OPERATING SYSTEMS

MULTI-THREADED TCP SERVER APPLICATION

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3rd year Software Development

GMIT

OPERATING SYSTEMS

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INTRODUCTION

The project is to write a Multi-threaded TCP Server Application which allows multiple customers to update their bank accounts and send payments to other bank accounts. The service should allow the users to:

1. Register with the system

- Name

- Address

- Bank A/C Number

- Username

- Password

2. Log-in to the banking system from the client application to the server application.

3. Change customer details.

4. Make Lodgments to their Bank Account.

5. Make Withdrawal from their Bank Account (Note: Each User has a credit limit of €1000).

6. View the last ten transactions on their bank account.

CLIENT – INITIAL SCREEN

```
Connected to 127.0.0.1 in port 2004
Connection successful
----------------------

Welcome Bank of GMIT

OP 1 - Login
OP 2 - Register

OP 99 - Exit
```

Register a new User

```
Welcome Bank of GMIT

OP 1 - Login
OP 2 - Register

OP 99 - Exit
2
Enter your Name
AlexanderSouza
Enter your Address
15_Rivel_Walk
Enter A/C Number
111222
Enter your Username
alex
Enter your Password
123
```

Login with user created

```
OP 1 - Login
OP 2 - Register

OP 99 - Exit
1
Enter your A/C Number
111222
Enter your Username
alex
Enter your Password
123
```
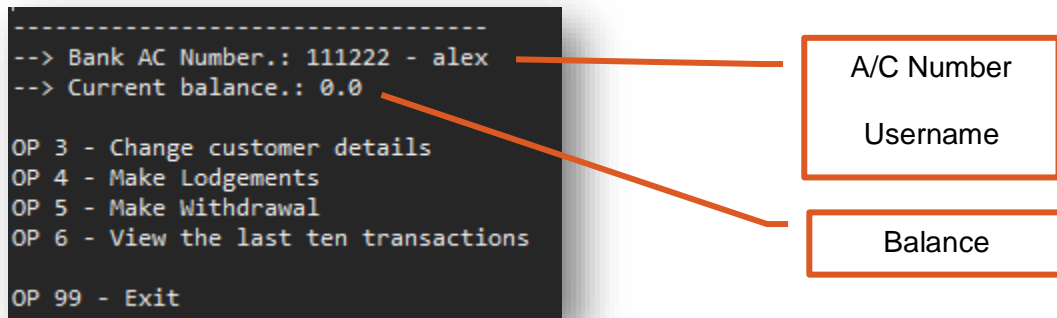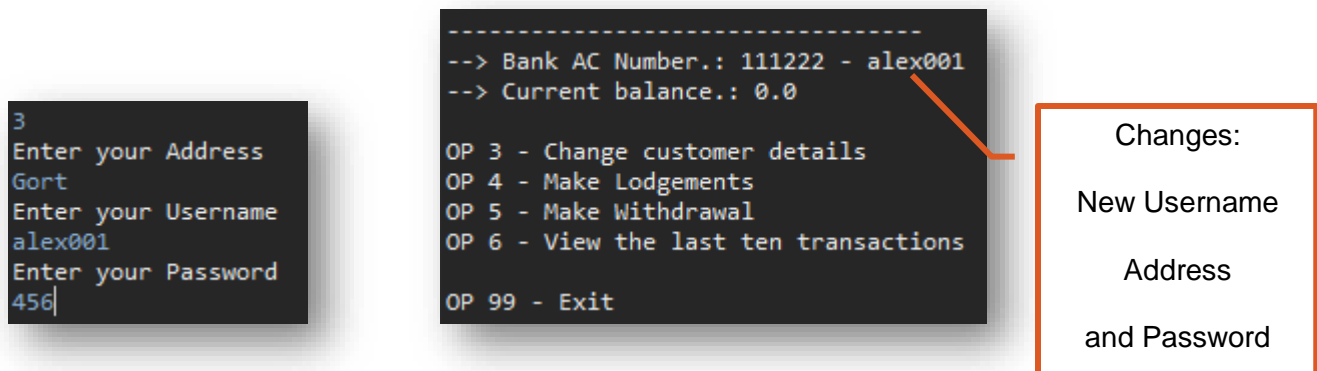
All Clients details are save into the file (loginData.dat)

```
1  Vanessa,Galway,333442,sandra,9999
2  Maria,Dublin,2223,maria,111
3  AlexanderSouza,15_River_walk,111222,alex,123
4
```

CLIENT – INITIAL SCREEN AFTER AUTHENTICATION

```
-----------------------------------
--> Bank AC Number.: 111222 - alex
--> Current balance.: 0.0

OP 3 - Change customer details
OP 4 - Make Lodgements
OP 5 - Make Withdrawal
OP 6 - View the last ten transactions

OP 99 - Exit
```

A/C Number

Username

Balance

OP 3 - Change customer details

```
3
Enter your Address
Gort
Enter your Username
alex001
Enter your Password
456
```

```
-----------------------------------
--> Bank AC Number.: 111222 - alex001
--> Current balance.: 0.0

OP 3 - Change customer details
OP 4 - Make Lodgements
OP 5 - Make Withdrawal
OP 6 - View the last ten transactions

OP 99 - Exit
```

Changes:

New Username

Address

and Password

This is the file (loginData.dat) where all Clients details are saved.

Before Change

```
1    Vanessa,Galway,333442,sandra,9999
2    Maria,Dublin,2223,maria,111
3    AlexanderSouza,15_River_walk,111222,alex,123
4
```

After Change

```
1    Vanessa,Galway,333442,sandra,9999
2    Maria,Dublin,2223,maria,111
3    AlexanderSouza,Gort,111222,alex001,456
4
```

OP 4 - Make Lodgements

```
-------------------------------------
--> Bank AC Number.: 111222 - alex001
--> Current balance.: 5500.0

OP 3 - Change customer details
OP 4 - Make Lodgements
OP 5 - Make Withdrawal
OP 6 - View the last ten transactions

OP 99 - Exit
```

```
4
Enter amount Lodgement
5500
```

```
-------------------------------------
--> Bank AC Number.: 111222 - alex001
--> Current balance.: 5569.0

OP 3 - Change customer details
OP 4 - Make Lodgements
OP 5 - Make Withdrawal
OP 6 - View the last ten transactions

OP 99 - Exit
```

New Balance

```
4
Enter amount Lodgement
69
```

OP 5 - Make Withdrawal

```
-------------------------------------
--> Bank AC Number.: 111222 - alex001
--> Current balance.: 5069.0

OP 3 - Change customer details
OP 4 - Make Lodgements
OP 5 - Make Withdrawal
OP 6 - View the last ten transactions

OP 99 - Exit
```

Was 5569.0

Now 5069.0

```
5
Enter amount Withdrawal (Max credit limit €1000.00)
500
```

This test shows the validations working, values less €-1000.00 are not accepting.

```
--> Current balance.: -1000.0

OP 3 - Change customer details
OP 4 - Make Lodgements
OP 5 - Make Withdrawal
OP 6 - View the last ten transactions

OP 99 - Exit

5
Enter amount Withdrawal (Max credit limit €1000.00)
500
Enter amount Withdrawal (Max credit limit €1000.00)
```

Current Balance

€500

This value is not accepting

OP 6 - View the last ten transactions

```
Transactions    Balance
------------------------

-8.0       --->      5061.0
658.0      --->      5719.0
-852.0     --->      4867.0
-59.0      --->      4808.0
-458.0     --->      4350.0
42.0       --->      4392.0
90.0       --->      4482.0
-123.0     --->      4359.0
-987.0     --->      3372.0
78.0       --->      3450.0
```

This is the last transaction

All transactions for all clients are storage into a file (Statements.dat).

```
47   111222,5500.0,5500.0
48   111222,69.0,5569.0
49   111222,-500.0,5069.0
50   111222,0.0,5069.0
51   111222,-8.0,5061.0
52   111222,658.0,5719.0
53   111222,-852.0,4867.0
54   111222,-59.0,4808.0
55   111222,-458.0,4350.0
56   111222,42.0,4392.0
57   111222,90.0,4482.0
58   111222,-123.0,4359.0
59   111222,-987.0,3372.0
60   111222,78.0,3450.0
```

This is the last transaction

OP 99 – Exit

```
------------------------------------
--> Bank AC Number.: 111222 - alex001
--> Current balance.: 3448.0

OP 3 - Change customer details
OP 4 - Make Lodgements
OP 5 - Make Withdrawal
OP 6 - View the last ten transactions

OP 99 - Exit


99
Exit - Finish connection
```
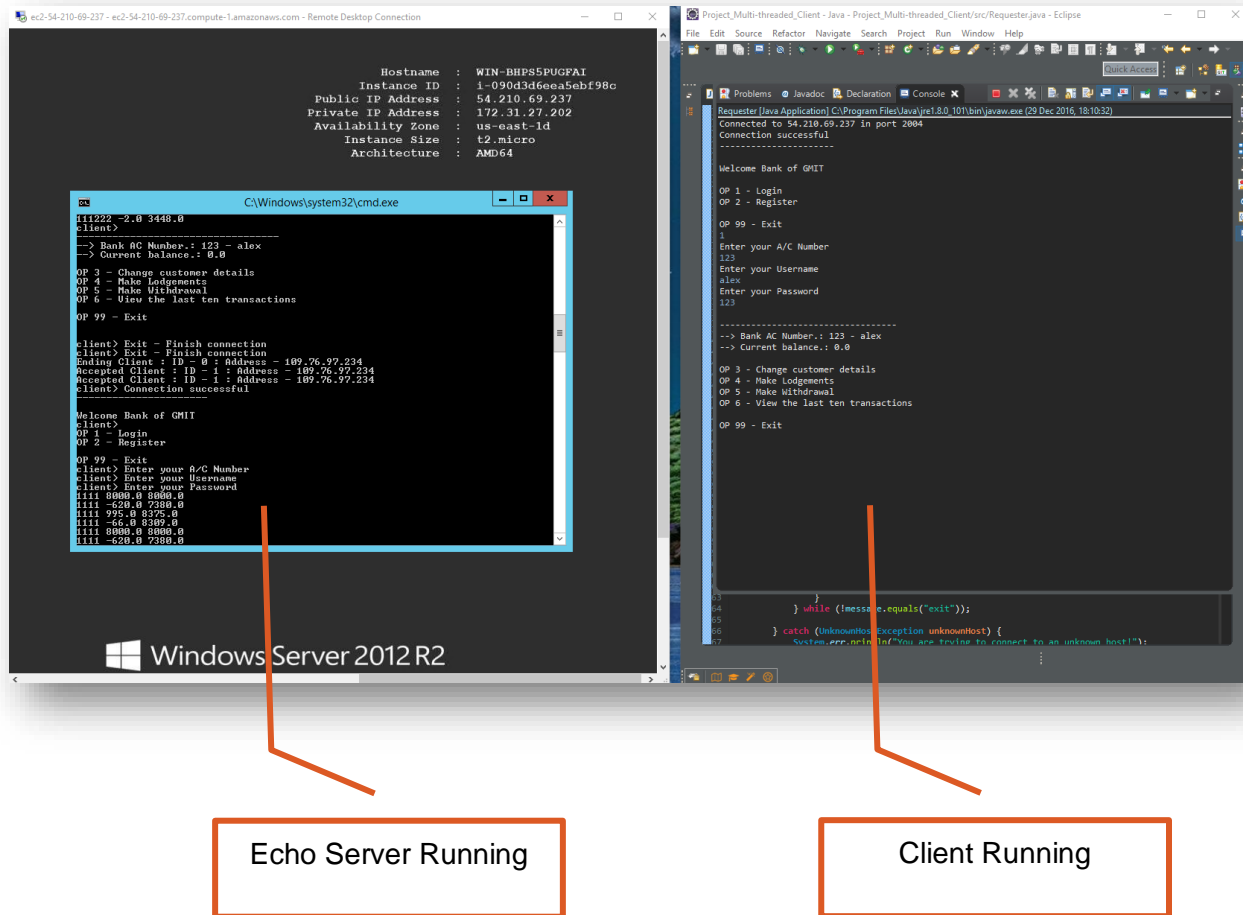
This OP 99 will finish the client connection from server

TESTING ON AMAZON WEB SERVICES (WINDOWS 2012 SERVER)

Echo Server Running

Client Running

Server Configurations

- The connections are set on port **2004** for both (client and server).
- The Server IP address is **54.210.69.237**.
- The Firewall on Server was modified to allow connection between Server and Client, to do that I opened the port **2004**.
- To do the connection between Server and Client I also modified Amazon Console, on **Security Groups** opening ports **2004**.

GITHUB

Server

https://github.com/alexpt2000gmit/Project_Multi-threaded_EchoServer

https://github.com/alexpt2000gmit/Project_Multi-threaded_EchoServer.git

Client

https://github.com/alexpt2000gmit/Project_Multi-threaded_Client

https://github.com/alexpt2000gmit/Project_Multi-threaded_Client.git