

**Figure 1** shows the initial state of the data, with highlighted areas indicating missing values and duplicates.

(Select All)

☐ Ahmedabad

☐ Andhra Pradesh

☒ Bangalore

☒ Bangalore, Karnataka

☒ Bangalore

☒ Bangalore, Karnataka

Location

Odisha,Bhubaneswar

Bhubaneswar, odisha

bhubaneswar,odisha,India

Odisha,Bhubaneswar

Bhubaneswar, odisha

bhubaneswar,odisha,India

Odisha,Bhubaneswar

Bhubaneswar, odisha

What is your favorite game?

Call of duty

Call of duty

call of duty

CALL OF DUTY

Call of duty

Call of duty

call of duty

Figures 2 and 3 show the inconsistent data, on 'Location' field.

Figure 4 shows the inconsistent data on 'What is your favorite game?' field.

Transaction ID	Customer ID	Product ID	Transaction Date	Amount	Location	Game
1	1	1	2019-01-01	100	Bhubaneswar, odisha	Call of duty
2	2	2	2019-01-02	200	Bhubaneswar, odisha	Call of duty
3	3	3	2019-01-03	300	Bhubaneswar, odisha	Call of duty
4	4	4	2019-01-04	400	Bhubaneswar, odisha	Call of duty
5	5	5	2019-01-05	500	Bhubaneswar, odisha	Call of duty
6	6	6	2019-01-06	600	Bhubaneswar, odisha	Call of duty
7	7	7	2019-01-07	700	Bhubaneswar, odisha	Call of duty
8	8	8	2019-01-08	800	Bhubaneswar, odisha	Call of duty
9	9	9	2019-01-09	900	Bhubaneswar, odisha	Call of duty
10	10	10	2019-01-10	1000	Bhubaneswar, odisha	Call of duty
11	11	11	2019-01-11	1100	Bhubaneswar, odisha	Call of duty
12	12	12	2019-01-12	1200	Bhubaneswar, odisha	Call of duty
13	13	13	2019-01-13	1300	Bhubaneswar, odisha	Call of duty
14	14	14	2019-01-14	1400	Bhubaneswar, odisha	Call of duty
15	15	15	2019-01-15	1500	Bhubaneswar, odisha	Call of duty
16	16	16	2019-01-16	1600	Bhubaneswar, odisha	Call of duty
17	17	17	2019-01-17	1700	Bhubaneswar, odisha	Call of duty
18	18	18	2019-01-18	1800	Bhubaneswar, odisha	Call of duty
19	19	19	2019-01-19	1900	Bhubaneswar, odisha	Call of duty
20	20	20	2019-01-20	2000	Bhubaneswar, odisha	Call of duty
21	21	21	2019-01-21	2100	Bhubaneswar, odisha	Call of duty
22	22	22	2019-01-22	2200	Bhubaneswar, odisha	Call of duty
23	23	23	2019-01-23	2300	Bhubaneswar, odisha	Call of duty
24	24	24	2019-01-24	2400	Bhubaneswar, odisha	Call of duty
25	25	25	2019-01-25	2500	Bhubaneswar, odisha	Call of duty
26	26	26	2019-01-26	2600	Bhubaneswar, odisha	Call of duty
27	27	27	2019-01-27	2700	Bhubaneswar, odisha	Call of duty
28	28	28	2019-01-28	2800	Bhubaneswar, odisha	Call of duty
29	29	29	2019-01-29	2900	Bhubaneswar, odisha	Call of duty
30	30	30	2019-01-30	3000	Bhubaneswar, odisha	Call of duty
31	31	31	2019-01-31	3100	Bhubaneswar, odisha	Call of duty
32	32	32	2019-02-01	3200	Bhubaneswar, odisha	Call of duty
33	33	33	2019-02-02	3300	Bhubaneswar, odisha	Call of duty
34	34	34	2019-02-03	3400	Bhubaneswar, odisha	Call of duty
35	35	35	2019-02-04	3500	Bhubaneswar, odisha	Call of duty
36	36	36	2019-02-05	3600	Bhubaneswar, odisha	Call of duty
37	37	37	2019-02-06	3700	Bhubaneswar, odisha	Call of duty
38	38	38	2019-02-07	3800	Bhubaneswar, odisha	Call of duty
39	39	39	2019-02-08	3900	Bhubaneswar, odisha	Call of duty
40	40	40	2019-02-09	4000	Bhubaneswar, odisha	Call of duty
41	41	41	2019-02-10	4100	Bhubaneswar, odisha	Call of duty
42	42	42	2019-02-11	4200	Bhubaneswar, odisha	Call of duty
43	43	43	2019-02-12	4300	Bhubaneswar, odisha	Call of duty
44	44	44	2019-02-13	4400	Bhubaneswar, odisha	Call of duty
45	45	45	2019-02-14	4500	Bhubaneswar, odisha	Call of duty
46	46	46	2019-02-15	4600	Bhubaneswar, odisha	Call of duty
47	47	47	2019-02-16	4700	Bhubaneswar, odisha	Call of duty
48	48	48	2019-02-17	4800	Bhubaneswar, odisha	Call of duty
49	49	49	2019-02-18	4900	Bhubaneswar, odisha	Call of duty
50	50	50	2019-02-19	5000	Bhubaneswar, odisha	Call of duty
51	51	51	2019-02-20	5100	Bhubaneswar, odisha	Call of duty
52	52	52	2019-02-21	5200	Bhubaneswar, odisha	Call of duty
53	53	53	2019-02-22	5300	Bhubaneswar, odisha	Call of duty
54	54	54	2019-02-23	5400	Bhubaneswar, odisha	Call of duty
55	55	55	2019-02-24	5500	Bhubaneswar, odisha	Call of duty
56	56	56	2019-02-25	5600	Bhubaneswar, odisha	Call of duty
57	57	57	2019-02-26	5700	Bhubaneswar, odisha	Call of duty
58	58	58	2019-02-27	5800	Bhubaneswar, odisha	Call of duty
59	59	59	2019-02-28	5900	Bhubaneswar, odisha	Call of duty
60	60	60	2019-02-29	6000	Bhubaneswar, odisha	Call of duty
61	61	61	2019-03-01	6100	Bhubaneswar, odisha	Call of duty
62	62	62	2019-03-02	6200	Bhubaneswar, odisha	Call of duty
63	63	63	2019-03-03	6300	Bhubaneswar, odisha	Call of duty
64	64	64	2019-03-04	6400	Bhubaneswar, odisha	Call of duty
65	65	65	2019-03-05	6500	Bhubaneswar, odisha	Call of duty
66	66	66	2019-03-06	6600	Bhubaneswar, odisha	Call of duty
67	67	67	2019-03-07	6700	Bhubaneswar, odisha	Call of duty
68	68	68	2019-03-08	6800	Bhubaneswar, odisha	Call of duty
69	69	69	2019-03-09	6900	Bhubaneswar, odisha	Call of duty
70	70	70	2019-03-10	7000	Bhubaneswar, odisha	Call of duty
71	71	71	2019-03-11	7100	Bhubaneswar, odisha	Call of duty
72	72	72	2019-03-12	7200	Bhubaneswar, odisha	Call of duty
73	73	73	2019-03-13	7300	Bhubaneswar, odisha	Call of duty
74	74	74	2019-03-14	7400	Bhubaneswar, odisha	Call of duty
75	75	75	2019-03-15	7500	Bhubaneswar, odisha	Call of duty
76	76	76	2019-03-16	7600	Bhubaneswar, odisha	Call of duty
77	77	77	2019-03-17	7700	Bhubaneswar, odisha	Call of duty
78	78	78	2019-03-18	7800	Bhubaneswar, odisha	Call of duty
79	79	79	2019-03-19	7900	Bhubaneswar, odisha	Call of duty
80	80	80	2019-03-20	8000	Bhubaneswar, odisha	Call of duty
81	81	81	2019-03-21	8100	Bhubaneswar, odisha	Call of duty
82	82	82	2019-03-22	8200	Bhubaneswar, odisha	Call of duty
83	83	83	2019-03-23	8300	Bhubaneswar, odisha	Call of duty
84	84	84	2019-03-24	8400	Bhubaneswar, odisha	Call of duty
85	85	85	2019-03-25	8500	Bhubaneswar, odisha	Call of duty
86	86	86	2019-03-26	8600	Bhubaneswar, odisha	Call of duty
87	87	87	2019-03-27	8700	Bhubaneswar, odisha	Call of duty
88	88	88	2019-03-28	8800	Bhubaneswar, odisha	Call of duty
89	89	89	2019-03-29	8900	Bhubaneswar, odisha	Call of duty
90	90	90	2019-03-30	9000	Bhubaneswar, odisha	Call of duty
91	91	91	2019-03-31	9100	Bhubaneswar, odisha	Call of duty
92	92	92	2019-04-01	9200	Bhubaneswar, odisha	Call of duty
93	93	93	2019-04-02	9300	Bhubaneswar, odisha	Call of duty
94	94	94	2019-04-03	9400	Bhubaneswar, odisha	Call of duty
95	95	95	2019-04-04	9500	Bhubaneswar, odisha	Call of duty
96	96	96	2019-04-05	9600	Bhubaneswar, odisha	Call of duty
97	97	97	2019-04-06	9700	Bhubaneswar, odisha	Call of duty
98	98	98	2019-04-07	9800	Bhubaneswar, odisha	Call of duty
99	99	99	2019-04-08	9900	Bhubaneswar, odisha	Call of duty
100	100	100	2019-04-09	10000	Bhubaneswar, odisha	Call of duty

Figure 5 shows the final state of the data, after changes.

## 2. Database Schema Design with SQL as a DDL

### Schema Design

A star schema was chosen to optimize data performance and quality. The central fact table holds transaction data, while dimension tables cover customers, products, and dates. This structure supports efficient querying, reducing redundancy (as seen in figure 10).

### Table Definitions

- **Customers Table:** Contains unique customer IDs, names, and locations (as seen in figure 6).
- **Products Table:** Includes product IDs, names, and category information (as seen in figure 6).
- **Transactions Table:** Holds transaction ID, customer ID (foreign key), product ID (foreign key), transaction date, and amount (as seen in figure 6).

\*Assumptions\*: Data types include integers for IDs, decimals for amounts, and strings for descriptive fields. The Date from Transactions table is in DATE format to enable efficient querying.

### SQL DDL and DML Commands

The sample SQL commands used to define these tables, to add some sample data can be seen in Figure 6:

```

1  -- Create tables
2  CREATE TABLE Customers (
3      CustomerID INT PRIMARY KEY,
4      Name VARCHAR(100),
5      Age INT,
6      Location VARCHAR(50)
7  );
8
9  CREATE TABLE Products (
10     ProductID INT PRIMARY KEY,
11     ProductName VARCHAR(100),
12     Category VARCHAR(50)
13 );
14
15 CREATE TABLE Transactions (
16     TransactionID INT PRIMARY KEY,
17     CustomerID INT,
18     ProductID INT,
19     TransactionDate DATE,
20     Amount DECIMAL(10, 2),
21     FOREIGN KEY (CustomerID) REFERENCES Customers(CustomerID),
22     FOREIGN KEY (ProductID) REFERENCES Products(ProductID)
23 );
24
25 -- Insert data into Customers
26 INSERT INTO Customers (CustomerID, Name, Age, Location) VALUES
27 (1, 'John Doe', 30, 'New York'),
28 (2, 'Jane Smith', 25, 'Los Angeles'),
29 (3, 'Alice Brown', 28, 'Chicago');
30
31 -- Insert data into Products
32 INSERT INTO Products (ProductID, ProductName, Category) VALUES
33 (1, 'Laptop', 'Electronics'),
34 (2, 'Coffee Maker', 'Appliances'),
35 (3, 'Book', 'Literature');
36
37 -- Insert data into Transactions
38 INSERT INTO Transactions (TransactionID, CustomerID, ProductID, TransactionDate, Amount) VALUES
39 (1, 1, 1, '2023-10-01', 1200.00),
40 (2, 2, 2, '2023-10-02', 150.50),
41 (3, 3, 3, '2023-10-03', 20.00);
42
43 -- Show all customers
44 SELECT * FROM Customers;
45
46 -- Show all products
47 SELECT * FROM Products;
48
49 SELECT
50     t.TransactionID,
51     c.Name,
52     p.ProductName as Product,
53     t.TransactionDate as Date,
54     t.Amount
55 FROM
56     Transactions t
57 JOIN
58     Customers c, Products p
59 ON
60     t.CustomerID = c.CustomerID AND t.ProductID = p.ProductID

```

**Figure 6** shows the MySQL queries to create the tables: Customers, Products, Transactions, queries to add some sample data and queries to show the data from the tables

CustomerID	Name	Age	Location
1	John Doe	30	New York
2	Jane Smith	25	Los Angeles
3	Alice Brown	28	Chicago

Figure 7 shows the Customers table

ProductID	ProductName	Category
1	Laptop	Electronics
2	Coffee Maker	Appliances
3	Book	Literature

Figure 8 shows the Products table

TransactionID	Name	Product	Date	Amount
1	John Doe	Laptop	2023-10-01	1200
2	Jane Smith	Coffee Maker	2023-10-02	150.5
3	Alice Brown	Book	2023-10-03	20

Figure 9 shows the Transactions table

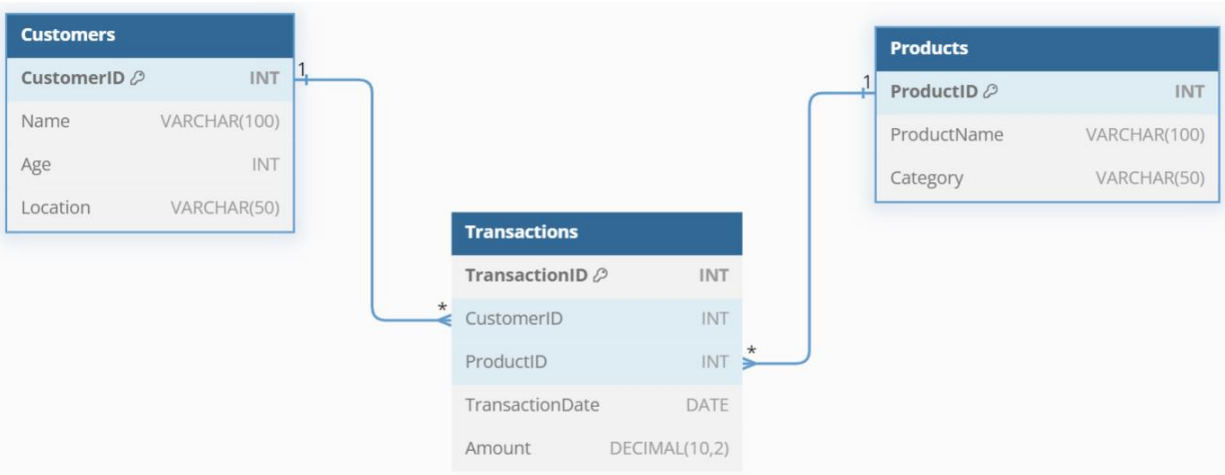


Figure 10 displays the schema creation in SQL, showing relationships among tables.

This document demonstrates a complete workflow, from data quality assessment to schema design, aimed at enhancing both data quality and performance.