HandinThree Report

The following report describes how a grpc server could work for handling a server-client relation and how it is implemented into our program for this assignment. On the following link you can inspect the code:

https://github.com/Rpou/Distributed-system/tree/main/ChittyChat

Server-client relation

The program is using server-side streaming since it works in the following way. The client sends a single message to be posted and at the same time can receive a stream of data in the form of a list of all previous posts. Therefore server side streaming seems optimal for this project.

System architecture

The program utilizes a server-client architecture, because the client sends a single post to the server, where the server then responds with all the other information on the chat-service. Another reason the architecture fits the server-client, is because there is a single server that receives requests from multiple clients. The clients don't communicate other than through the server.

Program methods

The program only uses messages as types. These message types are used to create the following gRPC methods.

GetConnectionLog

The GetConnectionLog takes a ClientInfo(The client number and client lamport time), and returns the ConnectionsLog which is a list of strings.

This function is very relevant to how the clients receive data. Every second each client calls this function through a separate goroutine and therefore checks if any new posts have been posted to the server. If this is the case it will then log the new ones, this is seen in the appendix. Here it can also be noted, that the lamport time quickly becomes rather big due to the many “GetConnectionLog”-calls.

PublishPost

The PublishPost takes a Post (a string with a chat and a lamport time) and it returns Posted (a boolean and lamport time.).

Connect

The Connect takes a ClientInfo (the client Nr and the clients local lamport time) and returns nothing

Disconnect

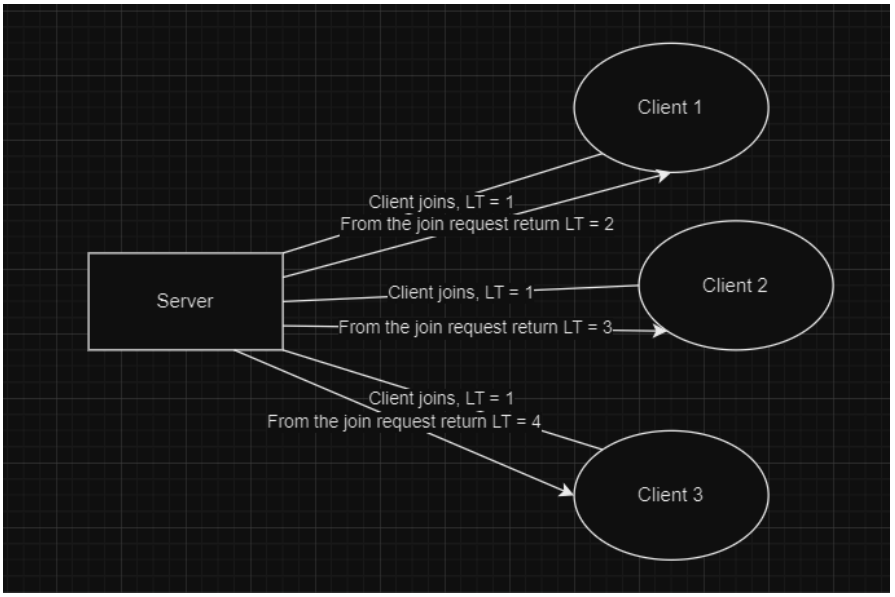
The last method is Disconnect that takes ClientInfo and returns nothing

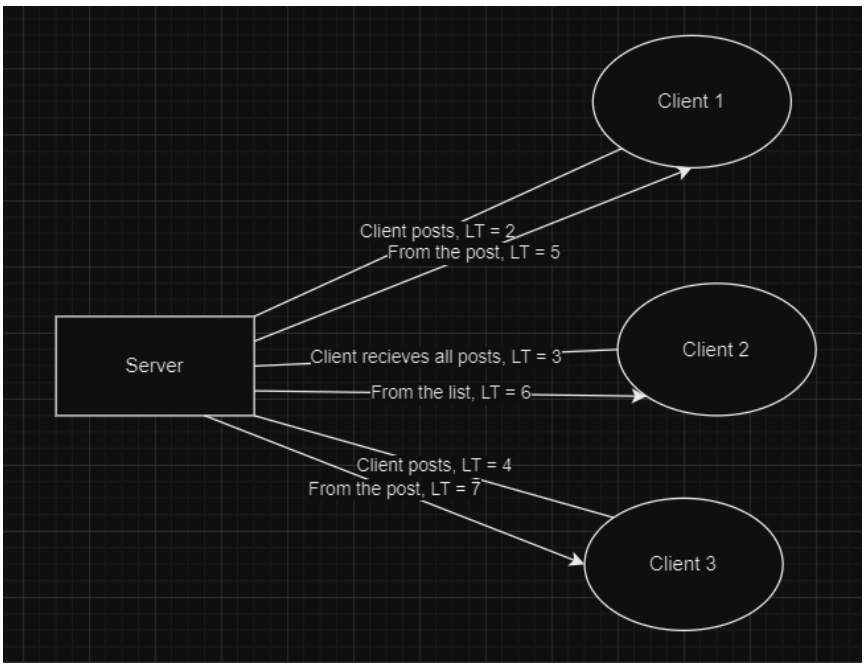
User inputs

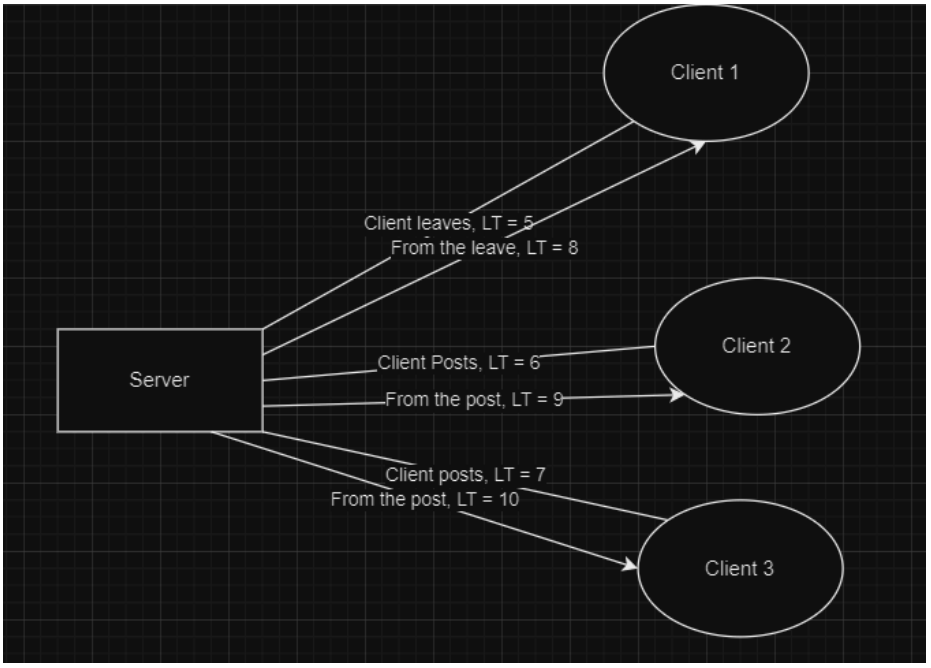
To use the service you have three options of how to act. You firstly have to write “join” to connect to the service and use it. From here you can write any message shorter than 128 characters, which will then be posted to the server. As a third option you can write “disconnect” and cut all ties to the server. You will then not receive new posts.

Lamport time implementation

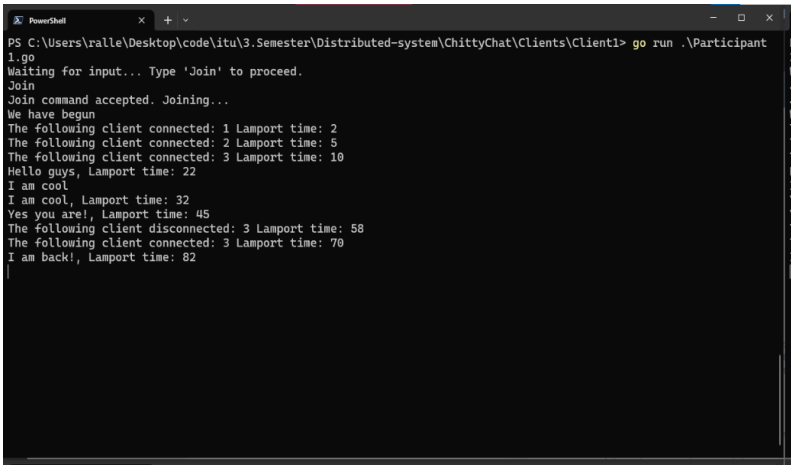
All communication between server and client is done with a lamport time. When a post is sent to the server it also has a lamport time included, the server will then calculate the appropriate lamport time when comparing its own and the client's current.
In this program's case, since we have multiple clients and they can only communicate to the server, then the server will always have the most recent lamport time, which the clients will then update their own lamport time to also. An example of this can be seen in the following pictures. Please note that while this is happening the “listenForUpdates” runs in the background. This is not included in the pictures for simplicity

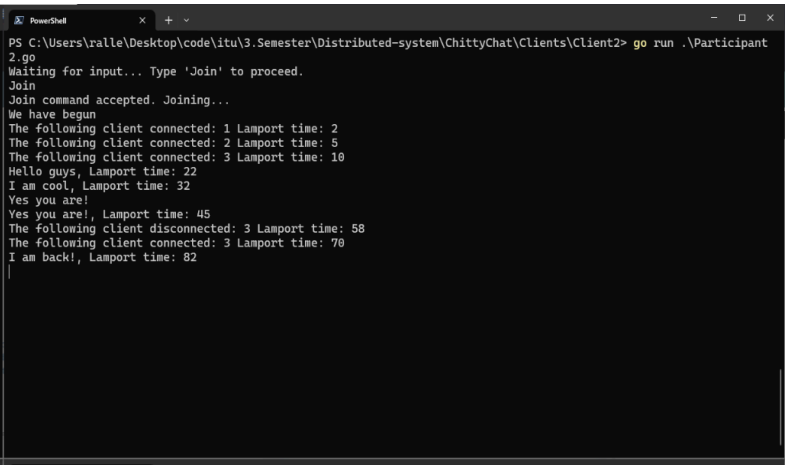


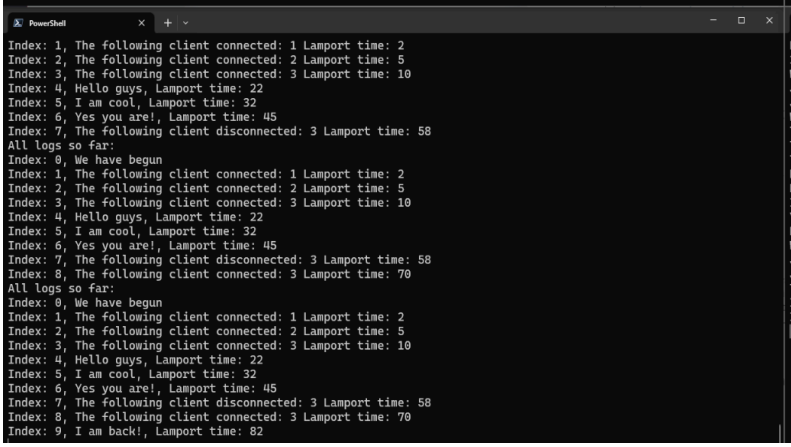

Client 1
Client posts, LT = 2
From the post, LT = 5
Server
Client recieves all posts, LT = 3
Client 2
From the list, LT = 6
Client posts, LT = 4
From the post, LT = 7
Client 3

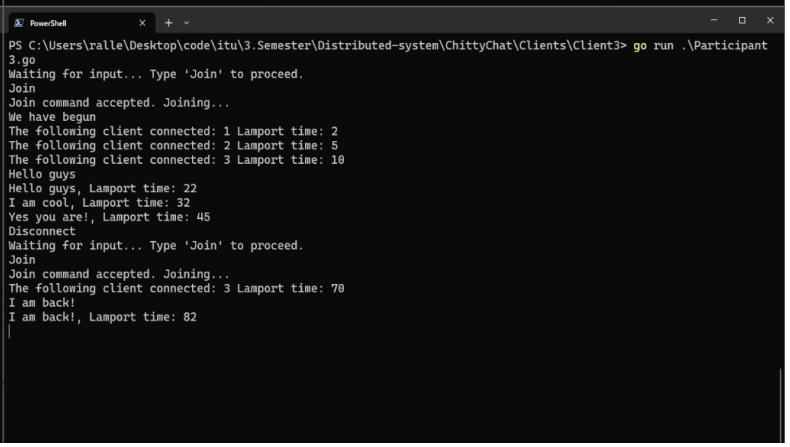

Client 1
Client leaves, LT = 5
From the leave, LT = 8
Server
Client 2
Client Posts, LT = 6
From the post, LT = 9
Client posts, LT = 7
From the post, LT = 10
Client 3

Appendix


PowerShell
PS C:\Users\ralle\Desktop\code\itu\3.Semester\Distributed-system\ChittyChat\Clients\Client1> go run .\Participant1.go
Waiting for input... Type 'Join' to proceed.
Join
Join command accepted. Joining...
We have begun
The following client connected: 1 Lamport time: 2
The following client connected: 2 Lamport time: 5
The following client connected: 3 Lamport time: 10
Hello guys, Lamport time: 22
I am cool
I am cool, Lamport time: 32
Yes you are!, Lamport time: 45
The following client disconnected: 3 Lamport time: 58
The following client connected: 3 Lamport time: 70
I am back!, Lamport time: 82


PowerShell
PS C:\Users\ralle\Desktop\code\itu\3.Semester\Distributed-system\ChittyChat\Clients\Client2> go run .\Participant2.go
Waiting for input... Type 'Join' to proceed.
Join
Join command accepted. Joining...
We have begun
The following client connected: 1 Lamport time: 2
The following client connected: 2 Lamport time: 5
The following client connected: 3 Lamport time: 10
Hello guys, Lamport time: 22
I am cool, Lamport time: 32
Yes you are!
Yes you are!, Lamport time: 45
The following client disconnected: 3 Lamport time: 58
The following client connected: 3 Lamport time: 70
I am back!, Lamport time: 82


PowerShell
Index: 1, The following client connected: 1 Lamport time: 2
Index: 2, The following client connected: 2 Lamport time: 5
Index: 3, The following client connected: 3 Lamport time: 10
Index: 4, Hello guys, Lamport time: 22
Index: 5, I am cool, Lamport time: 32
Index: 6, Yes you are!, Lamport time: 45
Index: 7, The following client disconnected: 3 Lamport time: 58
All logs so far:
Index: 0, We have begun
Index: 1, The following client connected: 1 Lamport time: 2
Index: 2, The following client connected: 2 Lamport time: 5
Index: 3, The following client connected: 3 Lamport time: 10
Index: 4, Hello guys, Lamport time: 22
Index: 5, I am cool, Lamport time: 32
Index: 6, Yes you are!, Lamport time: 45
Index: 7, The following client disconnected: 3 Lamport time: 58
Index: 8, The following client connected: 3 Lamport time: 70
All logs so far:
Index: 0, We have begun
Index: 1, The following client connected: 1 Lamport time: 2
Index: 2, The following client connected: 2 Lamport time: 5
Index: 3, The following client connected: 3 Lamport time: 10
Index: 4, Hello guys, Lamport time: 22
Index: 5, I am cool, Lamport time: 32
Index: 6, Yes you are!, Lamport time: 45
Index: 7, The following client disconnected: 3 Lamport time: 58
Index: 8, The following client connected: 3 Lamport time: 70
Index: 9, I am back!, Lamport time: 82


PowerShell
PS C:\Users\ralle\Desktop\code\itu\3.Semester\Distributed-system\ChittyChat\Clients\Client3> go run .\Participant3.go
Waiting for input... Type 'Join' to proceed.
Join
Join command accepted. Joining...
We have begun
The following client connected: 1 Lamport time: 2
The following client connected: 2 Lamport time: 5
The following client connected: 3 Lamport time: 10
Hello guys
Hello guys, Lamport time: 22
I am cool, Lamport time: 32
Yes you are!, Lamport time: 45
Disconnect
Waiting for input... Type 'Join' to proceed.
Join
Join command accepted. Joining...
The following client connected: 3 Lamport time: 70
I am back!
I am back!, Lamport time: 82