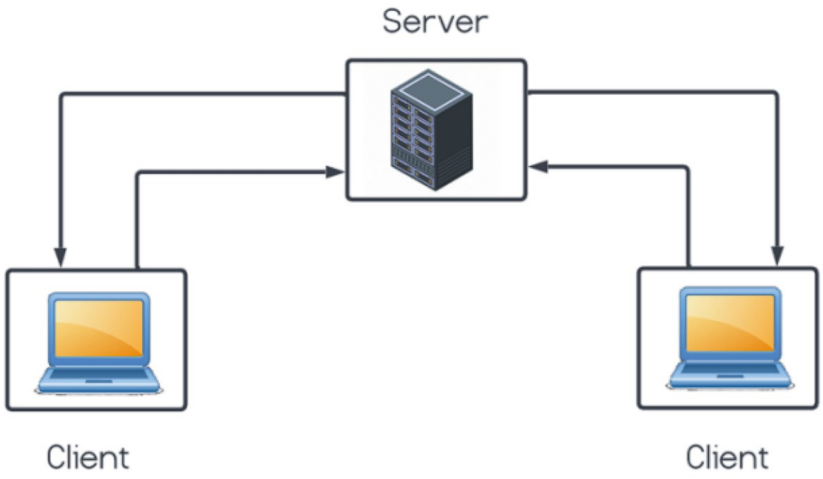
Term Project: Socket Programming

Simple Chat Application



Background

Socket programming is an alternative way of developing a communication channel between two hosts over the network. A socket is bound to a port number to identify the application process. To develop a chat application, students can implement it based on any language socket programming. Students may write their programs in Java, C++, Python, or C on any platform (Linux/Unix, Mac, PC). The client and server processes must be implemented in separate files. The chat application can communicate between two or more computers as a regular chat application.

Objectives

- To understand socket programming
- To apply socket programming with a simple chat application

Materials

- Socket programming in Python
  - https://realpython.com/python-sockets/
- Socket.IO - Bidirectional and low-latency communication for every platform
  - https://socket.io/docs/v4/
- Socket.IO and React tutorial
  - https://developer.okta.com/blog/2021/07/14/socket-io-react-tutorial
- Go websocket tutorial
  - https://tutorialedge.net/golang/go-websocket-tutorial/
- WebSockets with Spring
  - https://www.baeldung.com/websockets-spring

Score Criteria (Full score = 12.5 points)

Students must present "Implementation Explanation" slide along with the demonstration and explain the concepts and code related to socket programming/requirements questioned by the instructor.

Part 1 System Architecture Design (1.5 point)

This part must be fully completed; otherwise, Part 2 will not be graded.

- *R1* (1.0) You must present your system architecture. There must be at least **two clients**, each running on a **different physical computer**. The server may run on one of these computers or on a third one.
    - Note: Cloud-based deployment is allowed but optional and will be marked as one special point.
- *R2* (0.5) The chat messages between the server and each client must be implemented using Socket Programming only.

Part 2 Fundamental implementation (7 points)

This part must be fully completed; otherwise, Part 3 will not be graded.

- *R3* (0.5) Each client must have a unique name.
- *R4* (0.5) Each client can see a list of names of all clients that are currently connected to the server including its own name.
- *R5* (0.5) Each chat between clients (both **Private** and **Group message**) must have its own chat room.
- *R6* (0.5) Each chat room (both **Private** and **Group message**) must include a chat box for sending text messages and chat window for displaying the sent messages and new incoming messages.
- **Private message**
    - *R7* (1.0) Each client can send a direct text message to any clients in the list. Only the sender and receiver can see the messages.
- **Group message**
    - *R8* (1.0) Each client can create a chat group(s), which initially includes only themselves as a member.
    - *R9* (1.0) Each client can see a list of all existing chat groups (with the member list) created by any clients.
    - *R10* (1.0) Clients can choose to join a group chat only by themselves; they are not added automatically by the group creator.
    - *R11* (1.0) Each client can send a text message to the group that they joined. Only the members of the chat group can see the messages.

Part 3 Special points (4 points: 1.0 point per feature)

1.	2.
3.	4.