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P2. Design a group messaging system.

We have two files, msgq_server.c and msgq_client.c. Client program prints a menu of options and asks for user's input as to which option to execute. The options available are :

1. REGISTER USER
2. CREATE GROUP
3. LIST GROUPS
4. JOIN GROUP
5. SEND MESSAGE TO A GROUP
6. READ MESSAGES FROM A GROUP
7. EXIT

All these actions, except option 6, are communicated to the server, which then sends an appropriate response. Every client has its own message queue to pass on its desired action and receive responses from the server. To initiate communication with the server, there is a welcoming message queue whose msgid can be obtained by each client using a publicly available pre-decided key. This welcoming queue is analogous to a welcoming socket in a HTTP server. The client passes on the key of its privately created message queue to the server using this welcoming queue, and all further communications with the server are through this private message queue. This functionality is achieved using REGISTER USER option.

Two tables are maintained at the server.

1. A table to keep track of user ids and corresponding msgids.
2. A list of all groups, where each group contains information about it's size, it's name, and a list of users who belong to that group.

REGISTER USER - User sends its private msgid to server. Server makes an entry of this in table 1, and sends back a userid to the user.

CREATE GROUP - User requests creation of a new group by specifying the group name. Server creates a new group by adding it to list 2, adds the user to this group, and returns the group id to the user.

LIST GROUPS - User requests the list of all groups. Server replies by sending group id of all the groups.

JOIN GROUP - User requests to join a group by specifying the group id. Server adds user to that particular group by modifying list 2 and sends an acknowledgment.

SEND MESSAGE - User specifies a message and a group id to which the message is to be sent. Server collects the message and puts it in the message queues of all the members of that group.

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READ MESSAGE - User specifies a group id from which to read the messages (This is online mode). The messages from that group are retrieved and displayed to the user.
Concept of online and offline mode : If an user has not specified a group id from which to read messages, then the user is said to be in offline mode w.r.t. this group and if there are pending messages to be read in this group, then the user will receive a notification regarding this.

EXIT - Quits the program.