International Institute of Information Technology
Bangalore

Operating Systems
EG 301P

OS MINI PROJECT REPORT

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1 Summary

1.1 Problem:-

This is a server-client based project where the server is Admin and the user is the client. There communication between the user and admin should happen using socket programming.
The code should be done in the C programming language.
Menu:
1. Admin
2. User
Admin:
1. Add/Del a product
2. Update the quantity/price of an existing product
When the update is finished and the admin exits, generate a log file which contains all the details about the stock levels, products available etc.
User:
Display all the products in the format: PID, PName, Cost
Also display the Cart.
Ask the user to Choose a product and quantity to add into the cart.
Also give the user the option to edit the cart.

1.2 Approach:-

Data Structures:
The code defines several data structures, including struct Product to represent a product with its ID, name, quantity, and cost. struct ProductList is an array of Product structures, representing the product inventory. struct Cart represents a customer's shopping cart, which contains an array of Product structures. struct Customer represents a customer with their ID, name, passcode, and Cart. struct CustomerList is an array of Customer structures, representing the list of customers.

Semaphore Implementation:

The code includes functions for creating, locking, and unlocking semaphores. Semaphores are used to control access to critical sections of the code to ensure mutual exclusion. The createsemaphore function creates a semaphore using semget and initializes its value to 1 for each product. semaphorelock and semaphoreunlock functions lock and unlock the semaphore respectively using semop to prevent concurrent access to shared resources.

File Handling:

The code uses file handling to read and write the product inventory and customer data.
The generateLogFile function creates a log file named "log.txt" and writes the product details from the ProductList to the file.
printdatabase and printdatabase1 functions iterate over the ProductList and CustomerList arrays, respectively, and print their contents.

Server Operations:

The server handles multiple clients using a loop. Each client connection is processed in a separate thread using pthread.The server provides various operations for the clients, including adding a product, updating product details, deleting a product, adding to a cart, changing a cart, buying a cart, and displaying a cart.
The server reads the client's choice and performs the corresponding operation.

Client Interaction:

The client interacts with the server by sending requests and receiving responses.
The client sends the chosen operation and relevant data to the server using write.
The server processes the request and sends appropriate responses back to the client using read and write.

1.3 OS Concepts Used:-

Multi-threading:

The code employs multi-threading to handle multiple client connections concurrently. Each client connection is processed in a separate thread using the POSIX threads library (pthread). This approach enables efficient utilization of system resources and allows multiple clients to interact with the server simultaneously.

Semaphore:

Semaphores are used to control access to critical sections of the code, ensuring mutual exclusion. The createsemaphore, semaphorelock, and semaphoreunlock functions enable synchronization among multiple threads and prevent concurrent access to shared resources, such as the product inventory. This technique helps maintain data integrity and prevents race conditions.

File Handling:

The code utilizes file handling operations to read and write data. It creates a log file named "log.txt" and writes the product details from the ProductList structure to the file. The file handling mechanism provides a persistent storage solution for preserving the state of the product inventory across different program executions.

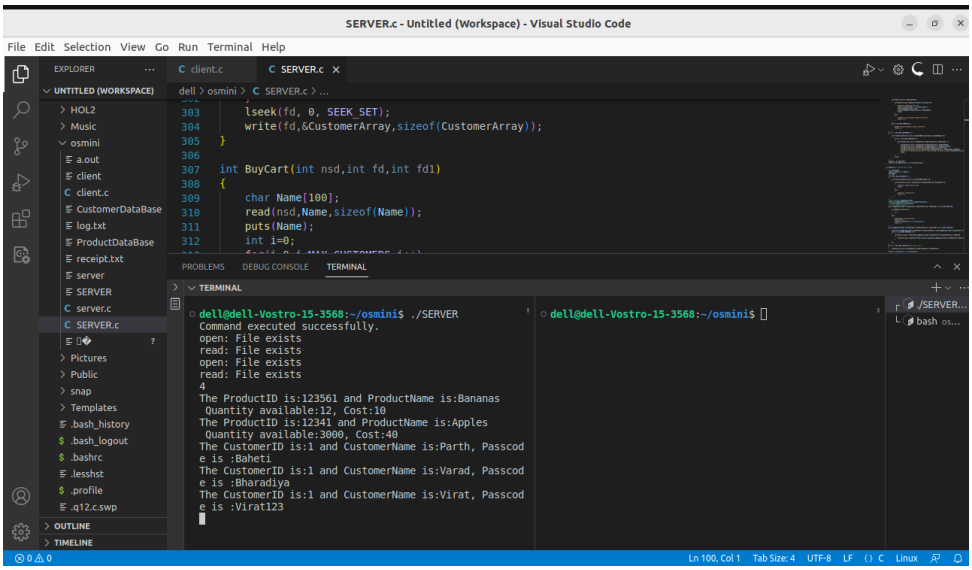
Networking:

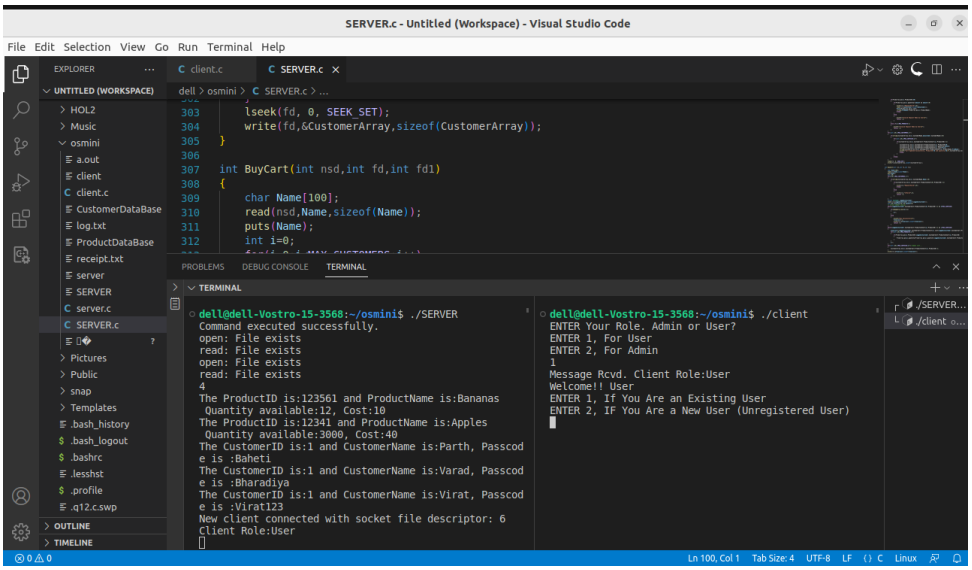
The client-server communication is facilitated through network sockets. Clients send requests to the server by writing data to the socket, and the server responds by reading and writing data to the respective client socket. This network-based approach enables remote access to the inventory management system and allows clients to interact with

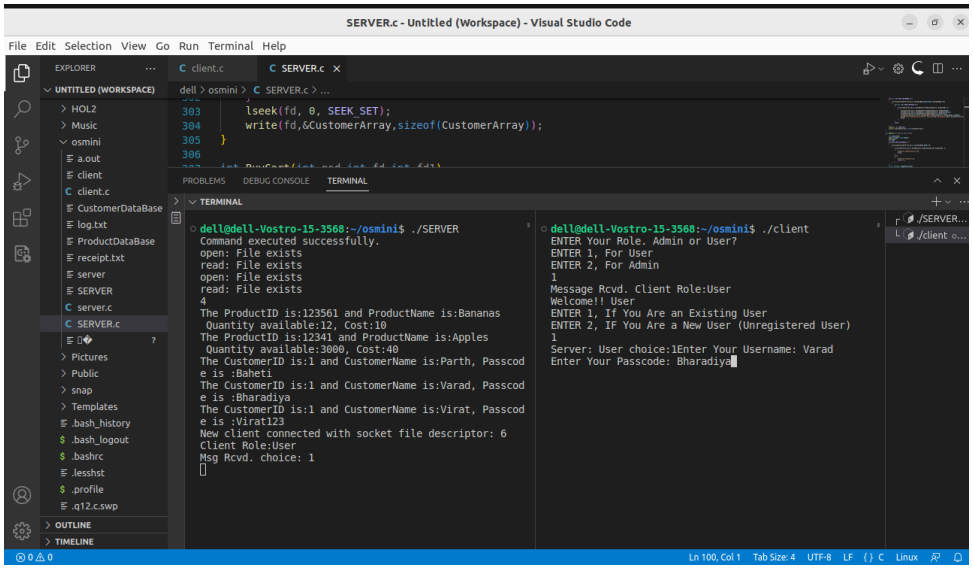
the server from different machines or locations.

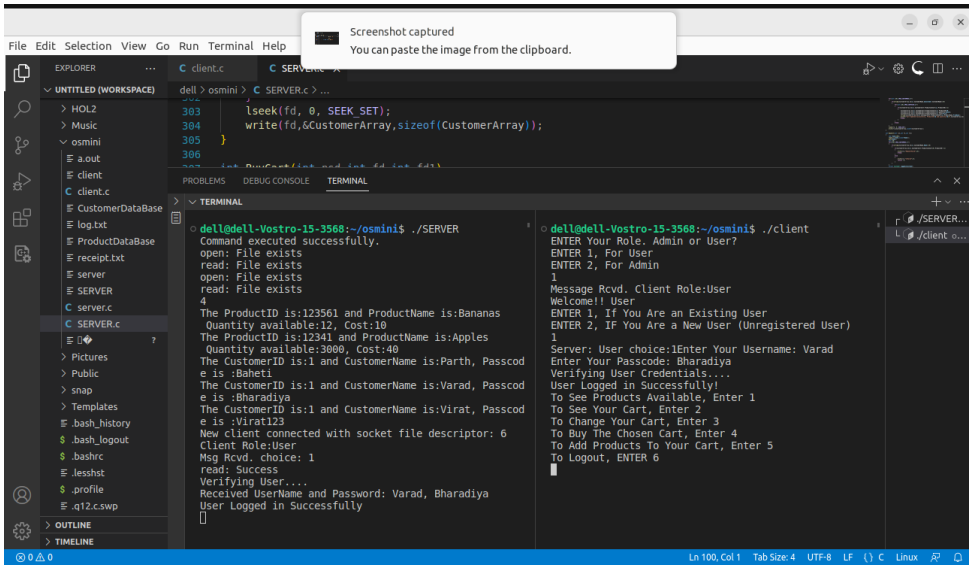
1.4 Results and Screen Shots .:-

To Test the programme..
Just open two terminals.
One for server side and the other for client side.
Next run:
gcc -o SERVER SERVER.c (in server terminal..)
gcc -o client client.c (in client terminal...)
Please feel free to use extra clients(multiple)






SERVER.c - Untitled (Workspace) - Visual Studio Code
File Edit Selection View Go Run Terminal Help
EXPLORER
UNTITLED (WORKSPACE)
HOL2
Music
osmini
a.out
client
client.c
CustomerDataBase
log.txt
ProductDataBase
receipt.txt
server
SERVER
server.c
SERVER.c
Pictures
Public
snap
Templates
.bash_history
.bash_logout
.bashrc
.lesshst
.profile
.q12.c.swp
OUTLINE
TIMELINE
client.c
SERVER.c
dell > osmini > SERVER.c > ...
303 lseek(fd, 0, SEEK_SET);
304 write(fd,&CustomerArray,sizeof(CustomerArray));
305 }
306
PROBLEMS
DEBUG CONSOLE
TERMINAL
dell@dell-Vostro-15-3568:~/osmini$ ./SERVER
Command executed successfully.
open: File exists
read: File exists
open: File exists
read: File exists
4
The ProductID is:123561 and ProductName is:Bananas
Quantity available:12, Cost:10
The ProductID is:12341 and ProductName is:Apples
Quantity available:3000, Cost:40
The CustomerID is:1 and CustomerName is:Parth, Passcod
e is :Baheti
The CustomerID is:1 and CustomerName is:Varad, Passcod
e is :Bharadiya
The CustomerID is:1 and CustomerName is:Virat, Passcod
e is :Virat123
New client connected with socket file descriptor: 6
Client Role:User
Msg Rcvd. choice: 1
dell@dell-Vostro-15-3568:~/osmini$ ./client
ENTER Your Role. Admin or User?
ENTER 1, For User
ENTER 2, For Admin
1
Message Rcvd. Client Role:User
Welcome!! User
ENTER 1, If You Are an Existing User
ENTER 2, IF You Are a New User (Unregistered User)
1
Server: User choice:1Enter Your Username: Varad
Enter Your Passcode: Bharadiya
./SERVER...
./client o...
Ln 100, Col 1
Tab Size: 4
UTF-8
LF
C
Linux


Screenshot captured
You can paste the image from the clipboard.
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e is :Virat123
New client connected with socket file descriptor: 6
Client Role:User
Msg Rcvd. choice: 1
read: Success
Verifying User....
Received UserName and Password: Varad, Bharadiya
User Logged in Successfully
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ENTER Your Role. Admin or User?
ENTER 1, For User
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Welcome!! User
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Enter Your Passcode: Bharadiya
Verifying User Credentials....
User Logged in Successfully!
To See Products Available, Enter 1
To See Your Cart, Enter 2
To Change Your Cart, Enter 3
To Buy The Chosen Cart, Enter 4
To Add Products To Your Cart, Enter 5
To Logout, ENTER 6
./SERVER...
./client o...
Ln 100, Col 1
Tab Size: 4
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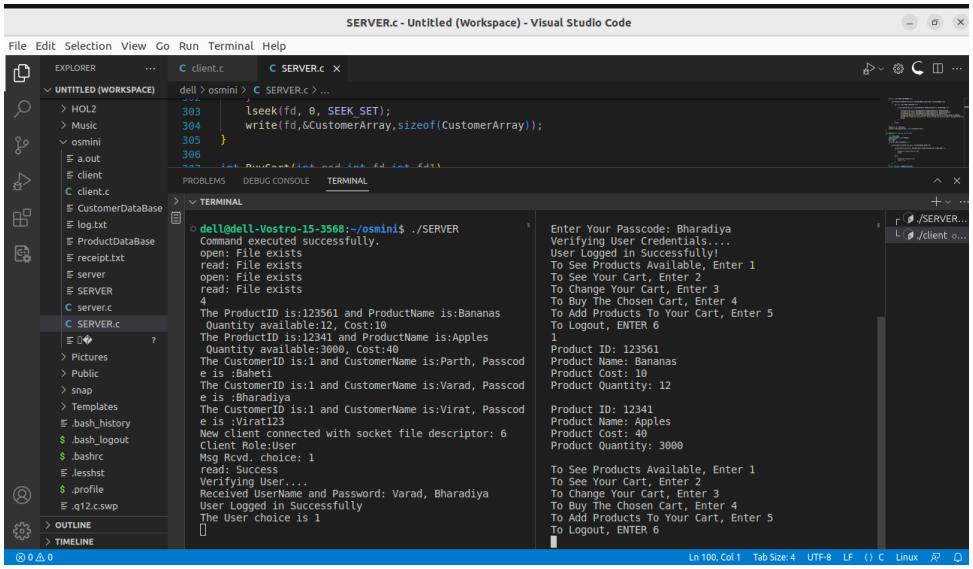
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Verifying User....
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User Logged in Successfully
The User choice is 1
Enter Your Passcode: Bharadiya
Verifying User Credentials....
User Logged in Successfully!
To See Products Available, Enter 1
To See Your Cart, Enter 2
To Change Your Cart, Enter 3
To Buy The Chosen Cart, Enter 4
To Add Products To Your Cart, Enter 5
To Logout, ENTER 6
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Product Name: Bananas
Product Cost: 10
Product Quantity: 12
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