb9m-shard-0 [primary] MongoDB>
```

```
db.Restaurants.find( { cuisine: "Italian" } ).explain()
```

```
> db.Restaurants.find({cuisine:"Italian"}).explain()
< {
  queryPlanner: {
    plannerVersion: 1,
    namespace: 'MongoDB.Restaurants',
    indexFilterSet: false,
    parsedQuery: { cuisine: { '$eq': 'Italian' } },
    winningPlan: {
      stage: 'FETCH',
      inputStage: {
        stage: 'IXSCAN',
        keyPattern: { cuisine: 1 },
        indexName: 'cuisine_1',
        isMultiKey: false,
        multiKeyPaths: { cuisine: [] },
        isUnique: false,
        isSparse: false,
        isPartial: false,
        indexVersion: 2,
        direction: 'forward',
        indexBounds: { cuisine: [ ("Italian", "Italian") ] } },
        rejectedPlans: [
          {
            stage: 'FETCH',
            inputStage: {
              stage: 'IXSCAN',
              keyPattern: { cuisine: 1, 'address.zipcode': -1 },
              indexName: 'cuisine_1_address.zipcode_-1',
              isMultiKey: false,
              multiKeyPaths: { cuisine: [], 'address.zipcode': [] },
              isUnique: false,
              isSparse: false,
              isPartial: false,
              indexVersion: 2,
              direction: 'forward',
              indexBounds: { cuisine: [ ("Italian", "Italian") ],
                            'address.zipcode': [ '[MaxKey, MinKey]' ] } }
            }
          ]
        }
      }
    }
  }
}
```

What information is provided by the system?

With the `explain()` method MongoDB execute a query plan information, this means that it returns a document with the query plan and, optionally, the execution statistics. The amount of information would be affected by the *verbosity* mode (by default is the `queryPlanner` verbosity mode)db.

```
Restaurants.find( { cuisine: "Italian" } ).explain( "executionStats" )
```

```
> db.Restaurants.find({cuisine:"Italian"}).explain("executionStats")
< {
  queryPlanner: {
    plannerVersion: 1,
    namespace: 'MongoDB.Restaurants',
    indexFilterSet: false,
    parsedQuery: { cuisine: { '$eq': 'Italian' } },
    winningPlan: {
      stage: 'FETCH',
      inputStage: {
        stage: 'IXSCAN',
        keyPattern: { cuisine: 1 },
        indexName: 'cuisine_1',
        isMultiKey: false,
        multiKeyPaths: { cuisine: [] },
        isUnique: false,
        isSparse: false,
        isPartial: false,
        indexVersion: 2,
        direction: 'forward',
        indexBounds: { cuisine: [ ("Italian", "Italian") ] } },
        rejectedPlans: [
          {
            stage: 'FETCH',
            inputStage: {
              stage: 'IXSCAN',
              keyPattern: { cuisine: 1, 'address.zipcode': -1 },
              indexName: 'cuisine_1_address.zipcode_-1',
              isMultiKey: false,
              multiKeyPaths: { cuisine: [], 'address.zipcode': [] },
              isUnique: false,
              isSparse: false,
              isPartial: false,
              indexVersion: 2,
              direction: 'forward',
              indexBounds: { cuisine: [ ("Italian", "Italian") ],
                            'address.zipcode': [ '[MaxKey, MinKey]' ] } }
            }
          ]
        }
      }
    }
  }
}

{
  executionStats: {
    executionSuccess: true,
    nReturned: 1070,
    executionTimeMillis: 2,
    totalKeysExamined: 1070,
    totalDocsExamined: 1070,
    executionStages: {
      stage: 'FETCH',
      nReturned: 1070,
      executionTimeMillisEstimate: 2,
      works: 1071,
      advanced: 1070,
      needTime: 0,
      needYield: 0,
      saveState: 1,
      restoreState: 1,
      isEOF: 1,
      docsExamined: 1070,
      alreadyHasObj: 0,
      inputStage: {
        stage: 'IXSCAN',
        nReturned: 1070,
        executionTimeMillisEstimate: 1,
        works: 1071,
        advanced: 1070,
        needTime: 0,
        needYield: 0,
        saveState: 1,
        restoreState: 1,
        isEOF: 1,
        keyPattern: { cuisine: 1 },
        indexName: 'cuisine_1',
        isMultiKey: false,
        multiKeyPaths: { cuisine: [] },
        isUnique: false,
        isSparse: false,
        isPartial: false,
        indexVersion: 2,
        direction: 'forward',
        indexBounds: { cuisine: [ ("Italian", "Italian") ],
                      'address.zipcode': [ '[MaxKey, MinKey]' ] } }
      }
    }
  }
}

{
  serverInfo: {
    host: 'cluster0-shard-00-02.5moup.mongodb.net',
    port: 27017,
    version: '4.4.12',
    gitVersion: '51475a8c4d9856eb1461137e7539a0a763cc85dc',
    ok: 1,
    '$clusterTime': {
      clusterTime: Timestamp({ t: 1644258521, i: 17 }),
      signature: {
        hash: Binary(Buffer.from("a8c2473169a1cb6c9d91b4bf03ffd0facdbe2f", "hex"), 0),
        keyId: 7030435011954213000
      },
      operationTime: Timestamp({ t: 1644258521, i: 17 })
    }
  }
}
```

With `explain("executionStats")` the statistics are contained, they describe the completed query execution (refers to the modifications that would be performed, but they doesn't apply) for the winning plan. However, this method doesn't provide query execution information for the rejected plans.

```
db.Restaurants.dropIndexes/dropIndex ( "cuisine_1", "cuisine_1_address.zipcode_-1" )
```

```
> db.Restaurants.dropIndex("cuisine_1")
< {
  nIndexesWas: 3,
  ok: 1,
  '$clusterTime': {
    clusterTime: Timestamp({ t: 1644259970, i: 12 }),
    signature: {
      hash: Binary(Buffer.from("c504e7082fdabdcdeb61863d2fb98fcc69379f6b", "hex"), 0),
      keyId: Long("7030435011954212874")
    }
  },
  operationTime: Timestamp({ t: 1644259970, i: 12 })
}
```

```
> db.Restaurants.dropIndex("cuisine_1_address.zipcode_-1")
< {
  nIndexesWas: 2,
  ok: 1,
  '$clusterTime': {
    clusterTime: Timestamp({ t: 1644260851, i: 1 }),
    signature: {
      hash: Binary(Buffer.from("304fa31961bc888c0483a1cf402507da9bf0f815", "hex"), 0),
      keyId: Long("7030435011954212874")
    }
  },
  operationTime: Timestamp({ t: 1644260851, i: 1 })
}
```

Without the Indexes, the information provide by the system has some changes, for example the rejectedPlans are not there any more, as well as the Indexes that where drop before.

```
> db.Restaurants.find({cuisine: "Italian"}).explain()
< { queryPlanner:
  { plannerVersion: 1,
    namespace: 'MongoDB.Restaurants',
    indexFilterSet: false,
    parsedQuery: { cuisine: { '$eq': 'Italian' } },
    winningPlan:
      { stage: 'COLLSCAN',
        filter: { cuisine: { '$eq': 'Italian' } },
        direction: 'forward' },
    rejectedPlans: [] },
  serverInfo:
    { host: 'cluster0-shard-00-02.5moup.mongodb.net',
      port: 27017,
      version: '4.4.12',
      gitVersion: '51475a8c4d9856eb1461137e7539a0a763cc85dc' },
  ok: 1,
  '$clusterTime':
    { clusterTime: Timestamp({ t: 1644260925, i: 13 }),
      signature:
        { hash: Binary(Buffer.from("489185c5bec79de1a599cbd2d8c0fb100e2de2a1", "hex"), 0),
          keyId: 7030435011954213000 } },
  operationTime: Timestamp({ t: 1644260925, i: 13 }) }
```