

MongoDB Geospatial Queries

mongodb.com

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Overview

- ▶ MongoDB supports geospatial queries on:
 - ▶ GeoJSON objects (spherical geometry)
 - ▶ Legacy coordinate pairs (planar geometry)
- ▶ Geospatial indexes enhance query performance
- ▶ Applications include location-based services, mapping, and spatial analysis

GeoJSON Format

- ▶ Represents geospatial data on an earth-like sphere
- ▶ Structure:

```
{  
  "type": "Point",  
  "coordinates": [-73.856077, 40.848447]  
}
```

- ▶ Coordinates are in [longitude, latitude] order

Legacy Coordinate Pairs

- ▶ Represents geospatial data on a Euclidean plane
- ▶ Preferred format:

```
"location": [-73.856077, 40.848447]
```

- ▶ Also supports embedded documents:

```
"location": { "x": -73.856077, "y": 40.848447 }
```

- ▶ Use 2d indexes for planar geometry

Geospatial Indexes

▶ 2dsphere Index:

- ▶ Supports spherical geometry
- ▶ Required for GeoJSON objects
- ▶ Created with:

```
db.collection.createIndex({ location: "2dsphere" })
```

▶ 2d Index:

- ▶ Supports planar geometry
- ▶ Suitable for legacy coordinate pairs
- ▶ Created with:

```
db.collection.createIndex({ location: "2d" })
```

Geospatial Query Operators

- ▶ **\$near:**
 - ▶ Finds documents close to a point
 - ▶ Requires a geospatial index
- ▶ **\$geoWithin:**
 - ▶ Finds documents within a specified geometry
- ▶ **\$geoIntersects:**
 - ▶ Finds documents that intersect with a geometry
- ▶ **\$nearSphere:**
 - ▶ Similar to **\$near** but calculates distances on a sphere

Example: \$near Query

```
1  db.places.find({
2    location: {
3      $near: {
4        $geometry: {
5          type: "Point",
6          coordinates: [-73.856077, 40.848447]
7        },
8        $maxDistance: 1000
9      }
10   }
11 })
```

- Finds places within 1 km of the specified point

Example: \$geoWithin Query

```
1  db.places.find({
2      location: {
3          $geoWithin: {
4              $geometry: {
5                  type: "Polygon",
6                  coordinates: [[
7                      [-73.958, 40.800],
8                      [-73.949, 40.796],
9                      [-73.973, 40.764],
10                     [-73.981, 40.768],
11                     [-73.958, 40.800]
12                 ]]
13             }
14         }
15     })
```

- Finds places within the specified polygon

Summary

- ▶ MongoDB provides robust support for geospatial data
- ▶ Choose appropriate data formats and indexes based on your application's needs
- ▶ Utilize geospatial query operators to perform spatial searches

Resources

- ▶ Official Documentation: [MongoDB Geospatial Queries](#)
- ▶ GeoJSON Specification: geojson.org