A CHAT SERVER APPLICATION IN C

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Chat Server application is designed using TCP Sockets for communication, message queues to handle messaging between clients and shared memory for maintaining global information about clients across processes and semaphores to enable mutual exclusive access. Chat Server runs on Port number 5000.

Shared memory is used to declare a global structure which contains information about clients like username (used to identify different clients), password (to provide authentication), last login information, online status information and many more to implement additional features. Semaphores is used to prevent race conditions while modifying the global client informations. Message Queue is used to at the server to store and deliver messages to online and offline clients. All are System V resources. Resources are allocated with IPC_PRIVATE. No information is stored across sessions. Resources are deallocated on exiting the server.

An application protocol is designed to facilitate chat and implement required features. TELNET client is clients. Following are the commands the server supports. They can also be listed at the client by sending the HELP command.
1. JOIN <username> <password>
This Command is used to create new account if username is available with specified password. The command fails if number of total users exceeds maximum (including both online and offline users) defined as MAX_USERS.
2. USER <username> <password>
This command is used to login back if account already exists. On login users are greeted with a welcome message and information about last login is also displayed (Last Login Time and IP Address). Username and password are used to authenticate. Users are allowed to login only from one place. Multiple login attempts are blocked.
3. LIST
This command lists all users with their online and blocked status. Online status is Y if user is online, N if online and C for current user. B is used to indicate that user is blocked by the other user or vice-versa. Online status is also influenced by HIDE (described below in HIDE).
4. SEND <username> <message>
This command is used to send a message to specified user. This command succeeds if valid user and message queue if not full. The message is delivered whenever user comes online or if already online then message is fetched from message queue. User is not allowed to send messages to users they blocked or user is themselves blocked by the other.
5. MCAST <usercount> <username> <username> ... <message>
This command is used to send a message to specified list of users. Block still applies. Note using this call user can send multiple messages to same user as well. Usercount must match the number of usernames specified.
6. BCAST <message>
This command is used to send a message to all users. Block still applies.
7. BLOCK <username>
This command is used to block another user. On Blocking, users can not send messages to each other. (Blocking applies to a pair of users when one user blocks the other or both block each other).
8. UNBLOCK <username>
This command is used to unblock another user. Note user still may not be able send message if other user has block him. (Message is sent if neither blocked the other)
9. HIDE <username>
This command is used to prevent other user from viewing the online status of the current user. Hide applies both ways. If one user hides from other then both see each others online status in LIST or FINGER as offline. HIDE influences LIST, FOLLOW and FINGER commands.
10. UNHIDE <username>

This command is used to remove the HIDE imposed.
11. FOLLOW <username>
This command is used by user to enable notifications about when other users come online. This also shows list of online following users when user logins. Notifications are displayed if other following users come online. FOLLOW is overruled by HIDE. If User hides from other user then follow notifications not sent. Note followed user also gets notification when notification sent to other user.
12. UNFOLLOW <username>
This command is used to stop following another user.
13. FINGER <username>
This command is used to get IP address of an Online user. Note this is overruled by HIDE command.
14. EXIT
This command is used to logout from a current session. To login back user USER command and authenticate.
15. LEAVE
This command is used to delete the current user. The current user information is removed from the chat system and can not login again without creating a new account.
16. HELP
This command lists all commands.
All the above commands are used by clients. All commands except JOIN, USER and HELP are not available if user is not logged in.

Apart from client functionality, This chat server also provides admin functionality at the server end. Following are the commands available to ADMIN.
1. LIST
This command lists all users with all their information that server stores. Like username, password, last seen, block, hide and follow details and online status.
2. RESOURCE
This command displays the current status of MESSAGE QUEUE.
3. SEND <username>
This command is used by ADMIN to send message to any client.
4. MCAST <usercount> <username> ... <message>
This command is used by ADMIN to send messages to many clients.
5. BCAST <message>
This command is used by ADMIN to send broadcast message to all clients.

Also client cannot send any message to ADMIN. Also ADMIN views all live messages.

Note: All sends work irrespective of whether the other user is online or offline. All other commands or commands not following format are treated as invalid.