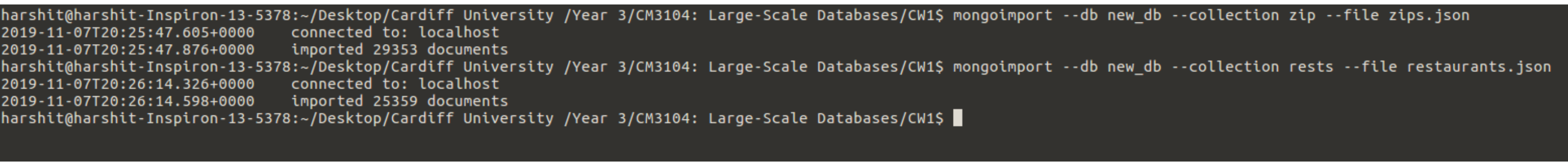
CM3104: Large Scale Databases
Coursework – 1

Coursework Part A: NoSQL Databases

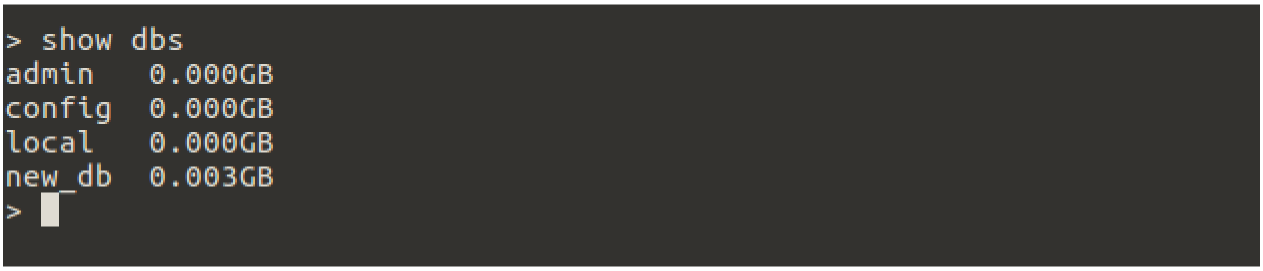
Task 1: Build a MongoDB database to store both the restaurants and zipcodes datasets

mongoimport --db new_db --collection zip --file zips.json
mongoimport --db new_db --collection rests --file restaurants.json



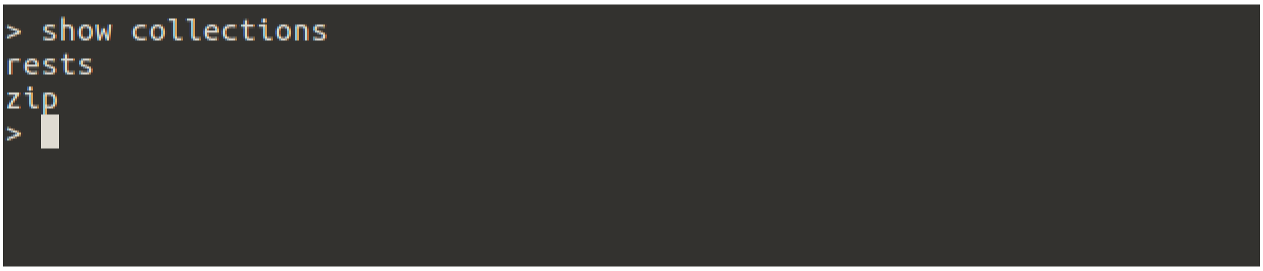
```
harshit@harshit-Inspiron-13-5378:~/Desktop/Cardiff University /Year 3/CM3104: Large-Scale Databases/CW1$ mongoimport --db new_db --collection zip --file zips.json
2019-11-07T20:25:47.605+0000    connected to: localhost
2019-11-07T20:25:47.876+0000    imported 29353 documents
harshit@harshit-Inspiron-13-5378:~/Desktop/Cardiff University /Year 3/CM3104: Large-Scale Databases/CW1$ mongoimport --db new_db --collection rests --file restaurants.json
2019-11-07T20:26:14.326+0000    connected to: localhost
2019-11-07T20:26:14.598+0000    imported 25359 documents
harshit@harshit-Inspiron-13-5378:~/Desktop/Cardiff University /Year 3/CM3104: Large-Scale Databases/CW1$
```

mongo new_db
> show dbs



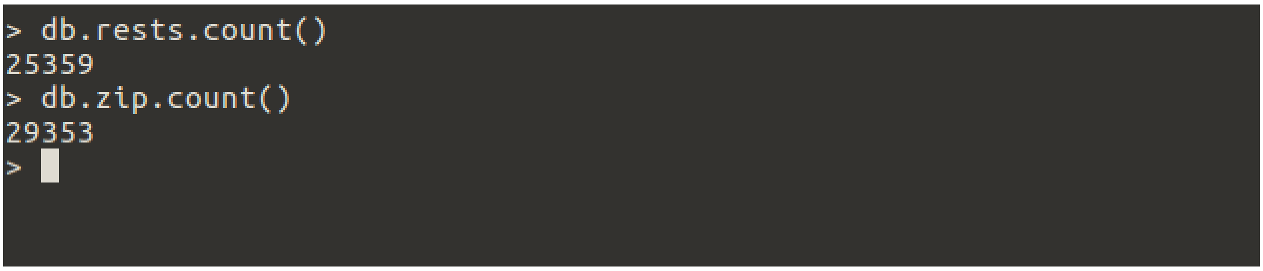
```
> show dbs
admin   0.000GB
config  0.000GB
local   0.000GB
new_db  0.003GB
>
```

> show collections



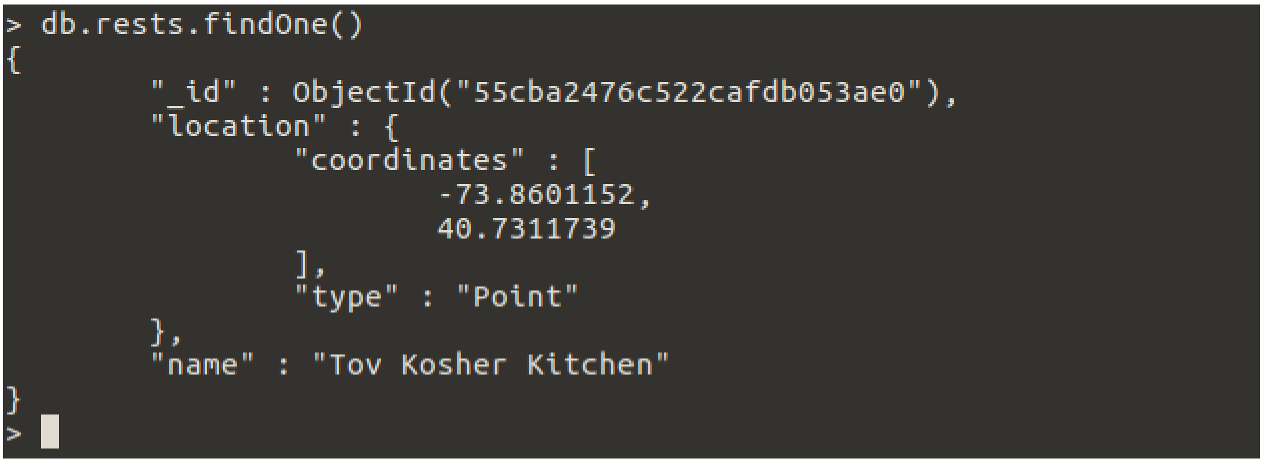
```
> show collections
rests
zip
>
```

> db.rests.count()
25359
> db.zip.count()
29353



```
> db.rests.count()
25359
> db.zip.count()
29353
>
```

```
> db.rests.findOne()
{
        "_id" : ObjectId("55cba2476c522cafdb053ae0"),
        "location" : {
                "coordinates" : [
                        -73.8601152,
                        40.7311739
                ],
                "type" : "Point"
        },
        "name" : "Tov Kosher Kitchen"
}
```



```
> db.rests.findOne()
{
        "_id" : ObjectId("55cba2476c522cafdb053ae0"),
        "location" : {
                "coordinates" : [
                        -73.8601152,
                        40.7311739
                ],
                "type" : "Point"
        },
        "name" : "Tov Kosher Kitchen"
}
> 
```

```
> db.zip.findOne()
{
        "_id" : "01007",
        "city" : "BELCHERTOWN",
        "loc" : [
                -72.410953,
                42.275103
        ],
        "pop" : 10579,
        "state" : "MA"
}
```

```
> db.zip.findOne()
{
        "_id" : "01007",
        "city" : "BELCHERTOWN",
        "loc" : [
                -72.410953,
                42.275103
        ],
        "pop" : 10579,
        "state" : "MA"
}
> 
```

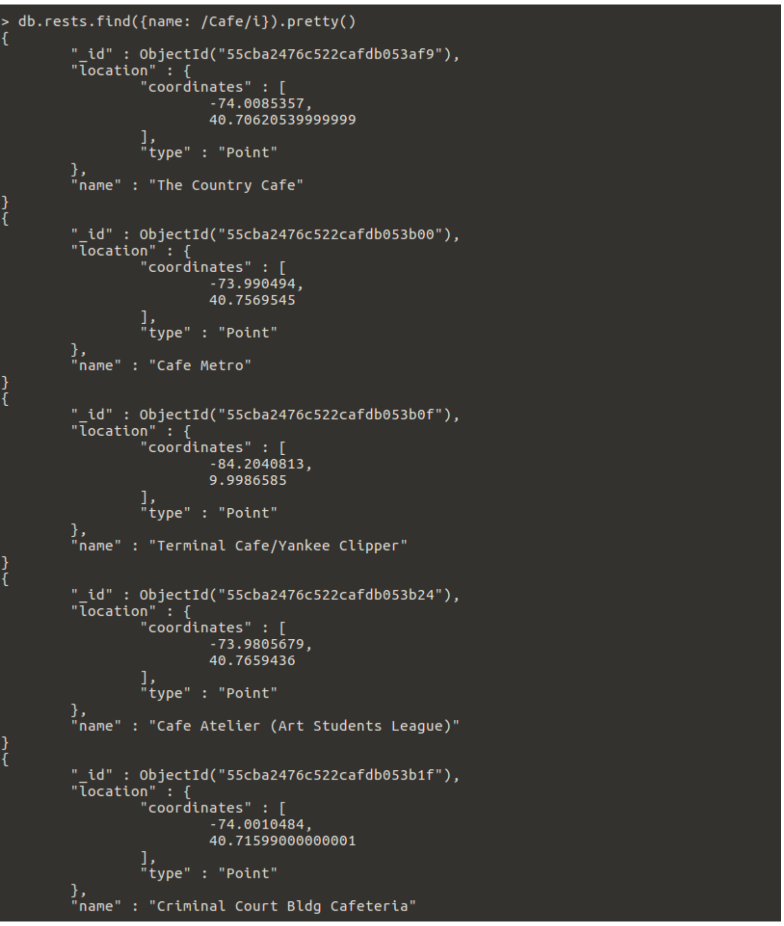
Task 2: Write queries over the database to:

I. Find all the Cafes in the dataset and count their number. A Cafe is any restaurant which has the word “Cafe” in its title. **II.** For each Cafe from the above set, find the city that it is located in. You can assume that a restaurant is located in the nearest city to its location.

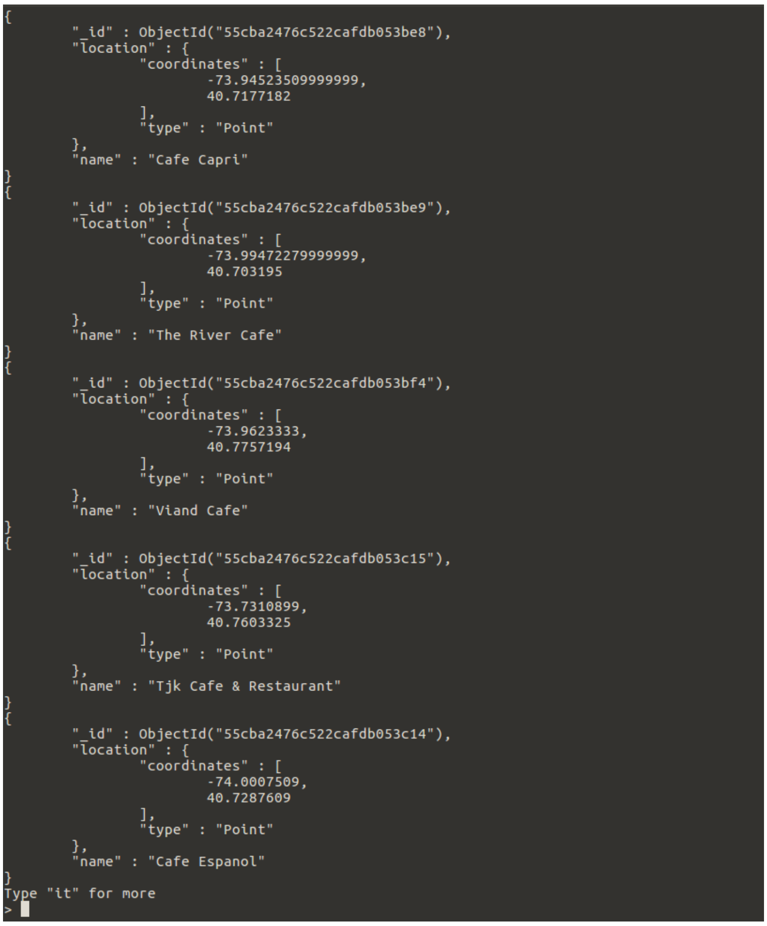
I.

```
> db.rests.find({name: /Cafe/i}).count()
1652

> db.rests.find({name: /Cafe/i}).pretty()
{
	"_id" : ObjectId("55cba2476c522cafdb053af9"),
	"location" : {
		"coordinates" : [
			-74.0085357,
			40.70620539999999
		],
		"type" : "Point"
	},
	"name" : "The Country Cafe"
}
{
	"_id" : ObjectId("55cba2476c522cafdb053b00"),
	"location" : {
		"coordinates" : [
			-73.990494,
			40.7569545
		],
		"type" : "Point"
	},
	"name" : "Cafe Metro"
}
{
	"_id" : ObjectId("55cba2476c522cafdb053b0f"),
	"location" : {
		"coordinates" : [
			-84.2040813,
			9.9986585
		],
		"type" : "Point"
	},
	"name" : "Terminal Cafe/Yankee Clipper"
}
Type "it" for more
>
```



```
> db.rests.find({name: /Cafe/i}).pretty()
{
        "_id" : ObjectId("55cba2476c522cafdb053af9"),
        "location" : {
                "coordinates" : [
                        -74.0085357,
                        40.70620539999999
                ],
                "type" : "Point"
        },
        "name" : "The Country Cafe"
}
{
        "_id" : ObjectId("55cba2476c522cafdb053b00"),
        "location" : {
                "coordinates" : [
                        -73.990494,
                        40.7569545
                ],
                "type" : "Point"
        },
        "name" : "Cafe Metro"
}
{
        "_id" : ObjectId("55cba2476c522cafdb053b0f"),
        "location" : {
                "coordinates" : [
                        -84.2040813,
                        9.9986585
                ],
                "type" : "Point"
        },
        "name" : "Terminal Cafe/Yankee Clipper"
}
{
        "_id" : ObjectId("55cba2476c522cafdb053b24"),
        "location" : {
                "coordinates" : [
                        -73.9805679,
                        40.7659436
                ],
                "type" : "Point"
        },
        "name" : "Cafe Atelier (Art Students League)"
}
{
        "_id" : ObjectId("55cba2476c522cafdb053b1f"),
        "location" : {
                "coordinates" : [
                        -74.0010484,
                        40.71599000000001
                ],
                "type" : "Point"
        },
        "name" : "Criminal Court Bldg Cafeteria"
```

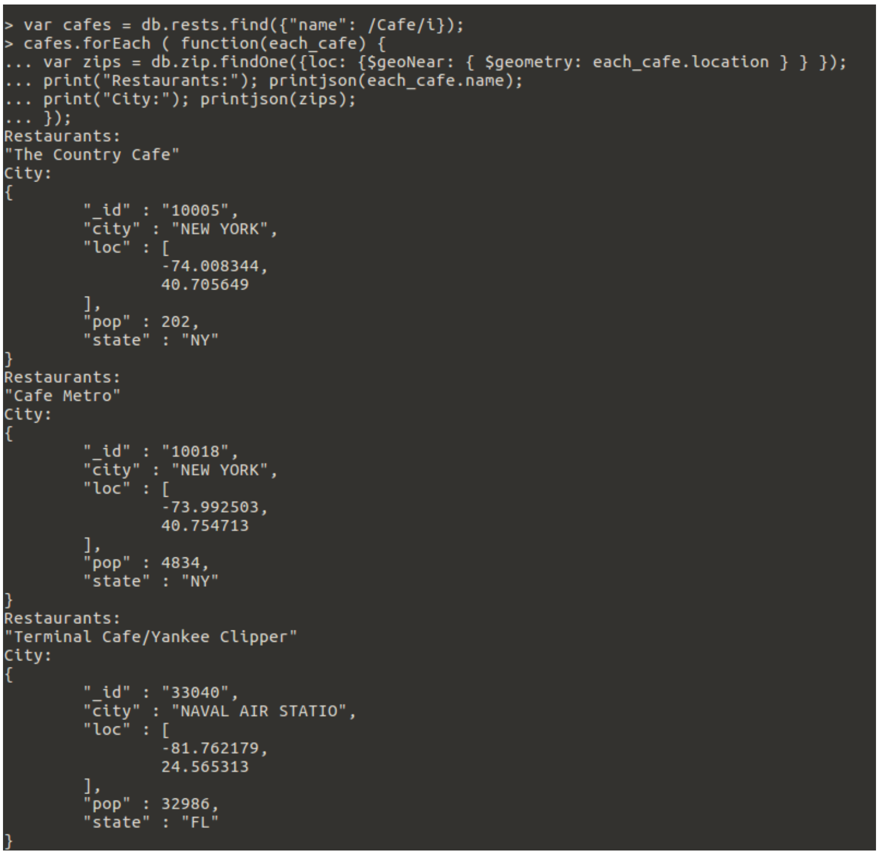


```
{
        "_id" : ObjectId("55cba2476c522cafdb053be8"),
        "location" : {
                "coordinates" : [
                        -73.94523509999999,
                        40.7177182
                ],
                "type" : "Point"
        },
        "name" : "Cafe Capri"
}
{
        "_id" : ObjectId("55cba2476c522cafdb053be9"),
        "location" : {
                "coordinates" : [
                        -73.99472279999999,
                        40.703195
                ],
                "type" : "Point"
        },
        "name" : "The River Cafe"
}
{
        "_id" : ObjectId("55cba2476c522cafdb053bf4"),
        "location" : {
                "coordinates" : [
                        -73.9623333,
                        40.7757194
                ],
                "type" : "Point"
        },
        "name" : "Viand Cafe"
}
{
        "_id" : ObjectId("55cba2476c522cafdb053c15"),
        "location" : {
                "coordinates" : [
                        -73.7310899,
                        40.7603325
                ],
                "type" : "Point"
        },
        "name" : "Tjk Cafe & Restaurant"
}
{
        "_id" : ObjectId("55cba2476c522cafdb053c14"),
        "location" : {
                "coordinates" : [
                        -74.0007509,
                        40.7287609
                ],
                "type" : "Point"
        },
        "name" : "Cafe Espanol"
}
Type "it" for more
>
```

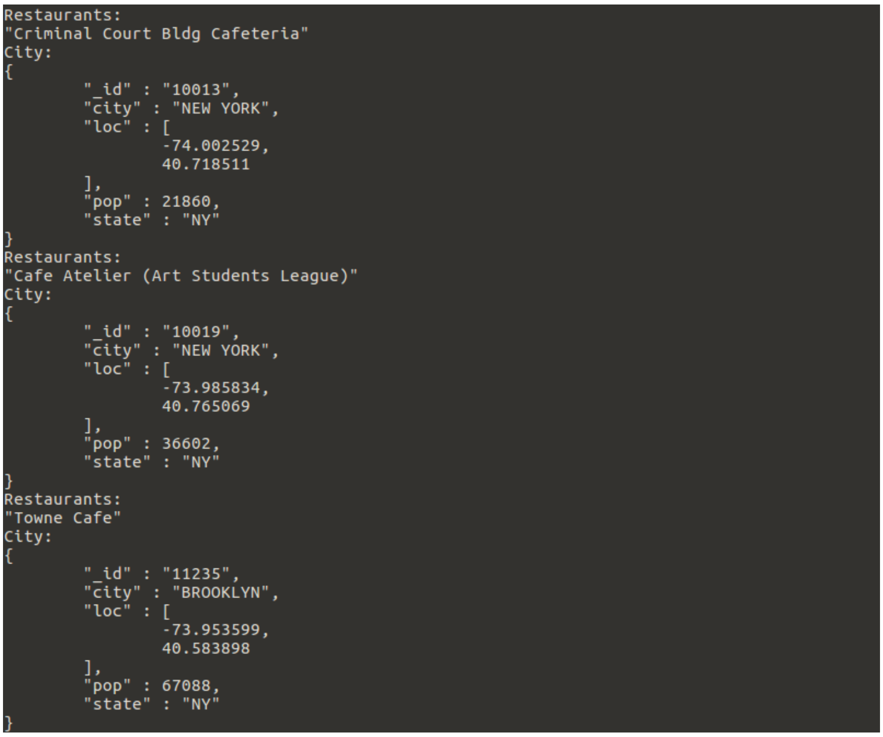
II.

```
> db.rests.createIndex({"location" : "2dsphere"});
> db.zip.createIndex({"loc" : "2dsphere", "city" : 1});
> var cafes = db.rests.find({"name": /Cafe/i});
> cafes.forEach ( function(each_cafe) {
... var zips = db.zip.findOne({loc: {$geoNear: { $geometry: each_cafe.location } } });
... print("Restaurants:"); printjson(each_cafe.name);
... print("City:"); printjson(zips);
... });
```

```
Restaurants:
"The Country Cafe"
City:
{
        "_id" : "10005",
        "city" : "NEW YORK",
        "loc" : [
                -74.008344,
                40.705649
        ],
        "pop" : 202,
        "state" : "NY"
}
Restaurants:
"Cafe Metro"
City:
{
        "_id" : "10018",
        "city" : "NEW YORK",
        "loc" : [
                -73.992503,
                40.754713
        ],
        "pop" : 4834,
        "state" : "NY"
}
Restaurants:
"Terminal Cafe/Yankee Clipper"
City:
{
        "_id" : "33040",
        "city" : "NAVAL AIR STATIO",
        "loc" : [
                -81.762179,
                24.565313
        ],
        "pop" : 32986,
        "state" : "FL"
}
```



```
> var cafes = db.rests.find({"name": /Cafe/i});
> cafes.forEach ( function(each_cafe) {
... var zips = db.zip.findOne({loc: {$geoNear: { $geometry: each_cafe.location } } });
... print("Restaurants:"); printjson(each_cafe.name);
... print("City:"); printjson(zips);
... });
Restaurants:
"The Country Cafe"
City:
{
        "_id" : "10005",
        "city" : "NEW YORK",
        "loc" : [
                -74.008344,
                40.705649
        ],
        "pop" : 202,
        "state" : "NY"
}
Restaurants:
"Cafe Metro"
City:
{
        "_id" : "10018",
        "city" : "NEW YORK",
        "loc" : [
                -73.992503,
                40.754713
        ],
        "pop" : 4834,
        "state" : "NY"
}
Restaurants:
"Terminal Cafe/Yankee Clipper"
City:
{
        "_id" : "33040",
        "city" : "NAVAL AIR STATIO",
        "loc" : [
                -81.762179,
                24.565313
        ],
        "pop" : 32986,
        "state" : "FL"
}
```



```
Restaurants:
"Criminal Court Bldg Cafeteria"
City:
{
        "_id" : "10013",
        "city" : "NEW YORK",
        "loc" : [
                -74.002529,
                40.718511
        ],
        "pop" : 21860,
        "state" : "NY"
}
Restaurants:
"Cafe Atelier (Art Students League)"
City:
{
        "_id" : "10019",
        "city" : "NEW YORK",
        "loc" : [
                -73.985834,
                40.765069
        ],
        "pop" : 36602,
        "state" : "NY"
}
Restaurants:
"Towne Cafe"
City:
{
        "_id" : "11235",
        "city" : "BROOKLYN",
        "loc" : [
                -73.953599,
                40.583898
        ],
        "pop" : 67088,
        "state" : "NY"
}
```

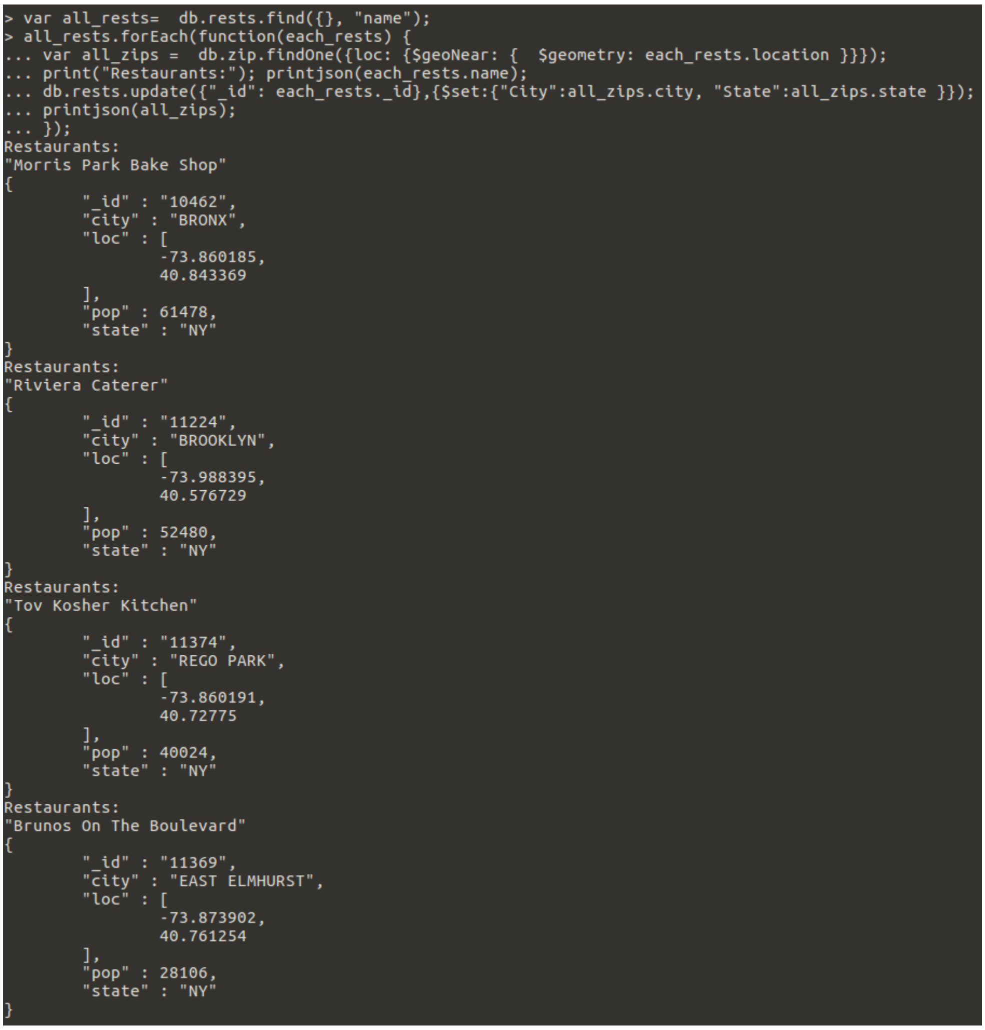
Task 3: In your application you will need to retrieve the restaurants and their associated cities frequently. Suggest and implement TWO different methods for relating the restaurants to the cities they are located in to allow for the efficient retrieval of the information.

Method - 1

```
> var all_rests=  db.rests.find({}, "name");
> all_rests.forEach(function(each_rests) {
... var all_zips =  db.zip.findOne({loc: {$geoNear: {  $geometry: each_rests.location }}});
... print("Restaurants:"); printjson(each_rests.name);
... db.rests.update({"_id": each_rests._id},{$set:{"City":all_zips.city, "State":all_zips.state }});
... printjson(all_zips);
... });
```

```
Restaurants:
"Morris Park Bake Shop"
{
        "_id" : "10462",
        "city" : "BRONX",
        "loc" : [
                -73.860185,
                40.843369
        ],
        "pop" : 61478,
        "state" : "NY"
}
Restaurants:
```

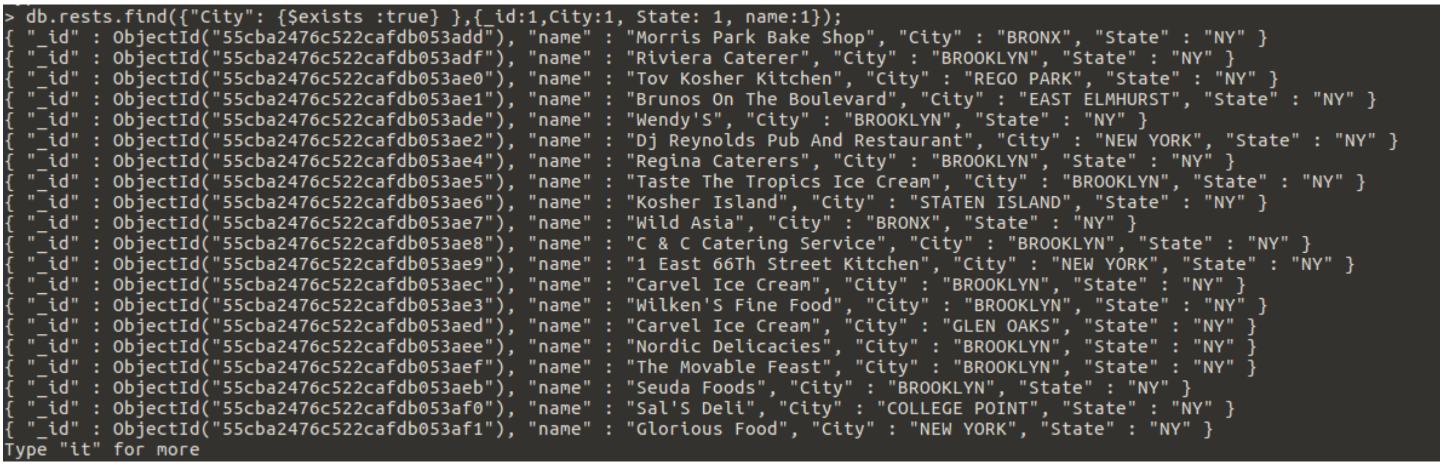
```
"Riviera Caterer"
{
	"_id" : "11224",
	"city" : "BROOKLYN",
	"loc" : [
		-73.988395,
		40.576729
	],
	"pop" : 52480,
	"state" : "NY"
}
Restaurants:
"Tov Kosher Kitchen"
{
	"_id" : "11374",
	"city" : "REGO PARK",
	"loc" : [
		-73.860191,
		40.72775
	],
	"pop" : 40024,
	"state" : "NY"
}
```



```
> var all_rests=  db.rests.find({}, "name");
> all_rests.forEach(function(each_rests) {
... var all_zips =  db.zip.findOne({loc: {$geoNear: {  $geometry: each_rests.location }}});
... print("Restaurants:"); printjson(each_rests.name);
... db.rests.update({"_id": each_rests._id},{$set:{"City":all_zips.city, "State":all_zips.state }});
... printjson(all_zips);
... });
Restaurants:
"Morris Park Bake Shop"
{
        "_id" : "10462",
        "city" : "BRONX",
        "loc" : [
                -73.860185,
                40.843369
        ],
        "pop" : 61478,
        "state" : "NY"
}
Restaurants:
"Riviera Caterer"
{
        "_id" : "11224",
        "city" : "BROOKLYN",
        "loc" : [
                -73.988395,
                40.576729
        ],
        "pop" : 52480,
        "state" : "NY"
}
Restaurants:
"Tov Kosher Kitchen"
{
        "_id" : "11374",
        "city" : "REGO PARK",
        "loc" : [
                -73.860191,
                40.72775
        ],
        "pop" : 40024,
        "state" : "NY"
}
Restaurants:
"Brunos On The Boulevard"
{
        "_id" : "11369",
        "city" : "EAST ELMHURST",
        "loc" : [
                -73.873902,
                40.761254
        ],
        "pop" : 28106,
        "state" : "NY"
}
```

```
> db.rests.find({"City": {$exists :true} },{_id:1,City:1, State: 1, name:1});

{ "_id" : ObjectId("55cba2476c522cafdb053add"), "name" : "Morris Park Bake Shop", "City" : "BRONX", 
"State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053adf"), "name" : "Riviera Caterer", "City" : "BROOKLYN", 
"State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053ae0"), "name" : "Tov Kosher Kitchen", "City" : "REGO PARK", 
"State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053ae1"), "name" : "Brunos On The Boulevard", "City" : "EAST 
ELMHURST", "State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053ade"), "name" : "Wendy'S", "City" : "BROOKLYN", "State" : 
"NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053ae2"), "name" : "Dj Reynolds Pub And Restaurant", "City" : 
"NEW YORK", "State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053ae4"), "name" : "Regina Caterers", "City" : "BROOKLYN", 
"State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053ae5"), "name" : "Taste The Tropics Ice Cream", "City" : 
"BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053ae6"), "name" : "Kosher Island", "City" : "STATEN ISLAND", 
"State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053ae7"), "name" : "Wild Asia", "City" : "BRONX", "State" : "NY" 
}
{ "_id" : ObjectId("55cba2476c522cafdb053ae8"), "name" : "C & C Catering Service", "City" : 
"BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053ae9"), "name" : "1 East 66Th Street Kitchen", "City" : "NEW 
YORK", "State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053aec"), "name" : "Carvel Ice Cream", "City" : "BROOKLYN", 
"State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053ae3"), "name" : "Wilken'S Fine Food", "City" : "BROOKLYN", 
"State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053aed"), "name" : "Carvel Ice Cream", "City" : "GLEN OAKS", 
"State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053aee"), "name" : "Nordic Delicacies", "City" : "BROOKLYN", 
"State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053aef"), "name" : "The Movable Feast", "City" : "BROOKLYN", 
"State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053aeb"), "name" : "Seuda Foods", "City" : "BROOKLYN", "State" 
: "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053af0"), "name" : "Sal'S Deli", "City" : "COLLEGE POINT", 
"State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053af1"), "name" : "Glorious Food", "City" : "NEW YORK", 
"State" : "NY" }
```

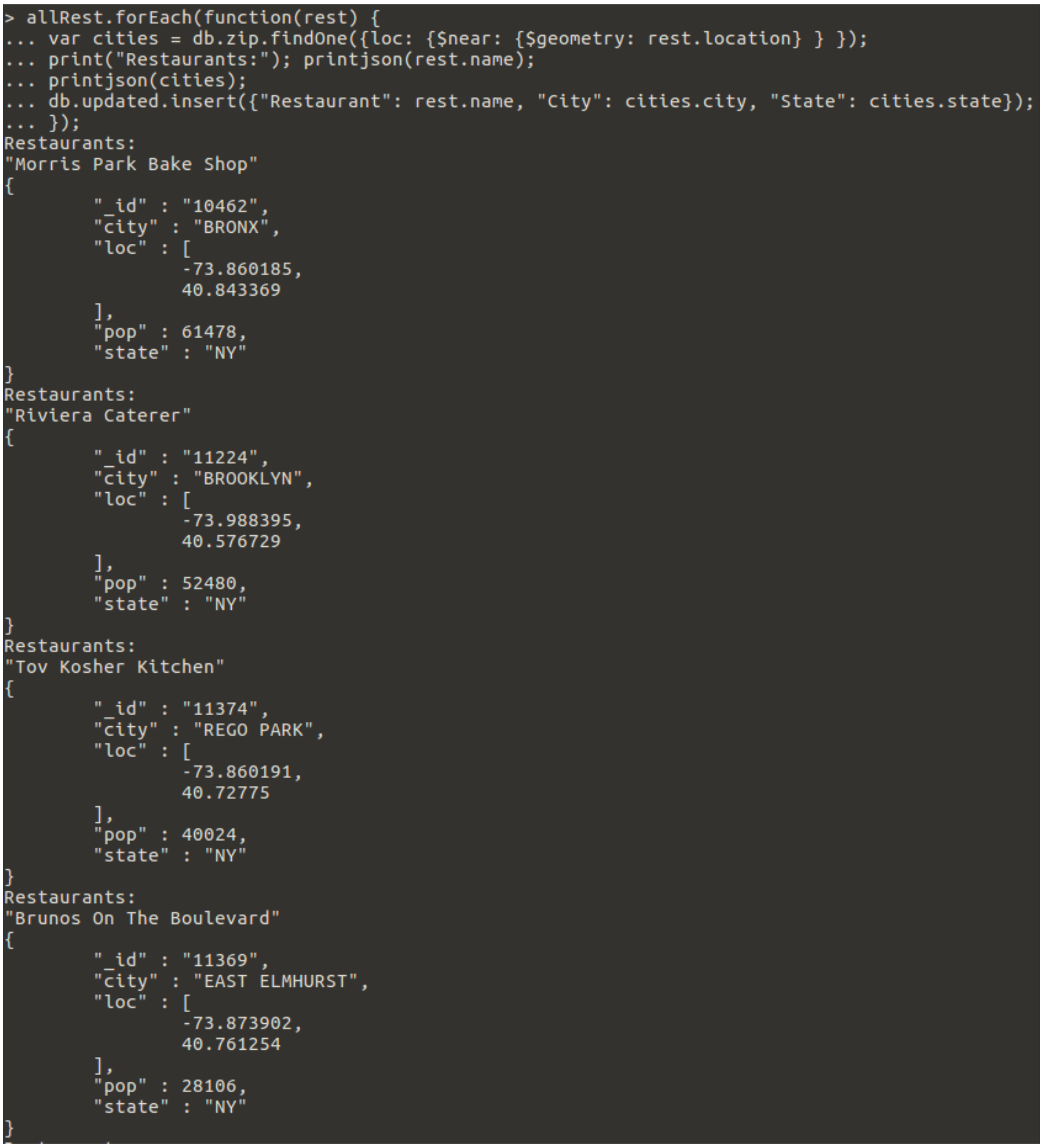


```
> db.rests.find({"City": {$exists :true} },{_id:1,City:1, State: 1, name:1});
{ "_id" : ObjectId("55cba2476c522cafdb053add"), "name" : "Morris Park Bake Shop", "City" : "BRONX", "State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053adf"), "name" : "Riviera Caterer", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053ae0"), "name" : "Tov Kosher Kitchen", "City" : "REGO PARK", "State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053ae1"), "name" : "Brunos On The Boulevard", "City" : "EAST ELMHURST", "State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053ade"), "name" : "Wendy'S", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053ae2"), "name" : "Dj Reynolds Pub And Restaurant", "City" : "NEW YORK", "State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053ae4"), "name" : "Regina Caterers", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053ae5"), "name" : "Taste The Tropics Ice Cream", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053ae6"), "name" : "Kosher Island", "City" : "STATEN ISLAND", "State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053ae7"), "name" : "Wild Asia", "City" : "BRONX", "State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053ae8"), "name" : "C & C Catering Service", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053ae9"), "name" : "1 East 66Th Street Kitchen", "City" : "NEW YORK", "State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053aec"), "name" : "Carvel Ice Cream", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053ae3"), "name" : "Wilken'S Fine Food", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053aed"), "name" : "Carvel Ice Cream", "City" : "GLEN OAKS", "State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053aee"), "name" : "Nordic Delicacies", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053aef"), "name" : "The Movable Feast", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053aeb"), "name" : "Seuda Foods", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053af0"), "name" : "Sal'S Deli", "City" : "COLLEGE POINT", "State" : "NY" }
{ "_id" : ObjectId("55cba2476c522cafdb053af1"), "name" : "Glorious Food", "City" : "NEW YORK", "State" : "NY" }
Type "it" for more
```

Method – 2

```
>var allRest = db.rests.aggregate([{$project:{"name": "$name", "location": "$location"} } ] );
> allRest.forEach(function(rest) {
... var cities = db.zip.findOne({loc: {$near: {$geometry: rest.location} } });
... print("Restaurants:"); printjson(rest.name);
... printjson(cities);
... db.updated.insert({"Restaurant": rest.name, "City": cities.city, "State": cities.state});
... });
```

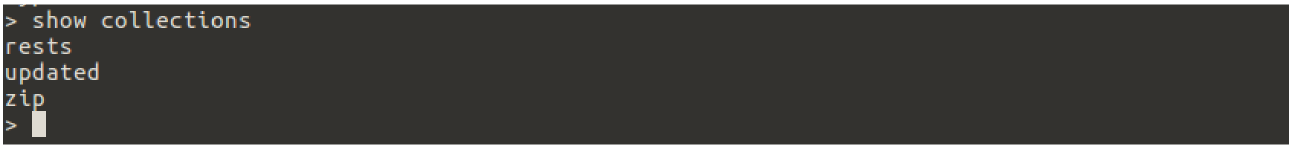
```
Restaurants:
"Morris Park Bake Shop"
{
	"_id" : "10462",
	"city" : "BRONX",
	"loc" : [
		-73.860185,
		40.843369
	],
	"pop" : 61478,
	"state" : "NY"
}
Restaurants:
"Riviera Caterer"
{
	"_id" : "11224",
	"city" : "BROOKLYN",
	"loc" : [
		-73.988395,
		40.576729
	],
	"pop" : 52480,
	"state" : "NY"
}
Restaurants:
"Tov Kosher Kitchen"
{
	"_id" : "11374",
        "city" : "REGO PARK",
        "loc" : [
                -73.860191,
                40.72775
        ],
        "pop" : 40024,
        "state" : "NY"
}
Restaurants:
"Brunos On The Boulevard"
{
        "_id" : "11369",
        "city" : "EAST ELMHURST",
        "loc" : [
                -73.873902,
                40.761254
        ],
        "pop" : 28106,
        "state" : "NY"
}
```



```
> allRest.forEach(function(rest) {
... var cities = db.zip.findOne({loc: {$near: {$geometry: rest.location} } });
... print("Restaurants:"); printjson(rest.name);
... printjson(cities);
... db.updated.insert({"Restaurant": rest.name, "City": cities.city, "State": cities.state});
... });
Restaurants:
"Morris Park Bake Shop"
{
        "_id" : "10462",
        "city" : "BRONX",
        "loc" : [
                -73.860185,
                40.843369
        ],
        "pop" : 61478,
        "state" : "NY"
}
Restaurants:
"Riviera Caterer"
{
        "_id" : "11224",
        "city" : "BROOKLYN",
        "loc" : [
                -73.988395,
                40.576729
        ],
        "pop" : 52480,
        "state" : "NY"
}
Restaurants:
"Tov Kosher Kitchen"
{
        "_id" : "11374",
        "city" : "REGO PARK",
        "loc" : [
                -73.860191,
                40.72775
        ],
        "pop" : 40024,
        "state" : "NY"
}
Restaurants:
"Brunos On The Boulevard"
{
        "_id" : "11369",
        "city" : "EAST ELMHURST",
        "loc" : [
                -73.873902,
                40.761254
        ],
        "pop" : 28106,
        "state" : "NY"
}
```

In second method,

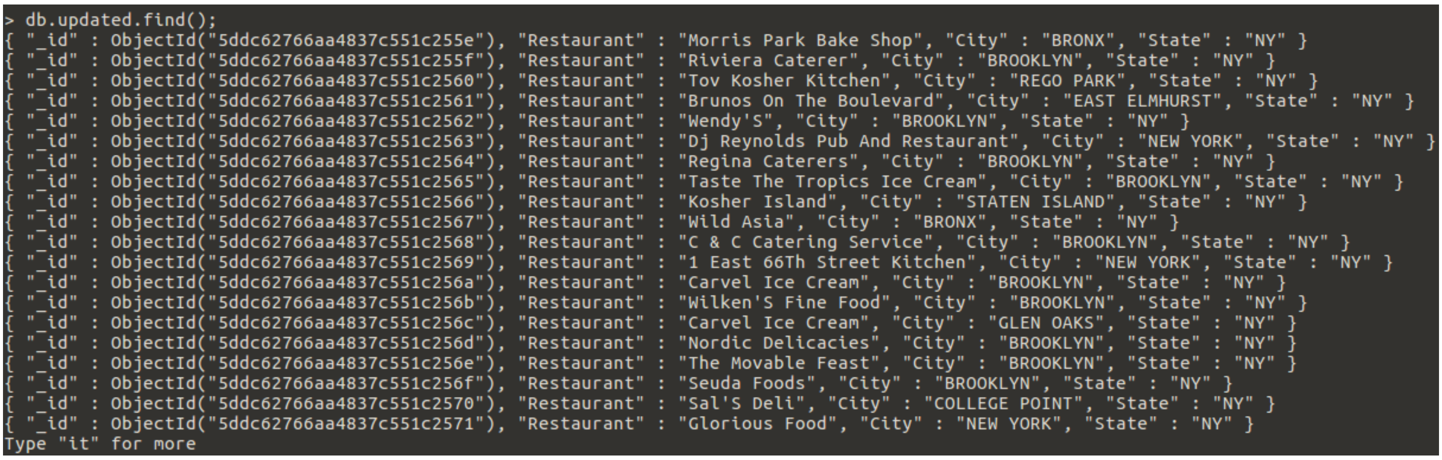
Created new collection (**updated**) and inserted restaurant name, nearest city & state.



```
> show collections
rests
updated
zip
> 
```

```
> db.updated.find();
```

```
{ "_id" : ObjectId("5ddc62766aa4837c551c255e"), "Restaurant" : "Morris Park Bake Shop", "City" : "BRONX", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c255f"), "Restaurant" : "Riviera Caterer", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c2560"), "Restaurant" : "Tov Kosher Kitchen", "City" : "REGO PARK", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c2561"), "Restaurant" : "Brunos On The Boulevard", "City" : "EAST ELMHURST", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c2562"), "Restaurant" : "Wendy'S", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c2563"), "Restaurant" : "Dj Reynolds Pub And Restaurant", "City" : "NEW YORK", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c2564"), "Restaurant" : "Regina Caterers", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c2565"), "Restaurant" : "Taste The Tropics Ice Cream", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c2566"), "Restaurant" : "Kosher Island", "City" : "STATEN ISLAND", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c2567"), "Restaurant" : "Wild Asia", "City" : "BRONX", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c2568"), "Restaurant" : "C & C Catering Service", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c2569"), "Restaurant" : "1 East 66Th Street Kitchen", "City" : "NEW YORK", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c256a"), "Restaurant" : "Carvel Ice Cream", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c256b"), "Restaurant" : "Wilken'S Fine Food", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c256c"), "Restaurant" : "Carvel Ice Cream", "City" : "GLEN OAKS", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c256d"), "Restaurant" : "Nordic Delicacies", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c256e"), "Restaurant" : "The Movable Feast", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c256f"), "Restaurant" : "Seuda Foods", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c2570"), "Restaurant" : "Sal'S Deli", "City" : "COLLEGE POINT", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c2571"), "Restaurant" : "Glorious Food", "City" : "NEW YORK", "State" : "NY" }
Type "it" for more
```

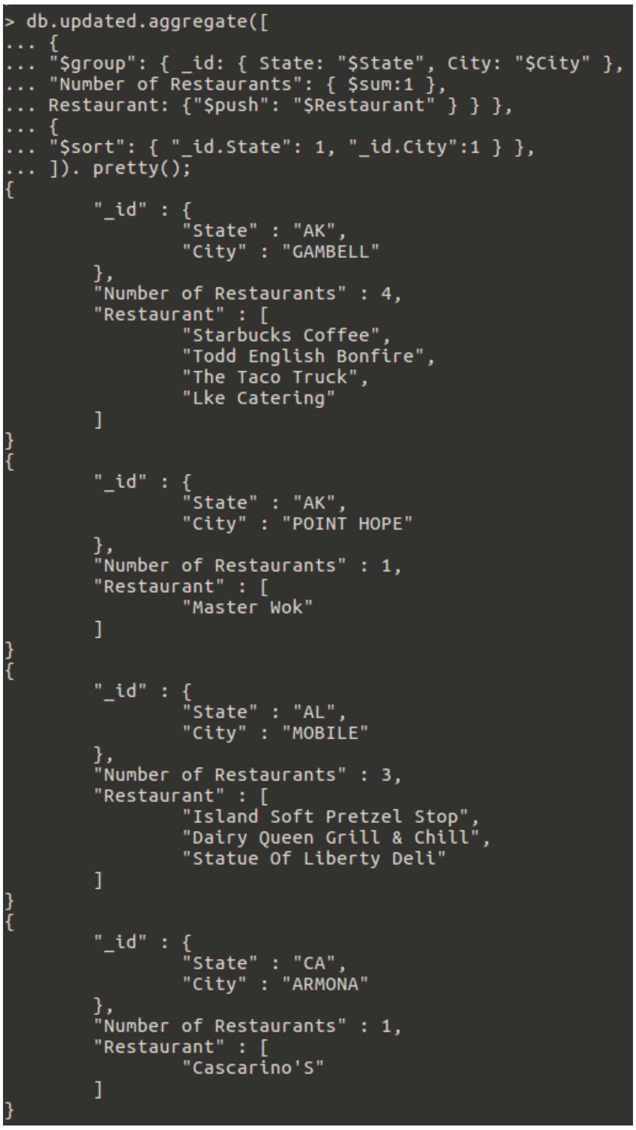


```
> db.updated.find();
{ "_id" : ObjectId("5ddc62766aa4837c551c255e"), "Restaurant" : "Morris Park Bake Shop", "City" : "BRONX", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c255f"), "Restaurant" : "Riviera Caterer", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c2560"), "Restaurant" : "Tov Kosher Kitchen", "City" : "REGO PARK", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c2561"), "Restaurant" : "Brunos On The Boulevard", "City" : "EAST ELMHURST", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c2562"), "Restaurant" : "Wendy'S", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c2563"), "Restaurant" : "Dj Reynolds Pub And Restaurant", "City" : "NEW YORK", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c2564"), "Restaurant" : "Regina Caterers", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c2565"), "Restaurant" : "Taste The Tropics Ice Cream", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c2566"), "Restaurant" : "Kosher Island", "City" : "STATEN ISLAND", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c2567"), "Restaurant" : "Wild Asia", "City" : "BRONX", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c2568"), "Restaurant" : "C & C Catering Service", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c2569"), "Restaurant" : "1 East 66Th Street Kitchen", "City" : "NEW YORK", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c256a"), "Restaurant" : "Carvel Ice Cream", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c256b"), "Restaurant" : "Wilken'S Fine Food", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c256c"), "Restaurant" : "Carvel Ice Cream", "City" : "GLEN OAKS", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c256d"), "Restaurant" : "Nordic Delicacies", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c256e"), "Restaurant" : "The Movable Feast", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c256f"), "Restaurant" : "Seuda Foods", "City" : "BROOKLYN", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c2570"), "Restaurant" : "Sal'S Deli", "City" : "COLLEGE POINT", "State" : "NY" }
{ "_id" : ObjectId("5ddc62766aa4837c551c2571"), "Restaurant" : "Glorious Food", "City" : "NEW YORK", "State" : "NY" }
Type "it" for more
```

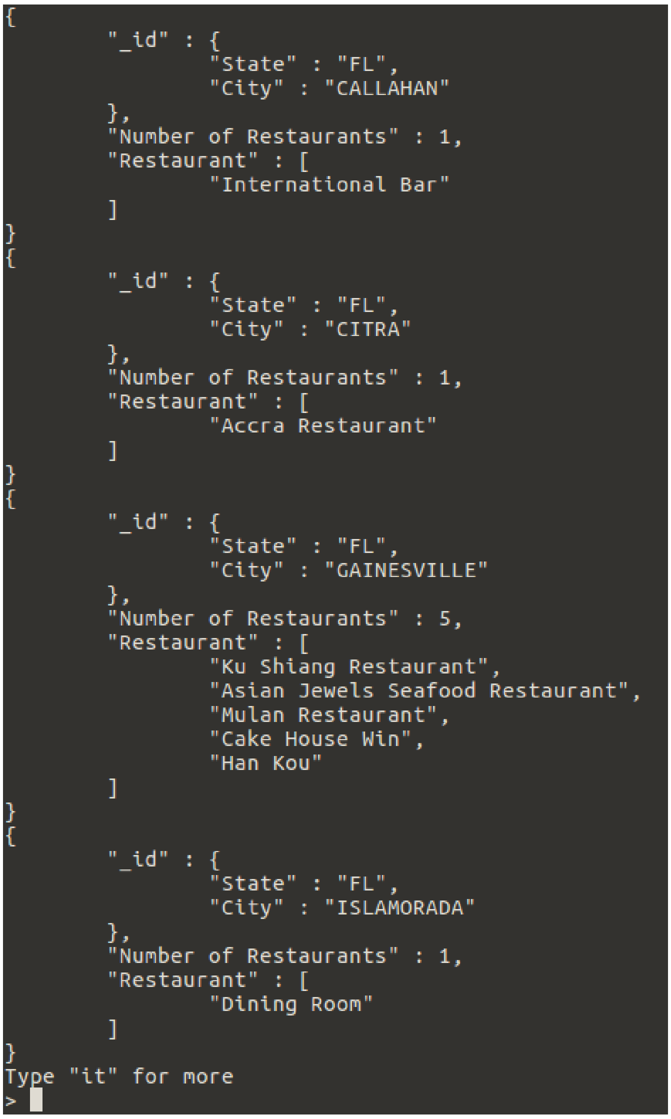
Task 4: Query the new designs to find restaurants, grouped by city and state. Your answer should include: city name, state name, number of restaurants in the city and a list of all the names of the restaurants in the city.

```
> db.updated.aggregate([
... {
... "$group": { _id: { State: "$State", City: "$City" },
... "Number of Restaurants": { $sum:1 },
... Restaurant: {"$push": "$Restaurant" } } },
... {
... "$sort": { "_id.State": 1, "_id.City":1 } },
... ]). pretty();
{
        "_id" : {
                "State" : "AK",
                "City" : "GAMBELL"
        },
        "Number of Restaurants" : 4,
        "Restaurant" : [
                "Starbucks Coffee",
                "Todd English Bonfire",
                "The Taco Truck",
                "Lke Catering"
        ]
}
{
        "_id" : {
                "State" : "AK",
                "City" : "POINT HOPE"
        },
        "Number of Restaurants" : 1,
        "Restaurant" : [
                "Master Wok"
        ]
```

```
}
{
        "_id" : {
                "State" : "AL",
                "City" : "MOBILE"
        },
        "Number of Restaurants" : 3,
        "Restaurant" : [
                "Island Soft Pretzel Stop",
                "Dairy Queen Grill & Chill",
                "Statue Of Liberty Deli"
        ]
}
{
        "_id" : {
                "State" : "CA",
                "City" : "ARMONA"
        },
        "Number of Restaurants" : 1,
        "Restaurant" : [
                "Cascarino'S"
        ]
}
{
        "_id" : {
                "State" : "FL",
                "City" : "CALLAHAN"
        },
        "Number of Restaurants" : 1,
        "Restaurant" : [
                "International Bar"
        ]
}
{
        "_id" : {
                "State" : "FL",
                "City" : "CITRA"
        },
        "Number of Restaurants" : 1,
        "Restaurant" : [
                "Accra Restaurant"
        ]
}
{
        "_id" : {
                "State" : "FL",
                "City" : "GAINESVILLE"
        },
        "Number of Restaurants" : 5,
        "Restaurant" : [
                "Ku Shiang Restaurant",
                "Asian Jewels Seafood Restaurant",
                "Mulan Restaurant",
                "Cake House Win",
                "Han Kou"
        ]
}
{
        "_id" : {
                "State" : "FL",
                "City" : "ISLAMORADA"
        },
        "Number of Restaurants" : 1,
        "Restaurant" : [
                "Dining Room"
        ]
}
Type "it" for more
```



```
> db.updated.aggregate([
... {
... "$group": { _id: { State: "$State", City: "$City" },
... "Number of Restaurants": { $sum:1 },
... Restaurant: {"$push": "$Restaurant" } } },
... {
... "$sort": { "_id.State": 1, "_id.City":1 } },
... ]). pretty();
{
        "_id" : {
                "State" : "AK",
                "City" : "GAMBELL"
        },
        "Number of Restaurants" : 4,
        "Restaurant" : [
                "Starbucks Coffee",
                "Todd English Bonfire",
                "The Taco Truck",
                "Lke Catering"
        ]
}
{
        "_id" : {
                "State" : "AK",
                "City" : "POINT HOPE"
        },
        "Number of Restaurants" : 1,
        "Restaurant" : [
                "Master Wok"
        ]
}
{
        "_id" : {
                "State" : "AL",
                "City" : "MOBILE"
        },
        "Number of Restaurants" : 3,
        "Restaurant" : [
                "Island Soft Pretzel Stop",
                "Dairy Queen Grill & Chill",
                "Statue Of Liberty Deli"
        ]
}
{
        "_id" : {
                "State" : "CA",
                "City" : "ARMONA"
        },
        "Number of Restaurants" : 1,
        "Restaurant" : [
                "Cascarino'S"
        ]
}
```



```
{
        "_id" : {
                "State" : "FL",
                "City" : "CALLAHAN"
        },
        "Number of Restaurants" : 1,
        "Restaurant" : [
                "International Bar"
        ]
}
{
        "_id" : {
                "State" : "FL",
                "City" : "CITRA"
        },
        "Number of Restaurants" : 1,
        "Restaurant" : [
                "Accra Restaurant"
        ]
}
{
        "_id" : {
                "State" : "FL",
                "City" : "GAINESVILLE"
        },
        "Number of Restaurants" : 5,
        "Restaurant" : [
                "Ku Shiang Restaurant",
                "Asian Jewels Seafood Restaurant",
                "Mulan Restaurant",
                "Cake House Win",
                "Han Kou"
        ]
}
{
        "_id" : {
                "State" : "FL",
                "City" : "ISLAMORADA"
        },
        "Number of Restaurants" : 1,
        "Restaurant" : [
                "Dining Room"
        ]
}
Type "it" for more
>
```

Task 5: . Compare the TWO designs you implemented, referring to their effectiveness for storing and retrieving the information about restaurants and associated cities.

In the first method, I created a variable and used find to select all the restaurants. For each restaurants, I created a function and to find the their associated cities I used $geoNear and updated the collection by storing the associated cities of each restaurants. In this method, storing of the data is taking less time because same collection is used to store the new data but retrieving of the data will be slow and difficult.

In the second method, I used aggregate and create a new collection to store the data. Storing in this will take longer time because it will create all the fields and store the data but retrieving of the data will be easier and will take less time than first method because there will be less number fields compare to previous one.
