**📘 Day 48 – SQL Challenge**

**Dataset: Banking Transactions & Fraud Detection**

**Customers**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CustomerID** | **Name** | **Country** | **JoinDate** | **Segment** |
| 1 | Alice | USA | 2020-01-01 | Retail |
| 2 | Bob | India | 2021-03-15 | Corporate |
| 3 | Charlie | UK | 2021-05-20 | Small Business |
| 4 | David | Canada | 2022-01-12 | Retail |
| 5 | Emma | India | 2022-06-25 | Retail |

**Accounts**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **AccountID** | **CustomerID** | **AccountType** | **OpenDate** | **Balance** | **Status** |
| 101 | 1 | Savings | 2020-01-01 | 5000.00 | Active |
| 102 | 2 | Checking | 2021-03-15 | 8000.00 | Active |
| 103 | 3 | Savings | 2021-05-20 | 2000.00 | Active |
| 104 | 4 | Checking | 2022-01-12 | 10000.00 | Closed |
| 105 | 5 | Savings | 2022-06-25 | 3000.00 | Active |

**Transactions**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TxnID** | **AccountID** | **TxnDate** | **Amount** | **TxnType** | **Channel** | **Status** |
| 1 | 101 | 2023-01-01 | 1000 | Debit | Online | Success |
| 2 | 101 | 2023-01-05 | 2000 | Credit | Branch | Success |
| 3 | 102 | 2023-01-06 | 5000 | Debit | Online | Success |
| 4 | 103 | 2023-02-01 | 1000 | Debit | ATM | Failed |
| 5 | 104 | 2023-02-05 | 3000 | Debit | Online | Success |
| 6 | 105 | 2023-03-01 | 2000 | Credit | Branch | Success |
| 7 | 101 | 2023-03-10 | 1500 | Debit | Online | Success |
| 8 | 102 | 2023-03-15 | 4000 | Debit | Online | Failed |
| 9 | 105 | 2023-04-01 | 2500 | Debit | ATM | Success |
| 10 | 103 | 2023-04-05 | 1200 | Credit | Online | Success |

**❓ Day 48 Questions (Intermediate → Advanced)**

1. **Customer Balances**  
   Show each customer’s total credits, debits, and final balance (consider only Success transactions).
2. **High Transaction Customers**  
   Find customers who made transactions worth more than **₹5000 in a single month**.
3. **Channel Performance**  
   For each channel (Online, ATM, Branch), calculate success vs failed transaction percentages.
4. **Top Spenders**  
   List the **top 3 accounts by total debit amount**.
5. **Fraud Detection – Multiple Failed Transactions**  
   Find accounts that had **more than 1 failed transaction in the same month**.
6. **Customer Lifetime Value (CLV)**  
   For each customer:
   * CLV = Total Successful Debits + Total Successful Credits  
     Normalize CLV by dividing by **years since JoinDate**.
7. **Window Function – Running Balance**  
   For each account, show transactions with a **running balance after each transaction** (ordered by TxnDate).
8. **Inactive Customers**  
   Find customers who have not made any transaction in the **last 90 days** (relative to max TxnDate).
9. **Recursive CTE – Managerial Fraud Chain**  
   Assume if an account has failed >2 transactions, mark it as “High Risk”.  
   Build a recursive CTE that propagates risk to all accounts **belonging to the same customer**.
10. **Country-Wise Insights**  
    Find total transactions, total credits, total debits, and average transaction value per country.

**🎯 Bonus Challenge (Advanced Fraud Detection)**

1. **Suspicious Transaction Pattern**  
   Find accounts that:

* Made **back-to-back debits within 1 day** (use LAG + DATEDIFF)
* Where each debit was **above ₹1000**  
  These accounts should be flagged as “Suspicious”.