

# **Clinical Trial Database Management System**

## **NoSQL Implementation**

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## NoSQL Implementation:

## Database access via python:

All the tables (clinical\_trial, monitors, uses, participates\_in, outcome, patient, person, researcher, product, supplier, supplies, uses) created in MySQL have been imported into MongoDB Atlas and the queries are executed using MongoDB Compass. The following NoSQL queries were done:

### Query 1: Retrieving Patients with Age Greater Than 50

```
db.patient.find({ "Age": { "$gt": 50 } })
```

```
db.patient.find({'Age': { '$gt': 50 } })
<
  _id: ObjectId('674b386e96e902c099e28c3c'),
  Patient_ID: 3,
  Medical_History: 'Allergy',
  Name: 'Jerry Chen',
  Age: 80,
  Gender: 'Male'
}
{
  _id: ObjectId('674b386e96e902c099e28c40'),
  Patient_ID: 7,
  Medical_History: 'Sleep Apnea',
  Name: 'Dawn Gregory',
  Age: 68,
  Gender: 'Female'
}
```

### Query 2: Retrieving Patients with Either Hypertension or Diabetes in Medical History

```
db.patient.find({
  "$or": [
    { "Medical_History": "Hypertension" },
    { "Medical_History": "Diabetes" }
  ]
})
```

```
{
  _id: ObjectId('674b386e96e902c099e28c52'),
  Patient_ID: 25,
  Medical_History: 'Diabetes',
  Name: 'Tiffany Garner',
  Age: 29,
  Gender: 'Female'
}

{
  _id: ObjectId('674b386e96e902c099e28c54'),
  Patient_ID: 27,
  Medical_History: 'Diabetes',
  Name: 'Marie Gregory MD',
  Age: 20,
  Gender: 'Male'
}
```

### Query 3: Retrieving Total Quantity of Products Grouped by Product Type

```
db.product.aggregate([
  {
    "$group": {
      "_id": "$Type",
      "Total_Quantity": { "$sum": "$Quantity" }
    }
  }
])
```

```
{
  _id: 'Capsule',
  Total_Quantity: 27785
}
{
  _id: 'Tablet',
  Total_Quantity: 15326
}
{
  _id: 'Liquid',
  Total_Quantity: 20022
}
{
  _id: 'Injection',
  Total_Quantity: 16954
}
```

#### Query 4: Retrieving Patients Participating in Phase 3 Clinical Trials with Trial Names

```
db.participates_in.aggregate([
  {
    "$lookup": {
      "from": "clinical_trial",
      "localField": "Trial_ID",
      "foreignField": "Trial_ID",
      "as": "trial_details"
    }
  },
  { "$unwind": "$trial_details" },
  {
    "$lookup": {
      "from": "patient",
      "localField": "Patient_ID",
      "foreignField": "Patient_ID",
      "as": "patient_details"
    }
  },
  { "$unwind": "$patient_details" },
  {
    "$match": { "trial_details.Phase": 3 }
  },
  {
    "$project": {
      "Patient_Name": "$patient_details.Name",
      "Age": "$patient_details.Age",
      "Trial_Name": "$trial_details.Trial_Name",
      "_id": 0
    }
  }
])
```

```
{
  Patient_Name: 'James Trujillo',
  Age: 19,
  Trial_Name: 'Trial Z'
}
{
  Patient_Name: 'Jerry Chen',
  Age: 80,
  Trial_Name: 'Trial R'
}
{
  Patient_Name: 'Melissa Tucker',
  Age: 47,
  Trial_Name: 'Trial G'
}
{
  Patient_Name: 'Heather Jones',
```

## Query 5: Retrieving only Injection-Type Products with Quantity Greater Than 100

```
db.product.aggregate([
  {
    "$match": {
      "$and": [
        { "Type": "Injection" },
        { "Quantity": { "$gt": 100 } }
      ]
    }
  },
  {
    "$project": {
      "Product_Name": 1,
      "Type": 1,
      "Quantity": 1
    }
  }
])
```

```
{
  _id: ObjectId('674b387296e902c099e28ef7'),
  Quantity: 357,
  Type: 'Injection'
}
{
  _id: ObjectId('674b387296e902c099e28efb'),
  Quantity: 488,
  Type: 'Injection'
}
{
  _id: ObjectId('674b387296e902c099e28efc'),
  Quantity: 147,
  Type: 'Injection'
}
```

## Query 6: Retrieving Product Details with Treatment Information Including Dosage and Type

```
db.uses.aggregate([
  {
    "$lookup": {
      "from": "product",
      "localField": "Product_ID",
      "foreignField": "Product_ID",
      "as": "product_details"
    }
  },
  { "$unwind": "$product_details" },
  {
    "$lookup": {
      "from": "treatment",
      "localField": "Treatment_ID",
      "foreignField": "Treatment_ID",
      "as": "treatment_details"
    }
  },
  { "$unwind": "$treatment_details" },
  {
    "$project": {
      "Product_Name": "$product_details.Name",
      "Type": "$product_details.Type",
      "Treatment_ID": "$treatment_details.Treatment_ID",
      "Dosage": "$treatment_details.Dosage" } } ] )
```

```
{
  _id: ObjectId('674b387996e902c099e29340'),
  Product_Name: 'Clindamycin',
  Type: 'Capsule',
  Treatment_ID: '1000552919',
  Dosage: '13mg'
}
{
  _id: ObjectId('674b387996e902c099e29341'),
  Product_Name: 'Omeprazole',
  Type: 'Capsule',
  Treatment_ID: '101G8228',
  Dosage: '25mg'
}
```