

Protocol Definition

Client can send any of the following commands:

ADD <N1> <N2> - to add N1 and N2
SUB <N1> <N2> - to subtract N2 from N1
MUL <N1> <N2> - to multiply N1 by N2
DIV <N1> <N2> - to divide N1 by N2
RND <N> - to generate a random number between 1 and N, inclusive
HELP [**command**] - to display the syntax and semantics of a specific command. If no command is specified, it will display all the available commands and their meanings
QUIT - to end the current session of the arithmetic server

The server responds as follows::

OK <Result of the command> - if there's no error encountered
ERR <Error message resulting from the execution of a command> - if there's an error encountered in the execution of a command

SAMPLE CLIENT-SERVER SESSIONS

Example 1: Addition / Subtraction / Multiplication / Division / Random Number

```
Activities Terminal Thu May 11 7:14:39 PM
ari@fangs:~/Documents/College/CSC113 - Computer Networks and Data Communication
~/doc/col/CSC113 - Computer Networks and Data Communication python3 arithmetic_server.py at 07:13:38 PM
starting up on localhost port 14344
waiting for a connection
connection from ('127.0.0.1', 45606)
Received:
ADD 1 2
Sent:
OK 3
Received:
SUB 3 4
Sent:
OK -1
Received:
MUL 5 6
Sent:
OK 30
Received:
DIV 40 3
Sent:
OK 13.333333333333334
Received:
DIV 12 0
Sent:
ERR division by zero.
Received:
RND 100
Sent:
OK 59
Received:
QUIT
~/doc/col/CSC113 - Computer Networks and Data Communication took 51s at 07:14:31 PM
```

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```
Activities Terminal Thu May 11 7:14:44 PM
ari@fangs:~/Documents/College/CSC113 - Computer Networks and Data Communication
ari@fangs:~ telnet localhost 14344 at 07:10:35 PM
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^'.

This is CSC 113 Arithmetic Server
Type "HELP" for Guide
***
$ ADD 1 2
OK 3
$ SUB 3 4
OK -1
$ MUL 5 6
OK 30
$ DIV 40 3
OK 13.333333333333334
$ DIV 12 0
ERR division by zero.
$ RND 100
OK 59
$ QUIT
OK Bye.
***
Connection closed by foreign host.
took 23s at 07:14:31 PM
```

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Example 2: Invalid number of arguments passed

Activities Terminal Thu May 11 7:16:06 PM 100 %

ari@fangs:~/Documents/College/CSC113 - Computer Networks and Data Communication

ari@fangs:~/Documents/College/CSC113 - Computer Networks and Data Communication

```
~/Documents/College/CSC113 - Computer Networks and Data Communication python3 arithmetic_server.py
starting up on localhost port 14344
waiting for a connection
connection from ('127.0.0.1', 46822)
Received:
MUL 3
Sent:
ERR Invalid number of arguments to MUL.
Received:
QUIT
~/Documents/College/CSC113 - Computer Networks and Data Communication
```

at 07:15:42 PM

took 16s at 07:16:01 PM

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A screenshot of a terminal window. The title bar shows 'Activities', 'Terminal', and system status icons. The terminal has two tabs: 'ari@fangs:~/Documents/College/CSC113 - Computer Networks and Data Communication' and 'ari@fangs:~'. The active tab shows a Telnet session. The user enters 'telnet localhost 14344', connects to '127.0.0.1', and receives a prompt 'This is CSC 113 Arithmetic Server'. The user enters 'Type "HELP" for Guide', and the server responds with '*** \$ MUL 3 ERR Invalid number of arguments to MUL. \$ QUIT OK Bye. ***'. The user then enters 'Connection closed by foreign host.' and the session ends. A large, semi-transparent ASCII art watermark 'THIS IS NOT JUST A WALLPAPER' is overlaid on the terminal output. In the bottom right corner, there is a signature 'BY: Eli'. Two status bars are visible: a green one at the top right saying 'at 07:15:22 PM' and a red one at the bottom right saying 'took 12s at 07:16:01 PM'.

Example 3: Unknown operation

```
Activities Terminal Thu May 11 7:17:29 PM
ari@fangs:~/Documents/College/CSC113 - Computer Networks and Data Communication
ari@fangs:~/Documents/College/CSC113 - Computer Networks and Data Communication
~/Documents/College/CSC113 - Computer Networks and Data Communication python3 arithmetic_server.py at 07:17:03 PM
starting up on localhost port 14344
waiting for a connection
connection from ('127.0.0.1', 50772)
Received:
XYZ 2 1
Sent:
ERR Unknown Operation XYZ. Type 'HELP' to see available commands.
Received:
QUIT
~/Documents/College/CSC113 - Computer Networks and Data Communication took 21s at 07:17:25 PM
```

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```
Activities Terminal Thu May 11 7:17:33 PM
ari@fangs:~/Documents/College/CSC113 - Computer Networks and Data Communication
ari@fangs:~/Documents/College/CSC113 - Computer Networks and Data Communication
ari@fangs:~/Documents/College/CSC113 - Computer Networks and Data Communication telnet localhost 14344 at 07:16:44 PM
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^['.

This is CSC 113 Arithmetic Server
Type "HELP" for Guide
***
$ XYZ 2 1
ERR Unknown Operation XYZ. Type 'HELP' to see available commands.
$ QUIT
OK Bye.
***
Connection closed by foreign host.
ari@fangs:~/Documents/College/CSC113 - Computer Networks and Data Communication took 19s at 07:17:25 PM
```

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Example 4: Asking for documentation of protocol commands multiple times

```
Activities Terminal Thu May 11 7:22:35 PM
ari@fangs:~/Documents/College/CSC113 - Computer Networks and Data Communication
ari@fangs:~/Documents/College/CSC113 - Computer Networks and Data Communication
~/Documents/College/CSC113 - Computer Networks and Data Communication python3 arithmetic_server.py at 07:18:25 PM
starting up on localhost port 14344
waiting for a connection
connection from ('127.0.0.1', 55430)
Received:
HELP
Sent:
OK The following commands are available:
  ADD <N1> <N2> - to add N1 and N2
  SUB <N1> <N2> - to subtract N2 from N1
  MUL <N1> <N2> - to multiply N1 by N2
  DIV <N1> <N2> - to divide N1 by N2
  RND <N> - to generate a random number between 1 and N, inclusive
  HELP [command] - to display the syntax and semantics of a specific command.
                  If no command is specified, it will display all the available commands and their meanings
  QUIT - to end the current session of the arithmetic server
Received:
HELP ADD
Sent:
ADD <N1> <N2> - to add N1 and N2
Received:
HELP HELP
Sent:
HELP [command] - to display the syntax and semantics of a specific command.
                  If no command is specified, it will display all the available commands and their meanings
Received:
QUIT
~/Documents/College/CSC113 - Computer Networks and Data Communication took 4m 4s at 07:22:29 PM
```

```
Activities Terminal Thu May 11 7:22:39 PM
ari@fangs:~/Documents/College/CSC113 - Computer Networks and Data Communication
ari@fangs:~/Documents/College/CSC113 - Computer Networks and Data Communication
ari@fangs:~/Documents/College/CSC113 - Computer Networks and Data Communication telnet localhost 14344 at 07:17:37 PM
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.

This is CSC 113 Arithmetic Server
Type "HELP" for Guide
***
$ HELP
OK The following commands are available:
  ADD <N1> <N2> - to add N1 and N2
  SUB <N1> <N2> - to subtract N2 from N1
  MUL <N1> <N2> - to multiply N1 by N2
  DIV <N1> <N2> - to divide N1 by N2
  RND <N> - to generate a random number between 1 and N, inclusive
  HELP [command] - to display the syntax and semantics of a specific command.
                  If no command is specified, it will display all the available commands and their meanings
  QUIT - to end the current session of the arithmetic server

$ HELP ADD
ADD <N1> <N2> - to add N1 and N2
$ HELP HELP
HELP [command] - to display the syntax and semantics of a specific command.
                  If no command is specified, it will display all the available commands and their meanings

$ QUIT
OK Bye.
***
Connection closed by foreign host.
~ took 4m 1s at 07:22:29 PM
```