

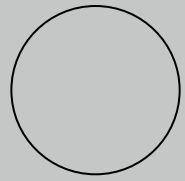


# **DATABASE DESIGN AND ANALYSIS FOR GRAINGER**

Enhancing Data Management and Insights

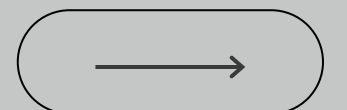
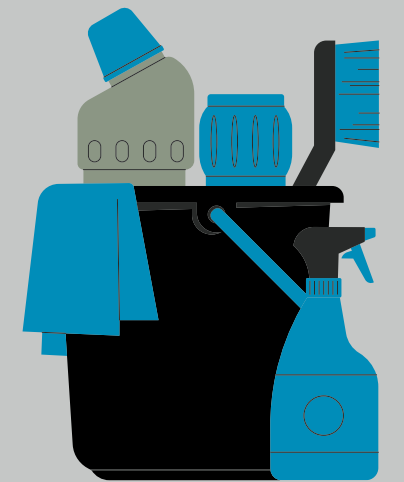
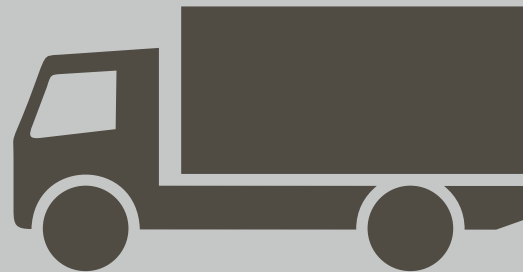
PRESENTED BY

Ahmed Raza Amaan



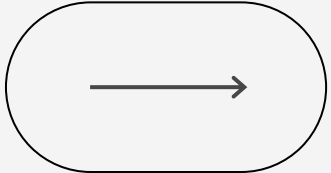
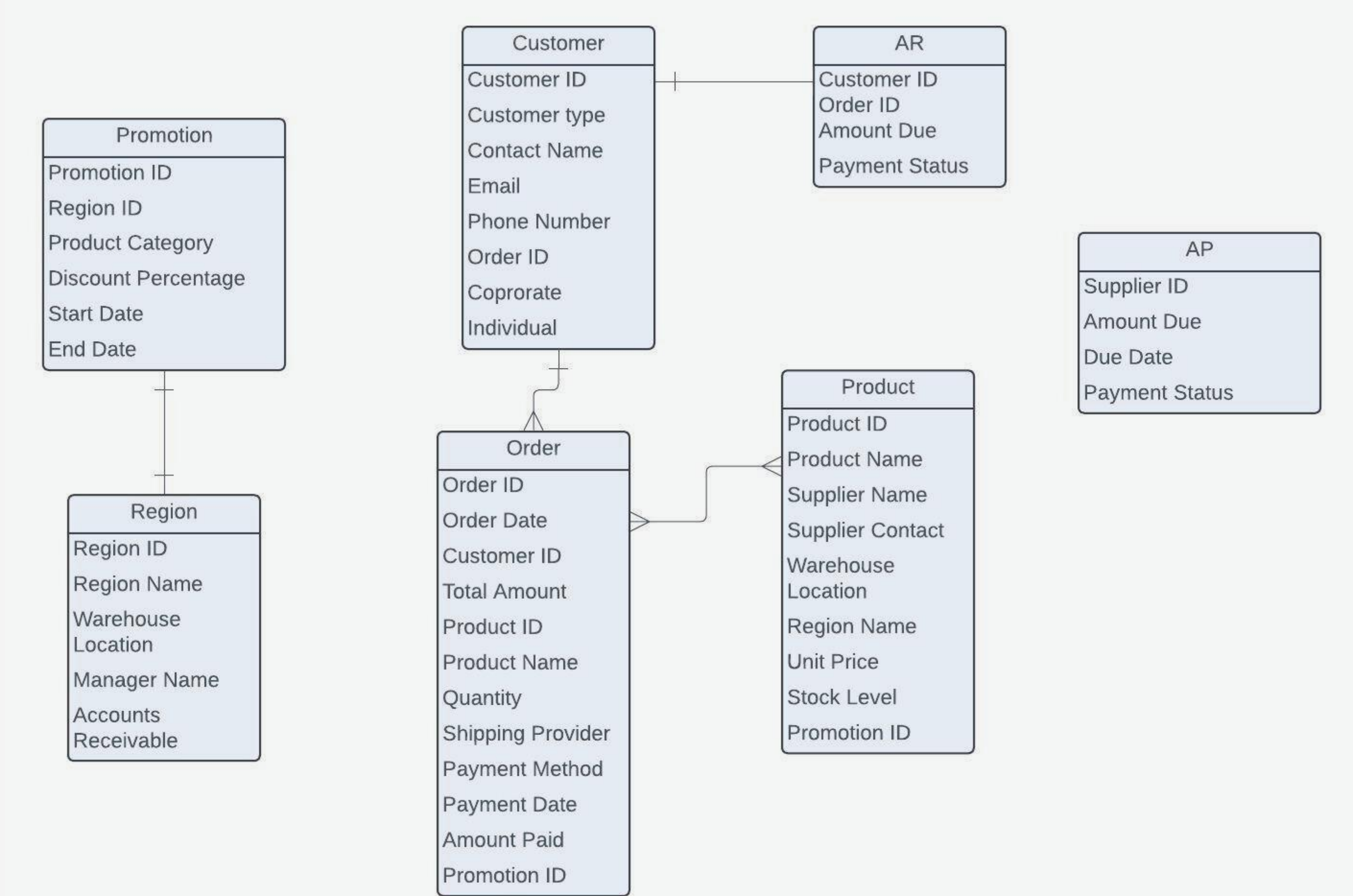
## OVERVIEW OF GRAINGER

- Grainger is a B2B industrial supply distributor.
- Focus on inventory management, order processing, and customer relationship management.
- Purpose: Build a database to streamline data organization and decision-making.





# FIRST CUT ERD



# NORMALIZATION

## First Step

Order ID	Customer ID	Order Date	Product ID	Quantity
001	C101	2024-12-01	P101, P102	2, 1
002	C102	2024-12-02	P103	3

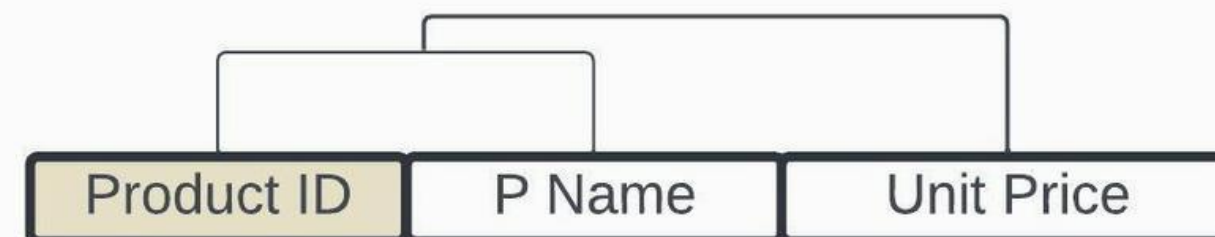
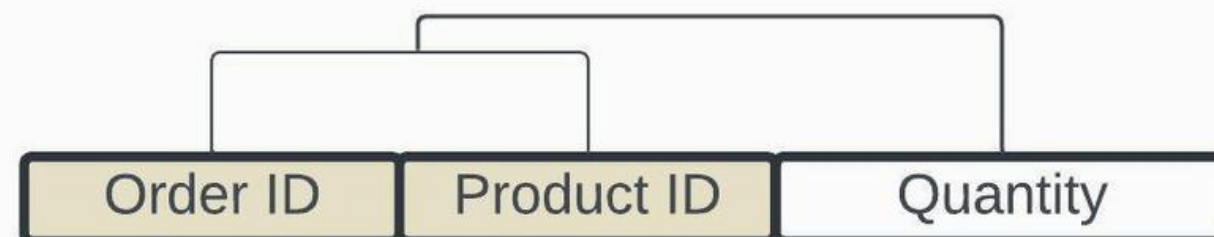
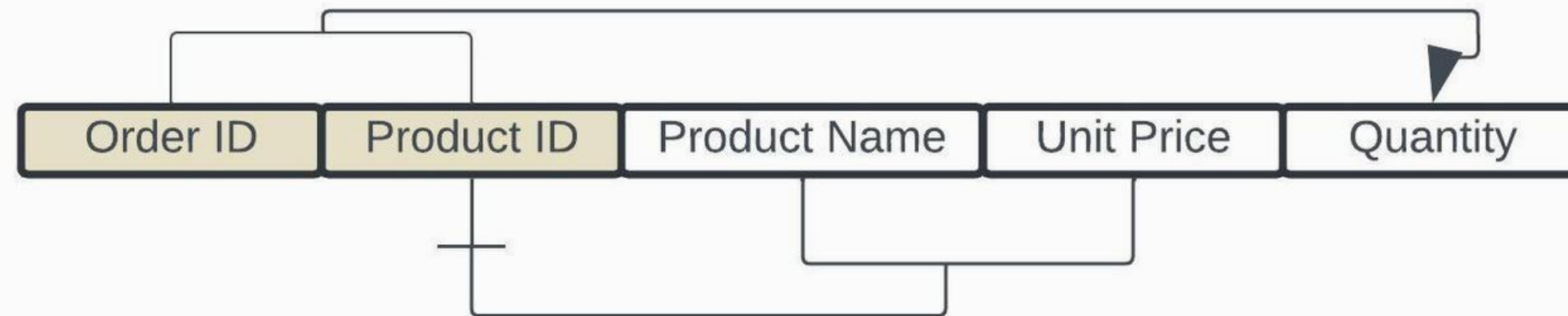


Order ID	Customer ID	Order Date	Product ID	Quantity
001	C101	2024-12-01	P101	2
001	C101	2024-12-01	P102	1
002	C102	2024-12-02	P103	3

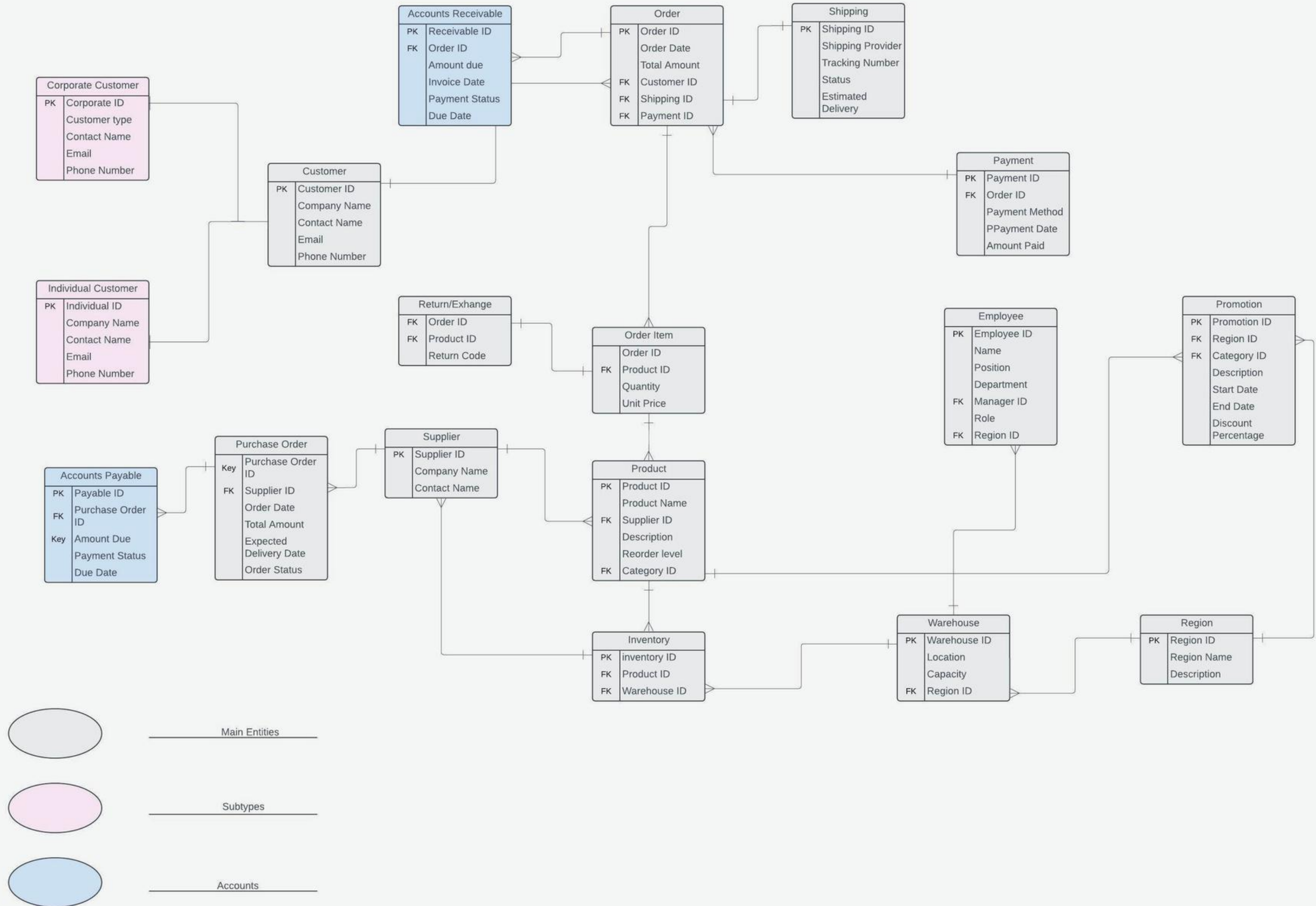
## Third Step(3NF)



## Second Step(2NF)



# FINAL ERD





The following steps were undertaken to achieve a fully functional physical model:

Sample Data Population: Each table was populated with at least 10 rows of sample data. This step was essential to test the database's functionality and identify any potential issues in data entry or retrieval.

	A	B	C	D	E	F
1	OrderID	OrderDate	TotalAmount	CustomerID	ShippingID	PaymentID
2	O1001	12/1/2024	5,000.00	C001	S1001	P1001
3	O1002	12/3/2024	1,200.00	C002	S1002	P1002
4	O1003	12/5/2024	8,750.00	C003	S1003	P1003
5	O1004	12/6/2024	2,500.00	C004	S1004	P1004
6	O1005	12/7/2024	4,300.00	C005	S1005	P1005
7	O1006	12/8/2024	6,450.00	C006	S1006	P1006
8	O1007	12/9/2024	3,700.00	C007	S1007	P1007
9	O1008	12/10/2024	9,100.00	C008	S1008	P1008
10	O1009	12/11/2024	7,800.00	C009	S1009	P1009
11	O1010	12/12/2024	1,550.00	C010	S1010	P1010

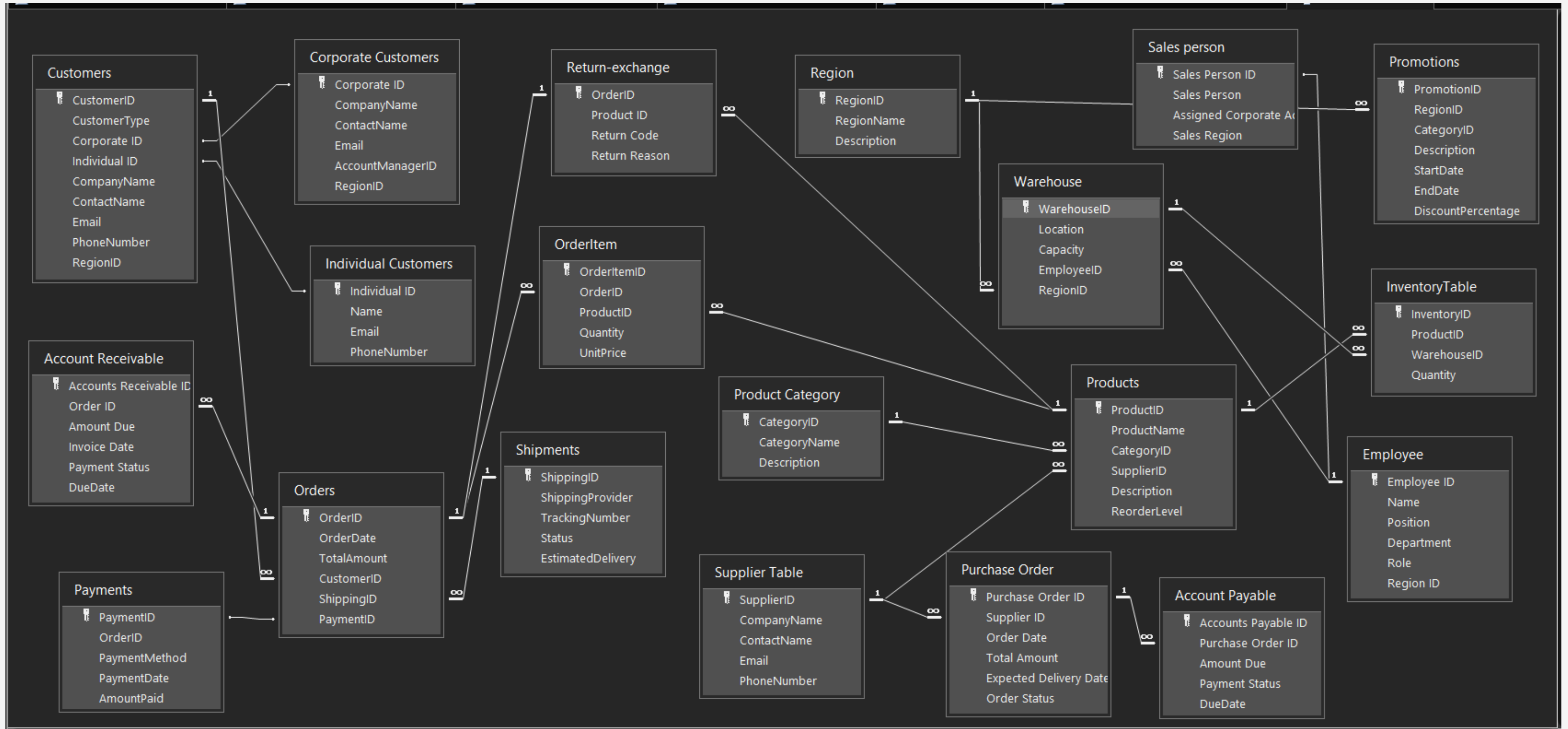
	A	B	C
1	CategoryID	CategoryName	Description
2	CAT001	Safety Equipment	Includes gloves, helmets, suits
3	CAT002	Protective Gear	Goggles, suits, and first aid kits
4	CAT003	Tools	Wrenches, drills, power tools
5	CAT004	Footwear	Work boots, safety shoes
6	CAT005	Fire Safety	Extinguishers, fire blankets
7	CAT006	Electrical	Cables, tools, equipment
8	CAT007	Medical Supplies	First aid, health kits
9	CAT008	Hardware	Nuts, bolts, general hardware
10	CAT009	Plumbing	Pipes, fittings, and accessories
11	CAT010	Cleaning Supplies	Detergents, mops, and cleaners

## Implementation of Business/User Views

Five user views were selected from the initial list of ten, and queries were created to implement them. Each query was designed to join at least two tables to ensure meaningful data extraction.

Customer Order Summary  
Inventory Levels by Product  
Monthly Sales Analysis  
Payment Method Analysis  
Payment Record  
Shipping Tracking & Analysis

# Relationships



# Payment Records

⌵	CustomerName ▾	OrderID ▾	PaymentDate ▾	PaymentMet ▾	AmountPaid ▾	PaymentStatus ▾
	Luke Brown	O1010	12/13/2024	Credit Card	1,550.00	Paid
	Steve Blue	O1009	12/12/2024	Bank Transfer	7,800.00	Paid
	Sara Black	O1008	12/11/2024	PayPal	9,100.00	Paid
	Tom Grey	O1007	12/10/2024	Credit Card	3,700.00	Paid
	Emma White	O1006	12/9/2024	Bank Transfer	6,450.00	Paid
	Bob Brown	O1005	12/8/2024	PayPal	4,300.00	Paid
	Mark Taylor	O1004	12/7/2024	Credit Card	2,500.00	Paid
	Alice Green	O1003	12/6/2024	Bank Transfer	8,750.00	Paid
	Jane Doe	O1002	12/4/2024	PayPal	1,200.00	Paid
	John Smith	O1001	12/2/2024	Credit Card	5,000.00	Paid
*						

# Customer Order Analysis

⌵	CustomerName ▾	OrderDate ▾	ProductName ▾	Quantity ▾	UnitPrice ▾	TotalPrice ▾
	Alice Green	12/5/2024	First Aid Kits	10	200	2000
	Alice Green	12/5/2024	Safety Helmets	20	75	1500
	Bob Brown	12/7/2024	Work Boots	12	90	1080
	Emma White	12/8/2024	Fire Extinguishers	6	150	900
	Jane Doe	12/3/2024	Drill Machine	1	1000	1000
	Jane Doe	12/3/2024	Wrenches Set	3	250	750
	John Smith	12/1/2024	Safety Goggles	5	30	150
	John Smith	12/1/2024	Industrial Gloves	10	50	500
	Mark Taylor	12/6/2024	Power Tools	15	80	1200
	Tom Grey	12/9/2024	Protective Suits	4	300	1200
*						

# Inventory Levels by Product

⌵	ProductName ▾	CurrentStock ▾	ReorderLevel ▾	StockStatus ▾
	Drill Machine	20	30	Reorder Required
	Fire Extinguishers	45	60	Reorder Required
	First Aid Kits	50	25	Sufficient
	Industrial Gloves	200	100	Sufficient
	Power Tools	85	80	Sufficient
	Protective Suits	60	40	Sufficient
	Safety Goggles	75	50	Sufficient
	Safety Helmets	90	75	Sufficient
	Work Boots	110	90	Sufficient
	Wrenches Set	150	200	Reorder Required
*				



# Monthly Sales Analysis

	Month	Total Sales
	03/12/2024	10,000
	04/12/2024	11,000
	05/12/2024	14,000
	06/12/2024	13,000
	07/12/2024	17,000
	08/12/2024	12,000
	09/12/2024	14,000
	10/12/2024	13,000
	11/12/2024	20,000
*		

# Shipping Tracking & Analysis

	ShippingID	ShippingProvider	TrackingNumber	Status	EstimatedDelive	ShipmentStatus
	S1010	UPS	1Z54321	Pending	12/12/2024	In Progress
	S1009	FedEx	1Z86420	In Transit	12/11/2024	In Progress
	S1008	USPS	1Z97531	Delivered	12/10/2024	Completed
	S1006	UPS	1Z24680	In Transit	12/9/2024	In Progress
	S1007	DHL	1Z13579	Pending	12/8/2024	In Progress
	S1003	DHL	1Z34567	Pending	12/7/2024	In Progress
	S1004	USPS	1Z89012	In Transit	12/6/2024	In Progress
	S1001	FedEx	1Z12345	In Transit	12/5/2024	In Progress
	S1005	FedEx	1Z56789	Delivered	12/4/2024	Completed
	S1002	UPS	1Z67890	Delivered	12/3/2024	Completed
*						

# Payment Records

	CustomerName	OrderID	PaymentDate	PaymentMet	AmountPaid	PaymentStatus
	Luke Brown	O1010	12/13/2024	Credit Card	1,550.00	Paid
	Steve Blue	O1009	12/12/2024	Bank Transfer	7,800.00	Paid
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	John Smith	O1001	12/2/2024	Credit Card	5,000.00	Paid
*						

# CHALLENGES AND SOLUTIONS

- Establishing Relationships and Referential Integrity
- Ensuring proper table relationships and resolving incorrect foreign key assignments by revisiting the relational model.
- Complex Query Design
- Overcoming difficulties in joining multiple tables through iterative testing and refinement.
- Testing Transaction Inputs
- Extensive testing revealed discrepancies that required adjustments in table structures and relationships.
- Iterative Debugging
- Collaborative problem-solving and step-by-step debugging were essential during data population and report generation.



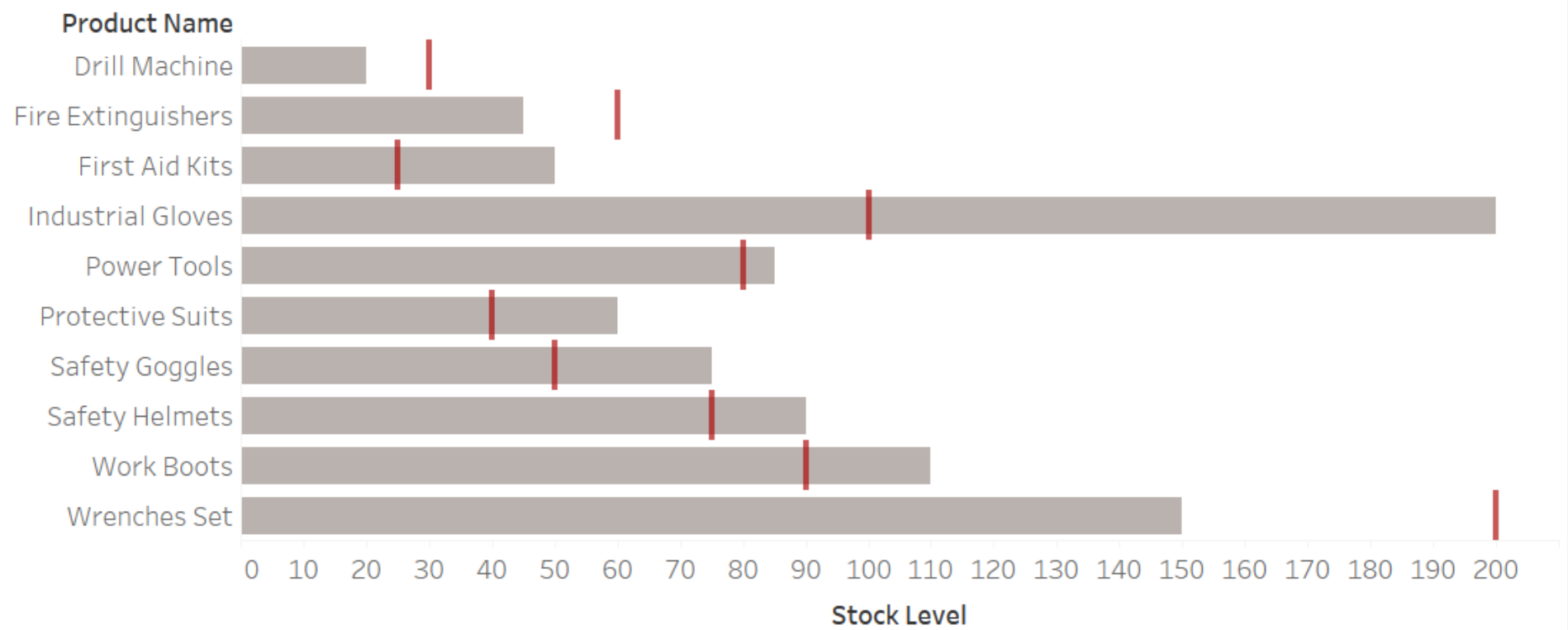
# WHY TABLEAU?

- User-Friendly Interface
- Tableau's intuitive design allowed for quick adoption, enabling easy visualization and analysis.
- Advanced Visualization Capabilities
- Created dynamic dashboards to represent sales trends, customer demographics, and inventory data.
- Provided interactive visualizations for deeper insights.
- Seamless Integration
- Effortlessly connected with the MS Access database, enabling direct import of data for analysis.
- Enhanced Decision-Making
- Visualized key metrics like sales performance and inventory trends, supporting strategic planning.
- Scalability for Future Use
- Tableau's adaptability makes it suitable for handling more extensive datasets and complex analyses.

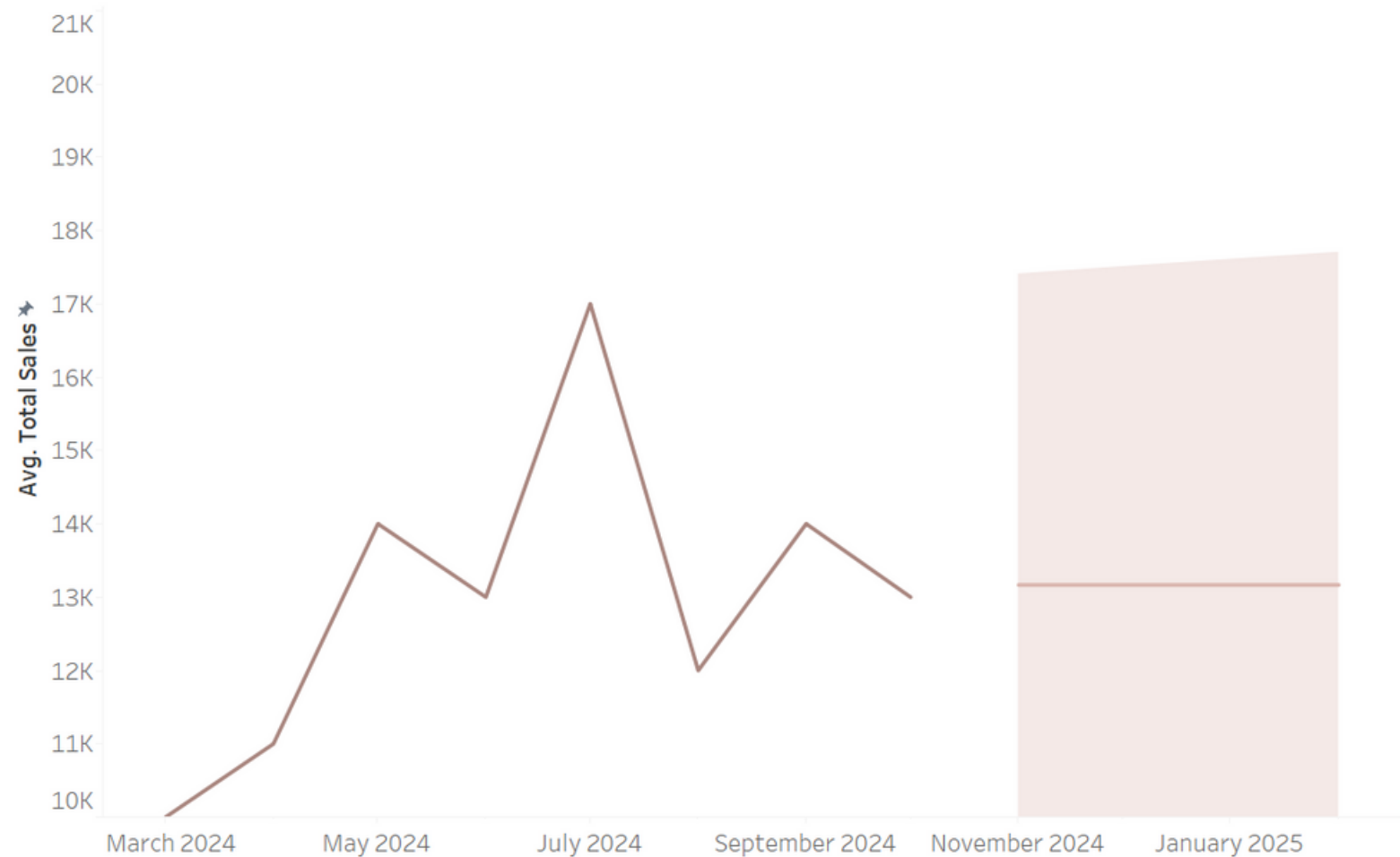
# Benefits of Using Data Analysis

Tracking Sales Trends and Inventory Restocks for Optimal Stock Management

Current Stock Level Vs Restock Level

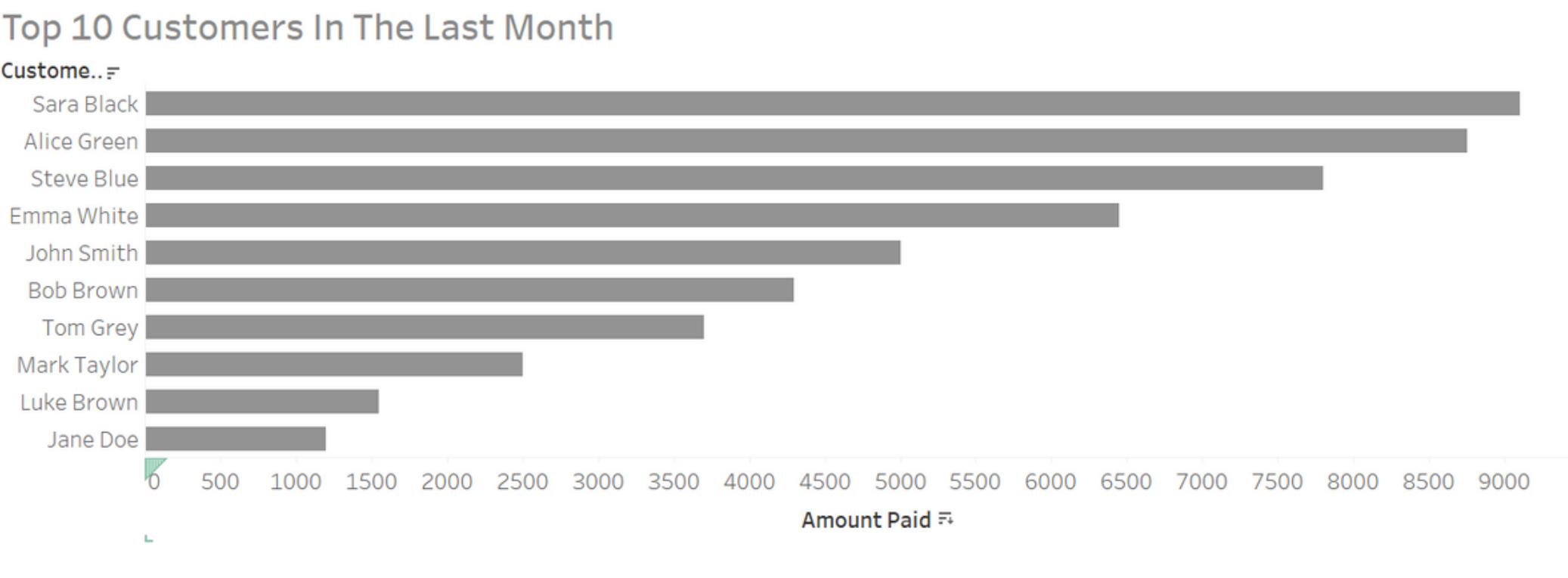


Monthly Sales - with 4 month forecast



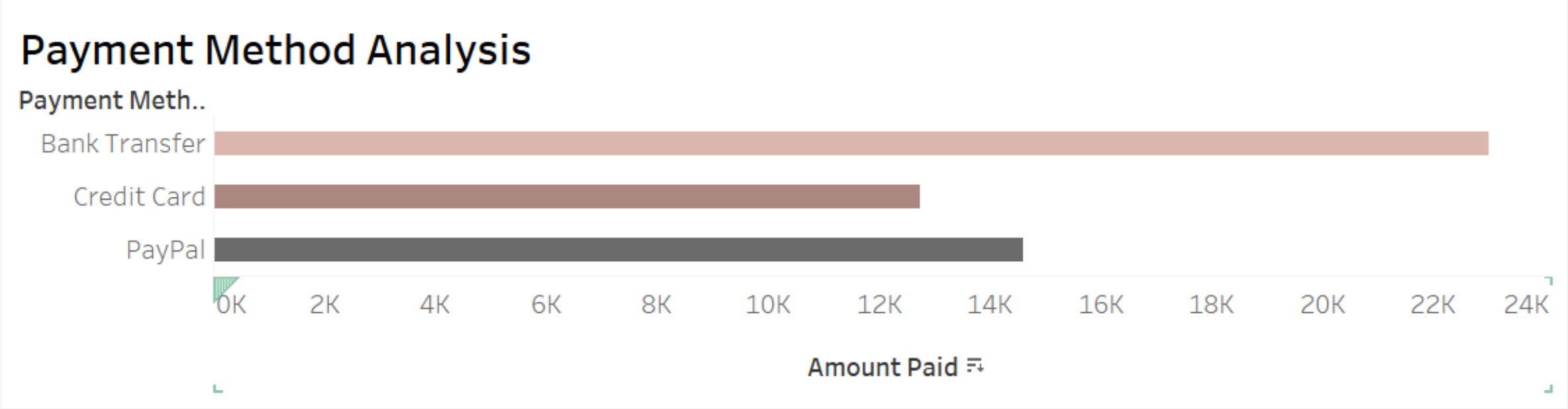
Monthly Sales Performance with a 4-Month Forecast Highlighting Projected Trends and Growth Opportunities.





Top 10 Customers In The Last Month

Distribution of Payment Methods:  
Bank Transfer, Credit Card, and  
PayPal Usage Trends.



# Shipping Status



Shipping Status Overview: Delivered, In Transit, and Pending Shipments.



# CONCLUSION

- The project highlighted the critical role of data as a cornerstone for decision-making, emphasizing the importance of robust database design for reliable and efficient systems. By following the database design lifecycle, we learned the value of careful planning, iterative refinement, and thorough testing. Integrating tools like Tableau showcased how data analysis transforms raw information into actionable insights. This experience not only reinforced the significance of data but also provided a solid framework for tackling more complex projects in the future.