

Assessment 1

Computer Networks - 1

November 4, 2022

1 Problem statement

Demonstration of simple banking application using connection oriented socket programming. Here, a client - identified by an unique account number - must be able to perform simple banking transactions such as account creation, crediting, debiting, check balance.

2 Spend time on

- Create an appropriate data structure to hold the following details of a client: account number (int, unique), balance (float, cannot be negative), password (string).
- Also, come up with a technique to hold/store multiple accounts.
(**Hint:** Some kind of linked list comes to my mind)
- You are welcome to use C++ or any other programming language. But, it has to be done using Socket programming.
(**Hint:** List or a Map comes to my mind)

3 Server Side

3.1 Commands

Server must be able to perform following functions based on the command received:

Command	Function	Return value
CREATE	Creates a new account	account number if successful, suitable error code otherwise
CREDIT	Credits into the account	new balance if successful, suitable error code otherwise
DEBIT	Debits from the account	new balance if successful, suitable error code otherwise
BAL	Checks balance	balance if successful, suitable error code otherwise
DISPLAY	Returns ALL account details	Returns all account numbers with their corresponding account balance as comma separated values , -400 if no accounts are present

3.2 Error codes

The following error codes must be sent by the server in case of invalid scenarios

Error code	Scenario
-100	Invalid command
-101	Valid command but insufficient arguments
-200	Incorrect password during password verification in case of CREDIT/DEBIT/BAL
-201	Invalid password in case of CREATE
-300	Invalid amount in case of CREATE/CREDIT/DEBIT
-301	Insufficient funds in case of DEBIT
-400	No accounts present in case of DISPLAY
-500	Invalid account number (integer and unique) in case of CREATE
-501	Invalid account number in case of CREDIT/DEBIT/BAL

Note: You are free to use other error codes for any other exceptions, if required.

4 Client side

A client must be able to perform the following activities by sending commands in a particular format.

4.1 Commands

1. Create account

`CREATE -a <accountNo> -p <password> -m <amount>`

This creates a new account with account number <accountNo>, password <password> with minimum 4 characters, and the opening balance of <amount>.

Cases to check:

- Invalid command
- Duplicate or invalid account number
- Invalid password
- Incorrect amount

Example 1: C: `CREATE -a 101 -p myPass -m 1000`
S: 101
C: Account created successfully with account number: 101

Example 2: C: `CREATE -a 101 -p abc -m 1000`
S: -201
C: Invalid password. Password must be of at least 4 characters

Example 3: C: `CREATE -a 101 -p abc -m 1000`
S: -201
C: Invalid password. Password must be of at least 4 characters

2. Crediting:

`CREDIT -a <accountNo> -p <password> -m <amount>`

Amount of <amount> must be added to the current balance of account with account number <accountNo>. All the fields are compulsory.

Cases to check:

- Invalid command

- Invalid account number
- Incorrect password
- Incorrect amount

Example 1: C: CREDIT -a 101 -p myPass -m 2000
 S: 3000
 C: Credit successfully. Current account balance: 3000

Example 2: C: CREDIT -a 201 -p myPass -m 1000
 S: -501
 C: Invalid account number

Example 3: C: CREATE -a 101 -p abc -m 1000
 S: -200
 C: Incorrect password.

3. Debiting:

DEBIT -a <accountNo> -p <password> -m <amount>

Amount of <amount> must be debited from the current balance of account with account number <accountNo>. All the fields are compulsory.

Cases to check:

- Invalid command
- Invalid account number
- Incorrect password
- Incorrect amount

Example 1: C: DEBIT -a 101 -p myPass -m 200
 S: 800
 C: Debited successfully. Current account balance: 800

Example 2: C: DEBIT -a 101 -p myPass -m 2000
 S: -301
 C: Insufficient funds.

Example 3: C: DEBIT -a 101 -p abc -m 500
 S: -200
 C: Incorrect password.

4. Check balance:

BAL -a <accountNo> -p <password>

The current balance of account with account number <accountNo> must be displayed. All the fields are compulsory.

Cases to check:

- Invalid command
- Invalid account number
- Incorrect password

5. Display all accounts:

DISPLAY

All accounts with their current balance must be displayed in a table format.

Cases to check:

- Invalid command

Example 1: C: DISPLAY

S: 101,1000,102,2650, and so on (Here, 101 and 102 are account numbers, and 1000 and 2650 are current balances in those accounts, respectively)

C:

Account No	Balance
101	1000
102	2650

5 Submission instructions

ANY one caught plagiarizing the code, ALL people will be given ZERO as their internal assessment marks. No excuses shall be accepted.

1. Create two files with names `<rollNo>_client.c` and `<rollNo>_server.c`
2. Put them into ONE zip file with name `<rollNo>.zip`
3. Upload it in the LMS before the deadline.