Highnote Coding Interview

We would like you to implement a "Transaction Processor" that processes an array of Transaction messages that each represent an operation to be performed on virtual bank accounts. **After processing all inputs, you should provide a way to validate all accounts and their balances.**

It is recommended that you first handle the message parsing before managing the accounts and their balances. **Unit tests are expected and should help guide you to building your solution incrementally.**

Reminder, any AI/LLM coding assistant tools should be disabled on your IDE before starting. Eg. Github Copilot, Jetbrains AI Assistant.

Transaction Message Specifications

Each Transaction message is formatted in the following way:
- The first four characters represent the type of Transaction Operation being requested.
- You will need to parse each message based on the message type format.
    - Note the `LLVAR` type - This is an alphanumeric field of variable length. It has a 2-digit field header at the beginning, indicating the length of the rest of the field, which can be 0 to 99.
- Depending on the type of transaction, there may be different data to be parsed.
- Depending on the type of transaction, different operations must be performed.
- **Any Money amount is represented in cents.**
- **You can assume any input data provided is well formatted according to the above specifications.**

Operations

Deposit Request:
For the given account, add to its existing balance.
- Transaction Request Code: `1010`
- Format: **`1010<LLVAR-ACCOUNT-NUMBER><AMOUNT-IN-10-DIGITS>`**
    - Sample Input: **`1010`**`10`**`8888888888`**`0000010000`
        - **`1010`** `- Deposit Request`
        - `10 - Length of Account Number`
        - **`8888888888`** `- Account Number`

- 0000010000 - Deposit amount in Cents (100.00 USD)

Withdrawal Request:

For the given account, debit the requested amount from the balance.
- Transaction Request Code: `1020`
- Format: **1020<LLVAR-ACCOUNT-NUMBER><AMOUNT-IN-10-DIGITS>**
  – Sample Input: **1020**10**8888888888**0000010000
    - **1020** – Withdrawal Request
    - 10 – Length of Account Number
    - **8888888888** – Account Number
    - 0000010000 - Withdrawal amount in Cents (100.00 USD)

Transfer Request:

Transfer the amount from the source account to the destination account.
- Transaction Request Code: `2010`
- Format:
  2010<LLVAR-WITH-SOURCE-ACCOUNT-NUMBER><LLVAR-WITH-DESTINATION-ACCOUNT-NUMBER><AMOUNT-IN-10-DIGITS>
  – Eg. 201008123456780612345600000010000
    - **2010**08**12345678**06**123456**0000010000
    - **2010** – Transfer Request
    - 08 – **Length of Source Account Number**
    - **12345678 – Source Account Number**
    - 06 – Length of Destination Account Number
    - **123456 - Destination Account Number**
    - 0000010000 - Transfer amount in Cents

Restrictions

Deposits
- The maximum amount allowed to be loaded in a single transaction is 1000.00 USD. If the amount requested to be loaded is greater than 1000.00 USD, then the transaction should be denied.
- If the account doesn't already exist, then create the account with the requested deposit amount, but only if the transaction amount isn't greater than the above mentioned deposit limit.

Withdrawals
- Only allow the withdrawal if the account exists and has appropriate funds for the withdrawal - otherwise, do not perform any updates.
- The amount to be withdrawn is not greater than 200 dollars (i.e. less than or equal to `0000020000`)

- The account cannot have more than 500 dollars withdrawn from it in total.

Transfers

- Only allow the transfer if both source and destination accounts exist, and the source account has the appropriate funds for the withdrawal
- The amount to be transferred is not greater than 200 dollars (i.e. less than or equal to `0000020000`)
- The source account cannot have more than 500 dollars withdrawn from it in total.

Sample Inputs/Outputs:

Deposits Only

Input

```
Unset
10100712345670000200000
10100644477700000100000
10100712345670000080000
10100623459100000040000
10100644477700000050000
10100611111100000200000
```

Expected Outcome

Account Number	Balance in Cents
444777	150000
234591	40000
1234567	80000

Deposit and Withdrawals

Input

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```
Unset
101007123456700000200000
101006444777000100000
101007123456700000080000
101006234591000040000
101006444777000050000
101006111111000200000
102006444777000020000
102006444777000020000
102007123456700000020000
102007123456700000020000
102007123456700000015000
102006234591000030000
102006111111000010000
```

Expected Outcome

Account Number	Balance in Cents
444777	110000
234591	40000
1234567	40000

Deposit, Withdrawals, and Transfers

Input

```
Unset
101007123456700000200000
101006444777000100000
101007123456700000080000
101006234591000040000
```

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```
10100644477700000050000
10100611111100000200000
10200644477700000020000
10200644477700000020000
10200712345670000020000
10200712345670000020000
10200712345670000015000
10200623459100000030000
10200611111100000010000
20100644477707123456700000020000
20100644477706234591000000005000
20100644477707123456700000005000
20100623459106111111000000005000
20100611111106234591000000005000
```

Expected Outcome

Account Number	Balance in Cents
444777	100000
234591	45000
1234567	45000