Mandatory Handin 3 - ChittyChat

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`https://github.com/RealMystique/chittyChatty`
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1 Assignment 3 - gRPC

1.1 System architecture

Our system architecture is a classical client-server model, where we have clients, in our case our Client.go class, which connect to a server, in our case being Server.go, which sets up a server using gRPC and Chatserver.go.

As with standard server-client architecture, the server shares resources with the clients, and the clients does not provide any resources to each other or the server, they simply stream to the server, making publish() requests to the server to send messages to the chat, while listening for incoming broadcasts, using stream.recv function, both functions generated in the grpc.pb.go file, which was generated using a protocol buffer compiler, generated from our chat.proto file.

1.2 RPC Methods

There are three implemented RPC methods in our chittyChat system: Join, Broadcast and Publish. Our Join method is a Callback RPC since it helps both the client and server services, the Join method is responsible for connecting the user to the server and terminating that connection, it is also responsible for receiving messages from the server to the client. The Broadcast method is a Broadcast RPC, this is because the Broadcast method is used by the server to broadcast a client request (message) to the other cients on the network and thus helps to reduce the load. The Publish method is a Callback RPC and it handles messages sent from the client to the server, it also makes sure that the message is broadcast by Broadcast method.

1.3 Lamport timestamps

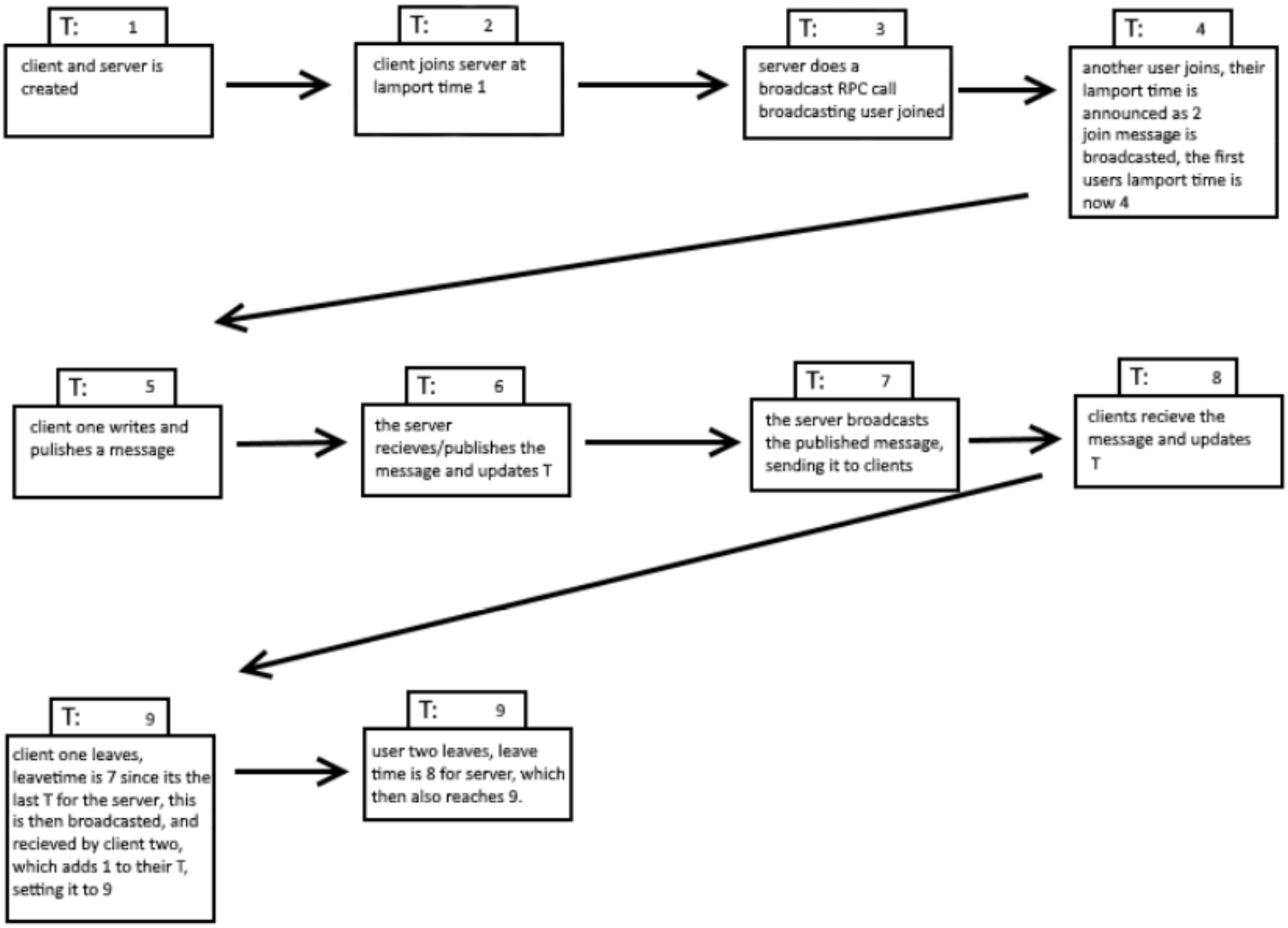
Client and chatserver both start out by declaring a 32 bit int called lamport to the value 1.
Client will increase its lamport by 1 every time it publishes a message to the server, the only other time the client currently changes its lamport timestamp, is when it recieves a message, in that case, it will store either its own lamport timestamp raised by 1, or the incomming lamport timestamp, whichever of the two is higher.
The server will upon publishing/recieving a message compare the lamport timestamp of the message, with the lamport timestamp it has stored, and store the highest of the two while adding 1 to it. Afterwards, it will broadcast the message, and in the process add 1 to the timestamp again.

This in its entirety, will mean that when the first user joins, the lamport timestamp of the user would be 1 in the servers message, since that is the

timestamp was 1 upon their arrival, but the lamport timestamp when the server recieves the join will be raised by 1, and once the join message is broadcasted to the user, it will be further increased by 1, meaning the users lamport timestamp at that exact moment would now be 3. Say another user joins such that they could chat, the lamport timestamp of the users would increase to 4, since they recieved a join message, and compared it to the current highest (3) and added 1. sending a message from this point on would raise the users lamport timestamp by 4. one from sending a message, one from the server publishing the message, one from the server broadcasting the message, and one from the users recieving it.

1.4 diagram of lamport

(see next page for image)



1.5 logs

Here are some pictures of the logs, replicating the exact situation illustrated in the image above.
serverlogs:

```
PS C:\Users\Nicol\Documents\A Folder for Uni\goGrpcNew\chittyC
hatty> cd .\goGrpc\
PS C:\Users\Nicol\Documents\A Folder for Uni\goGrpcNew\chittyC
hatty\goGrpc> cd .\server\
PS C:\Users\Nicol\Documents\A Folder for Uni\goGrpcNew\chittyC
hatty\goGrpc\server> go run server.go
2022/11/01 22:28:33 Loading...
2022/11/01 22:28:33 Server is setup at port 5000.
2022/11/01 22:28:51 (2) >> User one joined Chitty-Chat at Lamp
ort time 1
2022/11/01 22:29:13 (3) >> User two joined Chitty-Chat at Lamp
ort time 2
2022/11/01 22:43:30 (7, one) >> heya
2022/11/01 22:43:34 (8) >> User one left Chitty-Chat at Lampor
t time 7
2022/11/01 22:46:45 (9) >> User two left Chitty-Chat at Lampor
t time 8
```

clientlog 1:

```
PS C:\Users\Nicol\Documents\A Folder for Uni\goGrpcNew\chittyCha
tty> cd .\goGrpc\
PS C:\Users\Nicol\Documents\A Folder for Uni\goGrpcNew\chittyCha
tty\goGrpc> cd .\client\
PS C:\Users\Nicol\Documents\A Folder for Uni\goGrpcNew\chittyCha
tty\goGrpc\client> go run client.go --name=one
2022/11/01 22:28:51 (3) >> User one joined Chitty-Chat at Lampor
t time 1
2022/11/01 22:29:13 (4) >> User two joined Chitty-Chat at Lampor
t time 2
heya
2022/11/01 22:43:30 (8, one) >> heya
/leave
PS C:\Users\Nicol\Documents\A Folder for Uni\goGrpcNew\chittyCha
tty\goGrpc\client>
```

clientlog 2:

```
PS C:\Users\Nicol\Documents\A Folder for Uni\goGrpcNew\chittyCha
tty\goGrpc\client> go run client.go --name=two
2022/11/01 22:29:13 (4) >> User two joined Chitty-Chat at Lampor
t time 2
2022/11/01 22:43:30 (8, one) >> heya
2022/11/01 22:43:34 (9) >> User one left Chitty-Chat at Lamport
time 7
/leave
PS C:\Users\Nicol\Documents\A Folder for Uni\goGrpcNew\chittyCha
tty\goGrpc\client>
```