

I used LLM data (from GPT-4) to produce a graph in the Neo4j visual database. Neo4j is a very versatile tool that can use LLM text output as a means of visualization and presentation to understand how LLMs process data (similar to GraphRAG technology).

Just as people graph linear relationships, Neo4j can serve as a means to graph LLM neural, non-linear relationships based on algorithm backtracking, front-tracking, etc.

Neo4j is a graph database that allows you to visualize data using Nodes and relationships (actions taken or done to each node). In a typical relational database, the relationships appear in tabular format (i.e. SQL or Excel/CSV format). In a graphical Database, the relationship between variables stems from the parent relationship (in this case the person), which then logically goes down to the order, item, and restaurant (which can be backtracked in reverse).

Here is the outputted Neo4j query from Chat GPT 4o, with the instructions to make a random list of variable door dash orders with different types of restaurants:

```
// Create Users
CREATE (:User {id: "U1", name: "Emma Smith"});
CREATE (:User {id: "U2", name: "Liam Johnson"});
CREATE (:User {id: "U3", name: "Olivia Brown"});
CREATE (:User {id: "U4", name: "Noah Davis"});
CREATE (:User {id: "U5", name: "Sophia Martinez"});
CREATE (:User {id: "U6", name: "James Wilson"});
CREATE (:User {id: "U7", name: "Mia Garcia"});
CREATE (:User {id: "U8", name: "Ethan Lee"});
CREATE (:User {id: "U9", name: "Isabella Anderson"});
CREATE (:User {id: "U10", name: "Logan Thomas"});
CREATE (:User {id: "U11", name: "Ava Hernandez"});
CREATE (:User {id: "U12", name: "Benjamin Moore"});
CREATE (:User {id: "U13", name: "Charlotte White"});
CREATE (:User {id: "U14", name: "Lucas Hall"});
CREATE (:User {id: "U15", name: "Amelia King"});
CREATE (:User {id: "U16", name: "Harper Scott"});
CREATE (:User {id: "U17", name: "Daniel Young"});
CREATE (:User {id: "U18", name: "Ella Walker"});
CREATE (:User {id: "U19", name: "Matthew Harris"});
```

```
// Create Restaurants
CREATE (:Restaurant {id: "R1", name: "Pizza Hut"});
CREATE (:Restaurant {id: "R2", name: "Taco Bell"});
CREATE (:Restaurant {id: "R3", name: "Subway"});
CREATE (:Restaurant {id: "R4", name: "KFC"});
CREATE (:Restaurant {id: "R5", name: "Chipotle"});
```

```
CREATE (:Restaurant {id: "R6", name: "Cava"});
CREATE (:Restaurant {id: "R7", name: "Jimmy Johns"};
CREATE (:Restaurant {id: "R8", name: "Dominos"});
CREATE (:Restaurant {id: "R9", name: "Indian Food (any local chain)"});
CREATE (:Restaurant {id: "R10", name: "Panera bread"});
```

#### // Create Orders

```
CREATE (:Order {id: "O1", date: "2024-11-20", total: 30.00});
CREATE (:Order {id: "O2", date: "2024-11-21", total: 12.50});
CREATE (:Order {id: "O3", date: "2024-11-22", total: 25.75});
CREATE (:Order {id: "O4", date: "2024-11-23", total: 18.90});
CREATE (:Order {id: "O5", date: "2024-11-20", total: 22.75});
CREATE (:Order {id: "O6", date: "2024-11-19", total: 15.00});
CREATE (:Order {id: "O7", date: "2024-11-18", total: 40.50});
CREATE (:Order {id: "O8", date: "2024-11-17", total: 12.99});
CREATE (:Order {id: "O9", date: "2024-11-16", total: 9.99});
CREATE (:Order {id: "O10", date: "2024-11-15", total: 29.75});
CREATE (:Order {id: "O11", date: "2024-11-14", total: 18.99});
CREATE (:Order {id: "O12", date: "2024-11-13", total: 24.50});
CREATE (:Order {id: "O13", date: "2024-11-12", total: 35.25});
CREATE (:Order {id: "O14", date: "2024-11-11", total: 45.00});
CREATE (:Order {id: "O15", date: "2024-11-10", total: 28.00});
CREATE (:Order {id: "O16", date: "2024-11-09", total: 19.99});
CREATE (:Order {id: "O17", date: "2024-11-08", total: 50.75});
CREATE (:Order {id: "O18", date: "2024-11-07", total: 22.50});
CREATE (:Order {id: "O19", date: "2024-11-06", total: 11.00});
```

#### // Create Items

```
CREATE (:Item {id: "I1", name: "Large Pepperoni Pizza", price: 20.00});
CREATE (:Item {id: "I2", name: "Taco Combo", price: 10.00});
CREATE (:Item {id: "I3", name: "Footlong Veggie Sandwich", price: 7.50});
CREATE (:Item {id: "I4", name: "Bucket of Chicken", price: 18.90});
CREATE (:Item {id: "I5", name: "Cheesy Gordita Crunch", price: 5.00});
CREATE (:Item {id: "I6", name: "Meatball Marinara Sub", price: 8.25});
CREATE (:Item {id: "I7", name: "Cheese Pizza", price: 15.00});
CREATE (:Item {id: "I8", name: "Burrito Bowl", price: 12.75});
CREATE (:Item {id: "I9", name: "Chicken Sandwich", price: 8.00});
CREATE (:Item {id: "I10", name: "Gyro Wrap", price: 11.00});
CREATE (:Item {id: "I11", name: "Tacos Al Pastor", price: 10.00});
CREATE (:Item {id: "I12", name: "Chicken Caesar Salad", price: 14.99});
CREATE (:Item {id: "I13", name: "Italian Sub", price: 8.50});
CREATE (:Item {id: "I14", name: "Garlic Knots", price: 5.00});
```

```
CREATE (:Item {id: "I15", name: "Butter Chicken", price: 13.25});
CREATE (:Item {id: "I16", name: "Bagel Sandwich", price: 6.00});
```

```
// Relationships
```

```
// Emma placed an order containing a Large Pepperoni Pizza from Pizza Hut
```

```
MATCH (u:User {id: "U1"}, (o:Order {id: "O1"}, (i:Item {id: "I1"}, (r:Restaurant {id: "R1"}))
```

```
CREATE (u)-[:PLACED]->(o)
```

```
CREATE (o)-[:CONTAINS]->(i)
```

```
CREATE (i)-[:SERVED_BY]->(r);
```

```
// Liam placed an order containing a Taco Combo and Cheesy Gordita Crunch from Taco Bell
```

```
MATCH (u:User {id: "U2"}, (o:Order {id: "O2"}, (i1:Item {id: "I2"}, (i2:Item {id: "I5"},
```

```
(r:Restaurant {id: "R2"}))
```

```
CREATE (u)-[:PLACED]->(o)
```

```
CREATE (o)-[:CONTAINS]->(i1)
```

```
CREATE (o)-[:CONTAINS]->(i2)
```

```
CREATE (i1)-[:SERVED_BY]->(r)
```

```
CREATE (i2)-[:SERVED_BY]->(r);
```

```
// Olivia placed an order containing a Footlong Veggie Sandwich and Meatball Marinara Sub  
from Subway
```

```
MATCH (u:User {id: "U3"}, (o:Order {id: "O3"}, (i1:Item {id: "I3"}, (i2:Item {id: "I6"},
```

```
(r:Restaurant {id: "R3"}))
```

```
CREATE (u)-[:PLACED]->(o)
```

```
CREATE (o)-[:CONTAINS]->(i1)
```

```
CREATE (o)-[:CONTAINS]->(i2)
```

```
CREATE (i1)-[:SERVED_BY]->(r)
```

```
CREATE (i2)-[:SERVED_BY]->(r);
```

```
// Noah placed an order containing a Bucket of Chicken from KFC
```

```
MATCH (u:User {id: "U4"}, (o:Order {id: "O4"}, (i:Item {id: "I4"}, (r:Restaurant {id: "R4"}))
```

```
CREATE (u)-[:PLACED]->(o)
```

```
CREATE (o)-[:CONTAINS]->(i)
```

```
CREATE (i)-[:SERVED_BY]->(r);
```

```
//Repeat with random orders and items
```

```
MATCH (u:User {id: "U5"}, (o:Order {id: "O5"}, (i:Item {id: "I7"}, (r:Restaurant {id: "R1"}))
```

```
CREATE (u)-[:PLACED]->(o)
```

```
CREATE (o)-[:CONTAINS]->(i)
```

```
CREATE (i)-[:SERVED_BY]->(r);
```

```
MATCH (u:User {id: "U6"}), (o:Order {id: "O6"}), (i:Item {id: "I8"}), (r:Restaurant {id: "R5"})
CREATE (u)-[:PLACED]->(o)
CREATE (o)-[:CONTAINS]->(i)
CREATE (i)-[:SERVED_BY]->(r);
```

```
MATCH (u:User {id: "U7"}), (o:Order {id: "O7"}), (i:Item {id: "I9"}), (r:Restaurant {id: "R4"})
CREATE (u)-[:PLACED]->(o)
CREATE (o)-[:CONTAINS]->(i)
CREATE (i)-[:SERVED_BY]->(r);
```

```
MATCH (u:User {id: "U8"}), (o:Order {id: "O8"}), (i:Item {id: "I10"}), (r:Restaurant {id: "R6"})
CREATE (u)-[:PLACED]->(o)
CREATE (o)-[:CONTAINS]->(i)
CREATE (i)-[:SERVED_BY]->(r);
```

```
MATCH (u:User {id: "U9"}), (o:Order {id: "O9"}), (i:Item {id: "I11"}), (r:Restaurant {id: "R2"})
CREATE (u)-[:PLACED]->(o)
CREATE (o)-[:CONTAINS]->(i)
CREATE (i)-[:SERVED_BY]->(r);
```

```
MATCH (u:User {id: "U10"}), (o:Order {id: "O10"}), (i:Item {id: "I12"}), (r:Restaurant {id: "R10"})
CREATE (u)-[:PLACED]->(o)
CREATE (o)-[:CONTAINS]->(i)
CREATE (i)-[:SERVED_BY]->(r);
```

```
MATCH (u:User {id: "U11"}), (o:Order {id: "O11"}), (i:Item {id: "I13"}), (r:Restaurant {id: "R7"})
CREATE (u)-[:PLACED]->(o)
CREATE (o)-[:CONTAINS]->(i)
CREATE (i)-[:SERVED_BY]->(r);
```

```
MATCH (u:User {id: "U12"}), (o:Order {id: "O12"}), (i:Item {id: "I14"}), (r:Restaurant {id: "R8"})
CREATE (u)-[:PLACED]->(o)
CREATE (o)-[:CONTAINS]->(i)
CREATE (i)-[:SERVED_BY]->(r);
```

```
MATCH (u:User {id: "U13"}), (o:Order {id: "O13"}), (i:Item {id: "I15"}), (r:Restaurant {id: "R9"})
CREATE (u)-[:PLACED]->(o)
CREATE (o)-[:CONTAINS]->(i)
CREATE (i)-[:SERVED_BY]->(r);
```

```
MATCH (u:User {id: "U14"}), (o:Order {id: "O14"}), (i:Item {id: "I16"}), (r:Restaurant {id: "R10"})
CREATE (u)-[:PLACED]->(o)
CREATE (o)-[:CONTAINS]->(i)
CREATE (i)-[:SERVED_BY]->(r);
```

```
MATCH (u:User {id: "U15"}), (o:Order {id: "O15"}), (i:Item {id: "I7"}), (r:Restaurant {id: "R1"})
CREATE (u)-[:PLACED]->(o)
CREATE (o)-[:CONTAINS]->(i)
CREATE (i)-[:SERVED_BY]->(r);
```

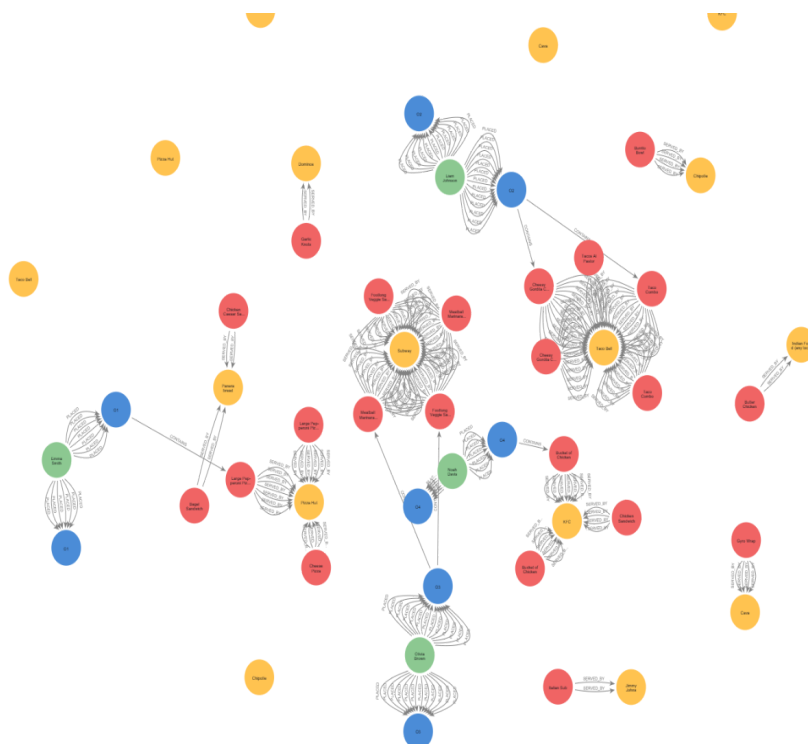
```
MATCH (u:User {id: "U16"}), (o:Order {id: "O16"}), (i:Item {id: "I8"}), (r:Restaurant {id: "R5"})
CREATE (u)-[:PLACED]->(o)
CREATE (o)-[:CONTAINS]->(i)
CREATE (i)-[:SERVED_BY]->(r);
```

```
MATCH (u:User {id: "U17"}), (o:Order {id: "O17"}), (i:Item {id: "I9"}), (r:Restaurant {id: "R4"})
CREATE (u)-[:PLACED]->(o)
CREATE (o)-[:CONTAINS]->(i)
CREATE (i)-[:SERVED_BY]->(r);
```

```
MATCH (u:User {id: "U18"}), (o:Order {id: "O18"}), (i:Item {id: "I10"}), (r:Restaurant {id: "R6"})
CREATE (u)-[:PLACED]->(o)
CREATE (o)-[:CONTAINS]->(i)
CREATE (i)-[:SERVED_BY]->(r);
```

```
MATCH (u:User {id: "U19"}), (o:Order {id: "O19"}), (i:Item {id: "I11"}), (r:Restaurant {id: "R2"})
CREATE (u)-[:PLACED]->(o)
CREATE (o)-[:CONTAINS]->(i)
CREATE (i)-[:SERVED_BY]->(r);
```

**Here is the resulting graph outputted by the query:**



This is a very complex LLM diagram, however, this can be used to filter relationships between financial systems, mathematical equations, and even simple searches. This can be applied to many industries and might be the next form of data visualization.

This can be used to graph out more complex machine learning algorithms compared to the graph tools we have already (like Seaborn and Matplotlib) and understand how a part works in comparison to its entire system.

**Another Example GPT prompt:** can you create a query for the relationship between financial systems?

GPT responded by explaining the steps to create the queries and outputted this example:

```
// Create Nodes
```

```
CREATE (:Bank {id: "B1", name: "Chase Bank"});
CREATE (:Bank {id: "B2", name: "Bank of America"});
CREATE (:StockMarket {id: "S1", name: "NYSE"});
CREATE (:StockMarket {id: "S2", name: "NASDAQ"});
CREATE (:PaymentProcessor {id: "P1", name: "PayPal"});
CREATE (:PaymentProcessor {id: "P2", name: "Stripe"});
CREATE (:RegulatoryBody {id: "R1", name: "SEC"});
CREATE (:RegulatoryBody {id: "R2", name: "FDIC"});
CREATE (:InvestmentFirm {id: "I1", name: "Goldman Sachs"});
CREATE (:InvestmentFirm {id: "I2", name: "Morgan Stanley"});
CREATE (:Customer {id: "C1", name: "Alice Johnson"});
CREATE (:Customer {id: "C2", name: "Bob Smith"});
```

```
// Create Relationships
```

```
// Banks providing services to customers
```

```
MATCH (b:Bank {name: "Chase Bank"}), (c:Customer {name: "Alice Johnson"})
CREATE (b)-[:PROVIDES_SERVICE]->(c);
```

```
MATCH (b:Bank {name: "Bank of America"}), (c:Customer {name: "Bob Smith"})
CREATE (b)-[:PROVIDES_SERVICE]->(c);
```

```
// Payment processors partnering with banks
```

```
MATCH (p:PaymentProcessor {name: "PayPal"}), (b:Bank {name: "Chase Bank"})
CREATE (p)-[:PARTNERS_WITH]->(b);
```

```
MATCH (p:PaymentProcessor {name: "Stripe"}), (b:Bank {name: "Bank of America"})
CREATE (p)-[:PARTNERS_WITH]->(b);
```

```
// Stock markets being regulated by regulatory bodies
```

```
MATCH (s:StockMarket {name: "NYSE"}), (r:RegulatoryBody {name: "SEC"})
CREATE (s)-[:REGULATED_BY]->(r);
```

```
MATCH (s:StockMarket {name: "NASDAQ"}), (r:RegulatoryBody {name: "SEC"})
CREATE (s)-[:REGULATED_BY]->(r);
```

```
// Investment firms investing in stock markets
```

```
MATCH (i:InvestmentFirm {name: "Goldman Sachs"}), (s:StockMarket {name: "NYSE"})
CREATE (i)-[:INVESTS_IN]->(s);
```

```
MATCH (i:InvestmentFirm {name: "Morgan Stanley"}), (s:StockMarket {name: "NASDAQ"})
CREATE (i)-[:INVESTS_IN]->(s);
```

```
// Customers transacting through payment processors
```

```
MATCH (c:Customer {name: "Alice Johnson"}), (p:PaymentProcessor {name: "PayPal"})
CREATE (c)-[:TRANSACTS_WITH]->(p);
```

```
MATCH (c:Customer {name: "Bob Smith"}), (p:PaymentProcessor {name: "Stripe"})
CREATE (c)-[:TRANSACTS_WITH]->(p);
```

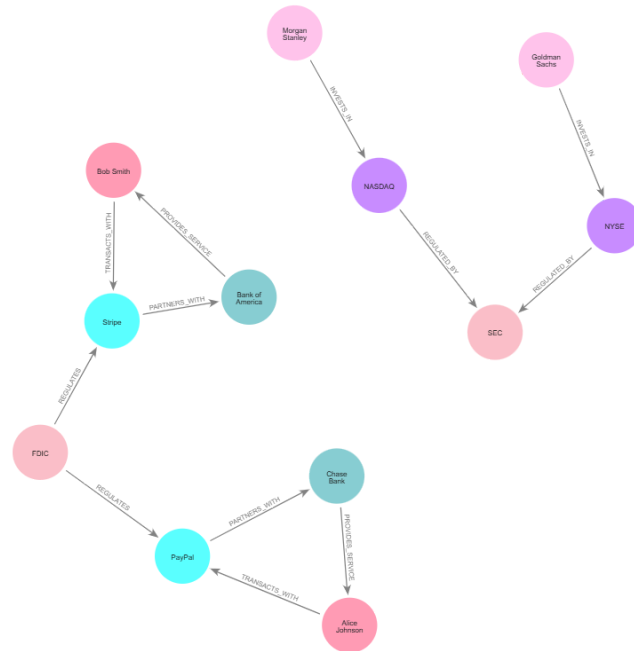
```
// Regulatory bodies overseeing payment processors
```

```
MATCH (p:PaymentProcessor {name: "PayPal"}), (r:RegulatoryBody {name: "FDIC"})
CREATE (r)-[:REGULATES]->(p);
```

```
MATCH (p:PaymentProcessor {name: "Stripe"}), (r:RegulatoryBody {name: "FDIC"})
CREATE (r)-[:REGULATES]->(p);
```

**GRAPH ON NEXT PAGE**

Here is the Outputted graph:



More testing and applications would need to be made in the future to determine how graphing out LLM data can be used to improve, strategize, or implement business, systems, etc.