Computer Networks
Jacobs University Bremen
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Course: 320301
Date: 2015-09-11
Due: 2015-09-18

Problem Sheet #1

Problem 1.1: *framed and check-summed data transmission* (10 points)

Write a client program that establishes a TCP connection to a server program and sends content (read from the standard input) to the server. The server reads the data from the network and outputs it to the standard output.

Both programs must be written in C using the socket API and they must support both IPv4 and IPv6. Furthermore, both programs must preserve the 'unit of work'. That is, if the client sends a chunk of content of a certain size, the server must send the exact same chunk of content to standard output. In other words, the client must frame the chunk of content and the server must receive the complete chunk of content before data is copied to the standard output. Note that TCP does not preserve any unit of work; TCP implements a byte stream abstraction and data is delivered in units that are determined by the TCP implementations involved.

As an extension, implement check-summing of content chunks, e.g., using the SHA-1 hash function. When enabled, the client sends the checksum along with the chunk of content and the server verifies the checksum before copying the data to the standard output. If the locally computed checksum does not match the received checksum, the data transfer is aborted with an appropriate error indication.

The programs must implement the following options:

`-s <size>`	send data in chunks of at most `<size>` bytes
`-c`	enable check-summing of chunks

Note that we will extend this program in subsequent assignments. Make sure your source code is clearly structured and that the program can be easily extended. In particular, you should be prepared that we will replace TCP with other mechanisms to transport chunks of data. Also make sure that your program can handle arbitrary binary content.

In your submission, you should discuss different techniques that can be used for framing. Explain why you did choose the framing mechanism you have implemented.