

Banking System using Client-Server Socket Programming

Devraj Gadhvi (214101017)

Gaurav Kumar (214101018)

Aishwarya Gupta(214101019)

- **Points Discussed:**

1. Introduction
2. Functions
3. Bank Server Files
4. Functions Explanation and Flow chart
5. Need of semaphore
6. Working of system
7. Screenshots
8. Conclusion

1. INTRODUCTION

The objective of this assignment is to simulate a Banking system which is secure and easy to use. The bank here has three types of users namely Bank_User, Bank_Admin and Police. The objective is to connect Users with the Bank Server by forming a secure TCP connection further they communicate with each other using TCP ports.

2. FUNCTIONS

- Login
 1. Login by providing credentials
 2. Verify user
 3. Provide functionalities depending on user type
- Functionalities provided to Bank Customer:
 1. View Balance
 2. View MiniStatement
- Functionalities provided to Bank Admin:
 1. Add new user
 2. Single window credit
 3. Single window debit
 4. Account to Account transfer

- Functionalities provided to Police

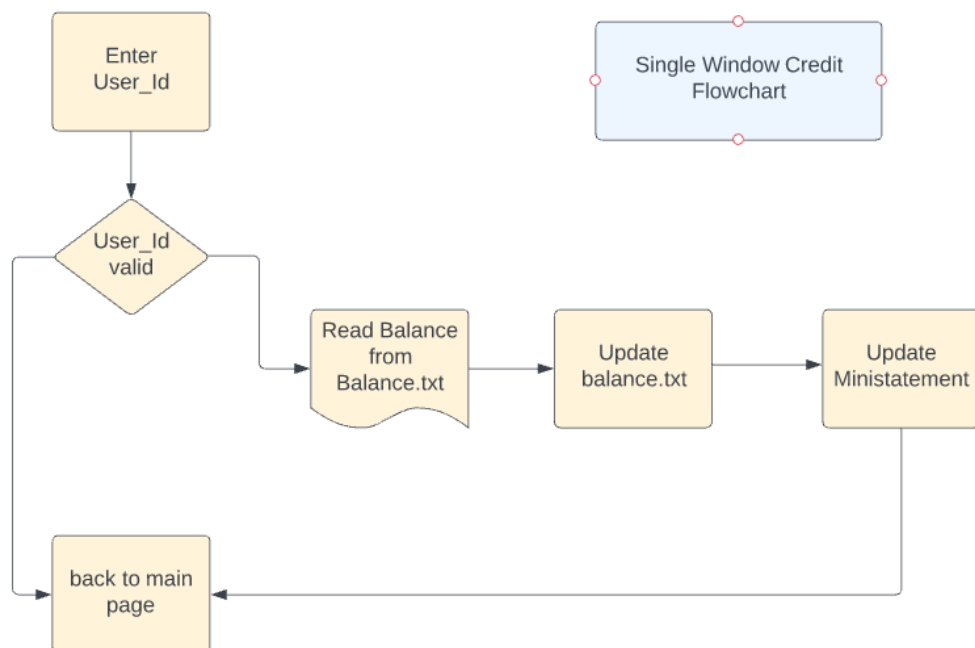
1. View balance of all bank clients
2. View balance of a specific client
3. View mini statement of a specific client
4. View entire Transaction history of a specific client

3. BANK SERVER FILES

1. **Login_data.txt**: Stores the user_id password user type
2. **Balance.txt**: Stores the client_id and available balance
3. **Transactions**: Generated corresponding to each bank client; stores the entire transaction history
4. **Mini Statement**: Generated corresponding to each bank client; stores the last 5 transaction history
5. **Backup.txt**: Stores the backup of Balance.txt file

4. FUNCTIONS EXPLANATION AND FLOW CHART

- Single Window Credit

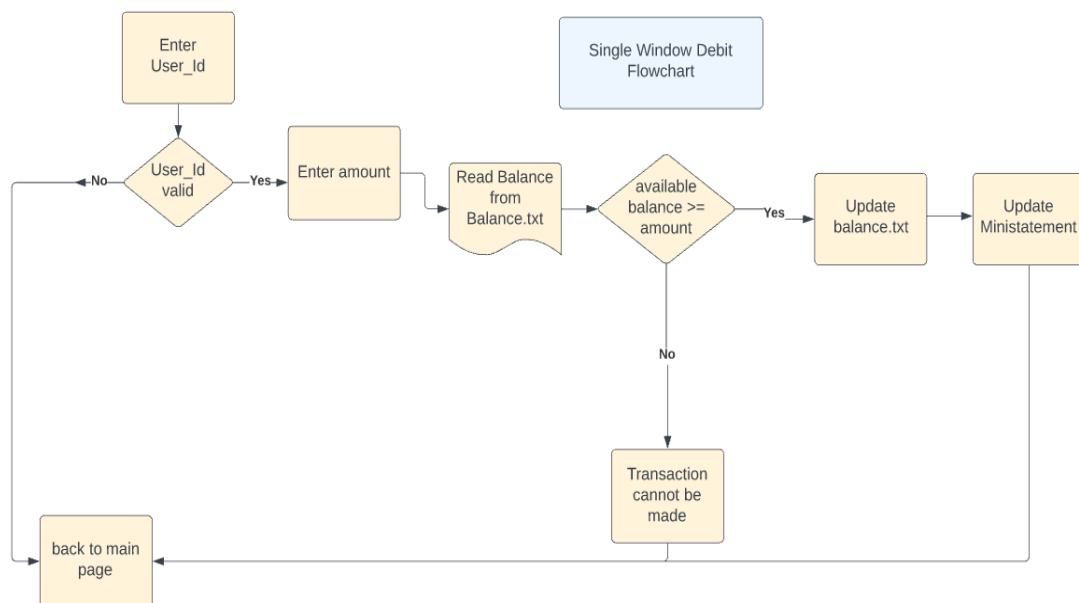


- Working of single window credit:

1. The admin is prompted to enter the account number to whom the amount is to be credited

2. On safe reception of account number, the server first verifies whether the account number is a valid user or not
3. If the account is valid then the available balance of the user is read from the balance.txt file and further updation is made to the balance.txt file corresponding transaction file and corresponding mini statement.
4. If the account number is not valid then the transaction is not made

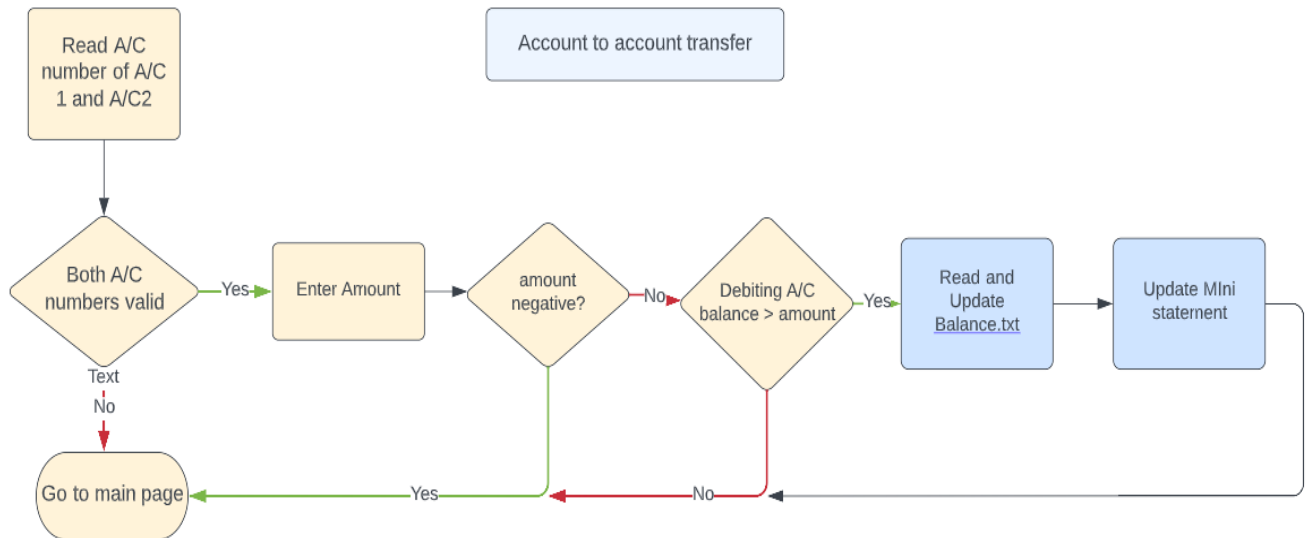
- **Single Window Debit**



- **Working of single window debit:**

1. The admin is prompted to enter the account number to whom the amount is to be credited
2. On safe reception of account number, the server first verifies whether the account number is a valid user or not
3. If the account is valid then the available balance of the user is read from the balance.txt file
4. Further is it checked whether the balance is less than the amount to be debited if it is then the transaction is not made
5. Else further updation to the balance.txt file corresponding transaction file and corresponding mini statement is made.
6. And If the account number is not valid then the transaction is not made

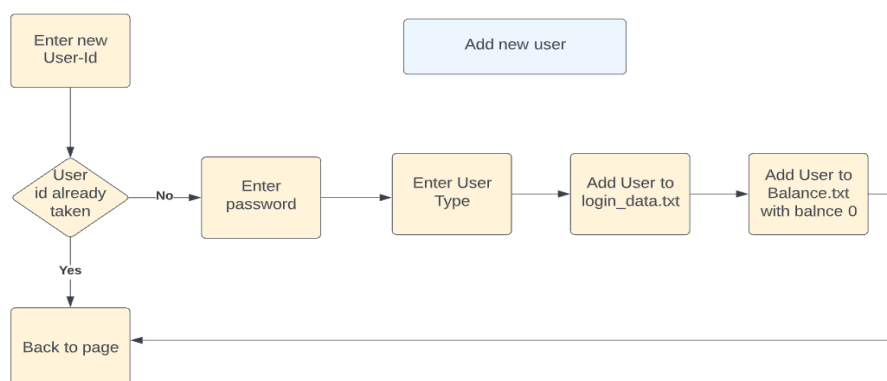
- **Account to Account Transfer**



- **Working of Account-to-Account Transfer:**

1. The admin is prompted to enter the account number of both accounts
2. On safe reception of account number, the server first verifies whether the account numbers are valid user or not
3. If the accounts are valid then the available balance of the user is read from the balance.txt file
4. Further is it checked whether the balance in the debiting account is less than the amount to be debited if it is then the transaction is not made
5. Else further updation to the balance.txt file corresponding transaction file and corresponding mini statement of both the accounts are made.
6. And if the account numbers are not valid then the transaction is not made

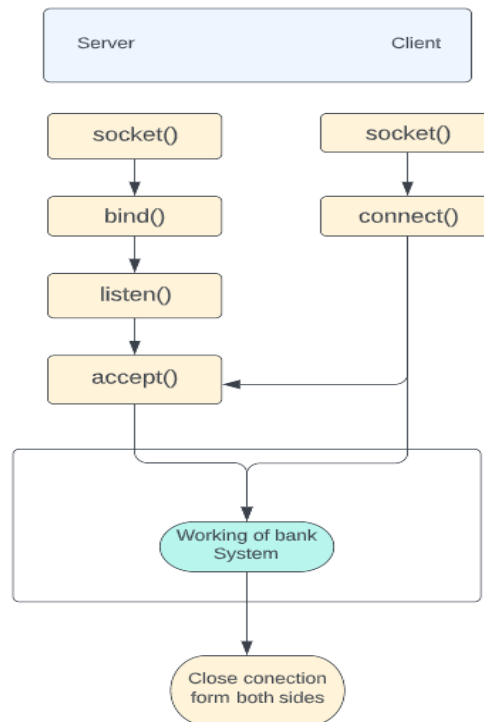
- **Add New User**



- **Working of addition of new user:**
 1. The user is prompted to enter the user id
 2. It is checked if the user id is already taken or not. If it is already taken, the user is taken back to the main page.
 3. Else the necessary entry is added to login_data.txt and balance.txt files.

- **Connection establishment between client and server.**

In our assignment, multiple clients up to 10 can connect with the bank server at the same time. Below is the flow chart showing the connection setup between server and a user.



5. NEED OF FORK AND SEMAPHORE

- Here multiple users can connect with the bank server, hence whenever a new user makes connection with the server, a fork system call is initiated and a child process is created corresponding to this user.
- Also, as multiple users can communicate with the bank server at the same time, shared resources like balance.txt, login_data.txt need to be handled efficiently.
- Further, whenever any account is being credited/debited or transfer between accounts is being made, then in order to maintain consistency of data, semaphores are required.

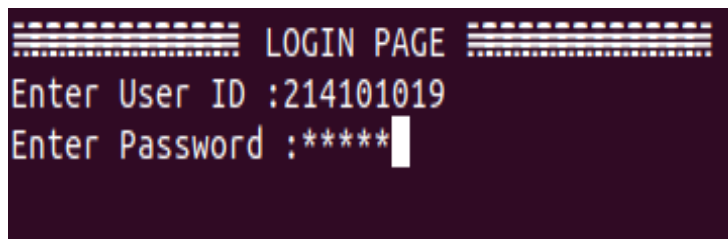
- Hence whenever any transaction is made then semaphore wait is called and upon successful completion of desired task the semaphore is signalled.

6. WORKING OF SYSTEM

1. The client connects to the server by providing the ip address and port number of the server.
2. On successful connection further process takes place.
3. The user is prompted to enter user_id
4. If the user_id is invalid then the session is closed else user is prompted to enter the password
5. The credentials are validity using login_data.txt
6. If the credentials are correct then depending on the user type the functionalities will be provided
7. The functionalities for bank_client, bank_admin and police are discussed earlier.
8. Once the user logs out the connection with the user is terminated.

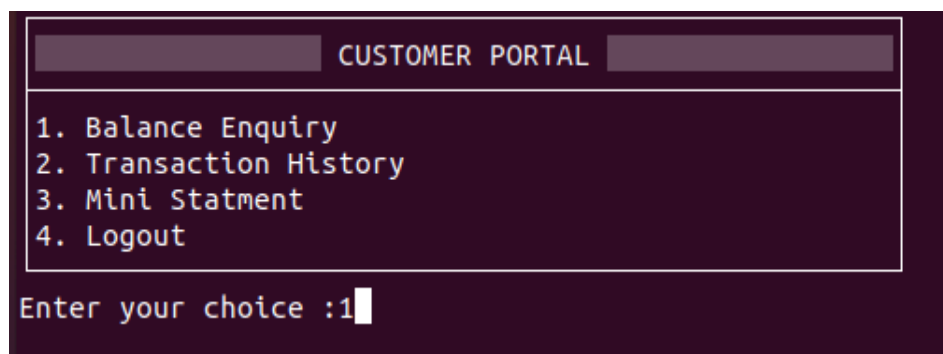
7. SCREENSHOTS

- Login Portal



- Client Portal

1. Balance Enquiry



USER BALANCE	
Account Number	Balance
214101019	499950

Do you want to continue?(Y/N): ☐

2. Transaction History

Date	Type	Amount	Balance
Fri-Apr--8-10:11:52-2022	C	1000	1000
Fri-Apr--8-10:16:15-2022	C	1000	2000
Fri-Apr--8-10:16:57-2022	C	5	2005
Fri-Apr--8-10:44:31-2022	C	10	10
Fri-Apr--8-10:45:40-2022	C	10000000	10000010
Fri-Apr--8-10:46:10-2022	D	5000000	5000010
Fri-Apr--8-10:46:38-2022	D	50000	4950010
Fri-Apr--8-10:47:43-2022	D	1000000	3950010
Sat-Apr--9-22:42:15-2022	C	0	3950010
Sat-Apr--9-22:56:45-2022	C	500	3950510
Sat-Apr--9-23:13:07-2022	C	1000000	4950510
Sun-Apr-10-00:09:15-2022	C	500	4951010
Sun-Apr-10-00:11:56-2022	C	90	4951100
Sun-Apr-10-00:12:26-2022	C	90	4951190
Sun-Apr-10-00:36:00-2022	C	1	4951191
Sun-Apr-10-00:37:06-2022	C	9	4951200
Sun-Apr-10-00:37:26-2022	C	9	4951209
Sun-Apr-10-00:39:38-2022	C	1	4951210
Sun-Apr-10-00:39:45-2022	C	1	4951211
Sun-Apr-10-00:47:21-2022	D	1	4951210
Sun-Apr-10-00:47:30-2022	D	1	4951209
Sun-Apr-10-01:07:38-2022	C	500	4951709
Sun-Apr-10-01:46:39-2022	C	5000	4956709

3. Mini Statement

Date	Type	Amount	Balance
Sun-Apr-10-00:39:45-2022	C	1	4951211
Sun-Apr-10-00:47:21-2022	D	1	4951210
Sun-Apr-10-00:47:30-2022	D	1	4951209
Sun-Apr-10-01:07:38-2022	C	500	4951709
Sun-Apr-10-01:46:39-2022	C	5000	4956709

Do you want to continue?(Y/N): ☐

- Admin Portal

1. Credit

```
ADMIN PORTAL

1. Credit
2. Debit
3. Transfer
4. Add New User
5. Logout

Enter Option : 1
Enter user_id : 214101019
Enter amount : 500
Transaction successful !!
Do you want to continue?(Y/N):
```

2. Debit

```
ADMIN PORTAL

1. Credit
2. Debit
3. Transfer
4. Add New User
5. Logout

Enter Option : 2
Enter user_id : 214101019
Enter amount : 250
Transaction successful !!
Do you want to continue?(Y/N):
```

- Transaction history of 214101019

```
Transaction History of 214101019
```

Date	Type	Amount	Balance
Fri-Apr--8-10:46:10-2022	C	5000000	5000000
Fri-Apr--8-10:48:58-2022	C	10	5000010
Fri-Apr--8-10:48:59-2022	C	100	5000110
Fri-Apr--8-10:49:30-2022	C	20	5000130
Fri-Apr--8-10:49:30-2022	C	50	5000180
Fri-Apr--8-10:57:20-2022	C	50	5000230
Sat-Apr--9-22:55:13-2022	C	500	5000730
Sat-Apr--9-22:56:17-2022	D	500	5000230
Sat-Apr--9-22:56:45-2022	D	500	4999730
Sat-Apr--9-23:13:07-2022	D	1000000	3999730
Sun-Apr-10-01:26:15-2022	C	70	3999800
Sun-Apr-10-01:32:54-2022	C	200	4000000
Sun-Apr-10-01:35:26-2022	C	1000	4001000
Sun-Apr-10-01:36:04-2022	C	900	4001900
Sun-Apr-10-01:39:45-2022	C	100	4002000
Sun-Apr-10-01:39:45-2022	D	4001000	1000
Sun-Apr-10-04:11:32-2022	C	9000	4011000
Sun-Apr-10-04:12:12-2022	D	10000	4001000
Sun-Apr-10-04:22:17-2022	D	4001000	0
Sun-Apr-10-04:23:15-2022	C	500000	500000
Sun-Apr-10-15:04:09-2022	C	500	500500
Sun-Apr-10-15:10:57-2022	D	250	500250

```
Do you want to continue?(Y/N):
```


3. Account to Account Transfer

```
ADMIN PORTAL
1. Credit
2. Debit
3. Transfer
4. Add New User
5. Logout

Enter Option : 3
Enter user id to send money from : 214101019
Enter user id to send money to : 214101017
Enter amount: 300
Transaction successful !!
Do you want to continue?(Y/N):
```

4. Add new user

```
ADMIN PORTAL
1. Credit
2. Debit
3. Transfer
4. Add New User
5. Logout

Enter Option : 4
Enter account number of new user : 214101088
Enter password of new user : 00000
Enter user type : 0
Account Created.
Do you want to continue?(Y/N):
```

- Police Portal

1. Balance

```
POLICE PORTAL
1. Balance Enquiry for all users
2. Balance Enquiry for specific user
3. Transaction History for specific user
4. Mini statement for specific user
5. Logout

Enter Option :
```

BALANCESHEET	
Account Number	Balance
214101017	1300
214101018	4956709
214101019	499950
214101067	0
214101066	0
214101001	0
214101022	0
214101088	0

Do you want to continue?(Y/N):

2. Transaction History

POLICE PORTAL

- Balance Enquiry for all users
- Balance Enquiry for specific user
- Transaction History for specific user
- Mini statement for specific user
- Logout

Enter Option : 3

Enter user_id : 214101019

Date	Type	Amount	Balance
Fri-Apr--8-10:46:10-2022	C	5000000	5000000
Fri-Apr--8-10:48:58-2022	C	10	5000010
Fri-Apr--8-10:48:59-2022	C	100	5000110
Fri-Apr--8-10:49:30-2022	C	20	5000130
Fri-Apr--8-10:49:30-2022	C	50	5000180
Fri-Apr--8-10:57:20-2022	C	50	5000230
Sat-Apr--9-22:55:13-2022	C	500	5000730
Sat-Apr--9-22:56:17-2022	D	500	5000230
Sat-Apr--9-22:56:45-2022	D	500	4999730
Sat-Apr--9-23:13:07-2022	D	1000000	3999730
Sun-Apr-10-01:26:15-2022	C	70	3999800
Sun-Apr-10-01:32:54-2022	C	200	4000000
Sun-Apr-10-01:35:26-2022	C	1000	4001000
Sun-Apr-10-01:36:04-2022	C	900	4001900
Sun-Apr-10-01:39:45-2022	C	100	4002000
Sun-Apr-10-01:39:45-2022	D	4001000	1000
Sun-Apr-10-04:11:32-2022	C	9000	4011000
Sun-Apr-10-04:12:12-2022	D	10000	4001000
Sun-Apr-10-04:22:17-2022	D	4001000	0
Sun-Apr-10-04:23:15-2022	C	500000	500000
Sun-Apr-10-15:04:09-2022	C	500	500500
Sun-Apr-10-15:10:57-2022	D	250	500250

Do you want to continue?(Y/N):

8. CONCLUSION

We thereby successfully implemented a banking system by creating a secure connection between the bank server and user. And by providing various mentioned and additional functionalities to the users.