

CSCE 662: MP1 Design Document

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1 Problem Statement

To build a server, client in C++, utilizing gRPC and Google Protocol Buffers to establish connectivity. The application intends to provide a functionality similar to posting tweets. Users (clients) can login, follow, unfollow and make posts.

2 High Level Diagram

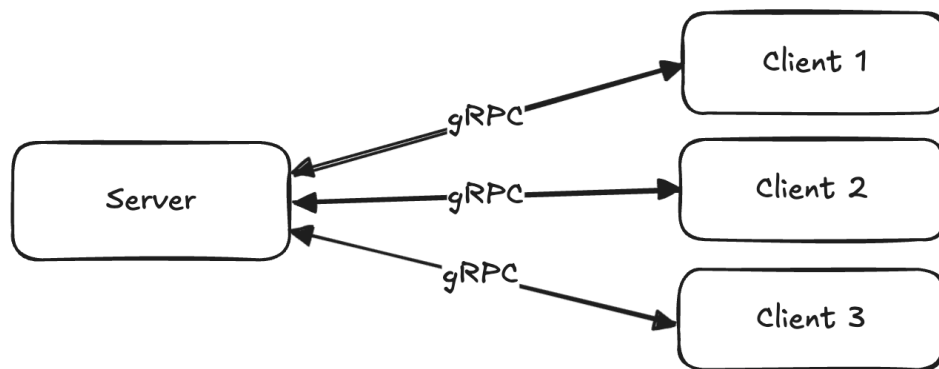


Figure 1: High Level Diagram

3 Functionality Description

3.1 Login

- User provides a unique username
- Server checks client_db if any client present with provided username, if not found, success is sent and Client is stored in the database, else `grpc::Status::ALREADY_EXISTS` is sent to Client
- If username is unique, the Client is stored in client_db at Server
- If username is unique, the Client displays Welcome Page with commands
- Otherwise it returns connection failed: -1

3.2 Follow

- Current User inputs command to follow user
- Server checks the possible incorrect scenarios, that are listed in Sequence Diagram 4.2, accordingly returns error code
- In a positive scenario, the user is added to Current User's following_list
- Current User is added to the user's follower_list

3.3 Unfollow

- Current User inputs command to unfollow user
- Server checks the possible incorrect scenarios, that are listed in Sequence Diagram 4.3, accordingly returns error code
- In a positive scenario, the user is removed from Current User's following_list
- Current User is removed from the user's follower_list
- User's Posts are removed from the timeline file of the Current User

3.4 Timeline

- User provides a command to enter timeline mode
- A bi-directional stream is setup between Client and Server
- Server checks if it is the first time the Client is connecting to the stream
- If first time, the user's timeline file is opened, and latest 20 posts are sent from Server to Client, that are displayed
- For subsequent inputs, it is considered as a Post, the message is sent to active client's using their stream by server
- The Post is added to each follower's timeline file
- The Post is also added to the user's posts file

4 Sequence Diagrams

4.1 Login

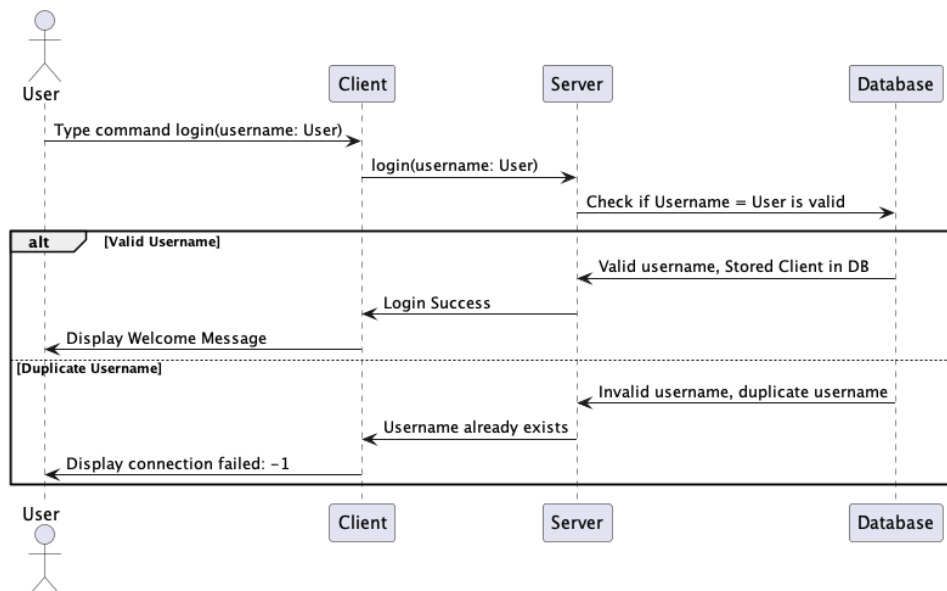


Figure 2: Login Sequence Diagram

4.2 Follow

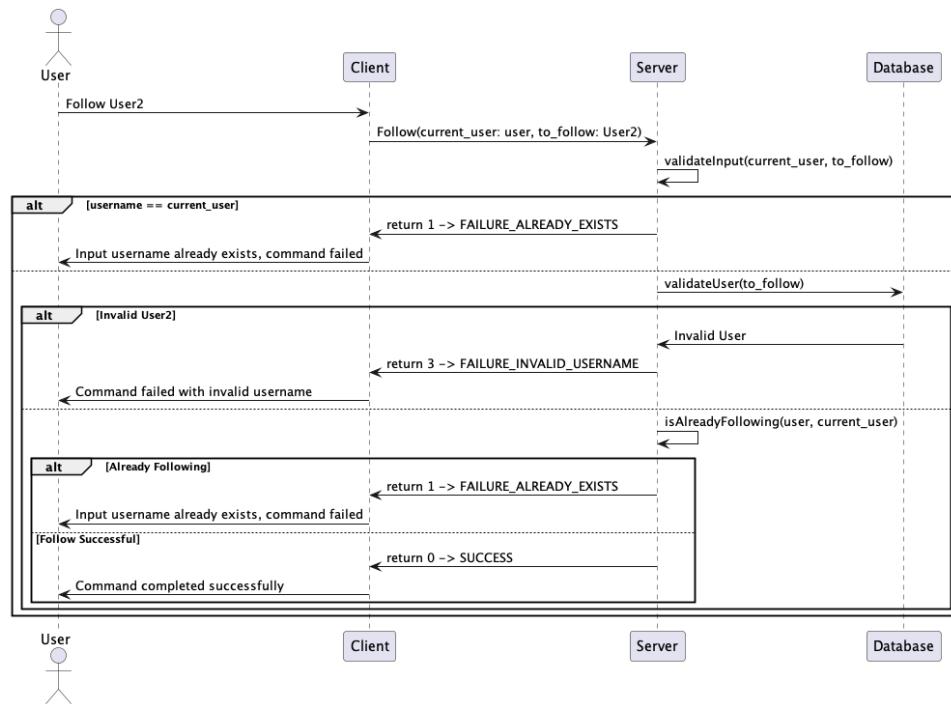


Figure 3: Follow Sequence Diagram

4.3 Unfollow

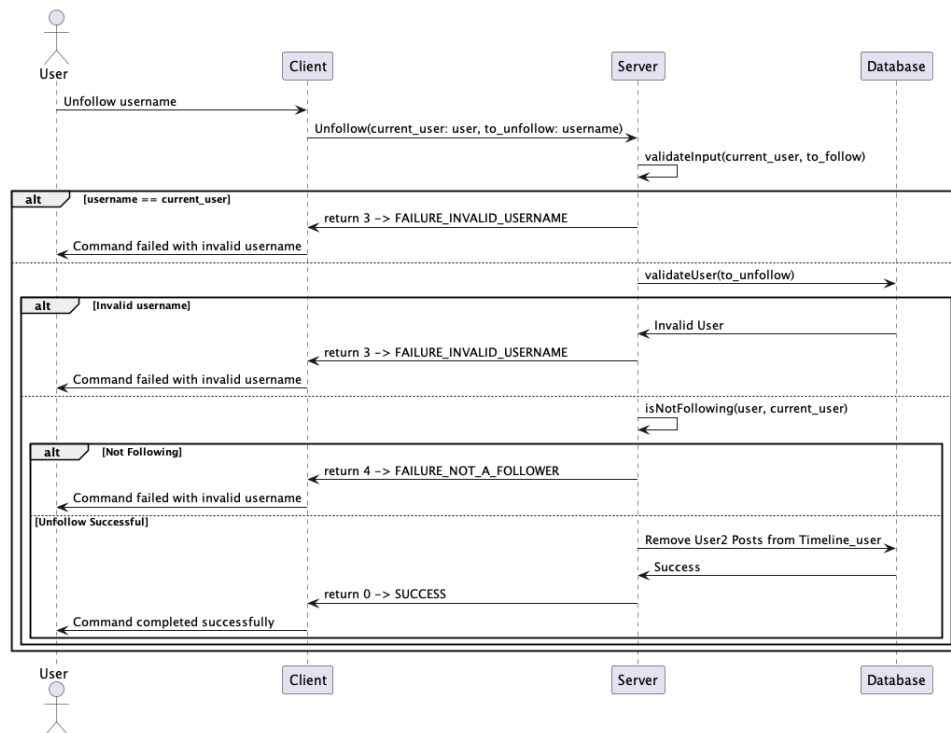


Figure 4: Unfollow Sequence Diagram

4.4 Timeline

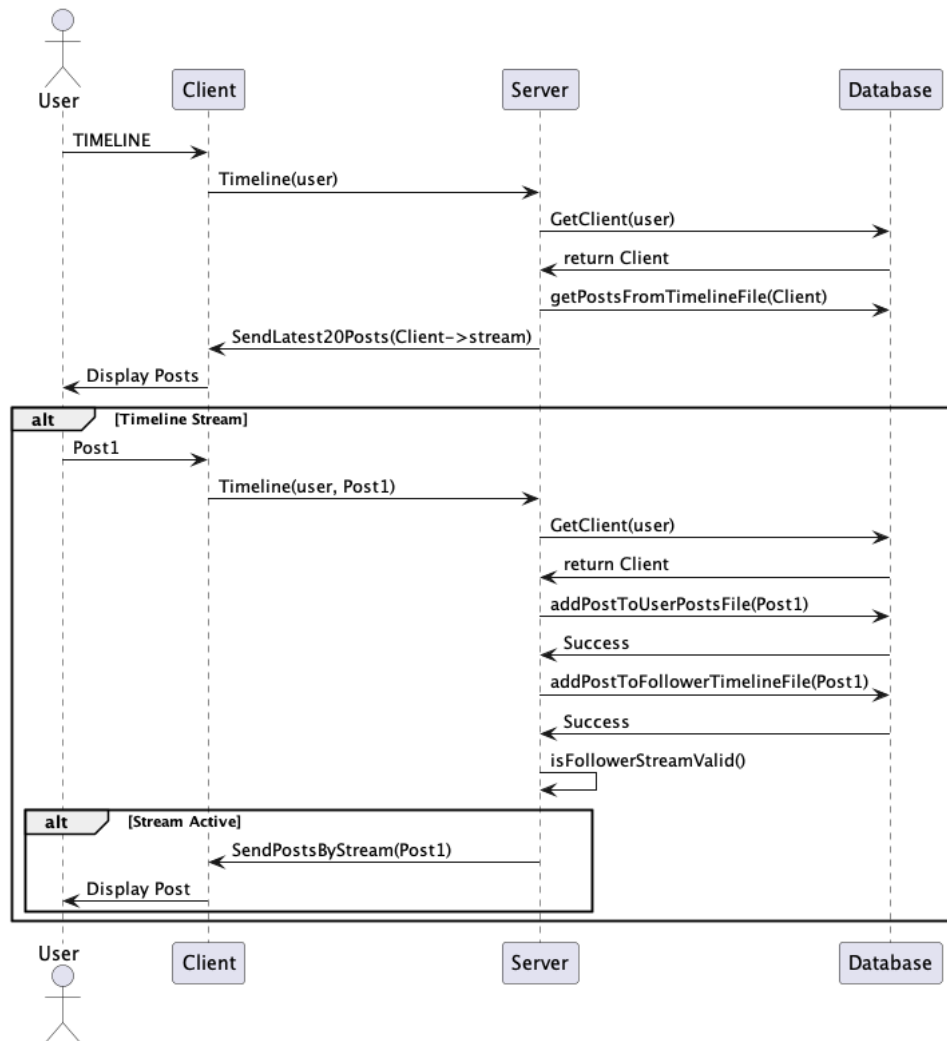


Figure 5: Timeline Sequence Diagram

5 Test Cases

5.1 Test Case 0

```

[Terminal 1]
$ ./src P non-json l v10.2.1 16:05
+ on tin-server start.sh
120240919 16:05:14.957311 197034 tsd.cc:494] Logging Initialized.
Server starting...
Server listening on 0.0.0.0:3010
120240919 16:05:14.964603 197034 tsd.cc:473] Server listening on
0.0.0.0:3010
120240919 16:05:44.586674 197047 tsd.cc:227] Login Successful:
  User u1
E20240919 16:05:59.482766 197328 tsd.cc:215] Login Failed:  U
  sername u1 already exists

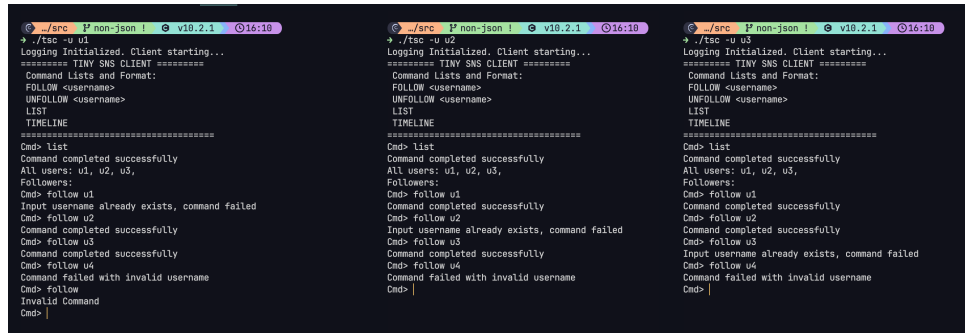
[Terminal 2]
$ ./src -u u1
Logging Initialized. Client starting...
===== TINY SNS CLIENT =====
Command Lists and Format:
FOLLOW <username>
UNFOLLOW <username>
LIST
TIMELINE
=====
Cmd>

[Terminal 3]
$ ./src P non-json l v10.2.1 16:05
+ ./src -u u1
Logging Initialized. Client starting...connection failed:
-1
$ ./src P non-json l v10.2.1 16:05

```

Figure 6: Test Case 0

5.2 Test Case 1



Three terminal screenshots showing the execution of Test Case 1 for users u1, u2, and u3. Each terminal displays the output of the 'tiny' client, including logging, command lists, and the results of various commands. The commands include 'list', 'follow', and 'unfollow', with some failing due to invalid usernames or already existing users.

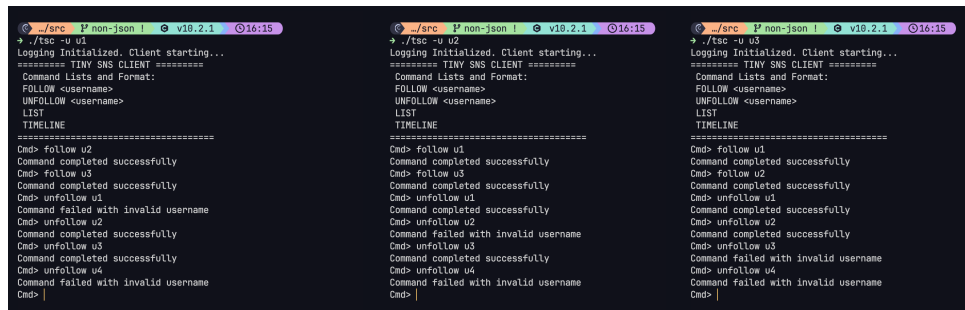
```
./src P non-json | v10.2.1 16:10
+ ./tsc -u u1
Logging Initialized. Client starting...
===== TINY SNS CLIENT =====
Command Lists and Format:
FOLLOW <username>
UNFOLLOW <username>
LIST
TIMELINE
=====
Cmd> list
Command completed successfully
All users: u1, u2, u3,
Followers:
Cmd> follow u1
Input username 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> |

./src P non-json | v10.2.1 16:10
+ ./tsc -u u2
Logging Initialized. Client starting...
===== 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> |

./src P non-json | v10.2.1 16:10
+ ./tsc -u u3
Logging Initialized. Client starting...
===== 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> |
```

Figure 7: Test Case 1

5.3 Test Case 2



Three terminal screenshots showing the execution of Test Case 2 for users u1, u2, and u3. The commands include 'follow', 'unfollow', and 'list', with some failing due to invalid usernames or already existing users.

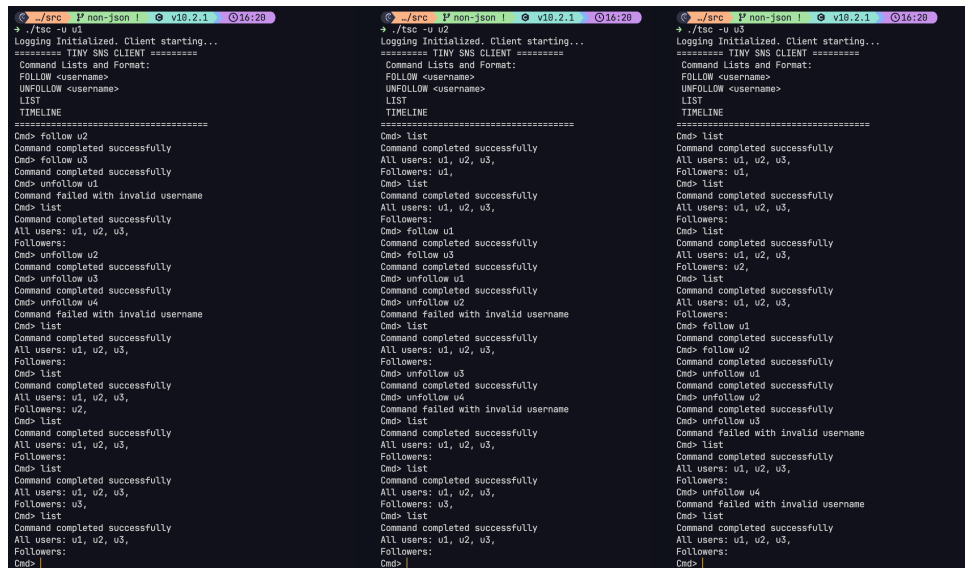
```
./src P non-json | v10.2.1 16:15
+ ./tsc -u u1
Logging Initialized. Client starting...
===== TINY SNS CLIENT =====
Command Lists and Format:
FOLLOW <username>
UNFOLLOW <username>
LIST
TIMELINE
=====
Cmd> follow u2
Command completed successfully
Cmd> follow u3
Command completed successfully
Cmd> unfollow 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> |

./src P non-json | v10.2.1 16:15
+ ./tsc -u u2
Logging Initialized. Client starting...
===== 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> |

./src P non-json | v10.2.1 16:15
+ ./tsc -u u3
Logging Initialized. Client starting...
===== 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> |
```

Figure 8: Test Case 2

5.4 Test Case 3



Three terminal screenshots showing the execution of Test Case 3 for users u1, u2, and u3. The commands include 'follow', 'unfollow', and 'list', with some failing due to invalid usernames or already existing users.

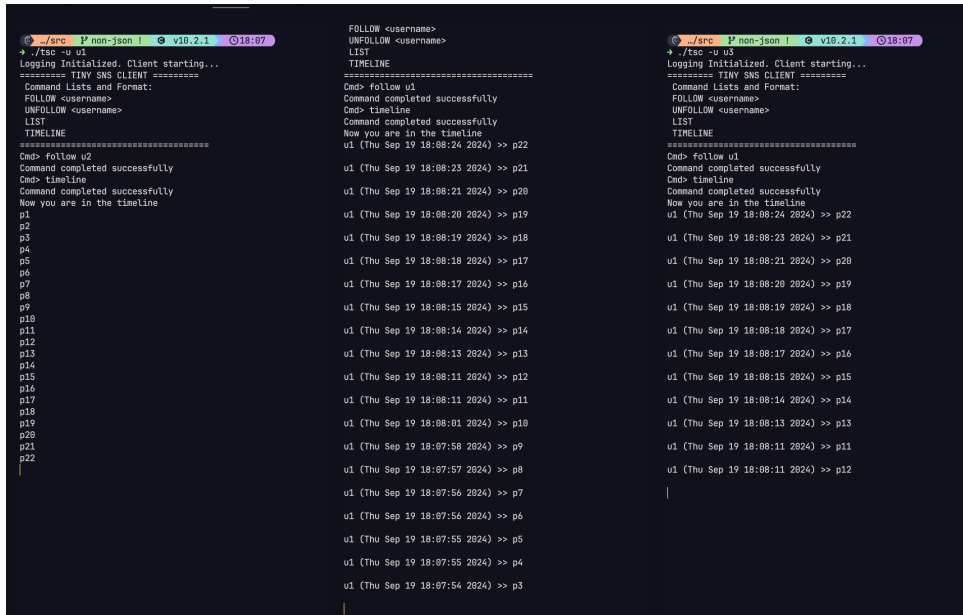
```
./src P non-json | v10.2.1 16:20
+ ./tsc -u u1
Logging Initialized. Client starting...
===== TINY SNS CLIENT =====
Command Lists and Format:
FOLLOW <username>
UNFOLLOW <username>
LIST
TIMELINE
=====
Cmd> follow u2
Command completed successfully
Cmd> follow u3
Command completed successfully
Cmd> unfollow u1
Command failed with invalid username
Cmd> list
Command completed successfully
All users: u1, u2, u3,
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, u2, u3,
Followers:
Cmd> list
Command completed successfully
All users: u1, u2, u3,
Followers: u2,
Cmd> list
Command completed successfully
All users: u1, u2, u3,
Followers: u3,
Cmd> list
Command completed successfully
All users: u1, u2, u3,
Followers:
Cmd> |

./src P non-json | v10.2.1 16:20
+ ./tsc -u u2
Logging Initialized. Client starting...
===== TINY SNS CLIENT =====
Command Lists and Format:
FOLLOW <username>
UNFOLLOW <username>
LIST
TIMELINE
=====
Cmd> list
Command completed successfully
All users: u1, u2, u3,
Followers: u1,
Cmd> list
Command completed successfully
All users: u1, u2, u3,
Followers:
Cmd> follow u1
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, u2, u3,
Followers:
Cmd> unfollow u3
Command completed successfully
Cmd> unfollow u4
Command failed with invalid username
Cmd> list
Command completed successfully
All users: u1, u2, u3,
Followers:
Cmd> list
Command completed successfully
All users: u1, u2, u3,
Followers: u3,
Cmd> list
Command completed successfully
All users: u1, u2, u3,
Followers:
Cmd> |

./src P non-json | v10.2.1 16:20
+ ./tsc -u u3
Logging Initialized. Client starting...
===== TINY SNS CLIENT =====
Command Lists and Format:
FOLLOW <username>
UNFOLLOW <username>
LIST
TIMELINE
=====
Cmd> list
Command completed successfully
All users: u1, u2, u3,
Followers: u1,
Cmd> list
Command completed successfully
All users: u1, u2, u3,
Followers:
Cmd> list
Command completed successfully
All users: u1, u2, u3,
Followers: u2,
Cmd> list
Command completed successfully
All users: u1, u2, u3,
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, u2, u3,
Followers:
Cmd> unfollow u4
Command failed with invalid username
Cmd> list
Command completed successfully
All users: u1, u2, u3,
Followers:
Cmd> |
```

Figure 9: Test Case 3

5.5 Test Case 4



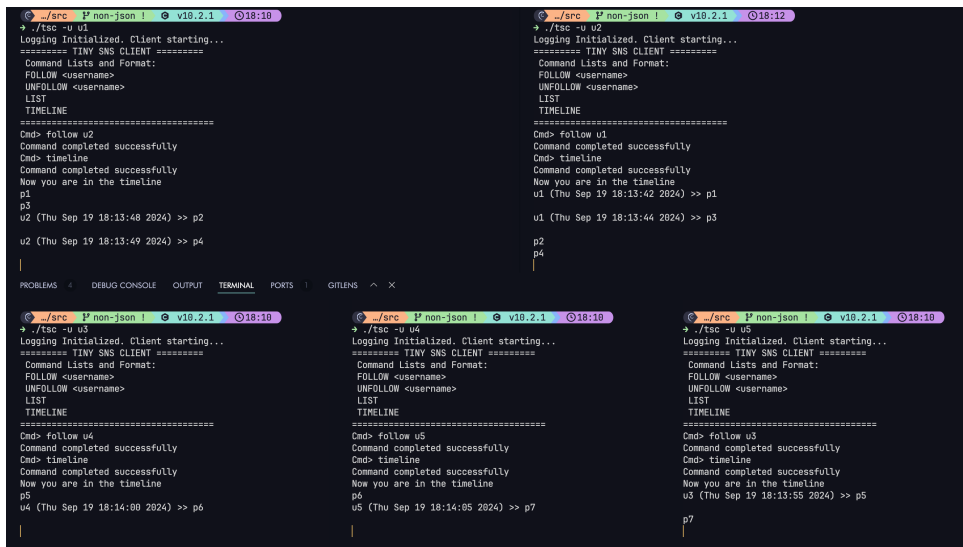
```
./src P non-json I v10.2.1 18:07
./tsc -u u1
Logging Initialized. Client starting...
===== TINY SMS CLIENT =====
Command Lists and Format:
FOLLOW <username>
UNFOLLOW <username>
LIST
TIMELINE
=====
Cmd> follow u2
Command completed successfully
Cmd> timeline
Command completed successfully
Now you are in the timeline
p1
p2
p3
p4
p5
p6
p7
p8
p9
p10
p11
p12
p13
p14
p15
p16
p17
p18
p19
p20
p21
p22

FOLLOW <username>
UNFOLLOW <username>
LIST
TIMELINE
=====
Cmd> follow u1
Command completed successfully
Cmd> timeline
Command completed successfully
Now you are in the timeline
u1 (Thu Sep 19 18:08:24 2024) >> p22
u1 (Thu Sep 19 18:08:23 2024) >> p21
u1 (Thu Sep 19 18:08:21 2024) >> p20
u1 (Thu Sep 19 18:08:20 2024) >> p19
u1 (Thu Sep 19 18:08:19 2024) >> p18
u1 (Thu Sep 19 18:08:18 2024) >> p17
u1 (Thu Sep 19 18:08:17 2024) >> p16
u1 (Thu Sep 19 18:08:15 2024) >> p15
u1 (Thu Sep 19 18:08:14 2024) >> p14
u1 (Thu Sep 19 18:08:13 2024) >> p13
u1 (Thu Sep 19 18:08:11 2024) >> p12
u1 (Thu Sep 19 18:08:11 2024) >> p11
u1 (Thu Sep 19 18:08:01 2024) >> p10
u1 (Thu Sep 19 18:07:58 2024) >> p9
u1 (Thu Sep 19 18:07:57 2024) >> p8
u1 (Thu Sep 19 18:07:56 2024) >> p7
u1 (Thu Sep 19 18:07:56 2024) >> p6
u1 (Thu Sep 19 18:07:55 2024) >> p5
u1 (Thu Sep 19 18:07:55 2024) >> p4
u1 (Thu Sep 19 18:07:54 2024) >> p3

./src P non-json I v10.2.1 18:07
./tsc -u u3
Logging Initialized. Client starting...
===== TINY SMS CLIENT =====
Command Lists and Format:
FOLLOW <username>
UNFOLLOW <username>
LIST
TIMELINE
=====
Cmd> follow u1
Command completed successfully
Cmd> timeline
Command completed successfully
Now you are in the timeline
u1 (Thu Sep 19 18:08:24 2024) >> p22
u1 (Thu Sep 19 18:08:23 2024) >> p21
u1 (Thu Sep 19 18:08:21 2024) >> p20
u1 (Thu Sep 19 18:08:20 2024) >> p19
u1 (Thu Sep 19 18:08:19 2024) >> p18
u1 (Thu Sep 19 18:08:18 2024) >> p17
u1 (Thu Sep 19 18:08:17 2024) >> p16
u1 (Thu Sep 19 18:08:15 2024) >> p15
u1 (Thu Sep 19 18:08:14 2024) >> p14
u1 (Thu Sep 19 18:08:13 2024) >> p13
u1 (Thu Sep 19 18:08:11 2024) >> p12
```

Figure 10: Test Case 4

5.6 Test Case 5



```
./src P non-json I v10.2.1 18:10
./tsc -u u1
Logging Initialized. Client starting...
===== TINY SMS CLIENT =====
Command Lists and Format:
FOLLOW <username>
UNFOLLOW <username>
LIST
TIMELINE
=====
Cmd> follow u2
Command completed successfully
Cmd> timeline
Command completed successfully
Now you are in the timeline
p1
p3
u2 (Thu Sep 19 18:13:48 2024) >> p2
u2 (Thu Sep 19 18:13:49 2024) >> p4

./src P non-json I v10.2.1 18:12
./tsc -u u2
Logging Initialized. Client starting...
===== TINY SMS CLIENT =====
Command Lists and Format:
FOLLOW <username>
UNFOLLOW <username>
LIST
TIMELINE
=====
Cmd> follow u1
Command completed successfully
Cmd> timeline
Command completed successfully
Now you are in the timeline
u1 (Thu Sep 19 18:13:42 2024) >> p1
u1 (Thu Sep 19 18:13:44 2024) >> p3
p2
p4

./src P non-json I v10.2.1 18:10
./tsc -u u3
Logging Initialized. Client starting...
===== TINY SMS CLIENT =====
Command Lists and Format:
FOLLOW <username>
UNFOLLOW <username>
LIST
TIMELINE
=====
Cmd> follow u4
Command completed successfully
Cmd> timeline
Command completed successfully
Now you are in the timeline
p5
u4 (Thu Sep 19 18:14:00 2024) >> p6

./src P non-json I v10.2.1 18:10
./tsc -u u4
Logging Initialized. Client starting...
===== TINY SMS CLIENT =====
Command Lists and Format:
FOLLOW <username>
UNFOLLOW <username>
LIST
TIMELINE
=====
Cmd> follow u5
Command completed successfully
Cmd> timeline
Command completed successfully
Now you are in the timeline
p4
u5 (Thu Sep 19 18:14:05 2024) >> p7

./src P non-json I v10.2.1 18:10
./tsc -u u5
Logging Initialized. Client starting...
===== TINY SMS CLIENT =====
Command Lists and Format:
FOLLOW <username>
UNFOLLOW <username>
LIST
TIMELINE
=====
Cmd> follow u3
Command completed successfully
Cmd> timeline
Command completed successfully
Now you are in the timeline
u3 (Thu Sep 19 18:13:55 2024) >> p5
p7
```

Figure 11: Test Case 5-a

```
#####
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> p8
Invalid Command
Cmd> timeline
Command completed successfully
Now you are in the timeline
p8
u7 (Thu Sep 19 18:18:30 2024) >> p9

u8 (Thu Sep 19 18:18:32 2024) >> p10

u9 (Thu Sep 19 18:18:34 2024) >> p11

u10 (Thu Sep 19 18:18:36 2024) >> p12

|

UNFOLLOW <username>
LIST
TIMELINE
#####
Cmd> follow u6
Command completed successfully
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
Command completed successfully
Now you are in the timeline
u6 (Thu Sep 19 18:18:25 2024) >> p8

u7 (Thu Sep 19 18:18:30 2024) >> p9

p10
u9 (Thu Sep 19 18:18:34 2024) >> p11

u10 (Thu Sep 19 18:18:36 2024) >> p12

|

UNFOLLOW <username>
LIST
TIMELINE
#####
Cmd> follow u6
Command completed successfully
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
Command completed successfully
Now you are in the timeline
u6 (Thu Sep 19 18:18:25 2024) >> p8

u7 (Thu Sep 19 18:18:30 2024) >> p9

u8 (Thu Sep 19 18:18:32 2024) >> p10

p11
u10 (Thu Sep 19 18:18:36 2024) >> p12

|

UNFOLLOW <username>
LIST
TIMELINE
#####
Cmd> follow u6
Command completed successfully
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
Command completed successfully
Now you are in the timeline
u6 (Thu Sep 19 18:18:25 2024) >> p8

u7 (Thu Sep 19 18:18:30 2024) >> p9

u8 (Thu Sep 19 18:18:32 2024) >> p10

u9 (Thu Sep 19 18:18:34 2024) >> p11

p12

|
```

Figure 12: Test Case 5-b