1 Introduction

Student ID	Full name	Course
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2 Statement

- This project is about using **Socket** to write a 1-to-n **Server-Client** program.
- The **Client** will send a string expressing a mathematical expression to the **Server**.
- The **Server** will calculate the result the expression and send it back to the **Client**.
- If the expression is invalid, the **Server** will send back an error message.
- The **Server** will be able to handle multiple **Clients** at the same time.

3 Idea

3.1 Server

- **Initialization**: Initialize the Server Socket, bind it to a specific port, and listen for incoming connections.
- **Multi-Client Handling**: Implement a multi-threaded approach to handle multiple Client connections concurrently.
- **Expression Evaluation**: Receive infix expressions from Clients, convert them to Polish Notation, evaluate, and send back the results.

3.2 Client

- **Initialization**: Create a Client Socket and attempt to connect to the Server.
- **User Interaction**: Allow users to input mathematical expressions in infix notation.
- **Expressions Sending**: Send expressions to the Server for evaluation and display the received results.

4 Implementation

4.1 Server

- **Socket Setup:** Use `socket()`, `bind()`, and `listen()` functions to set up the Server Socket.
- **Multi-threading:** Implement a loop to accept connections and create a new Thread for each Client using `pthread_create()`.
- **Expression Handling:** Upon receiving expressions, convert them from infix to Polish Notation and evaluate the result.
- **Thread Management:** Ensure proper handling of Thread creation, detachment, and resource release using `pthread_detach()` and `pthread_join()`.

4.2 Client

- **Socket Setup:** Use `socket()` and `connect()` functions to establish a connection to the Server.
- **User Input:** Allow users to input mathematical expressions in infix notation.
- **Sending Data:** Send the expressions to the Server using `write()` and wait for the response.
- **Display Results:** Receive and display the evaluated results from the Server.

5 Result

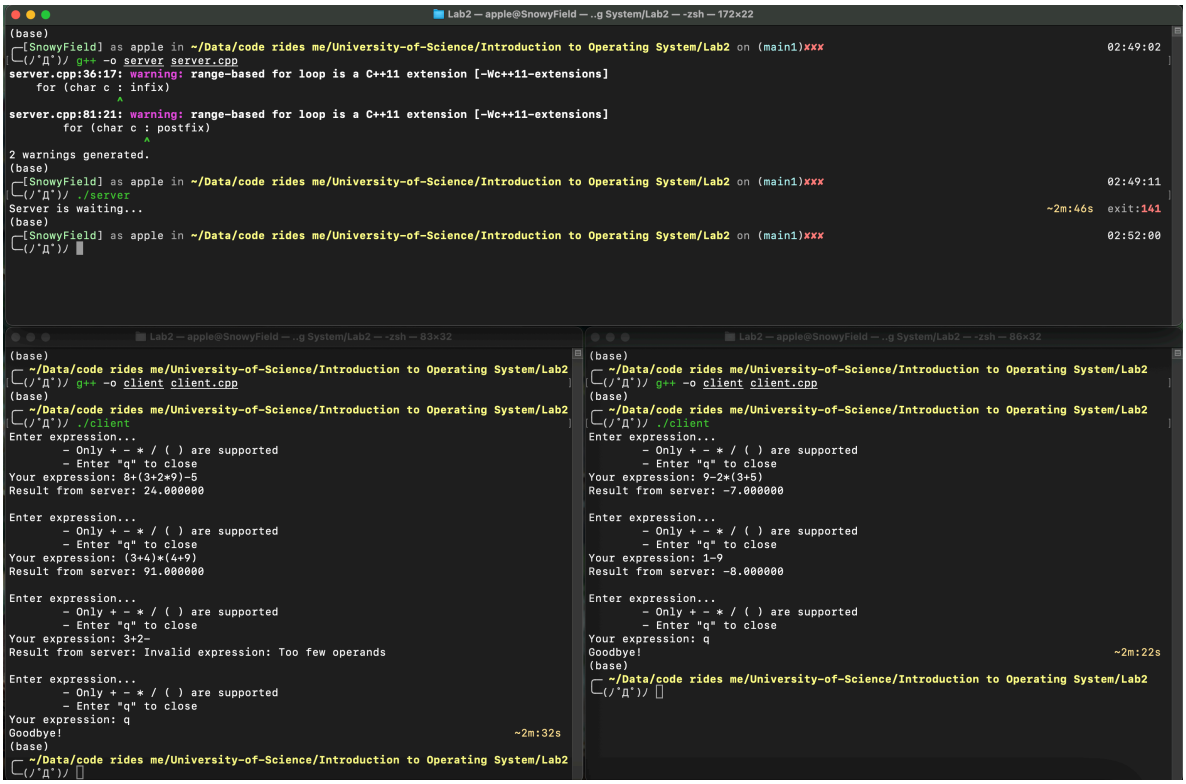

Figure 1: result

6 Specifications

No.	Specifications	Total Percentage	Estimated
1	The programs can be compiled.	10%	10%
2	Server and Client's Socket connect correctly.	30%	30%
3	Thread creation and management work correctly.	30%	30%
4	Expression evaluation works correctly.	30%	20%