

Chatroom

--- Term Project Specification

1. Purpose

A chatroom is an online forum that accepts all users to join and discuss a specific topic in real time. In this assignment, you are asked to design chatroom using a client-server architecture with asked functions below:

- A. supporting multiple themes/sessions;
- B. client/server technique;
- C. can be dynamically established or terminated.

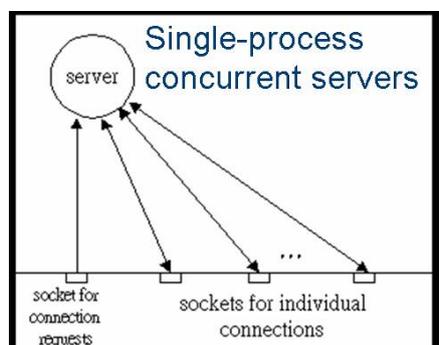
2. Background

Four important client-server models:

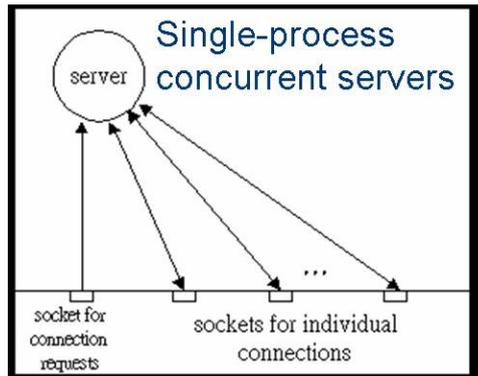
- 1. Iterative connectionless
- 2. Iterative connection-oriented,
- 3. Concurrent connectionless,
- 4. Concurrent connection-oriented.

In this four models, iterative and concurrency mean server request types. Connectionless and connection-oriented mean transfer protocol types. The best choice to design a chatroom is using the concurrent connection-oriented technique. In this model,. Four schemes can be used to implement the chatroom, which are (1) single-process concurrent servers, (2)master-slave concurrent server scheme, (3)Pre-allocated Master-Slave concurrent servers, (4)threads.

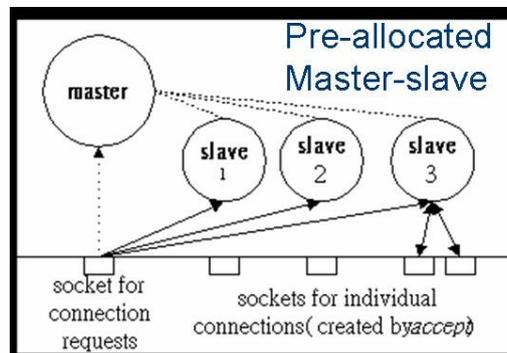
In the single-process concurrent servers(fig1.), the left-most socket is responsible for the connection requests, if accepted, others are responsible for this individual connection. The server uses SELECT command to know if there is any connection from any socket.



In the master-slave concurrent server scheme(fig2.), several slave processes are forked by the master process. Each slave is responsible for one chatroom, and uses the SELECT command to detect if any socket in the chatroom ask a request.



It's like master-slave concurrent server technique(fig3.). But we pre-allocated (use fork) some slave processes in the pool. When a new chatroom is created, one of the pre-allocated slaves will handle it. When the chatroom is closed, the slave will return to the pool.



In addition to the techniques above, we can further use *threads* to replace child processes. The advantages of this technique are as follows.

- A. You don't have to design a technique to control the inter-process communication between parent and child process.
- B. Decreasing the overhead of creating slave process.

But when using threads, you have to be cautious about some issues below.

- A. Although threads in the same process share variables and descriptors, you have to handle data synchronization carefully. (Hint: you can use conditional variables.)
- B. It is not always "thread-safe" when using functions in master-slave techniques(Hint: use thread-specific data to avoid this problem.)

3. Functional Requirement

Basic/Advanced requirements for users/hosts are listed below:

User:

Basic	
Command	Description
/help	List all commands that user can use.

/setid <userID>	Set your user ID
/w <userID> 'message'	Whisper to certain user ID
/user	List all participants in this chatroom
/q <userID>	Query a certain user(ID, identity, topic, source IP)
/bye	Leave this chat room
'message' <ENTER>	Send out the message to the topic group
Advanced	
Multi-Topics system:	
A. Create topic: User who create a topic will be the host of it.	
B. List topic: List all topics in the chatroom.	
C. Join topic: Join the topic and start chatting	
D. Quit topic	
Advanced chat system:	
A. Friend list: Mark friend, and list friends status	
B. Block list: Block message,	
C. Identity: User Identity(normal user/ friend / bad guy/ host)	
D. Acting:	
GUI interface(client):	
A. Ascii chat interface: Like BBS chatroom	
B. Graphic Interface: Xwindow framework to build a GUI interface	
C. Browser Interface: Use web interface to be the chat client	

Host

Basic	
Command	Description
/accept <userID>	Accept user to participant the room
/reject <userID>	Reject user to participant the room
/close	Close the topic
Advanced	
Advanced chat system:	
A. Block user	
B. Message log	
C. Message filter	

4. Testing

TAs will test your program by verifying the correctness of every step and all functions you implemented. The more you design, the more scores you get.

5. Problem Discussion (answer as many as you can to get more points)

- A. In the “background” section, four client-server techniques are introduced. What are their pros and cons?
- B. State the differences of chatroom designing issues between threads and child process.
- C. State the differences of “Master-slave concurrency server” and “concurrent server” in the background section.
- D. What else did you learn in this project?

6. Report format (answer as many as you can to get extra points)

The report should contain (1) purpose, (2) method, (3) implementation description, (4) program listing (comments are needed), and (5) screen dumping: the process of the compilation and result of the program; as what you include in a regular mini-project.

7. Reference

- [1] W. Richard Stevens, “Unix Network Programming”,3nd edition, Prentice-Hall , 1998
- [2] Douglas E. Comer , David L. Stevens, “Internetworking with TCP/IP “ Volume III , Prentice-Hall , 1996.