

Lab 3: MongoDB

Switch to dsci551 database

```
> use dsci551
```

Question 1

Find out how many entries (documents) there are for USA in August of 2022.

```
db.aqi.aggregate([
  {
    $match:
      {
        Country: "United States of America",
        Date: /2022-08/,
      },
  },
  {
    $count:
      "count",
  },
])
```

OUTPUT:

```
{
  count: 32
}
```

Question 2

Find out which date for USA in 08/2022 has more than one entry in the aqi collection.

```
db.aqi.aggregate([
  {
    $match: {
      Country: "United States of America",
      Date: /2022-08/,
    },
  },
  {
    $sortByCount: "$Date",
  },
  {
    $match: {
      count: {
        $gt: 1,
      },
    },
  },
])
```

OUTPUT:

```
{
  _id: '2022-08-23',
  count: 2
}
```

Question 3

Remove the entry you found in the previous question with a lower aqi value from the collection.

```
db.aqi.findAndModify(  
  {  
    query: {  
      Country: "United States of America",  
      Date: "2022-08-23"  
    },  
    sort: { aqi: 1 },  
    remove: true  
  }  
)
```

OUTPUT:

```
{  
  _id: ObjectId("640ed94f073c3cb4f31467b8"),  
  Date: '2022-08-23',  
  Country: 'United States of America',  
  Status: 'Moderate',  
  'AQI Value': 85  
}
```

Question 4

Compute the average AQI for USA in 08/2022.

```
db.aqi.aggregate([  
  {  
    $match: {  
      Country: "United States of America",  
      Date: /2022-08/,  
    },  
  },  
  {  
    $group: {  
      _id: null,  
      avg_aqi: {  
        $avg: "$AQI Value",  
      },  
    },  
  },  
  {  
    $project: {  
      _id: 0,  
    },  
  },  
])
```

OUTPUT:

```
{  
  "avg_aqi": 86.45161290322581  
}
```

Question 5

Find out how many different countries there are in the aqi collection

```
db.aqi.distinct("Country").length
```

OUTPUT:

142

Question 6

Find out how many entries there are in 2023 for each country.

```
db.aqi.aggregate([
  {
    $match: {
      Date: /2023/,
    },
  },
  {
    $group: {
      _id: "$Country",
      count: {
        $sum: 1,
      },
    },
  },
  {
    $group: {
      _id: null,
      counts: {
        $push: {
          k: "$_id",
          v: "$count",
        },
      },
    },
  },
  {
    $replaceRoot: {
      newRoot: {
        $arrayToObject: "$counts",
      },
    },
  },
])
```

OUTPUT:

```
{
  "Netherlands": 1,
  "Turkey": 1,
  "Pakistan": 1,
  "Greece": 1,
  "Ethiopia": 1,
  "Trinidad and Tobago": 1,
  "United Arab Emirates": 1,
  "Grenada": 1,
  "Slovenia": 1,
  "Venezuela": 1,
  "Burkina Faso": 1,
  "Hong Kong": 1,
  "Puerto Rico": 1,
  "Kyrgyzstan": 1,
  "France": 1,
  "Georgia": 1,
  "Uganda": 1,
  "Angola": 1,
  "Macao": 1,
  "Montenegro": 1,
```

"Bermuda": 1,
"Jersey": 1,
"Malta": 1,
"New Caledonia": 1,
"Albania": 1,
"Singapore": 1,
"Sri Lanka": 1,
"Italy": 1,
"Andorra": 1,
"Armenia": 1,
"Sweden": 1,
"Qatar": 1,
"Honduras": 1,
"India": 1,
"Lithuania": 1,
"New Zealand": 1,
"Israel": 1,
"Czech Republic": 1,
"Sudan": 1,
"Iraq": 1,
"Cape Verde": 1,
"Kazakhstan": 1,
"Thailand": 1,
"Tajikistan": 1,
"Vietnam": 1,
"El Salvador": 1,
"Canada": 1,
"Denmark": 1,
"Brazil": 1,
"Indonesia": 1,
"Costa Rica": 1,
"Kosovo": 1,
"Australia": 1,
"Philippines": 1,
"Lebanon": 1,
"Cyprus": 1,
"Norway": 1,
"Chad": 1,
"Kenya": 1,
"Iceland": 1,
"Estonia": 1,
"Belarus": 1,
"Brunei": 1,
"South Africa": 1,
"Ukraine": 1,
"Liechtenstein": 1,
"Guam": 1,
"Germany": 1,
"Austria": 1,
"Turkmenistan": 1,
"Gabon": 1,
"Japan": 1,
"Bosnia and Herzegovina": 1,
"United States of America": 1,
"Russia": 1,
"Saudi Arabia": 1,
"Luxembourg": 1,
"Ghana": 1,
"Reunion": 1,
"Zambia": 1,
"Mexico": 1,
"Azerbaijan": 1,
"Martinique": 1,

```

"Belgium": 1,
"Iran": 1,
"Moldova": 1,
"French Guiana": 1,
"Mongolia": 1,
"Senegal": 1,
"Malaysia": 1,
"Uzbekistan": 1,
"Vatican": 1,
"Kuwait": 1,
"Nepal": 1,
"Belize": 1,
"Portugal": 1,
"Guatemala": 1,
"Algeria": 1,
"Serbia": 1,
"Bangladesh": 1,
"Taiwan": 1,
"Laos": 1,
"Chile": 1,
"China": 1,
"Liberia": 1,
"Finland": 1,
"Cambodia": 1,
"Ivory Coast": 1,
"Palestinian Territory": 1,
"Bulgaria": 1,
"Dominican Republic": 1,
"Spain": 1,
"United Kingdom of Great Britain and Northern Ireland": 1,
"Macedonia": 1,
"Romania": 1,
"Central African Republic": 1,
"Monaco": 1,
"San Marino": 1,
"Ireland": 1,
"Slovakia": 1,
"Egypt": 1,
"Poland": 1,
"Switzerland": 1,
"Colombia": 1,
"Jordan": 1,
"Myanmar": 1,
"Croatia": 1,
"Guadeloupe": 1,
"Nigeria": 1,
"South Korea": 1,
"Peru": 1,
"Latvia": 1,
"Madagascar": 1,
"Argentina": 1,
"Ecuador": 1
}

```

Question 7

Find out the average AQI value for each country in 2023.

```

db.aqi.aggregate([
  {
    $match: {
      Date: /2023/,
    },
  },
])

```

```

    },
    {
      $group: {
        _id: "$Country",
        avg_aqi: {
          $avg: "$AQI Value",
        },
      },
    },
    {
      $sort: {
        avg_aqi: -1,
      },
    },
    {
      $group: {
        _id: null,
        counts: {
          $push: {
            k: "$_id",
            v: "$avg_aqi",
          },
        },
      },
    },
    {
      $replaceRoot: {
        newRoot: {
          $arrayToObject: "$counts",
        },
      },
    },
  ],
]})

```

OUTPUT:

```

{
  "China": 339,
  "India": 332,
  "Burkina Faso": 326,
  "Iraq": 307,
  "Central African Republic": 261,
  "Qatar": 183,
  "Turkey": 180,
  "Serbia": 165,
  "Mexico": 162,
  "South Korea": 161,
  "Chad": 159,
  "Bosnia and Herzegovina": 159,
  "Uzbekistan": 152,
  "Tajikistan": 151,
  "Ethiopia": 150,
  "Thailand": 149,
  "Uganda": 143,
  "Bangladesh": 141,
  "Kyrgyzstan": 138,
  "Myanmar": 138,
  "Iran": 131,
  "United States of America": 130,
  "Romania": 129,
  "Japan": 128,
  "Taiwan": 119,
  "Nepal": 114,
  "Sudan": 107,
  "Ivory Coast": 107,
}

```

"Kazakhstan": 105,
"Vietnam": 105,
"Nigeria": 105,
"Russia": 103,
"Gabon": 102,
"Saudi Arabia": 102,
"Kenya": 97,
"Spain": 96,
"Armenia": 95,
"Indonesia": 93,
"Sri Lanka": 92,
"Pakistan": 91,
"Peru": 91,
"Mongolia": 88,
"Liberia": 88,
"Egypt": 86,
"Poland": 86,
"Canada": 85,
"Philippines": 83,
"South Africa": 83,
"Ghana": 83,
"Slovakia": 83,
"Ukraine": 82,
"Montenegro": 80,
"Colombia": 80,
"Laos": 78,
"Lebanon": 76,
"Israel": 75,
"Slovenia": 72,
"Italy": 72,
"Turkmenistan": 68,
"France": 67,
"Czech Republic": 66,
"Algeria": 65,
"Macedonia": 65,
"Macao": 63,
"Jersey": 62,
"Cape Verde": 62,
"Madagascar": 62,
"Australia": 59,
"Zambia": 59,
"Kosovo": 58,
"United Arab Emirates": 57,
"Brazil": 57,
"Belarus": 55,
"Kuwait": 54,
"Hong Kong": 52,
"El Salvador": 52,
"Chile": 51,
"Greece": 48,
"Georgia": 47,
"Guatemala": 47,
"Malaysia": 46,
"Vatican": 46,
"United Kingdom of Great Britain and Northern Ireland": 46,
"Angola": 45,
"Belize": 45,
"Trinidad and Tobago": 44,
"Cyprus": 43,
"Ireland": 38,
"Martinique": 36,
"Malta": 34,
"Moldova": 33,

```

"Senegal": 33,
"Honduras": 32,
"Azerbaijan": 32,
"Denmark": 30,
"Germany": 30,
"Netherlands": 29,
"Singapore": 29,
"French Guiana": 29,
"Monaco": 29,
"Latvia": 29,
"Ecuador": 29,
"Croatia": 28,
"Lithuania": 27,
"Palestinian Territory": 26,
"Venezuela": 24,
"Sweden": 24,
"Austria": 24,
"Luxembourg": 24,
"San Marino": 24,
"Switzerland": 24,
"Norway": 23,
"Grenada": 22,
"Estonia": 22,
"Puerto Rico": 21,
"Bulgaria": 21,
"Dominican Republic": 21,
"Jordan": 21,
"New Caledonia": 20,
"New Zealand": 20,
"Portugal": 20,
"Argentina": 19,
"Reunion": 18,
"Finland": 16,
"Cambodia": 15,
"Liechtenstein": 14,
"Guadeloupe": 14,
"Costa Rica": 13,
"Belgium": 11,
"Brunei": 10,
"Albania": 9,
"Andorra": 9,
"Iceland": 7,
"Bermuda": 1,
"Guam": 1
}

```

Question 8

Find out which countries had the highest AQI in the year 2022. Report country names and dates.

```

db.aqi.aggregate([
  {
    $project: {
      _id: 0,
      Status: 0,
    },
  },
  {
    $match: {
      Date: /2022/,
    },
  },
  {
    $sort: {

```



```

        "AQI Value": -1,
    },
},
{
    $project: {
        "AQI Value": 0
    },
},
{
    $limit: 1,
},
])

```

OUTPUT:

```

{
  "Date": "2022-08-15",
  "Country": "United Arab Emirates"
}

```

Question 9

Find out which countries had the largest number of days with Moderate status in 2023.

```

db.aqi.aggregate([
  {
    $project: {
      _id: 0,
    },
  },
  {
    $match: {
      Date: /2023/,
      Status: "Moderate",
    },
  },
  {
    $group: {
      _id: "$Country",
      num_days: {
        $sum: 1,
      },
    },
  },
  {
    $sort: {
      num_days: -1,
    },
  },
  {
    $group: {
      _id: null,
      num_days: {
        $push: {
          k: "$_id",
          v: "$num_days",
        },
      },
    },
  },
  {
    $replaceRoot: {
      newRoot: {
        $arrayToObject: "$num_days",
      },
    },
  },
])

```

OUTPUT:

```
{
  "Lebanon": 1,
  "Slovakia": 1,
  "El Salvador": 1,
  "Jersey": 1,
  "Ghana": 1,
  "Pakistan": 1,
  "Australia": 1,
  "Kosovo": 1,
  "Liberia": 1,
  "Peru": 1,
  "South Africa": 1,
  "Zambia": 1,
  "Chile": 1,
  "Egypt": 1,
  "Algeria": 1,
  "Sri Lanka": 1,
  "Cape Verde": 1,
  "Kuwait": 1,
  "Armenia": 1,
  "Hong Kong": 1,
  "Israel": 1,
  "Macedonia": 1,
  "Italy": 1,
  "Poland": 1,
  "Canada": 1,
  "Madagascar": 1,
  "Belarus": 1,
  "Slovenia": 1,
  "Ukraine": 1,
  "Mongolia": 1,
  "Turkmenistan": 1,
  "Philippines": 1,
  "France": 1,
  "Kenya": 1,
  "Montenegro": 1,
  "Indonesia": 1,
  "Czech Republic": 1,
  "Spain": 1,
  "United Arab Emirates": 1,
  "Brazil": 1,
  "Laos": 1,
  "Colombia": 1,
  "Macao": 1
}
```

Question 10

Find out the number of countries whose AQI values were between 90 and 100 (inclusive) in December of 2022.

```
db.aqi.aggregate([
  {
    $project: {
      id: 0,
      Status: 0,
    },
  },
  {
    $match: {
      Date: /2022-12/,
    }
  }
])
```

```
        "AQI Value": {
          $gte: 90,
          $lte: 100,
        },
      },
    },
    {
      $group: {
        _id: "$Country",
        num_days: {
          $sum: 1,
        },
      },
    },
  ],
  {
    $count: "num_countries",
  },
])
```

OUTPUT:

N/A