

Design Document

This code consists of two parts, the Tiny SNS client and server. Once the server starts, the client has the opportunity to connect to it. When a client connects, they are presented with a few options: **1) FOLLOW 2) LIST 3) UNFOLLOW 4) TIMELINE**. When the client first connects, the client should issue a login command to add them to the current clients vector and establish them as a user. A stub is created for the user when they are instantiated. Whenever they pass through any commands after from the list above, we pass this through the `processCommand()` function to dictate what should happen.

If the client issues a **FOLLOW** command, they must also pass through an argument indicating who they are trying to follow. From here, the follow function on the client side must be called and it will check if the other username is valid and can be followed. From there, a request is sent to the server side to add the user to the other client's following and add the other user to the current user's followers.

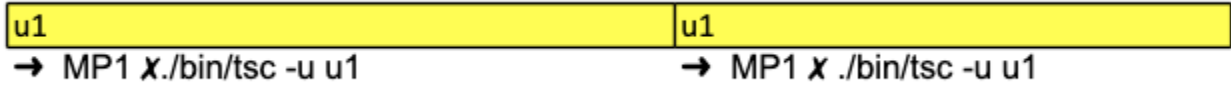
If the client issues a **LIST** command, the client side of the program will issue a request to the server to get a `list_reply` which contains a list of all users and the current user's followers. This list is filled by the server and can be read by the client and displayed.

If the client issues an **UNFOLLOW** command, they must also pass through an argument indicating who they are trying to unfollow. From there, the unfollow function will call the server in order to check if they are currently following the other user and that the other user exists. If all of this is true, the other user will be unfollowed and each of the corresponding vectors will be updated accordingly.

If the client issues a **TIMELINE** command, the client side of the program will start two threads. One thread will be responsible for writing new messages as they come in from the terminal, while the other one will be responsible for reading in new messages and displaying them to the user's terminal. This will use the `displayPost` and `getPost` functions. We will use the `Message` structure in order to store this data and the `MakeMessage` method helps fill this message with the timestamps. When the user first enters the timeline, the server will check that user's feed file to see the unread posts and display the most recent 20 posts. After this, whenever they write a post in the terminal, a message should be written to all of their follower's streams that are currently in timeline mode in order to display the message. This message should also be stored in the other user's files for future reading. This feature helps us see the unread posts for users that are not currently in timeline mode. The user's posts will also be saved to their own file for server timeline persistence.

Another important part of this SNS service is the `connectTo` function which is the first function called when a client is created. This function creates the GRPC stub for communicating with the server. It also calls the login function.

Test Case 1:



```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
csce438@csce438-VirtualBox:~/mpl_skeleton$ ./tsc -u u1
Logging Initialized. Client starting...Successfully Connected

===== TINY SNS CLIENT =====
Command Lists and Format:
FOLLOW <username>
UNFOLLOW <username>
LIST
TIMELINE
=====
Cmd>

csce438@csce438-VirtualBox:~/mpl_skeleton$ ./tsc -u u1
Logging Initialized. Client starting...connection failed: -1
csce438@csce438-VirtualBox:~/mpl_skeleton$
```

Test Case 2:

u1	u2	u3
list		
	list	
		list
follow u1		
follow u2		
follow u3		
follow u4		
	follow u1	
	follow u2	
	follow u3	
	follow u4	
		follow u1
		follow u2
		follow u3
		follow u4
unknown command		

PROBLEMS

OUTPUT

DEBUG CONSOLE

TERMINAL

PORTS

csce438@csce438-VirtualBox:~/mpl_skeleton\$./tsc -u u1

Logging Initialized. Client starting...Successfully Connected

===== TINY SNS CLIENT =====

Command Lists and Format:

FOLLOW <username>

UNFOLLOW <username>

LIST

TIMELINE

=====

Cmd> LIST

Command completed successfully

All users: u1, u2, u3,

Followers:

Cmd> follow u1

Input username already exists, command failed

Cmd> follow u2

Command completed successfully

Cmd> follow u3

Command completed successfully

Cmd> follow u4

Command failed with invalid username

Cmd> follow

Invalid Command

Cmd> █

csce438@csce438-VirtualBox:~/mpl_skeleton\$./tsc -u u2

Logging Initialized. Client starting...Successfully Connected

===== TINY SNS CLIENT =====

Command Lists and Format:

FOLLOW <username>

UNFOLLOW <username>

LIST

TIMELINE

=====

Cmd> LIST

Command completed successfully

All users: u1, u2, u3,

Followers:

Cmd> follow u1

Command completed successfully

Cmd> follow u2

Input username already exists, command failed

Cmd> follow u3

Command completed successfully

Cmd> follow u4

Command failed with invalid username

Cmd> []

csce438@csce438-VirtualBox:~/mpl_skeleton\$./tsc -u u3

Logging Initialized. Client starting...Successfully Connected

===== TINY SNS CLIENT =====

Command Lists and Format:

FOLLOW <username>

UNFOLLOW <username>

LIST

TIMELINE

=====

Cmd> LIST

Command completed successfully

All users: u1, u2, u3,

Followers:

Cmd> follow u1

Command completed successfully

Cmd> follow u2

Command completed successfully

Cmd> follow u3

Input username already exists, command failed

Cmd> follow u4

Command failed with invalid username

Cmd> []

Test Case 3:

u1	u2	u3
follow u2		
follow u3		
unfollow u1		
unfollow u2		
unfollow u3		
unfollow u4		
	follow u1	
	follow u3	
	unfollow u1	
	unfollow u2	
	unfollow u3	
	unfollow u4	
		follow u1
		follow u2
		unfollow u1
		unfollow u2
		unfollow u3
		unfollow u4

PROBLEMS

OUTPUT

DEBUG CONSOLE

TERMINAL

PORTS

csce438@csce438-VirtualBox:~/mpl_skeleton\$./tsc -u u1

Logging Initialized. Client starting...Successfully Connected

===== TINY SNS CLIENT =====

Command Lists and Format:

FOLLOW <username>

UNFOLLOW <username>

LIST

TIMELINE

=====

Cmd> follow u2

Command completed successfully

Cmd> follow u3

Command completed successfully

Cmd> unfollow u1

Command failed with invalid username

Cmd> unfollow u2

Command completed successfully

Cmd> unfollow u3

Command completed successfully

Cmd> unfollow u4

Command failed with invalid username

Cmd>

csce438@csce438-VirtualBox:~/mpl_skeleton\$./tsc -u u2

Logging Initialized. Client starting...Successfully Connected

===== TINY SNS CLIENT =====

Command Lists and Format:

FOLLOW <username>

UNFOLLOW <username>

LIST

TIMELINE

=====

Cmd> follow u1

Command completed successfully

Cmd> follow u3

Command completed successfully

Cmd> unfollow u1

Command completed successfully

Cmd> unfollow u2

Command failed with invalid username

Cmd> unfollow u3

Command completed successfully

Cmd> unfollow u4

Command failed with invalid username

Cmd>

csce438@csce438-VirtualBox:~/mpl_skeleton\$./tsc -u u3

Logging Initialized. Client starting...Successfully Connected

===== TINY SNS CLIENT =====

Command Lists and Format:

FOLLOW <username>

UNFOLLOW <username>

LIST

TIMELINE

=====

Cmd> follow u1

Command completed successfully

Cmd> follow u2

Command completed successfully

Cmd> unfollow u1

Command completed successfully

Cmd> unfollow u2

Command completed successfully

Cmd> unfollow u3

Command failed with invalid username

Cmd> unfollow u4

Command failed with invalid username

Cmd>

Test Case 4:

u1	u2	u3
follow u2		
	list	
follow u3		
		list
unfollow u1		
list		
unfollow u2		
	list	
unfollow u3		
		list
unfollow u4		
list		
	follow u1	
list		
	follow u3	
		list
	unfollow u1	
list		
	unfollow u2	
	list	
	unfollow u3	
		list
	unfollow u4	
	list	
		follow u1
list		
		follow u2
	list	
		unfollow u1
list		
		unfollow u2
	list	
		unfollow u3
		list
		unfollow u4
		list

PROBLEMS

OUTPUT

DEBUG CONSOLE

TERMINAL

PORTS

csce438@csce438-VirtualBox:~/mp1_skeleton\$./tsc -u u1

Logging Initialized. Client starting...Successfully Connected

===== TINY SNS CLIENT =====

Command Lists and Format:

FOLLOW <username>

UNFOLLOW <username>

LIST

TIMELINE

=====

Cmd> follow u2

Command completed successfully

Cmd> follow u3

Command completed successfully

Cmd> unfollow u1

Command failed with invalid username

Cmd> list

Command completed successfully

All users: u1, u3, u2,

Followers:

Cmd> unfollow u2

Command completed successfully

Cmd> unfollow u3

Command completed successfully

Cmd> unfollow u4

Command failed with invalid username

Cmd> list

Command completed successfully

All users: u1, u3, u2,

Followers:

Cmd> list

Command completed successfully

All users: u1, u3, u2,

Followers: u2,

Cmd> list

Command completed successfully

All users: u1, u3, u2,

Followers:

Cmd> list

Command completed successfully

All users: u1, u3, u2,

Followers: u3,

Cmd> list

Command completed successfully

All users: u1, u3, u2,

Followers:

Cmd> []

csce438@csce438-VirtualBox:~/mp1_skeleton\$./tsc -u u2

Logging Initialized. Client starting...Successfully Connected

===== TINY SNS CLIENT =====

Command Lists and Format:

FOLLOW <username>

UNFOLLOW <username>

LIST

TIMELINE

=====

Cmd> list

Command completed successfully

All users: u1, u3, u2,

Followers: u1,

Cmd> list

Command completed successfully

All users: u1, u3, u2,

Followers:

Cmd> follow u1

Command completed successfully

Cmd> follow u3

Command completed successfully

Cmd> unfollow u1

Command completed successfully

Cmd> unfollow u2

Command failed with invalid username

Cmd> list

Command completed successfully

All users: u1, u3, u2,

Followers:

Cmd> unfollow u3

Command completed successfully

Cmd> unfollow u4

Command failed with invalid username

Cmd> list

Command completed successfully

All users: u1, u3, u2,

Followers:

Cmd> list

Command completed successfully

All users: u1, u3, u2,

Followers: u3,

Cmd> list

Command completed successfully

All users: u1, u3, u2,

Followers:

Cmd> []

csce438@csce438-VirtualBox:~/mp1_skeleton\$./tsc -u u3

Logging Initialized. Client starting...Successfully Connected

===== TINY SNS CLIENT =====

Command Lists and Format:

FOLLOW <username>

UNFOLLOW <username>

LIST

TIMELINE

=====

Cmd> list

Command completed successfully

All users: u1, u3, u2,

Followers: u1,

Cmd> list

Command completed successfully

All users: u1, u3, u2,

Followers:

Cmd> follow u1

Command completed successfully

Cmd> follow u2

Command completed successfully

Cmd> unfollow u1

Command completed successfully

Cmd> unfollow u2

Command completed successfully

Cmd> unfollow u3

Command failed with invalid username

Cmd> list

Command completed successfully

All users: u1, u3, u2,

Followers:

Cmd> unfollow u4

Command failed with invalid username

Cmd> list

Command completed successfully

All users: u1, u3, u2,

Followers:

Cmd> []

Test 5:

u1	u2	u3
follow u2		
	follow u1	
timeline		
p1		
p2		
p3		
p4		
p5		
p6		
p7		
p8		
p9		
p10		
		follow u1
p11		
p12		
p13		
p14		
p15		
p16		
p17		
p18		
p19		
p20		
p21		
p22		
	timeline	
		timeline

```
csce438@csce438-VirtualBox:~/mp1_skeleton$ ./tsc -u u1
Logging Initialized. Client starting...Successfully Connected

===== TINY SNS CLIENT =====
Command Lists and Format:
FOLLOW <username>
UNFOLLOW <username>
LIST
TIMELINE

Cmd> follow u2
Command completed successfully
Cmd> timeline
p1
p2
p3
p4
p5
p6
p7
p8
p9
p10
p11
p12
p13
p14
p15
p16
p17
p18
p19
p20
p21
p22
```

```
csce438@csce438-VirtualBox:~/mp1_skeleton$ ./tsc -u u2
Logging Initialized. Client starting...Successfully Connected

===== TINY SNS CLIENT =====
Command Lists and Format:
FOLLOW <username>
UNFOLLOW <username>
LIST
TIMELINE

Cmd> follow u1
Command completed successfully
Cmd> timeline
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:48Z) >> p22
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:47Z) >> p21
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:45Z) >> p20
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:44Z) >> p19
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:42Z) >> p18
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:41Z) >> p17
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:40Z) >> p16
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:39Z) >> p15
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:38Z) >> p14
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:37Z) >> p13
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:36Z) >> p12
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:35Z) >> p11
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:25Z) >> p10
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:24Z) >> p9
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:22Z) >> p8
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:21Z) >> p7
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:20Z) >> p6
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:20Z) >> p5
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:19Z) >> p4
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:18Z) >> p3
```

```
csce438@csce438-VirtualBox:~/mp1_skeleton$ ./tsc -u u3
Logging Initialized. Client starting...Successfully Connected

===== TINY SNS CLIENT =====
Command Lists and Format:
FOLLOW <username>
UNFOLLOW <username>
LIST
TIMELINE

Cmd> follow u1
Command completed successfully
Cmd> timeline
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:48Z) >> p22
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:47Z) >> p21
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:45Z) >> p20
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:44Z) >> p19
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:42Z) >> p18
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:41Z) >> p17
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:40Z) >> p16
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:39Z) >> p15
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:38Z) >> p14
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:37Z) >> p13
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:36Z) >> p12
(Wed Dec 31 18:00:00 1969) >> u1 (2024-02-24T01:25:35Z) >> p11
```

Test 6:

u1	u2	u3	u4	u5	u6	u7	u8	u9	u10
follow u2									
	follow u1								
		follow u4							
			follow u5						
				follow u3					
					follow u7				
					follow u8				
					follow u9				
					follow u10				
						follow u6			
						follow u8			
						follow u9			
						follow u10			
							follow u7		
							follow u6		
							follow u9		
							follow u10		
								follow u7	
								follow u8	
								follow u6	
								follow u10	
									follow u7
									follow u8
									follow u9
									follow u6

timeline

timeline

timeline

timeline

timeline

timeline

timeline

timeline

timeline

timeline

p1									
	p2								
p3									
	p4								
		p5							
			p6						
				p7					
					p8				
						p9			
							p10		
								p11	
									p12

PROBLEMS	OUTPUT	DEBUG CONSOLE	TERMINAL	PORTS					
<pre>csc438@csc438-Vi rtualBox:~/mpi_ske leton\$ c lear /tsc -u u1 Logging Initialize d. Client starting ..Successfully Co nnected ===== TINY SNS CLIENT ===== Command Lists and Format: FOLLOW <username> UNFOLLOW <usern am> e> LIST TIMELINE ===== = Cmd> follow u2 Command completed successfully Cmd> timeline p1 u2 (Fri Feb 23 19: 34:06 2024) >> p2 p3 u2 (Fri Feb 23 19: 34:10 2024) >> p4 []</pre>	<pre>csc438@csc438-Vi rtualBox:~/mpi_ske leton\$ c lear /tsc -u u2 Logging Initialize d. Client starting ..Successfully Co nnected ===== TINY SNS CLIENT ===== Command Lists and Format: FOLLOW <username> UNFOLLOW <usern am> e> LIST TIMELINE ===== = Cmd> follow u1 Command completed successfully Cmd> timeline p1 u1 (Fri Feb 23 19: 34:04 2024) >> p1 p2 u1 (Fri Feb 23 19: 34:08 2024) >> p3 p4 []</pre>	<pre>csc438@csc438-Vi rtualBox:~/mpi_ske leton\$ c lear /tsc -u u3 Logging Initialize d. Client starting ..Successfully Co nnected ===== TINY SNS CLIENT ===== Command Lists and Format: FOLLOW <username> UNFOLLOW <usern am> e> LIST TIMELINE ===== = Cmd> follow u4 Command completed successfully Cmd> timeline p5 u4 (Fri Feb 23 19: 34:22 2024) >> p6 []</pre>	<pre>csc438@csc438-Vi rtualBox:~/mpi_ske leton\$ c lear /tsc -u u4 Logging Initialize d. Client starting ..Successfully Co nnected ===== TINY SNS CLIENT ===== Command Lists and Format: FOLLOW <username> UNFOLLOW <usern am> e> LIST TIMELINE ===== = Cmd> follow u5 Command completed successfully Cmd> timeline p6 u5 (Fri Feb 23 19: 34:25 2024) >> p7 []</pre>	<pre>csc438@csc438-Vi rtualBox:~/mpi_ske leton\$ c lear /tsc -u u5 Logging Initialize d. Client starting ..Successfully Co nnected ===== TINY SNS CLIENT ===== Command Lists and Format: FOLLOW <username> UNFOLLOW <usern am> e> LIST TIMELINE ===== = Cmd> follow u3 Command completed successfully Cmd> timeline p7 u3 (Fri Feb 23 19: 34:20 2024) >> p5 p7 []</pre>	<pre>csc438@csc438-Vi rtualBox:~/mpi_ske leton\$ c lear /tsc -u u6 Logging Initialize d. Client starting ..Successfully Co nnected ===== TINY SNS CLIENT ===== Command Lists and Format: FOLLOW <username> UNFOLLOW <usern am> e> LIST TIMELINE ===== = Cmd> follow u6 Command completed successfully Cmd> follow u8 Command completed successfully Cmd> follow u9 Command completed successfully Cmd> follow u10 Command completed successfully Cmd> timeline p8 u6 (Fri Feb 23 19: 34:27 2024) >> p8 p9 u8 (Fri Feb 23 19: 34:32 2024) >> p10 u9 (Fri Feb 23 19: 34:34 2024) >> p11 u10 (Fri Feb 23 19: 34:36 2024) >> p1 2 []</pre>	<pre>csc438@csc438-Vi rtualBox:~/mpi_ske leton\$ c lear /tsc -u u7 Logging Initialize d. Client starting ..Successfully Co nnected ===== TINY SNS CLIENT ===== Command Lists and Format: FOLLOW <username> UNFOLLOW <usern am> e> LIST TIMELINE ===== = Cmd> follow u7 Command completed successfully Cmd> follow u8 Command completed successfully Cmd> follow u9 Command completed successfully Cmd> follow u10 Command completed successfully Cmd> timeline p9 u6 (Fri Feb 23 19: 34:27 2024) >> p8 p9 u8 (Fri Feb 23 19: 34:30 2024) >> p10 u9 (Fri Feb 23 19: 34:34 2024) >> p11 u10 (Fri Feb 23 19: 34:36 2024) >> p1 2 []</pre>	<pre>csc438@csc438-Vi rtualBox:~/mpi_ske leton\$ c lear /tsc -u u8 Logging Initialize d. Client starting ..Successfully Co nnected ===== TINY SNS CLIENT ===== Command Lists and Format: FOLLOW <username> UNFOLLOW <usern am> e> LIST TIMELINE ===== = Cmd> follow u7 Command completed successfully Cmd> follow u8 Command completed successfully Cmd> follow u9 Command completed successfully Cmd> follow u10 Command completed successfully Cmd> timeline p10 u6 (Fri Feb 23 19: 34:27 2024) >> p8 p10 u7 (Fri Feb 23 19: 34:30 2024) >> p9 u8 (Fri Feb 23 19: 34:32 2024) >> p10 u9 (Fri Feb 23 19: 34:34 2024) >> p11 u10 (Fri Feb 23 19: 34:36 2024) >> p1 2 []</pre>	<pre>csc438@csc438-Vi rtualBox:~/mpi_ske leton\$ c lear /tsc -u u9 Logging Initialize d. Client starting ..Successfully Co nnected ===== TINY SNS CLIENT ===== Command Lists and Format: FOLLOW <username> UNFOLLOW <usern am> e> LIST TIMELINE ===== = Cmd> follow u7 Command completed successfully Cmd> follow u8 Command completed successfully Cmd> follow u9 Command completed successfully Cmd> follow u10 Command completed successfully Cmd> timeline p11 u6 (Fri Feb 23 19: 34:27 2024) >> p8 p11 u7 (Fri Feb 23 19: 34:30 2024) >> p9 u8 (Fri Feb 23 19: 34:32 2024) >> p10 u9 (Fri Feb 23 19: 34:34 2024) >> p11 u10 (Fri Feb 23 19: 34:36 2024) >> p1 2 []</pre>	<pre>csc438@csc438-Vi rtualBox:~/mpi_ske leton\$ c lear /tsc -u u1 0 Logging Initialize d. Client starting ..Successfully Co nnected ===== TINY SNS CLIENT ===== Command Lists and Format: FOLLOW <username> UNFOLLOW <usern am> e> LIST TIMELINE ===== = Cmd> follow u7 Command completed successfully Cmd> follow u8 Command completed successfully Cmd> follow u9 Command completed successfully Cmd> follow u10 Command completed successfully Cmd> timeline p12 u6 (Fri Feb 23 19: 34:27 2024) >> p8 p12 []</pre>