Optimizing Prescription Drug Delivery: Utilizing NOSQL Databases

W205 – Fall 2023 Data Engineering
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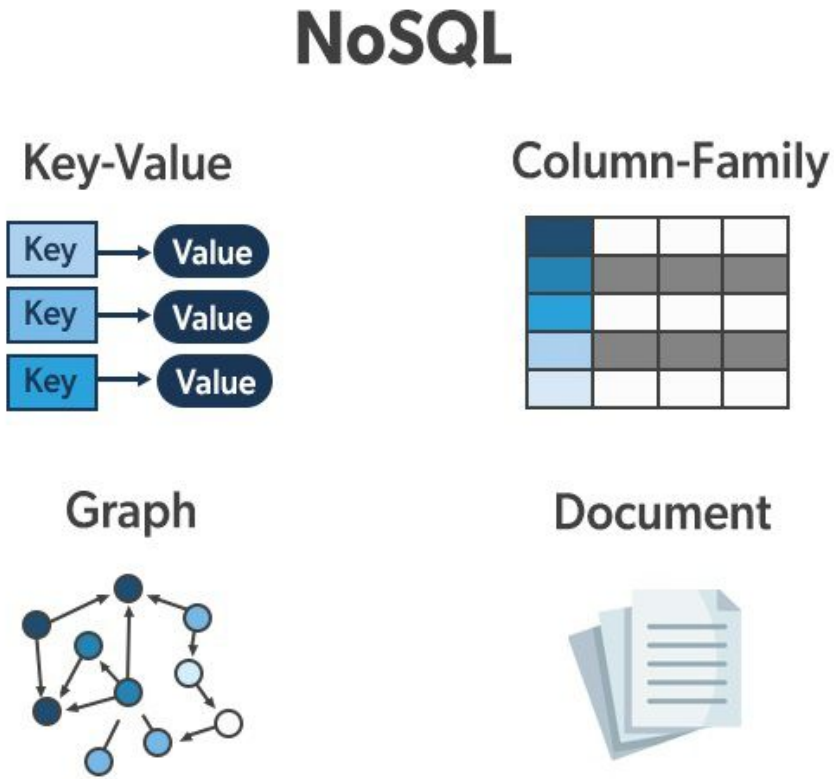
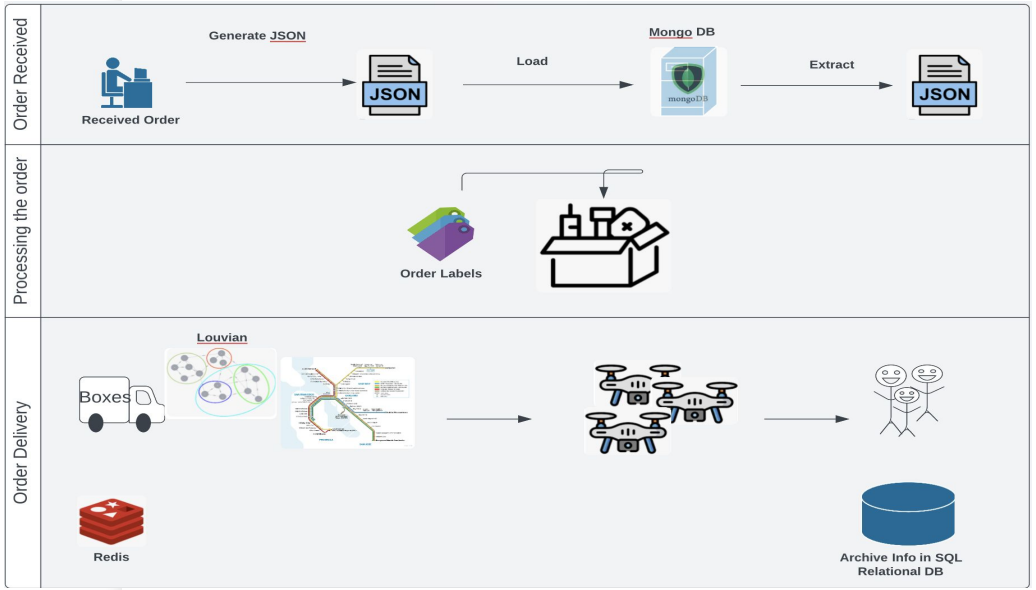
Agenda

- Why Go Beyond SQL?
- Process Overview
- NoSQL DB Business Case Scenario
  - Neo4j
  - MongoDB
  - Redis
- Q&A

Why Go Beyond SQL?



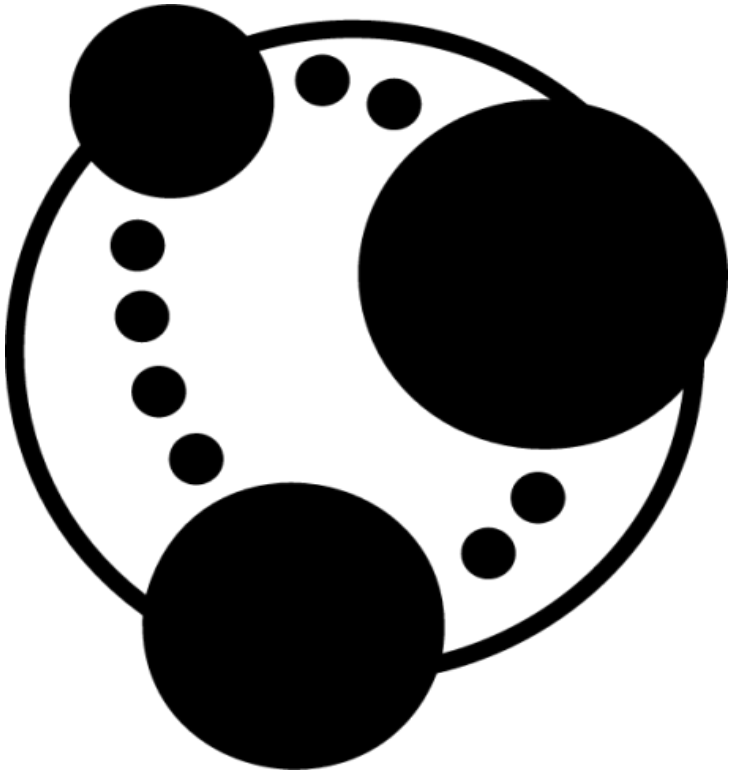
Process Overview



Neo4j

•Overview:

- Graph Database
- Data are represented by networks of nodes & relationships
- Scalability & Longevity

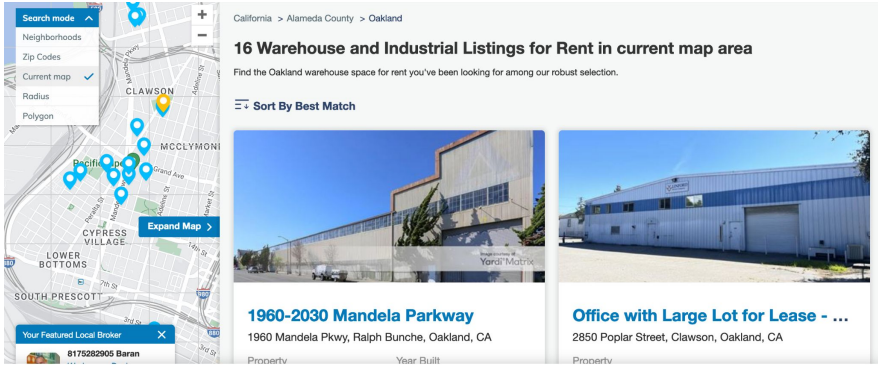


Optimal Distribution Location:

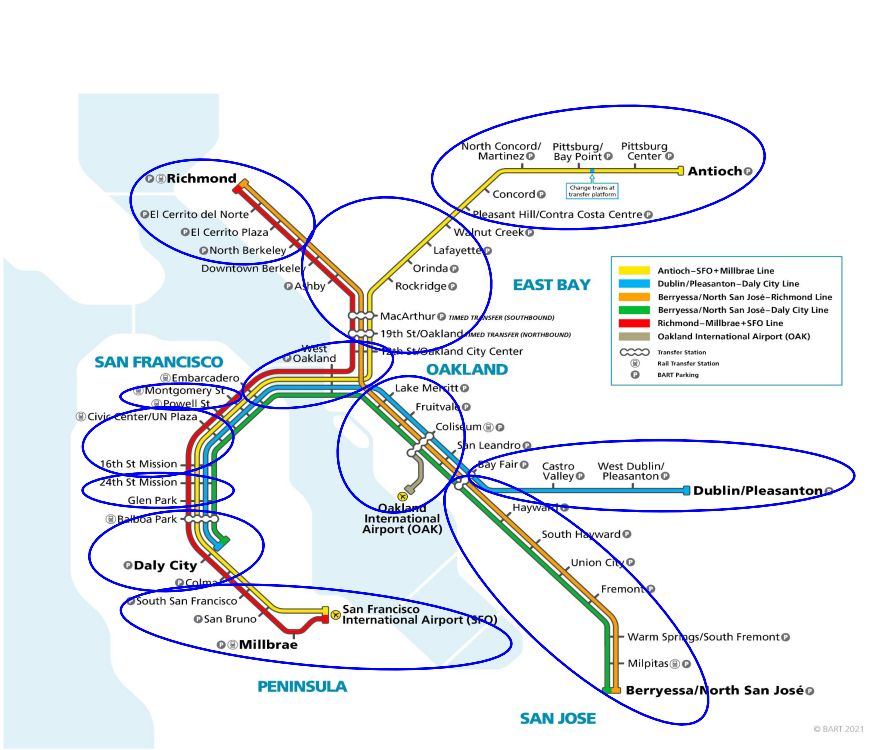
name	closeness
West Oakland	0.131206
Embarcadero	0.126800
Montgomery Street	0.123487
Powell Street	0.120650
Lake Merritt	0.120233
12th Street	0.120186
Civic Center	0.117977
Coliseum	0.117078
16th Street Mission	0.115257
Fruitvale	0.115005

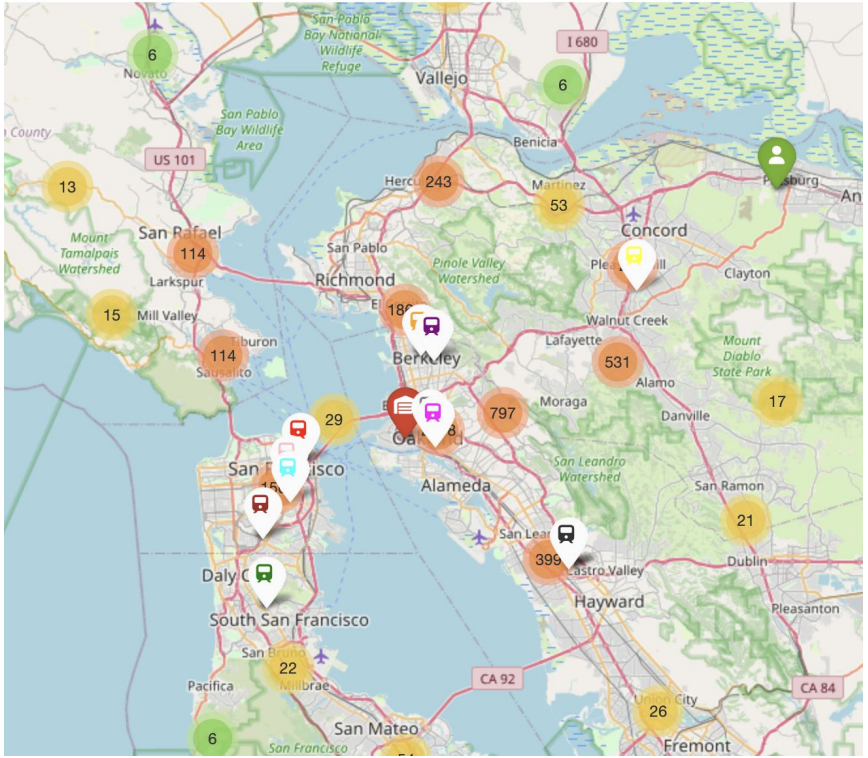
name	page_rank
Coliseum	0.676688
Pittsburg Center	0.657564
MacArthur	0.652098
Bay Fair	0.651456
Pittsburg	0.645698
West Oakland	0.644398
North Concord	0.641970
Concord	0.640679
Pleasant Hill	0.639852
Walnut Creek	0.638228

Optimal Distribution Location:



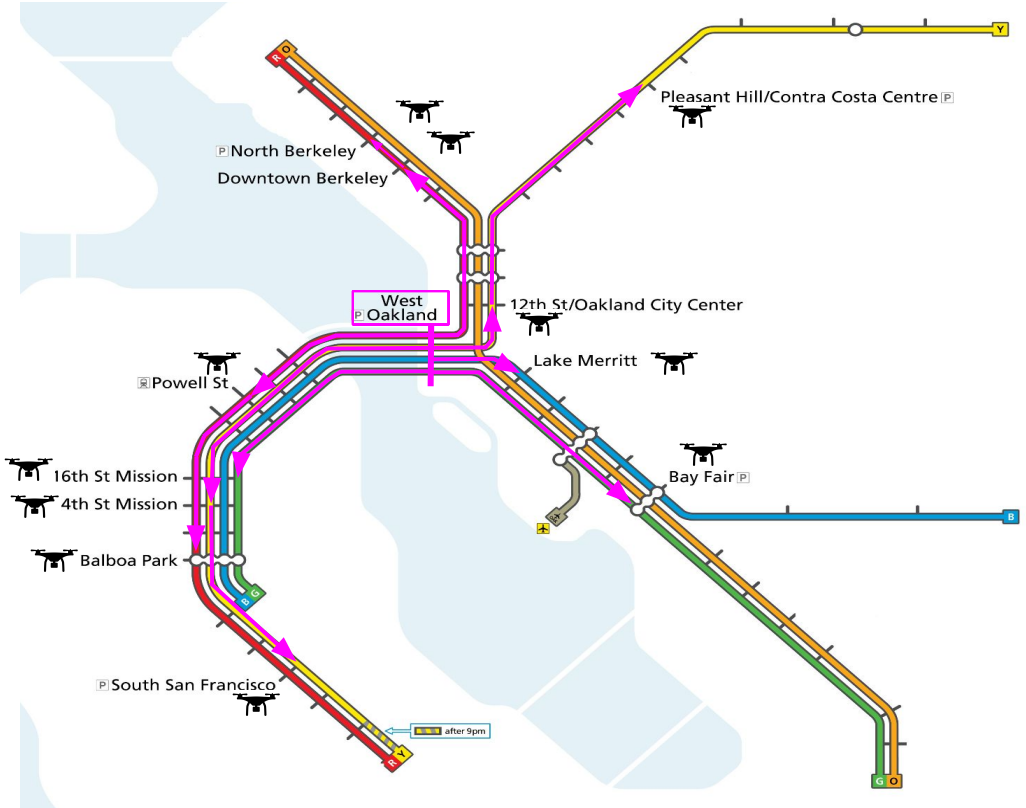
Optimal Drone Pickup Locations:





Optimal Delivery Routes:

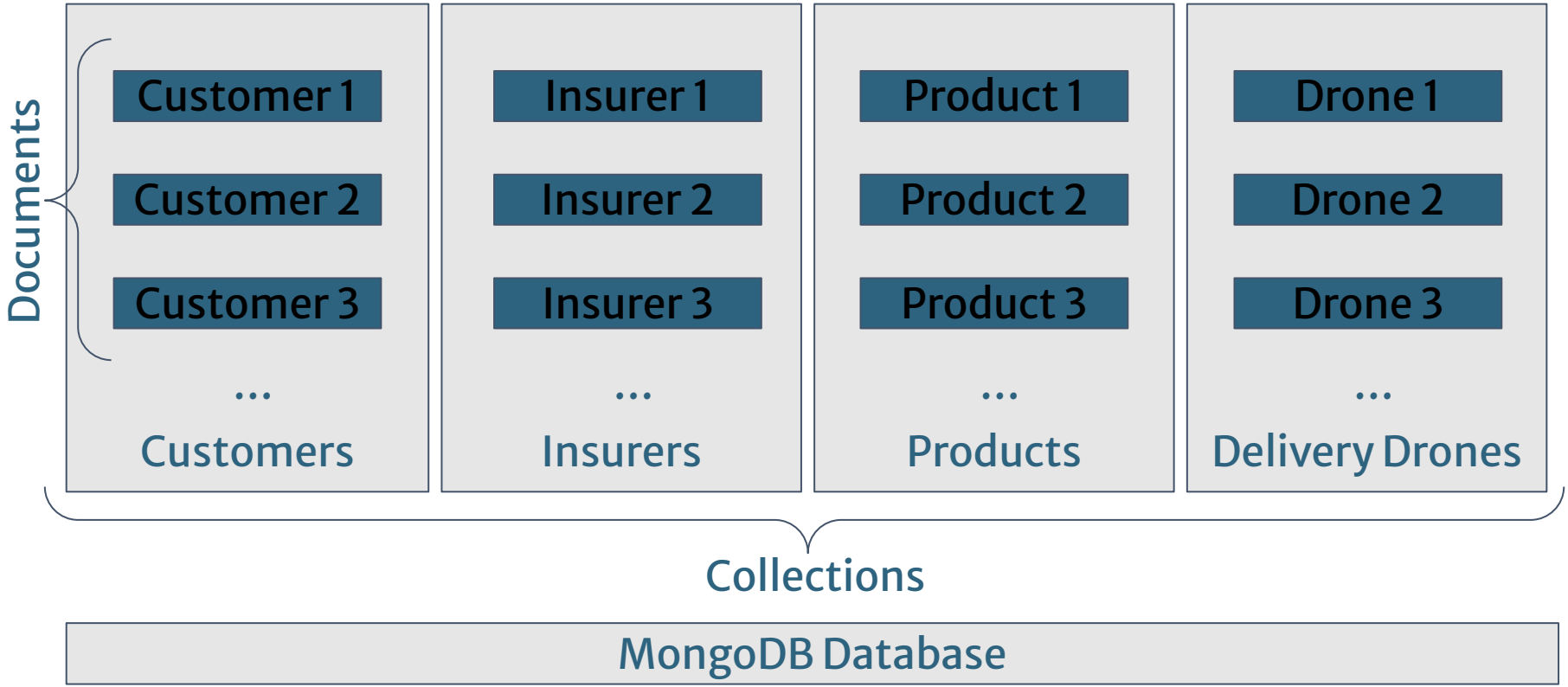
Station	Shortest Path From W. Oakland	
12th St	Yellow	5 mins
Lake Merritt	Blue	6 mins
Powell St	Red	10 mins
16th St	Green	14 mins
24th St	Yellow	16 mins
Berkeley	Red	17 mins
N. Berkeley	Red	19 mins
Balboa Park	Red	21 mins
Bay Fair	Green	23 mins
Pleasant Hill	Yellow	31 mins
South SF	Yellow	32 mins

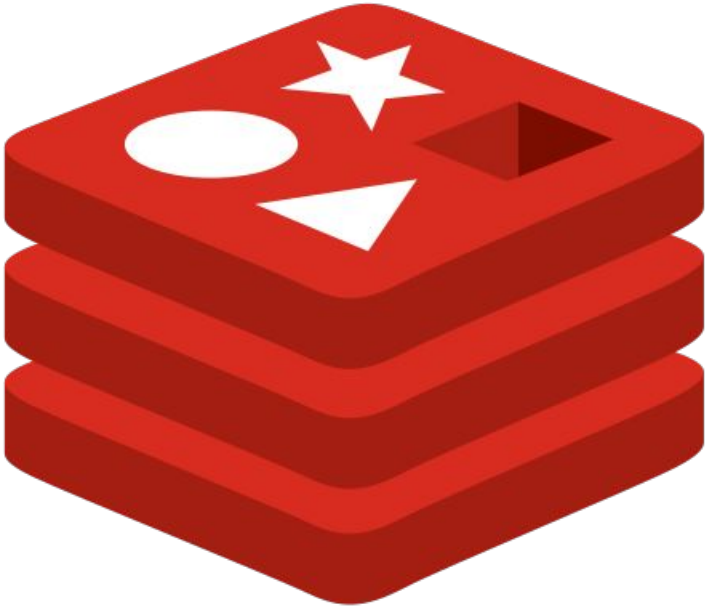


MongoDB

- WHY?
- -> JSON-like documents
- -> Scalability
- -> Many “point-of-view”
- -> It’s open-source


```
{
  "_id": ObjectId("5f8858458a3a3b9b3c9e6b84"),
  "transaction_date": ISODate("2023-03-01T15:45:00Z")
  "customer": {
    "name": "John Smith",
    "email": "john.smith@example.com",
    "phone": "+1234567890"
  },
  "items": [
    {
      "product": "Tylenol",
      "quantity": 3,
      "unit_price": 1.5
    },
    {
      "product": "Advil",
      "quantity": 2,
      "unit_price": 2.0
    },
    {
      "product": "Aspirin",
      "quantity": 5,
      "unit_price": 0.75
    }
  ],
  "total_amount": 15.25,
  "payment_method": "Credit Card",
  "is_completed": true
}
```


Documents
Customer 1
Customer 2
Customer 3
...
Customers
Insurer 1
Insurer 2
Insurer 3
...
Insurers
Product 1
Product 2
Product 3
...
Products
Drone 1
Drone 2
Drone 3
...
Delivery Drones
Collections
MongoDB Database



Redis

•Overview:

- Key-Value Database
- In-memory storage
- Fast querying and temporary storage

•Business Case Scenario(s):

- Real time tracking of drone current location, availability, real time movement, and battery status
- Real time tracking of Bart delays and scheduling
- Tracking status of medication delivery

•Relational database does not have capability to track real time location of drones or other real time data - relational database has latency issue with data acquisition


neo4j
redis
mongoDB
7171
7162
7188
7181
7180
7164
7158

Questions?

References

- https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.geeksforgeeks.org%2Ftypes-of-nosql-databases%2F&psig=AOvVaw0uyGs1zQUi4IoymgKVIKxf&ust=1702326404092000&source=images&cd=vfe&ved=0CBIQjRxqFwoTCNDeypbahYMDFQAAAAAdAAAAABAE
- https://www.propertyshark.com/cre/industrial/us/ca/oakland/?IncludeCoworking=false&CoworkingWorkspaceTypes=0&Zoom=14&Viewport=-122.30500183392981,37.78985480740017,-122.27796516705969,37.83271021222998&GeopickerType=viewport
- https://neo4j.com/product/neo4j-graph-database/?utm_medium=PaidSearch&utm_source=google&utm_campaign=GDB&utm_content=AMS-X-Conversion-GDB-Text&utm_term=neo4j&gclid=CjwKCAiApuCrBhAuEiwA8VJ6JnIaYxI9MQuHGSB2IWDMo6IGCSTc5GdIN1URzIUbEY0-wePmlsRF2RoC9RYQAvD_BwE
- https://www.mongodb.com/