W205 Summer 2022
Project 3 | Team 1

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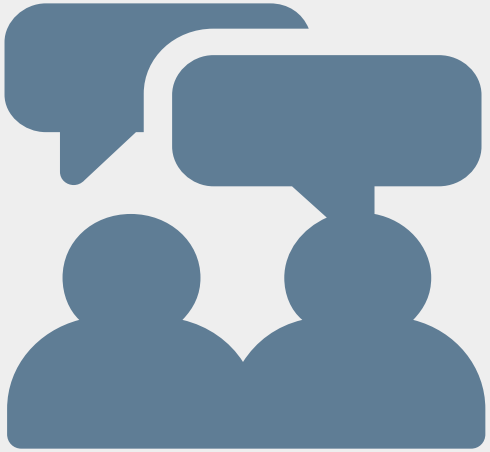
NoSQL Databases & the Future of AGM

Making use of NoSQL database technology to ensure the data science team’s strategic contribution to AGM’s future

What we heard

The executive vision

- Additional pickup locations
- BART for delivery
- Delivery drones
- Delivery robots



Technology Overview

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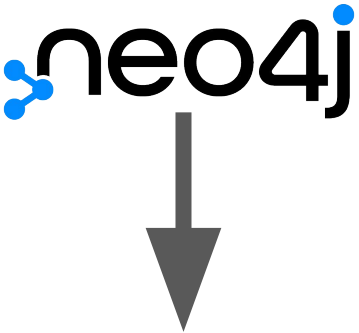
neo4j

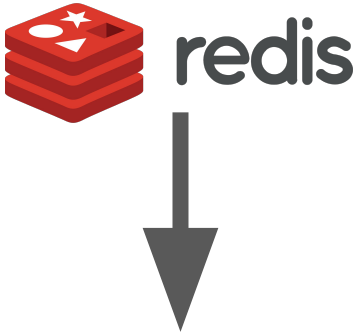

mongoDB


redis



Graph

Document

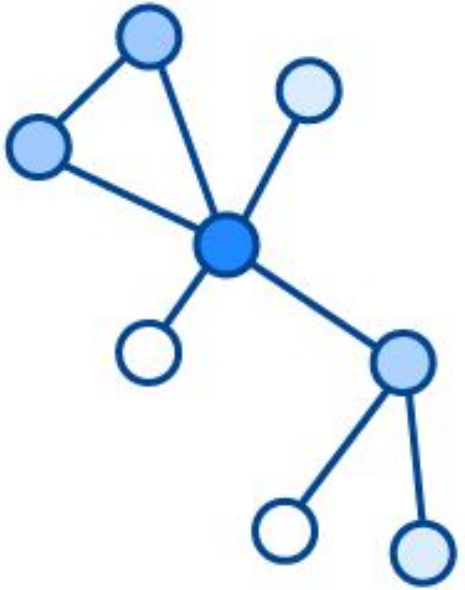


Key-Value

neo4j

Graph

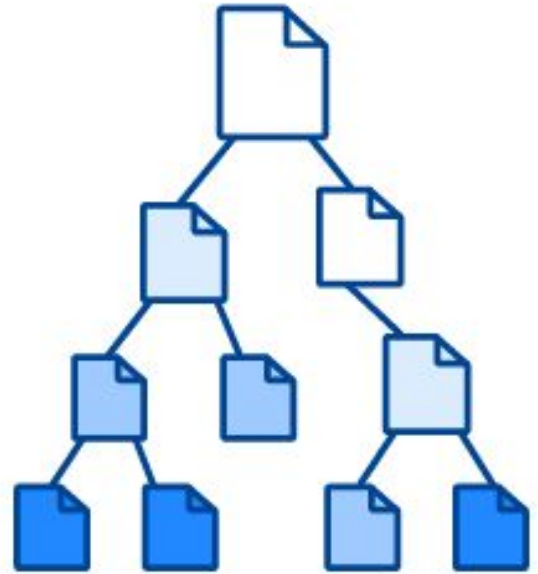
- Relationships between nodes
- Overwhelmingly suited to informing decisions directly related to the Future of AGM



mongoDB

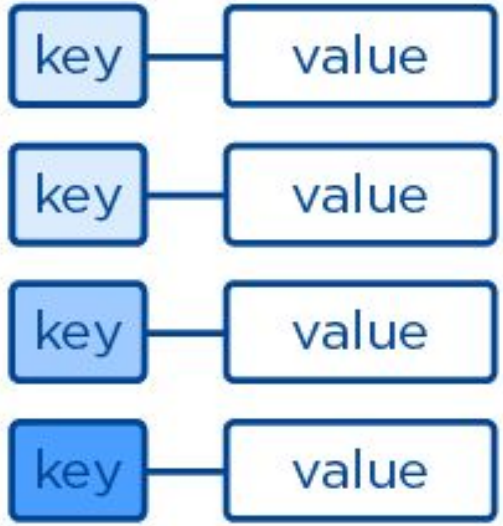
Document DB

- Large, stored data sets
- Denormalized data
- Flexible schema
- Great for analytics



Key/Value

- In-memory
- Unique key
- Very fast, real-time
- Similar to Python dictionary



Analyze BART station relationship to population density and other locations

Performance analytics

Real-time order tracking application

The Future of AGM

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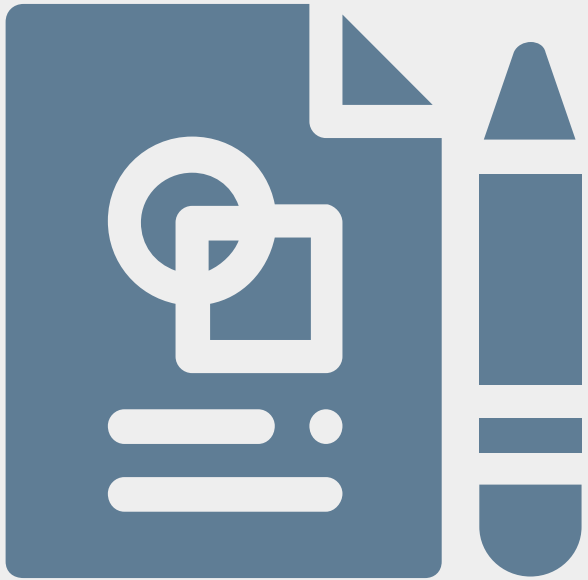
Adding Pick-up Locations at BART Stations

2-phase approach

1. Highly populated areas
2. High traffic stations

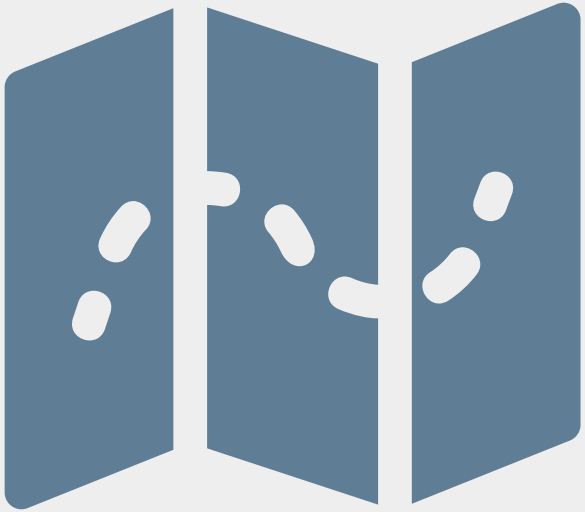


Phase 1.
Highly Populated Areas

- Geodesic distances
- Population data

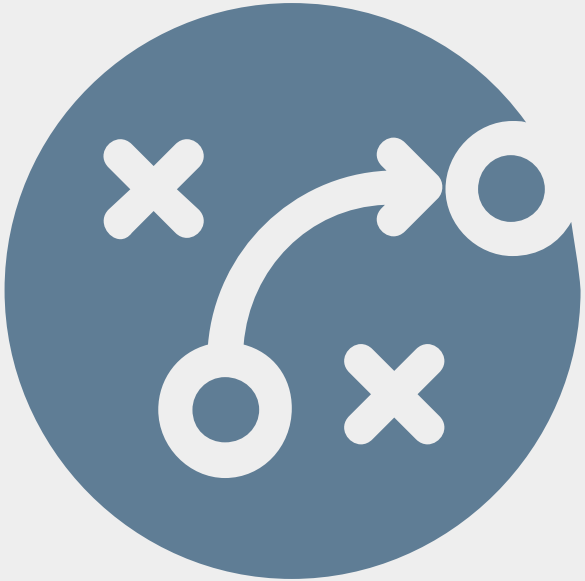
Phase 2.
High Traffic Stations

- Graph approach using centrality



Optimize Supply Routes From Kitchen to Pick-up Locations

- Graph approach using shortest path



Performance Analytics

MongoDB database

Location collections

Customer collections

Meal collections

Rider collections

Real Time Pick Up Tracker App

Redis database

Track order status

Communicate with pick up location

Proposed Implementation

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Open location at Balboa Park

Highest degree of centrality

Top 3 most populated within 1 mile radius of Balboa Park station

Assumptions

Meals pre-ordered the day before

Berkeley AGM makes food

Each location stocked once per day
⇒ 500 meal limit

Pick ups offered Mon. - Fri.

Operations

10% additional meals stocked

Use MongoDB for daily analytics

- Popular orders
- How many additional meals

Per-Location Costs (Monthly)

Permit:	$60
Worker:	$3,100
Transport (roundtrip):	$340

Total = **$3500**

Technology Costs (Monthly)

Neo4j:	$65
MongoDB:	$57
Redis:	$7
AWS:	$87
Total:	**$216**

Projected Daily Revenue from Balboa Park Location

Revenue: $6,000

⇒ 500 meals x $12 each

Costs: $6 per meal

$170 per location

Daily profit: **$2,830**

$2.8k

Projected daily profit
at Balboa Park location

$764k

Projected annual profit
at Balboa Park location

Conclusion

- Add pickup location at Balboa Park BART
- Use MongoDB to assess performance
  - Open potential brick-and-mortar
  - Expand more pickup locations
- Use Redis for order tracking

References

https://www.mongodb.com/developer/products/mongodb/map-terms-concepts-sql-mongodb/