

# Program Assignment 2

CMSC 417 Spring 2017

February 14, 2017

## 1 Deadline

March 2, 2017 11:00PM .

## 2 Objective

In this assignment you will write the server program which will communicate using sockets with the client program provided by us. Your server program will operate according to the protocol described in the next chapter. Obviously, the protocol is trivial/useless, however, this exercise will get familiarize you with client/server programming and communication protocol.

## 3 Protocol

The server runs on the machine `SERVER HOSTNAME` and listens for requests on a TCP socket bound to port `SERVER PORT`. Both constants are defined in the header file, “`common.h`”, provided for you.

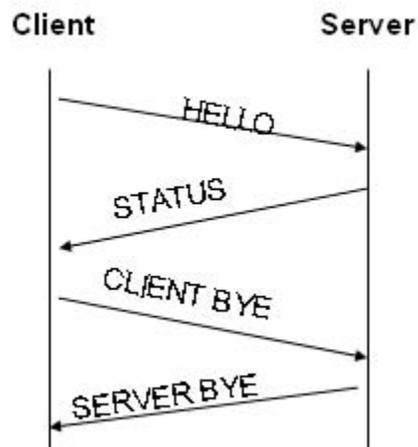


Figure 1: Protocol

The protocol has four types of messages: **HELLO, STATUS, CLIENT\_BYE and SERVER\_BYE**. Each message is an ASCII string, and consists of multiple fields **separated by whitespace (space (0x20) or newline (0x0a) character)**. The MAXIMUM length of the string is 255.

The protocol outline is given in Fig 1. The client initiates the protocol by sending a HELLO message to the server. The server replies with a STATUS message. The client then sends a CLIENT\_BYE message, and the server terminates the connection by sending a SERVER\_BYE message. A connection is successful if and only if all of these messages are correctly sent and received. Since we are using TCP for communication in this assignment, you do not have to worry about lost messages; you only need to ensure that all messages are sent correctly (and that you receive and parse messages correctly).

The details of each message are as follows:

### 1. **HELLO (From the client to the server: Client → Server)**

The HELLO message has 4 fields EXACTLY in the following order:

- Magic String  
It MUST set to be MAGIC STRING which is a constant defined in the header file ("cmisc417spring2017"). If the client sends a message which does not start with this magic string, the message should be ignored by your server program.
- Message Type  
The type string is HELLO to indicate a message type HELLO. The server should be case-sensitive.
- Login ID  
This field is a "pretend" login ID. You will put this login ID as a argument when you execute the client program. Please use the format, cs417xxx where xxx represents a three digit number of your choosing
- Name  
The last field is your first name. Please do NOT put spaces in your name, even if it contains spaces. You will also put your name as a argument when you execute the client program.

An example HELLO message might look like this:

**cmisc417spring2017 HELLO cs417000 Alice**

### 2. **STATUS (Server → Client)**

The STATUS message has 4 fields in the following order:

- Magic String  
Same as above.
- Message Type  
Must be set to STATUS.
- Cookie  
An integer randomly generated by the server (represented in ASCII). Cookie generation is explained later.

- IP Address and Port number  
A string of the form a.b.c.d:e, representing the IP address and port number of the client.

An example STATUS message might be:

**cmssc417spring2017 STATUS 42 128.8.128.153:48522**

### 3. CLIENT\_BYE (Client → Server)

The CLIENT\_BYE message has 3 fields in the following order:

- Magic String  
The same as above.
- Message Type  
Must be set to CLIENT\_BYE.
- Cookie  
A string of an integer, set to the value of the cookie sent by the server in the STATUS message for this connection.

An example CLIENT\_BYE message would be:

**cmssc417spring2017 CLIENT\_BYE 42**

### 4. SERVER\_BYE (Server → Client)

The SERVER\_BYE message has 2 fields in the following order:

- Magic String  
The same as above.
- Message Type  
Must be set to "SERVER\_BYE".

An example SERVER\_BYE message would be:

**cmssc417spring2017 SERVER\_BYE**

## 4 Server Program

The command line syntax for a minimal server is given below. The server will take the port as an argument.

USAGE:

`./server [<port>]`

- The cookie should be generated using the formula:  
 $(a + b + c + d) \cdot 13 \pmod{1111}$ , where a.b.c.d is the IP address of the client,  $0 \leq a, b, c, d \leq 255$ .

- After successful communication, the server MUST print the cookie it generates along with the clients login id, first name, IP address and port number. All this information should be in a single line. An example is:

**555 cs417050 Alice from 128.8.126.208:48542**

Notice that  $((128+8+126+208) \bmod 1111)$  is 555.

- Your server should not accept spurious input from the clients.
  - We will test your server with non-conforming clients; the server should print out an error message containing the clients IP address and port number also in a single line, as such: **\*\*Error\*\* from 128.8.126.133:48522** and immediately close the connection when it finds a bad message from the client. It should not breakdown, but continue operating after servicing misbehaving clients. Bad messages are ones that have an incorrect magic string, incorrect message type or too many fields. Remember, the cookie sent in the STATUS message has to match the cookie in the CLIENT BYE message for a communication to be successful.
- The server should be able to serve multiple clients. It is acceptable if this is done serially.
- Do NOT print out any other debugging messages. They are useful for you, but not for your TA to grade.
- All output should be printed to stdout. You may use `fflush(stdout);` after every output to stdout.
- You should have your server bind to all available interfaces

## 5 Client Program

The client program is provided. The command line syntax for the client is given below. The client program takes command line arguments corresponding to the login id and first name. The hostname and port specifications are optional. If included, they override the default definition of SERVER HOSTNAME and SERVER PORT in “common.h”.

USAGE:

```
./client [<hostname> [<port>]] <login id> <first name>
./client heaving.csic.umd.edu 9999 csic417050 Alice
```

## 6 Requirement

- Your code must be -Wall clean on gcc. (For example, when you compile your code, try like this: “gcc -o -Wall server server.c”)
- The TA will answer general questions/confusions only, and is not supposed to debug for you. The “This is my code, what could be the problem” type of questions will be ignored.

## 7 Submission

- Please submit your code to the Submit Server (<https://submit.cs.umd.edu/>).
- You should upload a zip file which contains the files `server.c` and `common.h` (and possibly any other `.h` files you are using). You can create this file on linux using:  
**`zip server.zip server.c common.h`**
- Your code must run in NRL's CORE