



# AGM

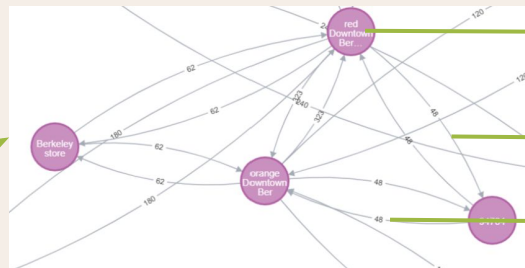
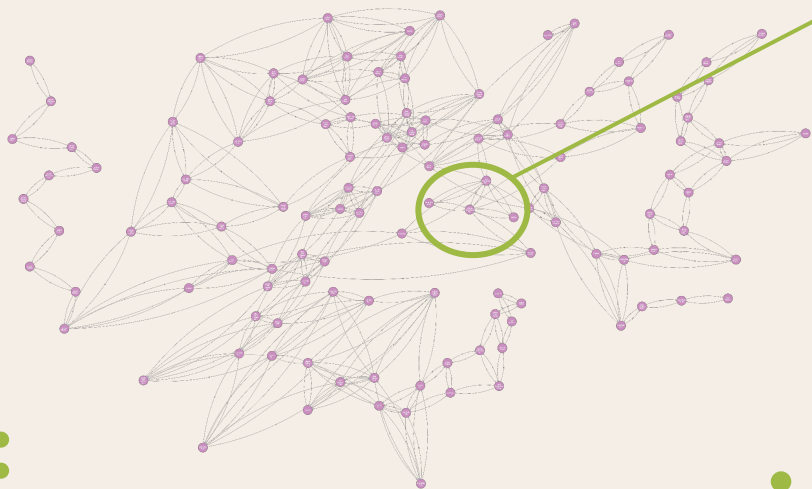
## Drone Delivery

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Project 3 | w205 | Fall 2023 | Section 05

# Neo4j

## Business Case: Implementing drone delivery while creating additional delivery stations

Graph of Bart stations, Berkeley store and Drone delivery stations



Nodes

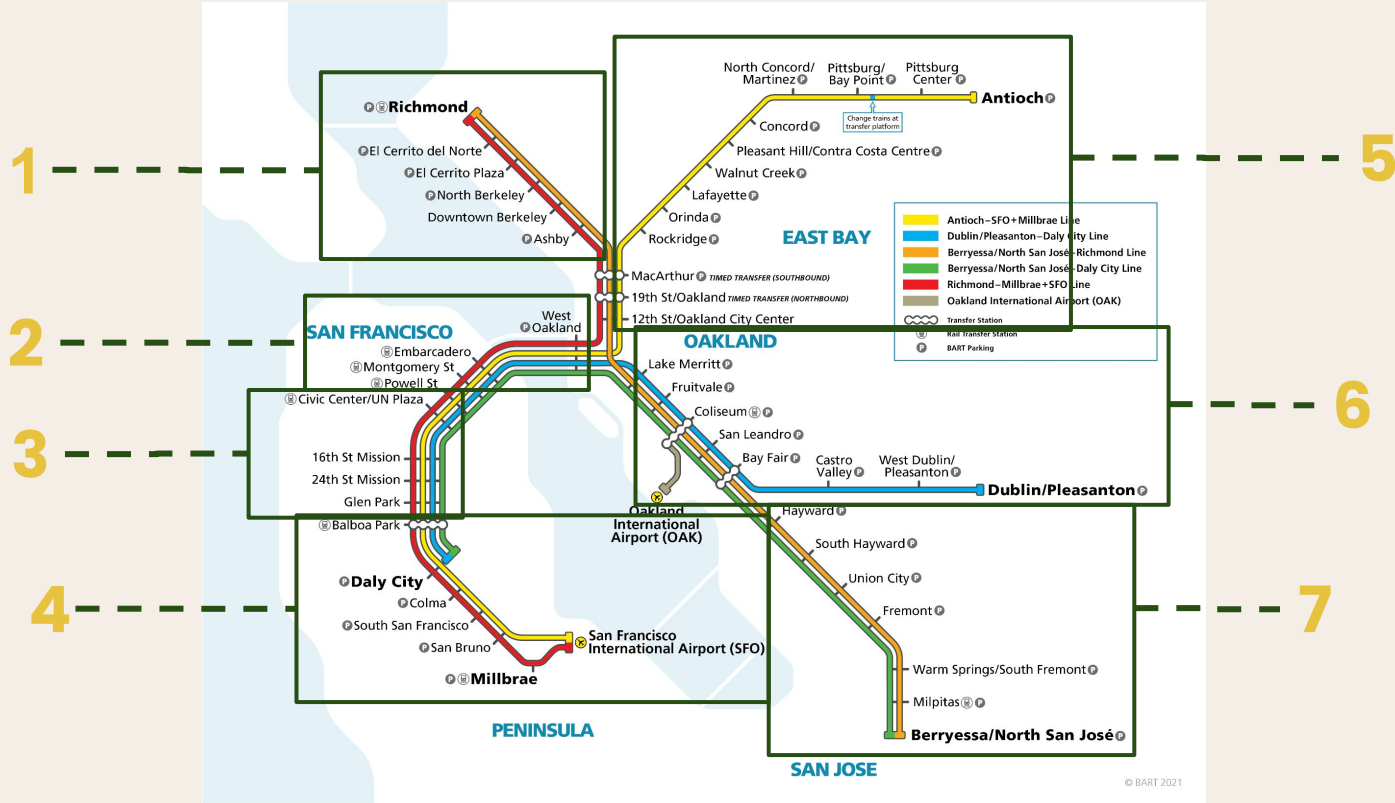
Relationships

Weights

### Neo4j vs Relational Database:

- Neo4J is a graph eccentric database which can easily showcase relationships between nodes.
- Can run and visualize complex graph algorithms (Shortest Path, Community Detection, Degree Centrality)

# Community Detection



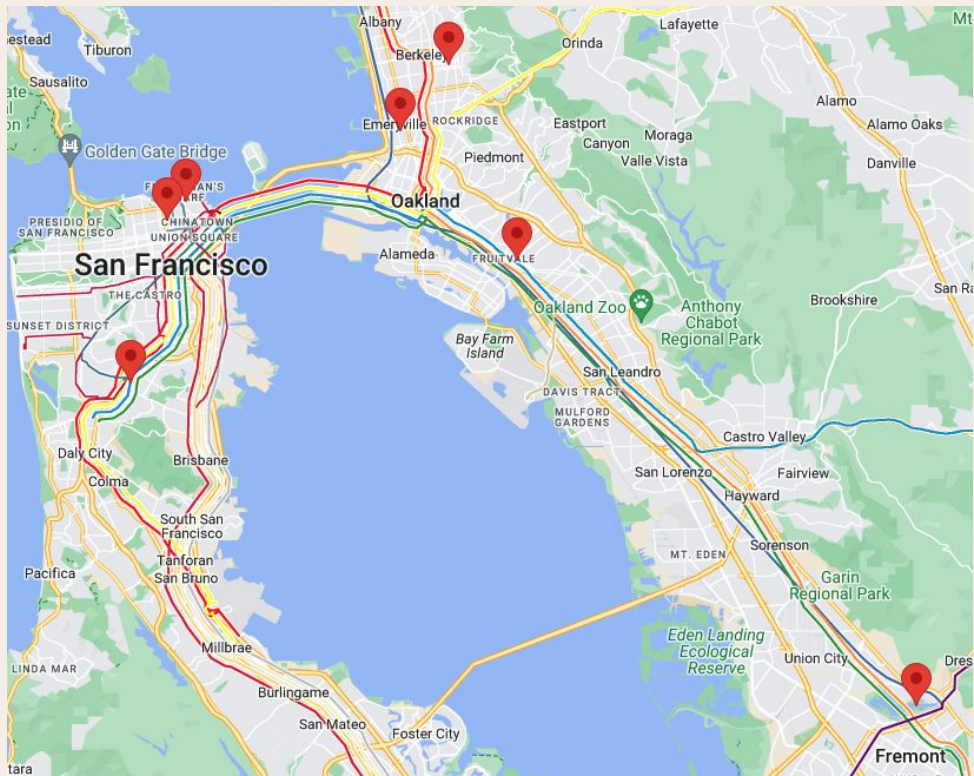
# Degree Centrality and Refinement of Result

## Drone delivery stations:

1. Fruitvale: 94601
2. MacArthur: 94608
3. Fremont: 94536
4. Balboa Park: 94112
5. Embarcadero: 94133
6. Civic Center: 94109
7. Downtown Berkeley: 94704

## Steps:

1. Run degree Centrality
2. Rank Centrality and no. of daily exits
3. Using Zip Code-Population data to refine results
4. Choose Zip with highest population
5. Create Drone Station







Driving Distance: 1.5 mi  
Driving Time: 10 mins



Flying Distance: 1.05mi  
Flying Time: 1.4min

# MongoDB Business Application

**Business Case:** Pre-determine delivery routes based on traffic times.

- Use large datasets containing historical traffic times to determine fastest delivery routes.
- If delivery happens during a peak time, find alternative routes to complete food delivery

## MongoDB vs Relational Database:

- MongoDB is a document-oriented database.
- View all of the data in a single place as a single document which makes it easier to work with.
- Suitable for handling time-series data

```
{
  "_id": 1,
  "first_name": "Tom",
  "email": "tom@example.com",
  "cell": "765-555-5555",
  "likes": [
    "fashion",
    "spas",
    "shopping"
  ],
  "businesses": [
    {
      "name": "Entertainment 1080",
      "partner": "Jean",
      "status": "Bankrupt",
      "date_founded": {
        "$date": "2012-05-19T04:00:00Z"
      }
    },
    {
      "name": "Swag for Tweens",
      "date_founded": {
        "$date": "2012-11-01T04:00:00Z"
      }
    }
  ]
}
```

Example of JSON document

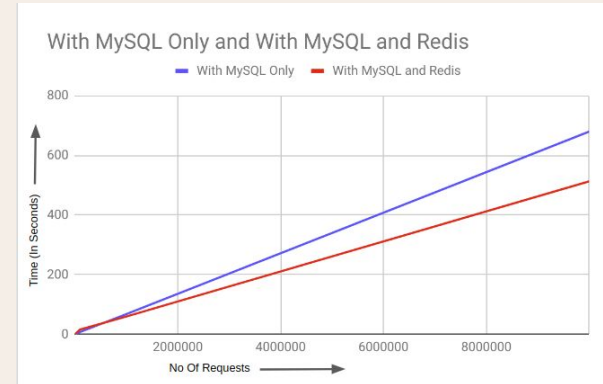
# Redis Business Application

**Business Case:** Providing real-time tracking and updates of delivery.

- Adopt similar tracking systems to food delivery competitors
- Allows for user notifications and updates in real-time on food delivery.

## Redis vs Relational Database:

- Redis is an in-memory relational database
- Access and store travel time data in real-time using shorter computation time
- Read and write to the same data set from different geographical locations seamlessly



Difference in computation time using Redis and Relational database

The background features a light beige color. A large, dashed orange oval is centered on the page. Four green leaf-like shapes are positioned around the oval: one at the top, one at the bottom-left, one at the bottom-right, and one at the top-right. In the top-left corner, there is a small cluster of five green dots. In the bottom-left corner, there is a single green circle. In the bottom-right corner, there is a 3x3 grid of green dots.

# Thank you

AGM data science team