

ISM 6205 | Phase Four

E-Commerce Database Application

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Project Introduction

Ocoho Electronics

- Transactional ecommerce database
- Emerging electronics retailer specializing in consumer electronics, gadgets, and accessories
- Robust and efficient database system to support the company's online retail operations

Application Purpose

- Facilitate management of online sales and transactions
- Backbone of ecommerce platform
- Allow customers to browse products, place orders, make payments, and track their orders

Questions Posed

- How can we streamline the online shopping experience for customers?
- How can we efficiently manage product listings, pricing, and inventory?
- How can we secure online transactions and customer data?
- How can we analyze customer purchase behavior for marketing and inventory planning?

Assumptions

- Customers will create accounts for placing orders and tracking them
- Products will have unique identifiers for efficient inventory management
- Secure payment gateways and encryption will be used for transaction security
- The database will be accessible 24/7, ensuring availability to customers

Business Rules

- Each product must have a unique SKU (Stock Keeping Unit) for inventory tracking
- Customers can use their registered accounts to keep track of previous orders but may place orders as a guest
- The system must keep track of real-time inventory status to prevent overselling

Business Rules

- Payment information should be stored securely and in compliance with relevant data protection regulations
- Order must be paid in full and only one form of payment
- Order will not be completed until payment is paid in full



Design and Features

Database Design and Features

Product Management: Database will store detailed product information, including product name, SKU, description, price, and quantity in stock

Customer Management: Customer profiles, including contact details, order history, and payment information, will be securely stored

Security: Implementation of robust security measures to protect customer data and transactions

ERD Logic

A Customer could have more than one order, but an order is placed by only one customer

An Order can contain more than one product

A Product can be sold more than once

An order must be paid for in full, with one payment method

A given payment transaction is for one order

Product

Order

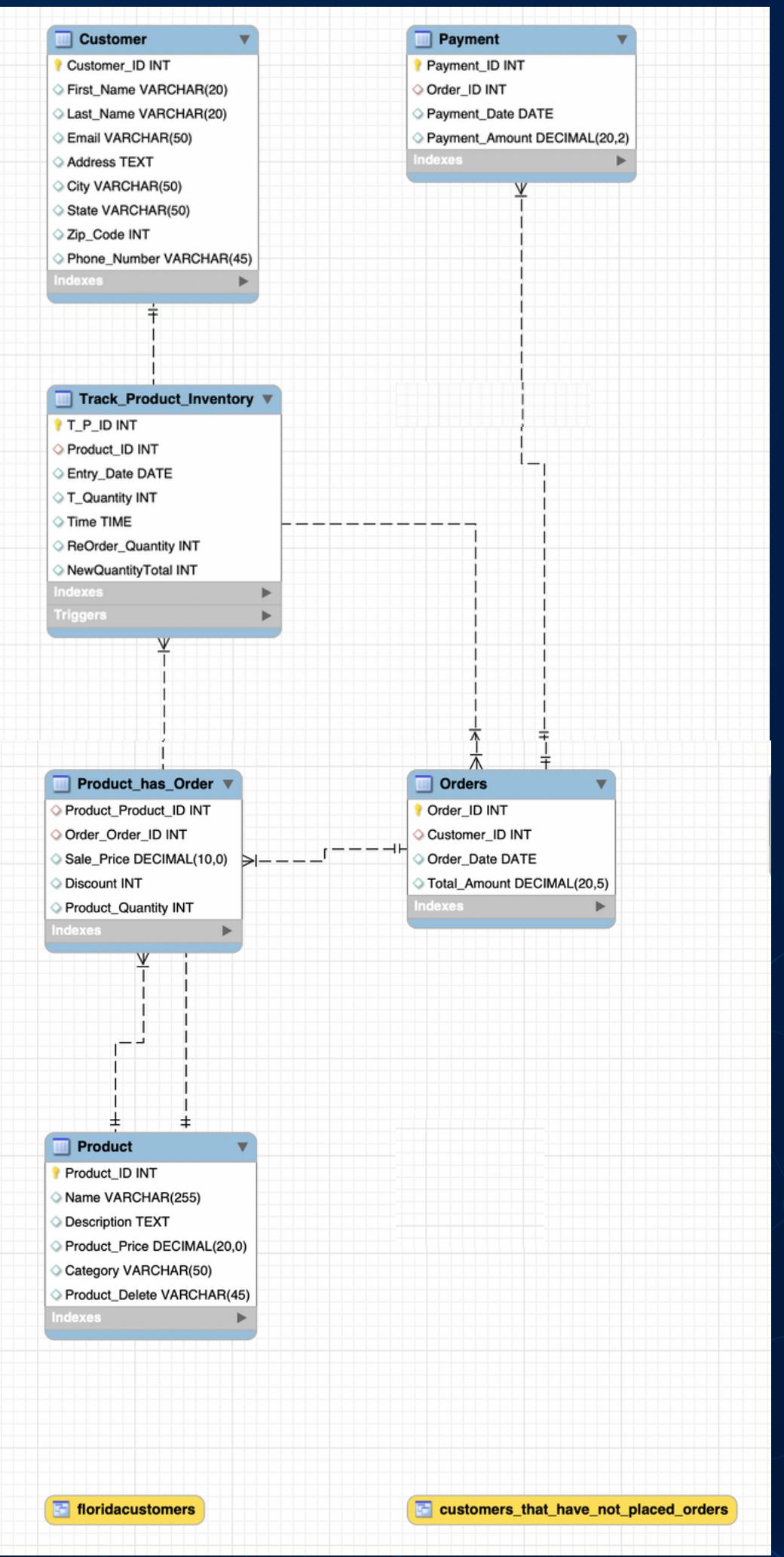
**Track Product
Inventory**

Payment

Customer



Database Schema



Snippet of Tables

Product_ID	Name	Description	Product_Price	Category	Product_Delete
1	Smartphone X	High-end smartphone with advanced features.	800	Phones	No
2	Laptop Pro	Powerful laptop for professional use.	1300	Laptops	No
3	Smart TV 4K	Ultra HD Smart TV with a large screen.	1000	TVs	No
4	Wireless Headphones	Premium wireless headphones with noise canceling.	200	Audio	No
5	Digital Camera	High-resolution digital camera for photography enthusiasts.	600	Cameras	No
6	Smartwatch Elite	Smartwatch with fitness tracking and notifications.	300	Wearables	No
7	Bluetooth Speaker	Portable Bluetooth speaker with crisp sound.	80	Audio	No
8	Gaming Console X	Next-gen gaming console for immersive gaming experiences.	500	Gaming	No
9	Tablet Pro	Versatile tablet with a high-resolution display.	450	Tablets	No
10	Wireless Router	High-speed wireless router for a seamless internet connection.	130	Networking	No
11	Smart Home Hub	Central hub for smart home automation.	150	Smart Home	No
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14	Robot Vacuum	Smart vacuum cleaner with automated cleaning and scheduling.	300	Appliances	No
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16	Solar Panel Kit	DIY solar panel kit for eco-friendly energy.	800	Gadgets	No
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34	Bluetooth Car Kit	Car kit for adding Bluetooth connectivity to vehicles.	60	Accessories	No
35	UV-C Sanitizer	UV-C sanitizer for disinfecting personal items.	50	Gadgets	No
36	Smart Water Bottle	Water bottle with hydration tracking and reminders.	30	Gadgets	No
37	Portable Air Purifier	Compact air purifier for improving air quality on the go.	80	Appliances	No
38	Bluetooth FM Transmitter	FM transmitter with Bluetooth for car audio.	35	Accessories	No
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40	Digital Alarm Clock	Alarm clock with digital display and additional features.	20	Gadgets	No
41	Wireless Bike Computer	Bike computer with wireless connectivity for tracking.	70	Gadgets	No

product 11

Cust_ID	First_Name	Last_Name	Email	Address	City	State	Zip_Code	Phone_Number
1	John	Doe	john.doe@email.com	123 Main St, Apt 4	Cityville	CA	12345	5551234567
2	Jane	Smith	jane.smith@email.com	456 Oak St, Suite 7	Towndale	NY	54321	5559876543
3	Robert	Johnson	robert.j@email.com	789 Pine St, Unit 12	Villagetown	TX	67890	5552345678
4	Emily	Williams	emily.w@email.com	101 Cedar St, Apt 45	Hometown	FL	98765	5558765432
5	Michael	Anderson	michael.a@email.com	202 Elm St, Unit 23	Suburbia	IL	54321	5553456789
6	Amanda	Brown	amanda.b@email.com	303 Maple St, Suite 56	Cityland	OH	87654	5556543210
7	David	Davis	david.d@email.com	404 Birch St, Apt 78	Townsville	WA	23456	5557890123
8	Sophia	Moore	sophia.m@email.com	505 Pine St, Unit 90	Villageville	GA	76543	5552109876
9	Matthew	Miller	matthew.m@email.com	606 Cedar St, Apt 12	Suburbtown	PA	12345	5554321098
10	Olivia	Taylor	olivia.t@email.com	707 Oak St, Suite 34	Citytown	MI	87654	5558765432
11	Daniel	Jackson	daniel.j@email.com	808 Maple St, Unit 56	Villageland	CO	34567	5553210987
12	Emma	White	emma.w@email.com	909 Elm St, Apt 78	Suburbville	NC	65432	5558901234
13	Christopher	Harris	chris.h@email.com	111 Pine St, Suite 90	Townsville	AZ	78901	5552345678
14	Isabella	Martinez	isabella.m@email.com	222 Cedar St, Unit 12	Cityland	NV	23456	5556789012
15	Andrew	Lopez	andrew.l@email.com	333 Oak St, Apt 34	Villageville	OR	56789	5551234567
16	Abigail	Gonzalez	abigail.g@email.com	444 Birch St, Suite 56	Suburbia	ID	89012	5559876543
17	Ryan	Rodriguez	ryan.r@email.com	555 Maple St, Unit 78	Hometown	UT	43210	5552345678
18	Madison	Lee	madison.l@email.com	666 Cedar St, Apt 90	Citytown	KS	10987	5558765432
19	Elijah	Walker	elijah.w@email.com	777 Elm St, Suite 12	Villageland	OK	76543	5553210987
20	Mia	Hall	mia.h@email.com	888 Pine St, Unit 34	Suburbville	AR	23456	5558901234
21	Ethan	Young	ethan.y@email.com	999 Oak St, Apt 56	Cityville	LA	87654	5551234567
22	Amelia	Ward	amelia.w@email.com	121 Cedar St, Suite 78	Villageville	MS	34567	5559876543
23	Logan	Scott	logan.s@email.com	232 Maple St, Unit 90	Townsville	ND	67890	5552345678
24	Grace	Green	grace.g@email.com	343 Birch St, Apt 12	Suburbia	NE	78901	5558765432
25	Lucas	Baker	lucas.b@email.com	454 Cedar St, Suite 34	Cityland	SD	10987	5553210987
26	Chloe	Murphy	chloe.m@email.com	565 Oak St, Unit 56	Villageland	MT	87654	5558901234
27	Alexander	Rivera	alexander.r@email.com	676 Elm St, Apt 78	Hometown	WY	76543	5551234567
28	Aiden	Cooper	aiden.c@email.com	787 Pine St, Suite 90	Citytown	VT	34567	5559876543
29	Mila	Hayes	mila.h@email.com	898 Maple St, Unit 12	Suburbville	NH	67890	5552345678
30	Carter	Fisher	carter.f@email.com	909 Birch St, Apt 34	Townsville	ME	78901	5558765432
31	Lillian	Evans	lillian.e@email.com	101 Cedar St, Suite 56	Villageville	HI	10987	5553210987
32	Jackson	Turner	jackson.t@email.com	202 Oak St, Unit 78	Suburbia	RI	23456	5558901234
33	Scarlett	Perez	scarlett.p@email.com	303 Elm St, Apt 90	Cityland	AK	87654	5551234567
34	Nathan	Gomez	nathan.g@email.com	404 Pine St, Suite 12	Villageland	IA	34567	5559876543
35	Ella	Diaz	ella.d@email.com	505 Cedar St, Unit 34	Hometown	MN	67890	5552345678
36	Leo	Wright	leo.w@email.com	606 Birch St, Apt 56	Citytown	AL	78901	5558765432
37	Avery	Collins	avery.c@email.com	707 Maple St, Suite 78	Suburbville	WI	10987	5553210987
38	Hudson	Barnes	hudson.b@email.com	808 Oak St, Unit 90	Townsville	KS	23456	5558901234
39	Skylar	Hill	skylar.h@email.com	909 Pine St, Apt 12	Cityland	OK	87654	5551234567
40	Aria	Cruz	aria.c@email.com	111 Elm St, Suite 34	Villageville	ND	34567	5559876543
41	Gravson	Perry	gravson.p@email.com	222 Birch St, Unit 56	Suburbia	WY	67890	5552345678

Customer 12

Snippet of Tables

Order_ID	Customer_ID	Order_Date	Total_Amount
1	1	2023-01-15	150.25000
2	2	2023-02-20	75.99000
3	4	2023-03-10	200.50000
4	2	2023-04-05	120.75000
5	9	2023-05-12	80.40000
6	11	2023-06-18	45.60000
7	1	2023-07-23	300.80000
8	4	2023-08-30	100.00000
9	17	2023-09-02	65.25000
10	19	2023-10-15	150.25000
11	21	2023-11-20	75.99000
12	2	2023-12-10	200.50000
13	25	2024-01-05	120.75000
14	27	2024-02-12	80.40000
15	29	2024-03-18	45.60000
16	31	2024-04-23	300.80000
17	33	2024-05-30	100.00000
18	35	2024-06-02	65.25000
19	40	2024-07-15	150.25000
20	6	2024-08-20	75.99000
21	41	2024-09-10	200.50000
22	5	2024-10-05	120.75000
23	45	2024-11-12	80.40000
24	6	2024-12-18	45.60000
25	49	2025-01-23	300.80000
26	2	2025-02-28	100.00000
27	4	2025-03-02	65.25000
28	6	2025-04-15	150.25000
29	8	2025-05-20	75.99000
30	10	2025-06-10	200.50000
31	50	2025-07-05	120.75000
32	14	2025-08-12	80.40000
33	34	2025-09-18	45.60000
34	9	2025-10-23	300.80000
35	20	2025-11-30	100.00000
36	12	2026-01-02	65.25000
37	45	2026-02-15	150.25000
38	26	2026-03-20	75.99000
39	28	2026-04-10	200.50000
40	45	2026-05-05	120.75000
41	32	2026-06-12	80.40000

Orders 13

Product_Product_ID	Order_Order_ID	Sale_Price	Discount	Product_Quant...
2	1	1105	15	2
2	2	1235	5	1
2	3	1170	10	1
2	4	975	25	2
3	5	1000	0	3
3	6	810	10	2
4	7	200	0	2
4	8	132	0	1
5	9	480	20	1
5	10	546	10	2
1	11	760	5	1
1	12	360	55	2
6	13	276	8	1
6	14	243	19	1
7	15	80	0	2
7	16	68	15	1
8	17	500	0	3
8	18	400	20	1
9	19	450	0	2
9	20	427	5	1
10	21	114	12	2
11	22	132	12	1
11	23	138	8	4
11	24	150	0	1
16	25	800	0	1
16	26	680	15	2
13	27	1200	20	1
13	28	1275	20	2
14	29	270	10	1
14	30	255	18	2
15	31	70	0	2
15	32	70	0	1
16	33	720	10	2
16	34	760	5	1
17	35	123	5	1
17	36	130	0	3
18	37	72	10	1
18	38	69	14	2
19	39	792	12	2
19	40	810	10	1
20	41	500	0	3

Product_has_Order 15

Payment_ID	Order_ID	Payment_Date	Payment_Amount
1	1	2023-01-20	150.25
2	3	2023-02-25	75.99
3	5	2023-03-15	200.50
4	7	2023-04-10	120.75
5	9	2023-05-17	80.40
6	11	2023-06-23	45.60
7	13	2023-07-28	300.80
8	15	2023-08-04	100.00
9	17	2023-09-07	65.25
10	19	2023-10-20	150.25
11	21	2023-11-25	75.99
12	23	2023-12-15	200.50
13	25	2024-01-10	120.75
14	27	2024-02-17	80.40
15	29	2024-03-23	45.60
16	31	2024-04-28	300.80
17	33	2024-05-05	100.00
18	35	2024-06-08	65.25
19	37	2024-07-21	150.25
20	39	2024-08-26	75.99
21	41	2024-09-15	200.50
22	43	2024-10-10	120.75
23	45	2024-11-17	80.40
24	47	2024-12-23	45.60
25	49	2025-01-28	300.80
26	2	2025-03-04	100.00
27	4	2025-04-06	65.25
28	6	2025-05-19	150.25
29	8	2025-06-24	75.99
30	10	2025-07-14	200.50
31	12	2025-08-09	120.75
32	14	2025-09-16	80.40
33	16	2025-10-22	45.60
34	18	2025-11-27	300.80
35	20	2026-01-03	100.00
36	22	2026-02-06	65.25
37	24	2026-03-19	150.25
38	26	2026-04-24	75.99
39	28	2026-05-14	200.50
40	30	2026-06-09	120.75
41	32	2026-07-16	80.40

payment 10

Views

Customer_ID	First_Name	Last_Name	Email	Address	City	State	Zip_Code	Phone_Number
4	Emily	Williams	emily.w@email.com	101 Cedar St, Apt 45	Hometown	FL	98765	5558765432

floridacustomers 7

```
413 • CREATE VIEW floridacustomers AS
414   SELECT *
415     FROM Customer
416    WHERE State = 'FL';
417
418 • select * from floridacustomers;
```

First_Name	Last_Name	Order_ID
Robert	Johnson	NULL
David	Davis	NULL
Christopher	Harris	NULL
Andrew	Lopez	NULL
Abigail	Gonzalez	NULL
Madison	Lee	NULL
Amelia	Ward	NULL
Logan	Scott	NULL
Grace	Green	NULL
Carter	Fisher	NULL
Avery	Collins	NULL
Skylar	Hill	NULL
Liam	Reed	NULL
Paisley	Hughes	NULL
Owen	Nelson	NULL

Customers_That_Have_Not_Placed_Orders 8

Views

```
420 • CREATE VIEW Customers_That_Have_Not_Placed_Orders AS  
421   SELECT c.First_Name, c.Last_Name, o.Order_ID  
422   FROM Customer c LEFT JOIN Orders o  
423   ON c.Customer_ID = o.Customer_ID  
424   WHERE o.Order_ID IS NULL;  
425  
426 • select * from Customers_That_Have_Not_Placed_Orders;
```

Triggers

```
463  /* revised triggers */  
464  
465 • set SQL_SAFE_UPDATES = 0;  
466  
467 • update product  
468  set Qty_on_Hand = 50;  
469  
470  DELIMITER //  
471  
472 • CREATE TRIGGER update_product_inventory  
473  AFTER INSERT ON Product_has_Order  
474  FOR EACH ROW  
475  BEGIN  
476    UPDATE Product  
477    SET Qty_on_Hand = Qty_on_Hand - NEW.Product_Quantity  
478    WHERE Product_ID = NEW.Product_Product_ID;  
479  END //  
480  
481  DELIMITER ;  
482  
483 • show triggers;  
485 • INSERT INTO Product_has_Order (Product_Product_ID, Order_Order_ID, Sale_Price, Discount, Product_Quantity)  
486  VALUES  
487  (2, 1, 1104.99, 17, 2),  
488  (2, 2, 1234.99, 79, 1),  
489  (2, 3, 1169.99, 15, 1),  
490  (2, 4, 974.99, 24, 2),  
491  (3, 5, 999.99, 95, 3),  
492  (3, 6, 809.99, 60, 2),  
493  (4, 7, 199.99, 12, 2),  
494  (4, 8, 131.99, 0, 1),  
495  (5, 9, 479.99, 82, 1),  
496  (5, 10, 545.99, 72, 2),  
497  (1, 11, 759.99, 21, 1),  
498  (1, 12, 360.0, 22, 2),  
499  (6, 13, 275.99, 11, 1),  
500  (6, 14, 242.99, 26, 1),  
501  (7, 15, 79.99, 69, 2),  
502  (7, 16, 67.99, 91, 1),  
503  (8, 17, 499.99, 96, 3),  
504  (8, 18, 399.99, 83, 1),  
505  (9, 19, 449.99, 71, 2),  
506  (9, 20, 427.49, 4, 1),  
507  (10, 21, 114.39, 82, 2),  
508  (11, 22, 131.99, 48, 1),  
509  (11, 23, 137.99, 27, 4),  
510  (11, 24, 149.99, 56, 1),  
511  (12, 25, 700.00, 5, 1)
```

Triggers



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36	Smart Water Bottle	Water bottle with hydration tracking and reminder features.	30	Gadgets	No	50
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Product 1

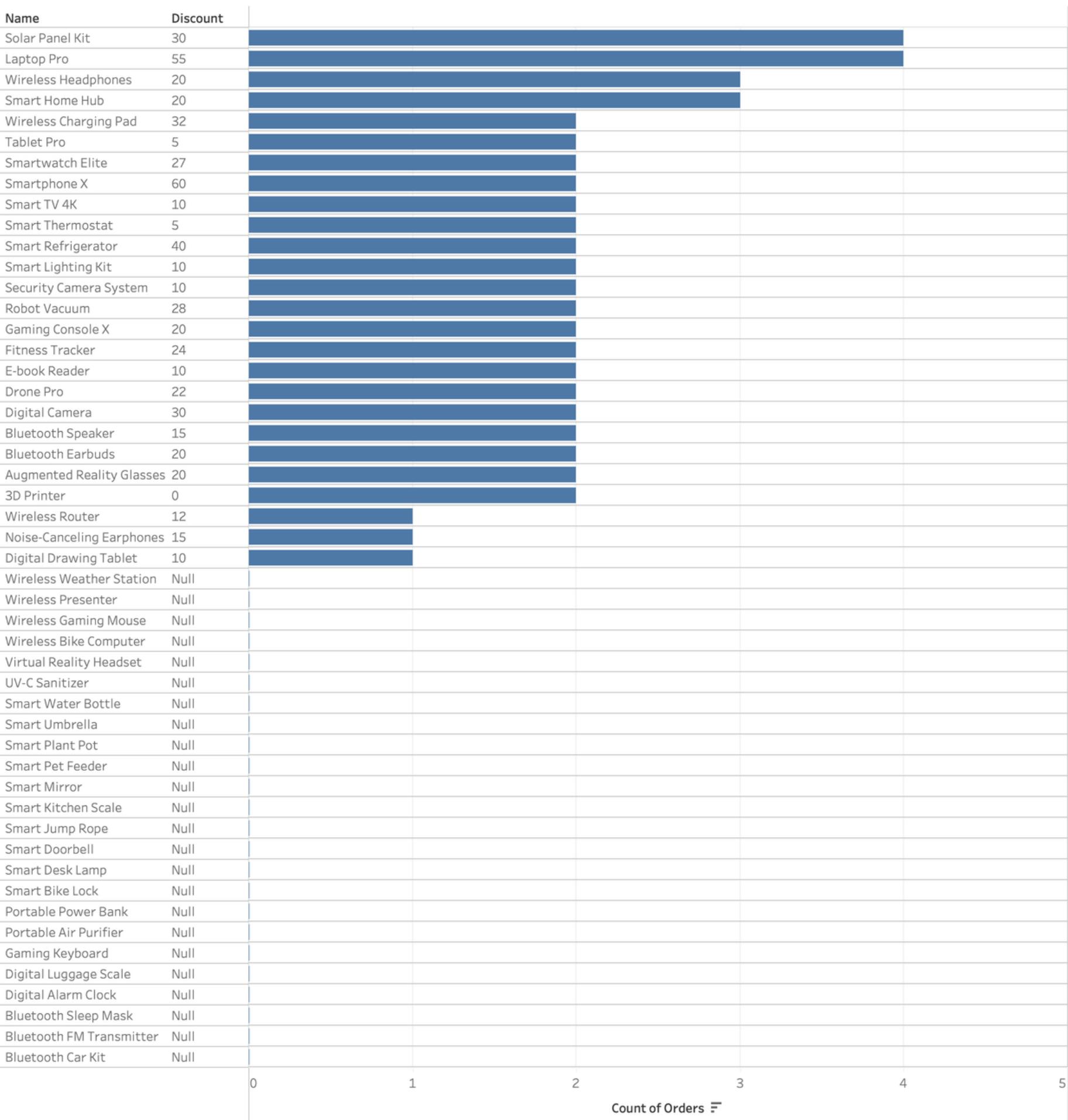


Reports

Products with No Discounts

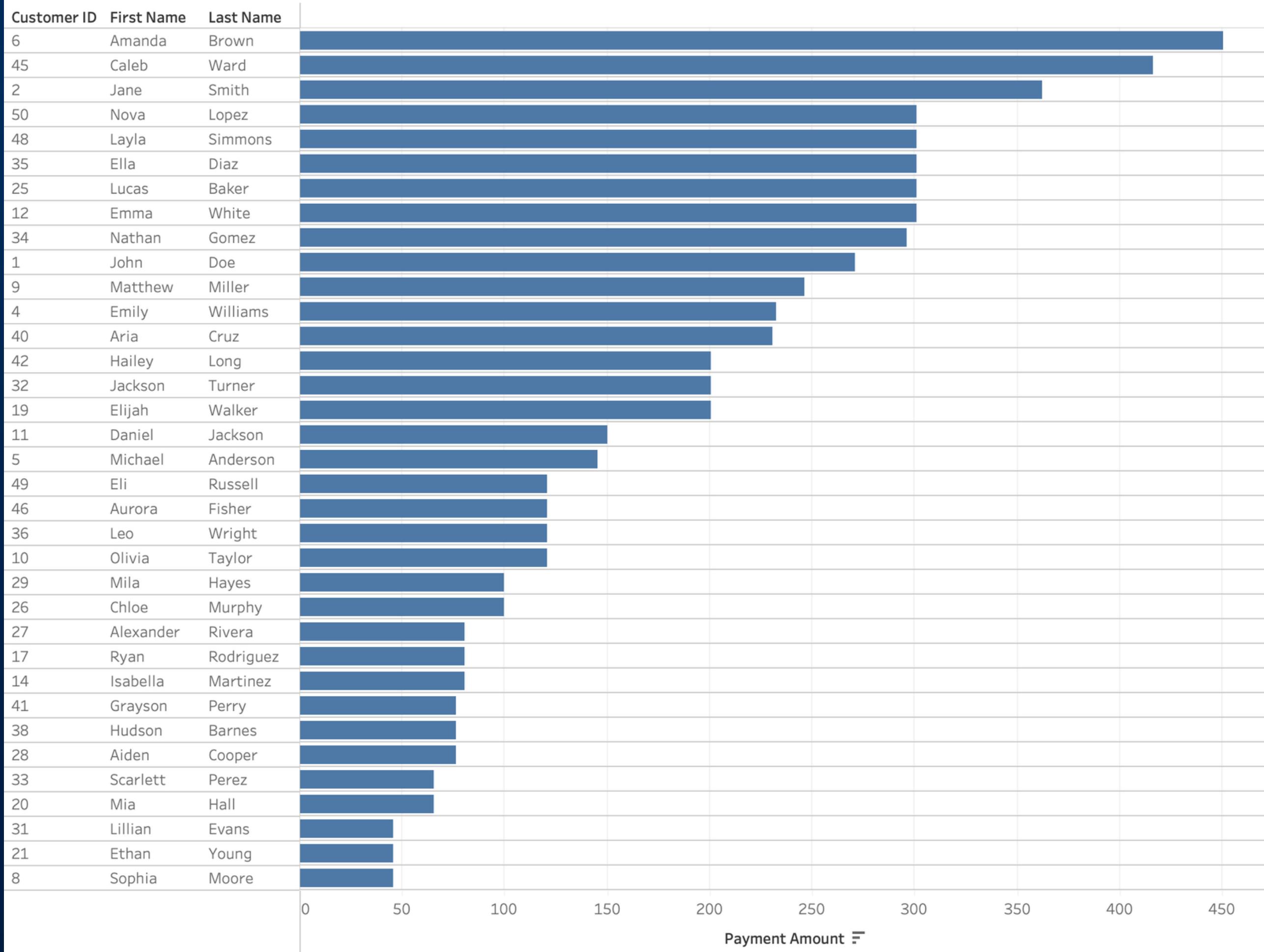
Name	Discount
3D Printer	0
Bluetooth Earbuds	0
Bluetooth Speaker	0
E-book Reader	0
Gaming Console X	0
Security Camera System	0
Smart Home Hub	0
Smart Lighting Kit	0
Smart Thermostat	0
Smart TV 4K	0
Solar Panel Kit	0
Tablet Pro	0
Wireless Headphones	0

Product Orders with and without Discounts

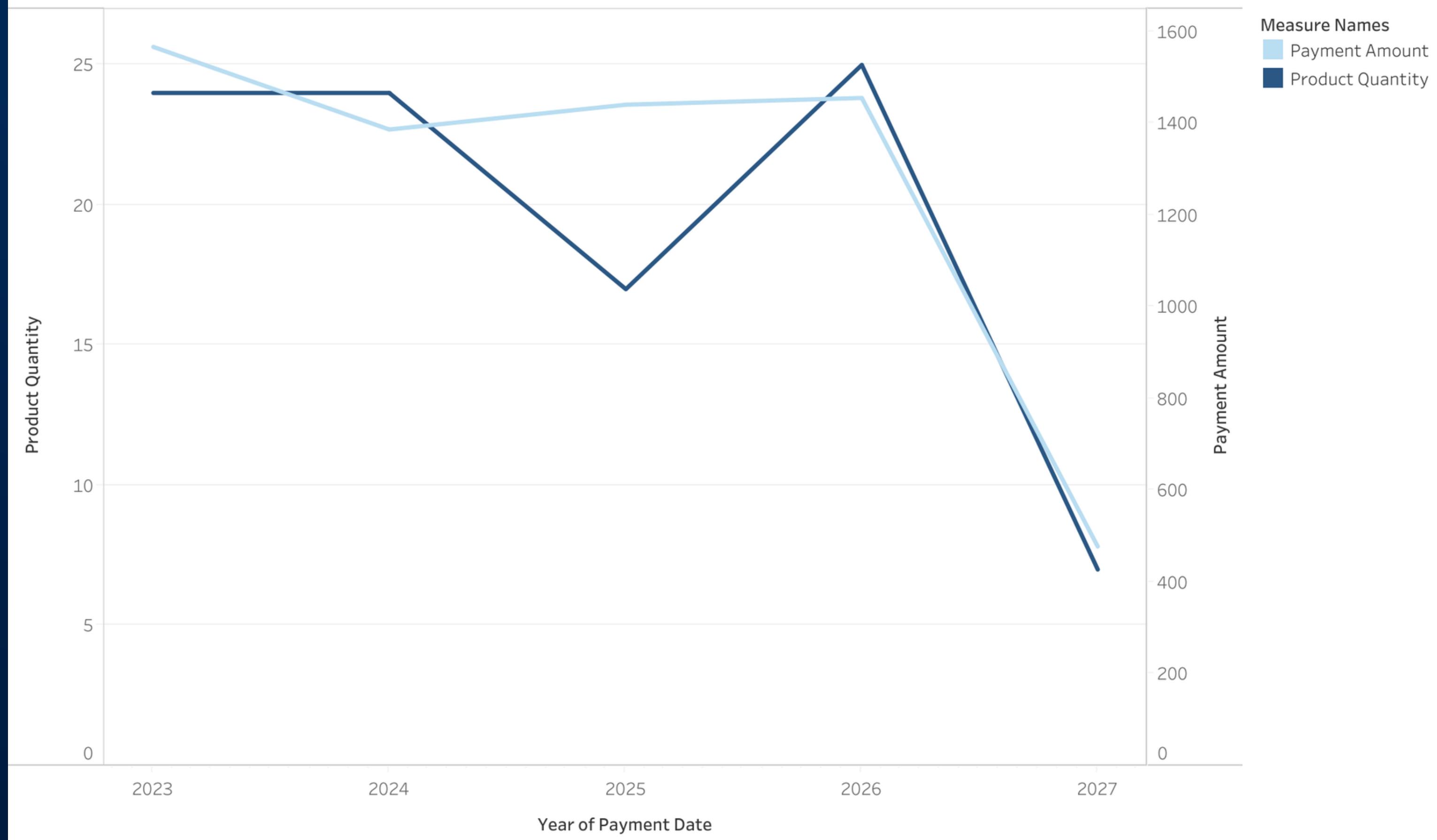


Count of Orders for each sum of Discount broken down by Name.

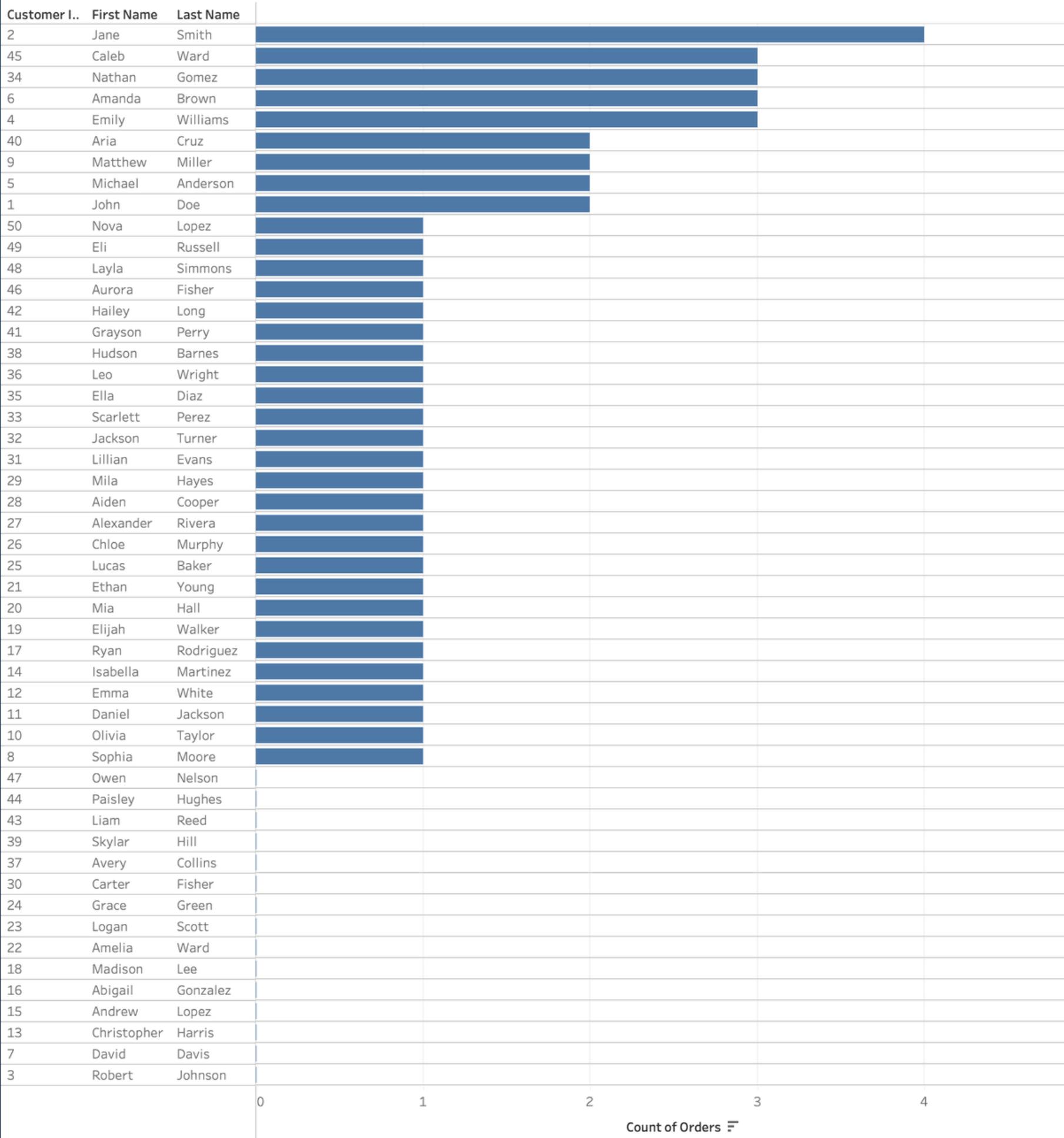
Total Amount Spent by Customer



Total Products Sold vs Payments Received over Time

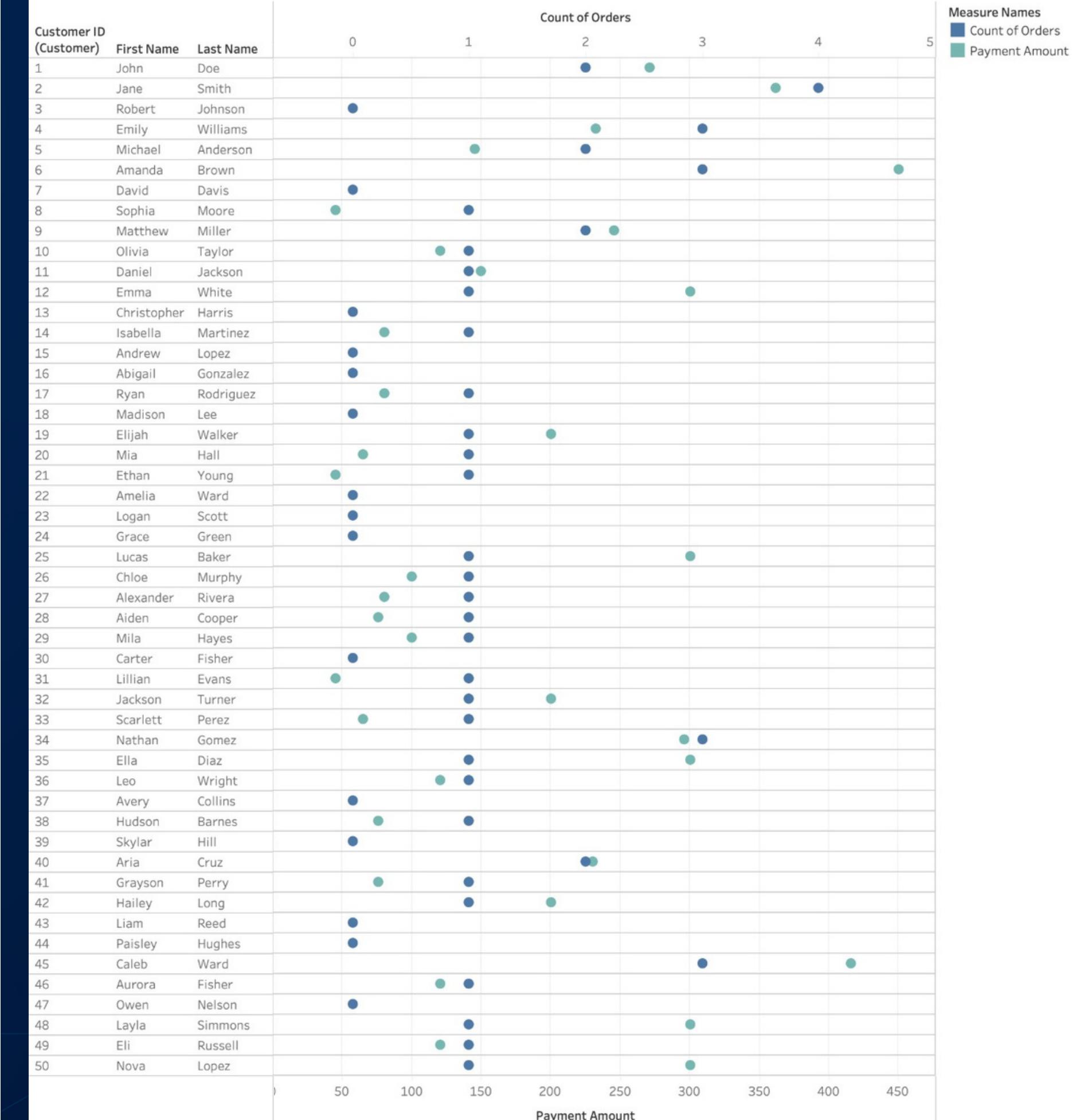


Customer Masterview



Count of Orders for each Last Name broken down by Customer ID (Customer) and First Name.

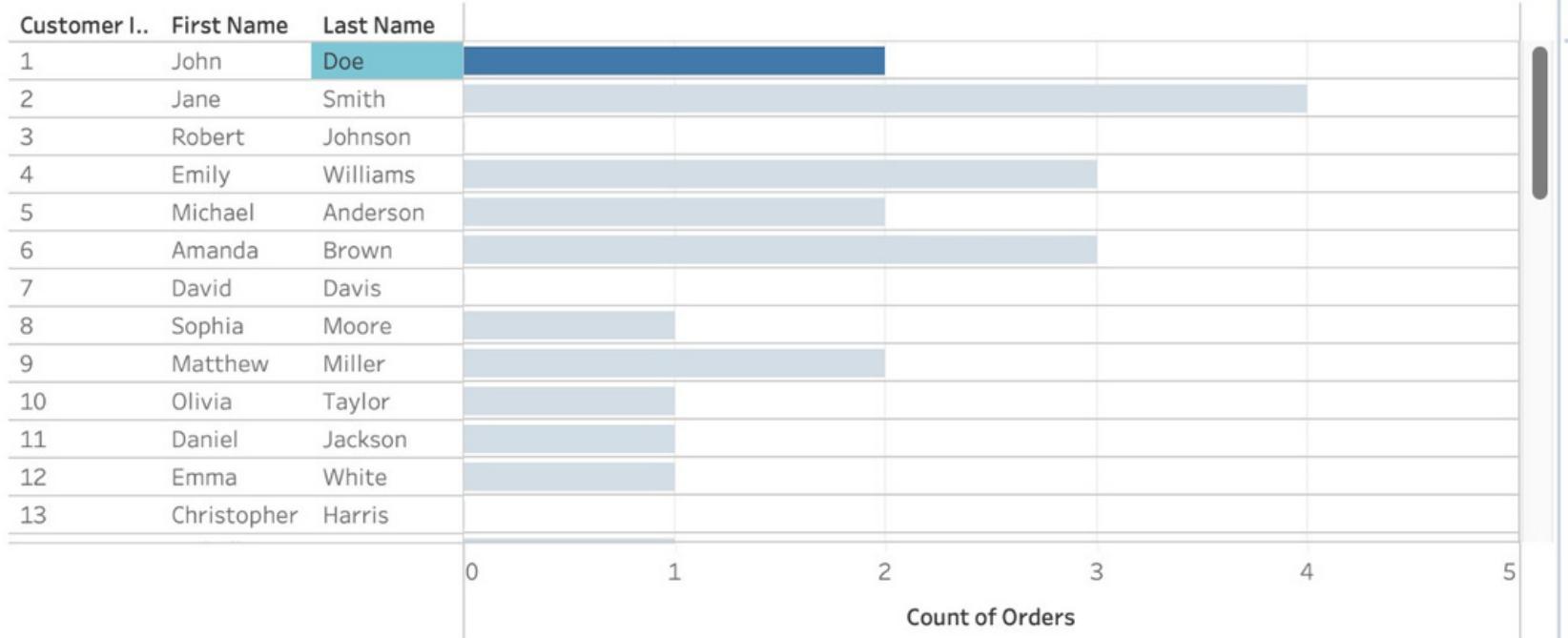
Customer Order Details



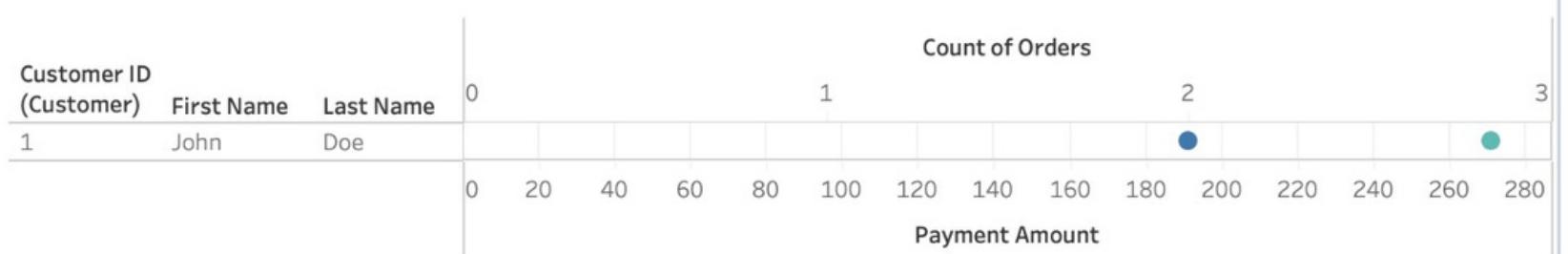
Measure Names

- Count of Orders
- Payment Amount

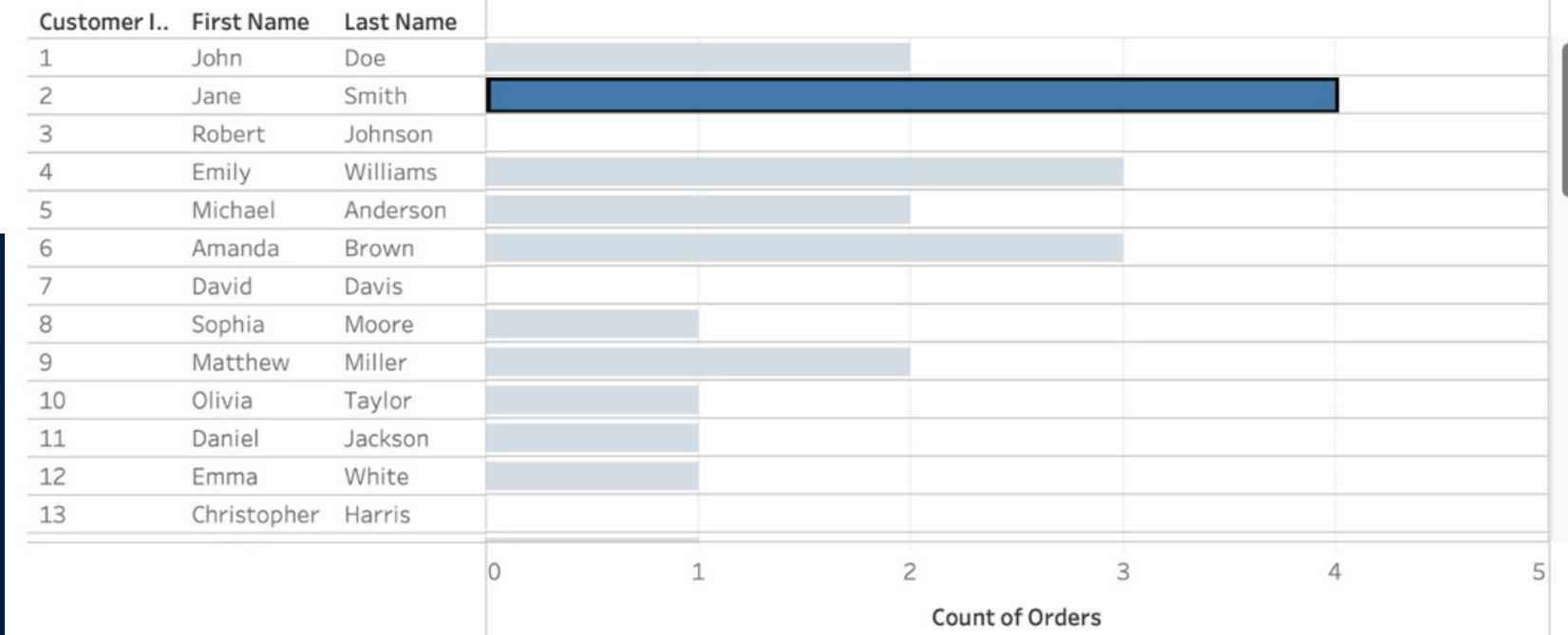
Customer Masterview



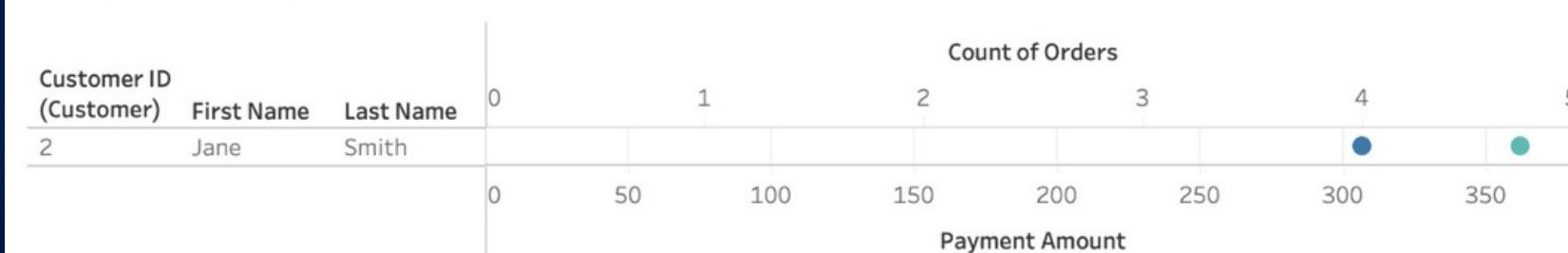
Customer Order Details



Customer Masterview



Customer Order Details



Product With Discount At

5

Customer
Savings

Cus..	=	Order ID	Produc..	Description	Product P..	Sale Price	Discou..	Savings
2		2	2	Powerful laptop ..	\$1,300.00	\$1,235.00	5	\$65.00
6		20	9	Versatile tablet ..	\$450.00	\$427.00	5	\$23.00
9		34	16	DIY solar panel k..	\$800.00	\$760.00	5	\$40.00
20		35	17	Energy-efficient ..	\$130.00	\$123.00	5	\$7.00
21		11	1	High-end smartp..	\$800.00	\$760.00	5	\$40.00
42		46	27	AR glasses for in..	\$500.00	\$475.00	5	\$25.00

\$200.00

Product With Discount At

8

Customer
Savings

Cus..	=	Order ID	Produc..	Description	Product P..	Sale Pr..	Discou..	Savings
25		13	6	Smartwatch wit..	\$300.00	\$276.00	8	\$24.00
45		23	11	Central hub for s..	\$150.00	\$138.00	8	\$12.00

\$36.00

Product Greater Than 500

Name	Description	Produc..	Sale Price	Category
3D Printer	Advanced 3D printer for creative projects.	15	770	
Augmented Reality Glasses	AR glasses for interactive augmented reality experiences.	27	900	
Digital Camera	High-resolution digital camera for photography enthusiasts.	5	1,026	Cameras
Drone Pro	Professional-grade drone for aerial photography and videography.	19	1,602	
Gaming Console X	Next-gen gaming console for immersive gaming experiences.	8	900	
Laptop Pro	Powerful laptop for professional use.	2	4,485	Laptops
Robot Vacuum	Smart vacuum cleaner with automated cleaning capabilities.	14	525	
Security Camera System	Home security camera system with multiple cameras.	20	950	
Smart Refrigerator	Refrigerator with smart features and touchscreen display.	13	2,475	
Smart TV 4K	Ultra HD Smart TV with a large screen.	3	1,810	
Smartphone X	High-end smartphone with advanced features.	1	1,120	Phones
Smartwatch Elite	Smartwatch with fitness tracking and notifications.	6	519	
Solar Panel Kit	DIY solar panel kit for eco-friendly energy.	16	2,960	
Tablet Pro	Versatile tablet with a high-resolution display.	9	877	

Streamline Shopping Experience

- Clear Product Descriptions
- User-Friendly Shopping
- Transparent Pricing
- Multiple Payment Options
- Post-Purchase Engagement
- Easy Returns and Exchanges

Management

Efficiently Manage Product Listing, Pricing, and Inventory

- Proper Tables & Fields
 - Product Listing
 - Pricing
 - Inventory
- Consider fields that may require another table
 - Ex - Product Attributes
 - color
 - size
- Trigger Implementation
 - Automatically update price with discounts
 - Reorder low-inventory items
- Efficiency
 - Database normalization(minimize redundancy)
 - Create a user-friendly UI to manage tables

Secure Data

- Data Encryption
- Stored Procedures
- Views for Limited Data Access
- Audit Trails
- Dynamic Data Masking

Customer Behavior Insights

- Customer Segmentation: Begin by categorizing customers into segments based on their purchasing behavior, such as high-value, regular, and one-time buyers.
- Data Visualization: Utilize Tableau to create visualizations depicting total purchase amounts by customer segments, popular products, and the effectiveness of discounts.
- Adaptive Strategies: Implement adaptive marketing strategies by analyzing customer buying behaviors, monitoring market trends, and regularly assessing inventory levels.

Conclusion

- Robust and secure transactional ecommerce database for Ocho Electronics
- Enhanced online shopping experience, streamlined operations, and valuable insights for business growth
- Implementation of this database will play a pivotal role in achieving OE's business goals

Thank You