

Retail Data Management



Jagruta Advani, Dhruv Arora, Rohan Giri, Sonali
Hornick, Deeksha Koonadi



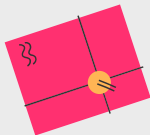
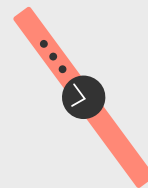


Table of contents



01

**Company
Overview**

02

OLTP

03

**Data
Warehouse**

04

Conclusion

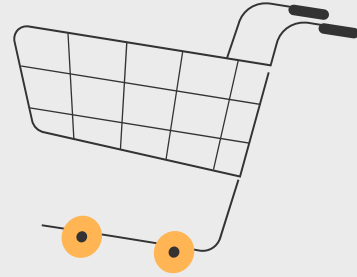
01

Company Overview





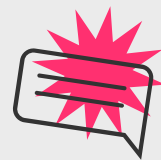
Company: Target



- Started in 1902
- Over 1900 stores with a wide range of products across apparel, electronic, home goods, and groceries
- Target customers are millennials and young families



Data Management Strategy



Offensive (75%)

- Improve
 - Customer engagement
 - Operational efficiency
 - Real-time insights

Defensive (25%)

- Ensure data privacy and security
 - Ensure compliance with regulations
 - Allow for operational consistency
-

Our Process

OLTP/WAREHOUSE BUILDING

- Focused on inventory, sales, and loyalty rewards (Target Cartwheel)
- Used **Lucid Charts** to build diagrams
- Showed relationships between inventory management and order fulfillment

DATA INSERTION

- Implemented DDL in Oracle
- Generated Mock Data and inserted into all tables
- Show the wide variety of payments, products, and customers



02

OLTPs



Sales & Payment Processing



Customer: customer information

SalesOrder: customer orders

SalesOrderItem: Links products to specific sales orders

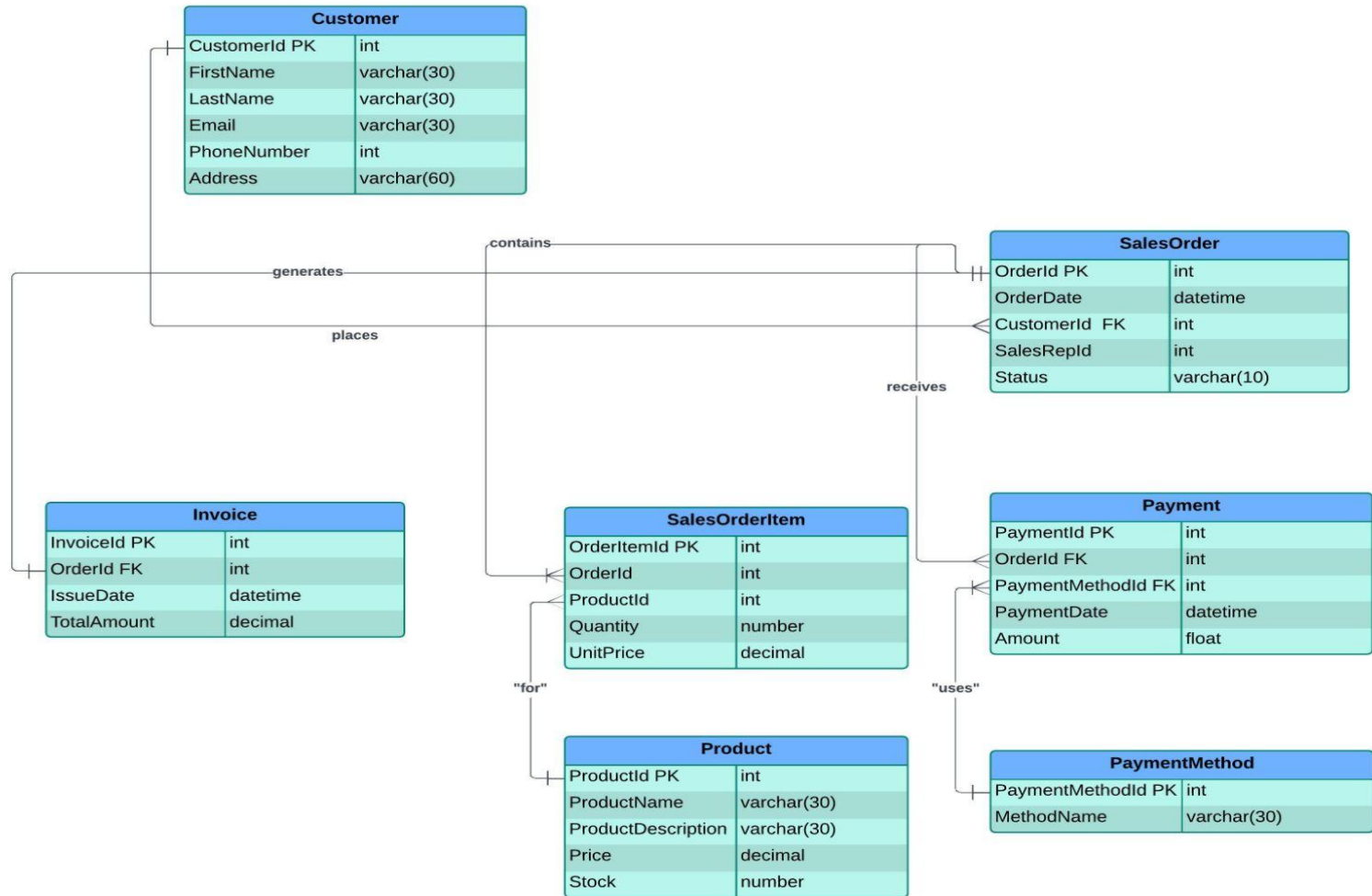
Product: Stores product details

Payment: Tracks payment details

PaymentMethod: Manages various payment options

Invoice: Tracks invoices





	⚡ CUSTOMERID	FIRSTNAME	⚡ LASTNAME	⚡ EMAIL	⚡ PHONENUMBER	⚡ ADDRESS
1	1	Alice	Johnson	alice.johnson@example.com	1234567890	123 Main St
2	2	Bob	Smith	bob.smith@example.com	2345678901	456 Elm St
3	3	Charlie	Brown	charlie.brown@example.com	3456789012	789 Oak St
4	4	Diana	Prince	diana.prince@example.com	4567890123	101 Maple St
5	5	Eve	Davis	eve.davis@example.com	5678901234	202 Pine St
6	6	Frank	Martin	frank.martin@example.com	6789012345	300 Birch St
7	7	Grace	Adams	grace.adams@example.com	7890123456	400 Willow St
8	8	Hank	Green	hank.green@example.com	8901234567	500 Aspen St
9	9	Ivy	White	ivy.white@example.com	9012345678	600 Cedar St
10	10	Jack	Black	jack.black@example.com	9123456789	700 Redwood St

	⚡ INVOICEID	⚡ ORDERID	⚡ ISSUEDATE	⚡ TOTALAMOUNT
1	1	1	1 01-NOV-23	699.99
2	2	2	2 02-NOV-23	999.99
3	3	3	3 03-NOV-23	199.99
4	4	4	4 04-NOV-23	49.99
5	5	5	5 05-NOV-23	89.99

	⚡ ORDERITEMID	⚡ ORDERID	⚡ PRODUCTID	⚡ QUANTITY	⚡ UNITPRICE
1	1	1	1	1	699.99
2	2	2	2	1	999.99
3	3	3	3	2	199.99

	⚡ ORDERID	⚡ ORDERDATE	⚡ CUSTOMERID	⚡ SALESREPID	⚡ STATUS
1	1	1 01-NOV-23	1	101	Completed
2	2	2 02-NOV-23	2	102	Pending
3	3	3 03-NOV-23	3	103	Cancelled
4	4	4 04-NOV-23	4	104	Completed
5	5	5 05-NOV-23	5	105	Pending

	⚡ PRODUCTID	⚡ PRODUCTNAME	⚡ PRODUCTDESCRIPTION	⚡ PRICE	⚡ STOCK
1	1	Smartphone	Latest model smartphone	699.99	50
2	2	Laptop	High-performance laptop	999.99	30
3	3	Headphones	Noise-cancelling headphones	199.99	100
4	4	Mouse	Wireless mouse	49.99	200
5	5	Keyboard	Mechanical keyboard	89.99	150
6	6	Tablet	High-resolution tablet	499.99	75
7	7	Monitor	27-inch 4K monitor	349.99	40
8	8	Speaker	Portable Bluetooth speaker	129.99	120
9	9	Printer	All-in-one laser printer	199.99	25
10	10	Camera	DSLR camera with 4K video	899.99	20
11	12	Gaming Console	Next-gen gaming console	499.99	60
12	13	Router	High-speed wireless router	89.99	150
13	14	Smart TV	55-inch 4K Smart TV	599.99	40
14	15	Electric Kettle	1.7L stainless steel kettle	39.99	120
15	16	Coffee Maker	Programmable coffee maker	79.99	50
16	17	Hair Dryer	Ionic hair dryer with diffuser	49.99	80
17	18	Vacuum Cleaner	Robot vacuum with Wi-Fi	249.99	30
18	19	Air Purifier	HEPA air purifier	129.99	45
19	20	Blender	High-performance blender	99.99	55

	⚡ PAYMENTID	⚡ ORDERID	⚡ PAYMENTMETHODID	⚡ PAYMENTDATE	⚡ AMOUNT
1	1	1	1	1 01-NOV-23	699.99
2	2	2	2	2 02-NOV-23	999.99
3	3	3	3	3 03-NOV-23	199.99

	⚡ PAYMENTMETHODID	⚡ METHODNAME
1	1	Credit Card
2	2	Debit Card
3	3	PayPal
4	4	Bank Transfer
5	5	Cash



Customer Loyalty and Engagement



LoyaltyProgram: Tracks customer loyalty details

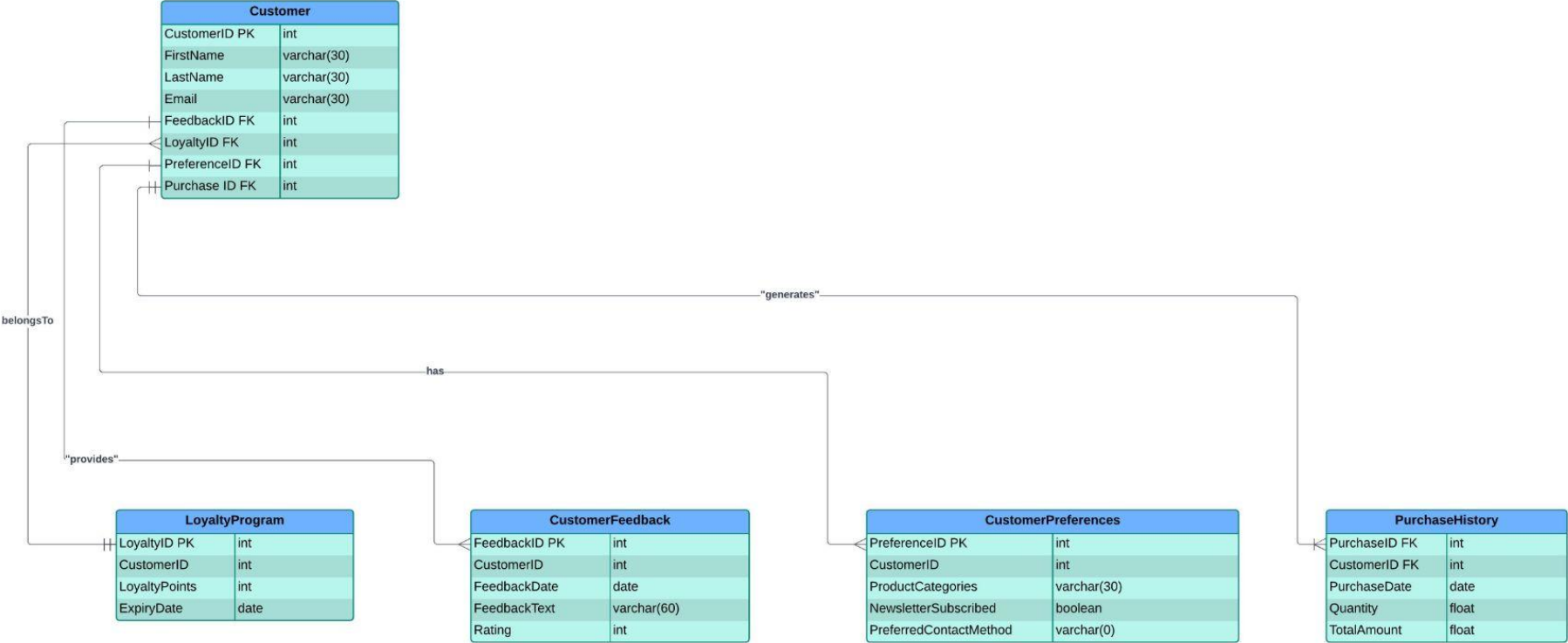
Customer: Stores customer personal information

PurchaseHistory: Maintains a record of customer purchases

CustomerFeedback: Captures feedback

CustomerPreferences: Records customer preferences





	❖ CUSTOMERID	❖ FIRSTNAME	❖ LASTNAME	❖ EMAIL	❖ FEEDBACKID	❖ LOYALTYID	❖ PREFERENCEID	❖ PURCHASEID
19	19	Sophia	Evans	sophia.evans@example.com	119	19	219	319
20	20	Tom	Bennett	tom.bennett@example.com	120	20	220	320
21	21	Uma	Scott	uma.scott@example.com	121	21	221	321
22	22	Victor	Mills	victor.mills@example.com	122	22	222	322
23	23	Wendy	Gray	wendy.gray@example.com	123	23	223	323
24	24	Xander	Taylor	xander.taylor@example.com	124	24	224	324
25	25	Yasmine	Hall	yasmine.hall@example.com	125	25	225	325
26	26	Zane	Lee	zane.lee@example.com	126	26	226	326
27	27	Alice	Ford	alice.ford@example.com	127	27	227	327
28	28	Bob	Grant	bob.grant@example.com	128	28	228	328
29	29	Chris	Howard	chris.howard@example.com	129	29	229	329
30	30	Dana	Ivy	dana.ivy@example.com	130	30	230	330
31	31	Ella	James	ella.james@example.com	131	31	231	331
32	32	Finn	Taylor	finn.taylor@example.com	132	32	232	332
33	33	Grace	Moore	grace.moore@example.com	133	33	233	333
34	34	Harry	Cooper	harry.cooper@example.com	134	34	234	334
35	35	Ivy	Clark	ivy.clark@example.com	135	35	235	335
36	36	Jake	Miller	jake.miller@example.com	136	36	236	336
37	37	Karen	Anderson	karen.anderson@example.com	137	37	237	337
38	38	Liam	Taylor	liam.taylor@example.com	138	38	238	338
39	39	Mia	Harris	mia.harris@example.com	139	39	239	339
40	40	Noah	Martinez	noah.martinez@example.com	140	40	240	340

	❖ LOYALTYID	❖ CUSTOMERID	❖ LOYALTYPPOINTS	❖ EXPIRYDATE
1	1	1	500	31-DEC-24
2	2	2	300	30-NOV-24
3	3	3	700	15-JAN-25
4	4	4	250	15-OCT-24
5	5	5	1000	20-MAY-25
6	6	6	400	01-JAN-25
7	7	7	350	01-MAR-25
8	8	8	600	30-JUN-25
9	9	9	500	15-SEP-25
10	10	10	700	31-DEC-25

	❖ FEEDBACKID	❖ CUSTOMERID	❖ FEEDBACKDATE	❖ FEEDBACKTEXT	❖ RATING
1	101	1	05-NOV-23	Great service and fast delivery!	5
2	102	2	06-NOV-23	Satisfied with the product.	4
3	103	3	07-NOV-23	Good quality, but delivery was late.	3
4	104	4	08-NOV-23	Product not as described.	2
5	105	5	09-NOV-23	Exceptional product and service!	5

	❖ PURCHASEID	❖ CUSTOMERID	❖ PURCHASEDATE	❖ QUANTITY	❖ TOTALAMOUNT
1	301	1	01-NOV-23	2	1399.98
2	302	2	02-NOV-23	1	999.99
3	303	3	03-NOV-23	3	599.97
4	304	4	04-NOV-23	1	49.99
5	305	5	05-NOV-23	1	89.99

	❖ PREFERENCEID	❖ CUSTOMERID	❖ PRODUCTCATEGORIES	❖ NEWSLETTERSUBSCRIBED	❖ PREFERREDCONTACTMETHOD
1	201	1	Electronics	Y	Email
2	202	2	Accessories	N	Phone
3	203	3	Home Appliances	Y	Email
4	204	4	Clothing	N	Phone
5	205	5	Furniture	Y	Email



Fulfillment and Inventory Management



Inventory: Manages stock levels

Order: Tracks customer orders

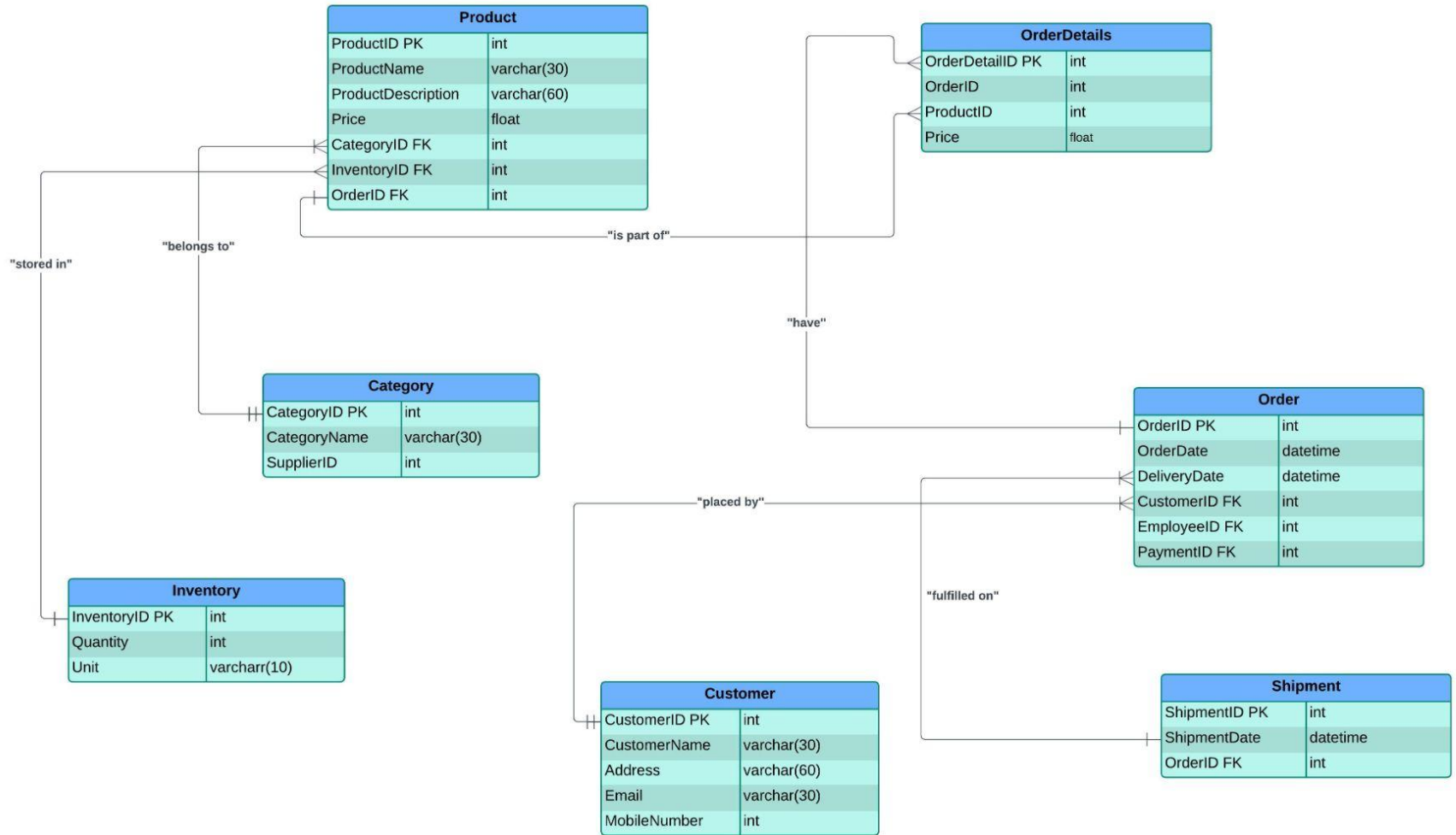
OrderDetails: Links products to specific orders

Product: Stores product information

Category: Organizes products into categories

Shipment: Tracks details of shipments





	PRODUCTID	PRODUCTNAME	PRODUCTDESCRIPTION	PRICE	CATEGORYID	INVENTORYID	ORDERID	CATEGORYID	CATEGORYNAME	SUPPLIERID
1	1	Smartphone	Latest model smartphone	699.99	1	1	1	1	Electronics	301
2	2	Laptop	High-performance laptop	999.99	1	2	2	2	Home Appliances	302
3	3	Microwave	Compact microwave oven	199.99	2	3	3	3	Furniture	303
4	4	Sofa	Comfortable 3-seater sofa	499.99	3	4	4	4	Clothing	304
5	5	Action Figure	Superhero action figure	19.99	5	5	5	5	Toys	305

	ORDERDETAILID	ORDERID	PRODUCTID	PRICE
1	1	1	1	699.99
2	2	2	2	999.99
3	3	3	3	199.99
4	4	4	4	499.99
5	5	5	5	19.99

	INVENTORYID	QUANTITY	UNIT
1	1	100	Units
2	2	200	Units
3	3	150	Units
4	4	250	Units
5	5	300	Units

	SHIPMENTID	SHIPMENTDATE	ORDERID
1	1	06-DEC-23	1
2	2	07-DEC-23	2
3	3	08-DEC-23	3
4	4	09-DEC-23	4
5	5	16-DEC-23	5

	CUSTOMERID	CUSTOMERNAME	ADDRESS	EMAIL	MOBILENUMBER
1	1	Alice Johnson	123 Elm Street	alice.johnson@example.com	555-1234
2	2	Bob Smith	456 Oak Avenue	bob.smith@example.com	555-5678
3	3	Charlie Brown	789 Maple Drive	charlie.brown@example.com	555-9101
4	4	Diana Prince	321 Birch Lane	diana.prince@example.com	555-1122
5	5	Emma Davis	567 Pine Street	emma.davis@example.com	555-2233
6	6	Oliver Brown	890 Cedar Avenue	oliver.brown@example.com	555-3344
7	7	Sophia Wilson	123 Birch Lane	sophia.wilson@example.com	555-4455
8	8	Liam Martinez	456 Maple Drive	liam.martinez@example.com	555-5566
9	9	Noah Clark	789 Birch Street	noah.clark@example.com	555-6677
10	10	Mia Anderson	567 Oak Avenue	mia.anderson@example.com	555-7788

	ORDERID	ORDERDATE	DELIVERYDATE	CUSTOMERID	EMPLOYEEID	PAYMENTID
1	1	01-DEC-23	05-DEC-23	1	101	201
2	2	02-DEC-23	06-DEC-23	2	102	202
3	3	03-DEC-23	07-DEC-23	3	103	203
4	4	04-DEC-23	08-DEC-23	4	104	204
5	5	10-DEC-23	15-DEC-23	5	105	205

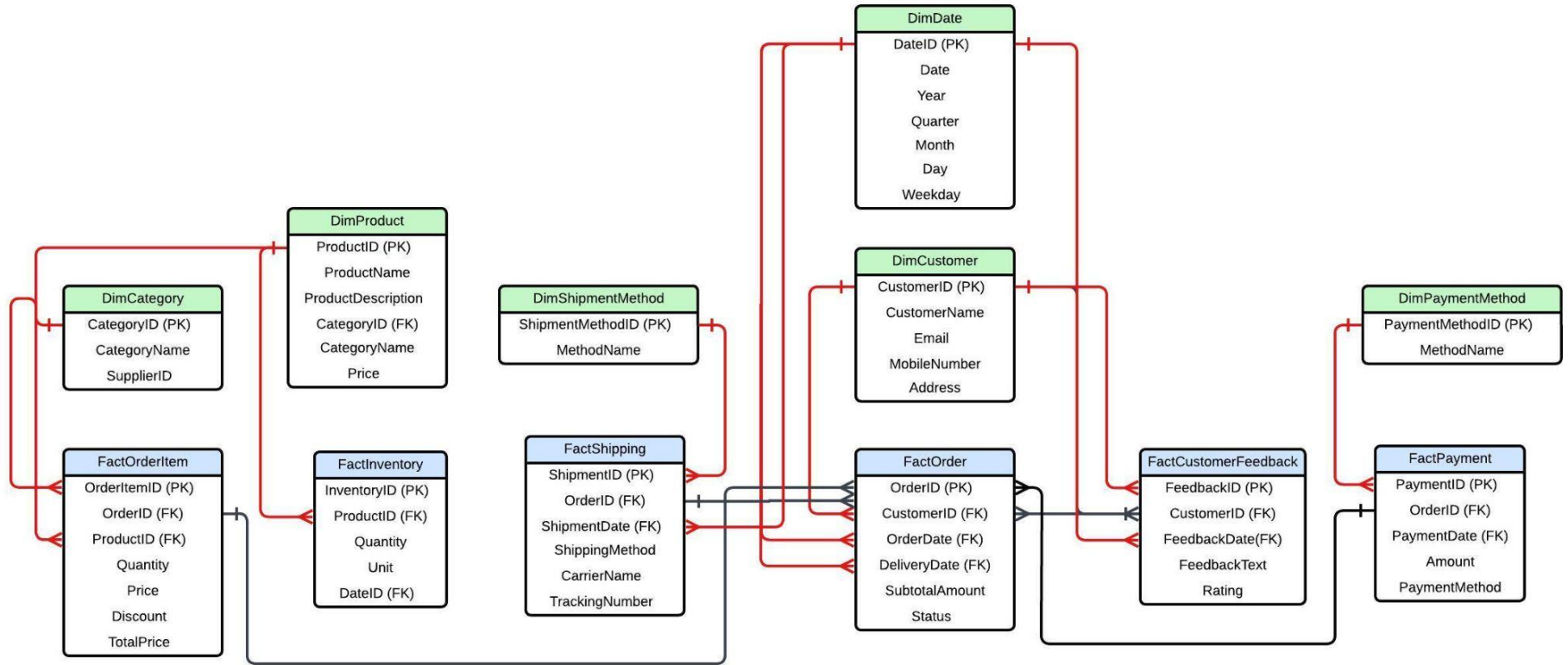


03



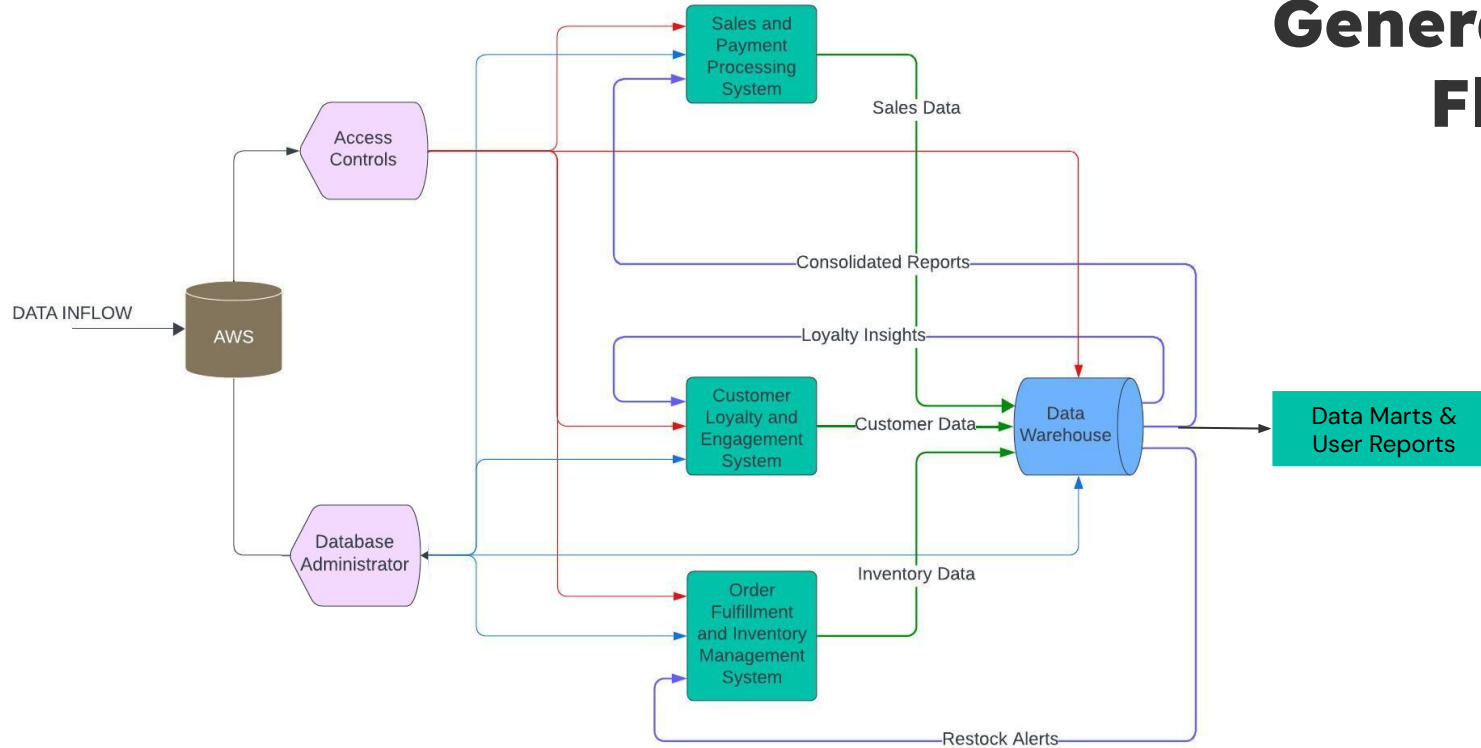
Data Warehous e







General Data Flow



EDA

DATA EXPLORATION



Fulfillment and Inventory Management

```
SELECT p.ProductID, p.ProductName, COUNT(od.ProductID) AS OrderCount
FROM Product p
JOIN OrderDetails od ON p.ProductID = od.ProductID
GROUP BY p.ProductID, p.ProductName
ORDER BY OrderCount DESC
FETCH FIRST 5 ROWS ONLY;
```

Script Output × Query Result × Query Result 1 × Query Result 2

SQL | All Rows Fetched: 5 in 0.017 seconds

	PRODUCTID	PRODUCTNAME	ORDERCOUNT
1	32	Fiction Book	9
2	7	Lipstick	6
3	19	Knife Set	4
4	110	Lip Gloss	4
5	26	Football	3

```
SELECT c.CategoryID, c.CategoryName, COUNT(od.ProductID) AS TotalOrders
FROM Category c
JOIN Product p ON c.CategoryID = p.CategoryID
JOIN OrderDetails od ON p.ProductID = od.ProductID
GROUP BY c.CategoryID, c.CategoryName
ORDER BY TotalOrders DESC
FETCH FIRST 5 ROWS ONLY;
```

Script Output × Query Result × Query Result 1 × Query Result 2 ×

SQL | All Rows Fetched: 5 in 0.025 seconds

	CATEGORYID	CATEGORYNAME	TOTALORDERS
1	7	Beauty Products	20
2	32	Books	9
3	19	Kitchenware	4
4	5	Toys	3
5	26	Sports	3

REASON

SHIPMENTCOUNT

1 Most Popular Product

3

2 Most Popular Category

5

Sales and Payment Processing

```
SELECT pm.MethodName, COUNT(p.PaymentID) AS PaymentCount
FROM Payment p
JOIN PaymentMethod pm ON p.PaymentMethodID = pm.PaymentMethodID
GROUP BY pm.MethodName
ORDER BY PaymentCount DESC
FETCH FIRST 1 ROWS ONLY;
```

Script Output x Query Result x
SQL | All Rows Fetched: 1 in 0.047 seconds

METHODNAME	PAYMENTCOUNT
1 Credit Card	5

```
SELECT
  c.CustomerID,
  c.FirstName,
  c.LastName,
  pm.MethodName AS PaymentMethod,
  SUM(p.Amount) AS TotalPaid
FROM
  Customer c
JOIN
  SalesOrder so ON c.CustomerID = so.CustomerID
JOIN
  Payment p ON so.OrderID = p.OrderID
JOIN
  PaymentMethod pm ON p.PaymentMethodID = pm.PaymentMethodID
GROUP BY
  c.CustomerID, c.FirstName, c.LastName, pm.MethodName
ORDER BY
  TotalPaid DESC
FETCH FIRST 2 ROWS ONLY;
```

Script Output x Query Result x Query Result 1 x Query Result 2 x
SQL | All Rows Fetched: 2 in 0.025 seconds

CUSTOMERID	FIRSTNAME	LASTNAME	PAYMENTMETHOD	TOTALPAID
1	2 Bob	Smith	Debit Card	999.99
2	8 Hank	Green	PayPal	899.99

CUSTOMERID	FIRSTNAME	LASTNAME	ORDERCOUNT
1	8 Hank	Green	2
2	33 Grace	Moore	1
3	13 Maya	Carter	1

CUSTOMERID	FIRSTNAME	LASTNAME	TOTALPAID
1	8 Hank	Green	1029.98
2	2 Bob	Smith	999.99
3	10 Jack	Black	899.99

showing popular payment methods, customers who spent the most and the method they used to pay for those purchases

```
SELECT
  c.CustomerID,
  c.FirstName,
  c.LastName,
  pm.MethodName AS PaymentMethod,
  p.Amount AS PaymentAmount,
  p.PaymentDate
FROM
  Customer c
JOIN
  SalesOrder so ON c.CustomerID = so.CustomerID
JOIN
  Payment p ON so.OrderID = p.OrderID
JOIN
  PaymentMethod pm ON p.PaymentMethodID = pm.PaymentMethodID
WHERE
  c.CustomerID = 8;
```

Script Output x Query Result x Query Result 1 x Query Result 2 x Query Result 3 x
SQL | All Rows Fetched: 2 in 0.017 seconds

CUSTOMERID	FIRSTNAME	LASTNAME	PAYMENTMETHOD	PAYMENTAMOUNT	PAYMENTDATE
1	8 Hank	Green	Credit Card	129.99	08-NOV-23
2	8 Hank	Green	PayPal	899.99	22-DEC-23

Customer Engagement and

Loyalty

Worksheet | Query Builder

`select * from customer`

Script Output x | Query Result x

All Rows Fetched: 40 in 0.059 seconds

	CUSTOMERID	FIRSTNAME	LASTNAME	EMAIL	FEEDBACKID	LOYALTYID	PREFERENCEID	PURCHASEID
1	1	Alice	Johnson	alice.johnson@example.com	101	1	201	301
2	2	Bob	Smith	bob.smith@example.com	102	2	202	302
3	3	Charlie	Brown	charlie.brown@example.com	103	3	203	303
4	4	Diana	Prince	diana.prince@example.com	104	4	204	304
5	5	Eve	Davis	eve.davis@example.com	105	5	205	305
6	6	Frank	Martin	frank.martin@example.com	106	6	206	306
7	7	Grace	Adams	grace.adams@example.com	107	7	207	307
8	8	Hank	Green	hank.green@example.com	108	8	208	308
9	9	Ivy	White	ivy.white@example.com	109	9	209	309
10	10	Jack	Black	jack.black@example.com	110	10	210	310

We can have customers that have made purchases who are not loyalty members → we can use this information to develop marketing strategies to incentivize these members to become apart of the loyalty program

```
SELECT DISTINCT c.CustomerID, c.FirstName, c.LastName, c.Email, p.purchaseid
FROM Customer c
JOIN PurchaseHistory p ON c.CustomerID = p.CustomerID
WHERE c.CustomerID IN (
  SELECT lp.CustomerID
  FROM LoyaltyProgram lp
);
```

Script Output x | Query Result x

All Rows Fetched: 35 in 0.021 seconds

	CUSTOMERID	FIRSTNAME	LASTNAME	EMAIL	PURCHASEID
1	13	Maya	Carter	maya.carter@example.com	313
2	18	Ryan	Walker	ryan.walker@example.com	318
3	19	Sophia	Evans	sophia.evans@example.com	319
4	20	Tom	Bennett	tom.bennett@example.com	320
5	31	Ella	James	ella.james@example.com	331
6	32	Finn	Taylor	finn.taylor@example.com	332
7	1	Alice	Johnson	alice.johnson@example.com	301
8	10	Jack	Black	jack.black@example.com	310
9	11	Kelly	Johnson	kelly.johnson@example.com	311
10	22	Victor	Mills	victor.mills@example.com	322

Customer Loyalty Engagement and Sales and Payment Processing

	LOYALCUSTOMERSWITHPURCHASES
1	34

	CUSTOMERTYPE	PURCHASECOUNT	TOTALSPENT
1	Loyalty Member	35	16599.29

	CUSTOMERID	FIRSTNAME	LASTNAME	FEEDBACKTEXT	RATING	PURCHASEID	TOTALAMOUNT
1	1	Alice	Johnson	Great service and fast delivery!	5	301	1399.98
2	2	Bob	Smith	Satisfied with the product.	4	302	999.99
3	3	Charlie	Brown	Good quality, but delivery was late.	3	303	599.97
4	4	Diana	Prince	Product not as described.	2	304	49.99
5	5	Eve	Davis	Exceptional product and service!	5	305	89.99





Role Access Matrix

Table/Role ▼	Inventory Manager ▼	Warehouse Staff ▼	Procurement Officer ▼	Store Manager ▼	Sales Associate ▼	Finance Analyst ▼	IT Admin ▼	Auditor ▼
Products	Create, Read, Update, Delete	Read	Create, Read, Update	Read	Read	Read	Create, Read, Update, Delete	Read
Warehouse	Create, Read, Update, Delete	Read	Read	Read	Read	Read	Create, Read, Update, Delete	Read
Inventory	Create, Read, Update	Read, Update	No Access	Read	No Access	Read	Create, Read, Update, Delete	Read
Suppliers	Create, Read, Update, Delete	No Access	Create, Read, Update, Delete	No Access	No Access	Read	Create, Read, Update, Delete	Read
ProductSupplier	Create, Read, Update, Delete	No Access	Create, Read, Update	No Access	No Access	No Access	Create, Read, Update, Delete	Read
Orders	Read, Update	No Access	Create, Read, Update	Read	No Access	No Access	Create, Read, Update, Delete	Read
OrderDetails	Create, Read, Update	No Access	Create, Read	Read	No Access	No Access	Create, Read, Update, Delete	Read
Deliveries	Create, Read, Update	Create, Read	No Access	Read	No Access	No Access	Create, Read, Update, Delete	Read

Working with Data

Semi Structured vs Unstructured

Social Media Data:

- semi-structured data to expand our online presence
- Scraping customer reviews to get customer sentiment

BENEFIT: customer sentiment

In-Store Audio/Video Data

- unstructured data

BENEFIT: Insights into customer concerns and operational inefficiencies and improving self-checkout



Data Governance

- Data Stewardship
- Data Security
- MDM
- Data Governance Council
- Training



04

Conclusion



Takeaways

What did you learn?

- Importance of balancing offensive and defensive strategies
- Separation of transactional applications from data warehouses

What was most valuable?

- Data Security Matrix
- MDM → maintain data consistency and quality

Future Work:

- Manage data as it is generated from multiple sources



Thanks!

Questions? Comments? Concerns?

