

## Exercise Sheet 2<sup>1</sup>

### Exercise 1

Start program with `java RunSentenceServer 8080`.

### Exercise 2

Start program with `java RunSearchServer 8080`.

### Exercise 3

See file `form.html`.

### Exercise 4

Different amounts of data have been requested via the three different connections. The smallest amount was 10 KB, the biggest one was 100MB. For comparison the following Box-Whisker-Plot is presented.

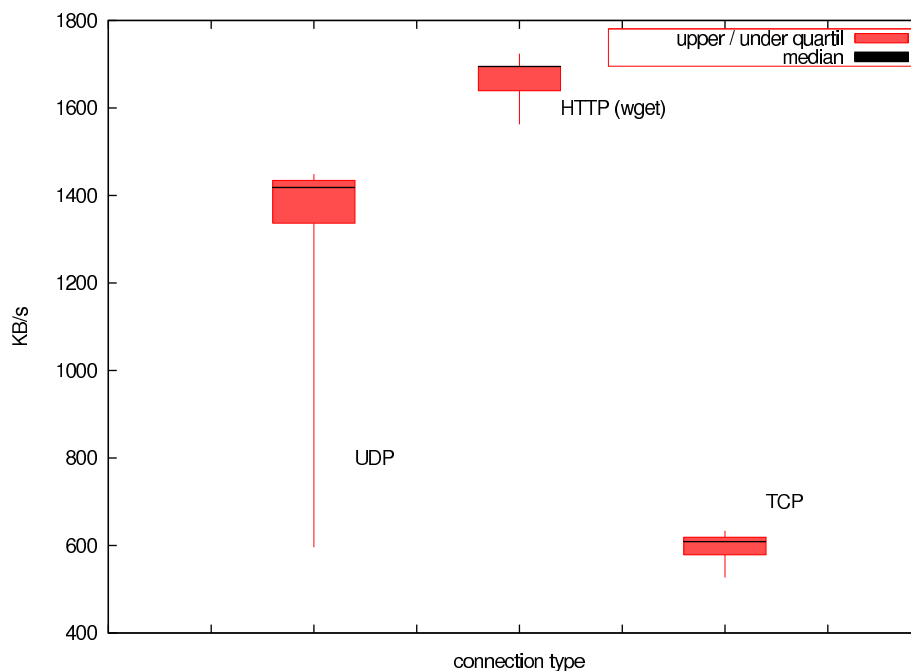


Figure 1: Box-Whisker-Plot that shows the distribution of the observed transmission rates

The above figure shows, that the UDP connection is substantially faster than the TCP connection. As observed with Wireshark<sup>2</sup> the TCP had to do multiple retransmissions as the sever did not answer within time. The following figure shows another reason for the higher transmission of the UDP.

<sup>1</sup>Version 1.0

<sup>2</sup><http://www.wireshark.org/>

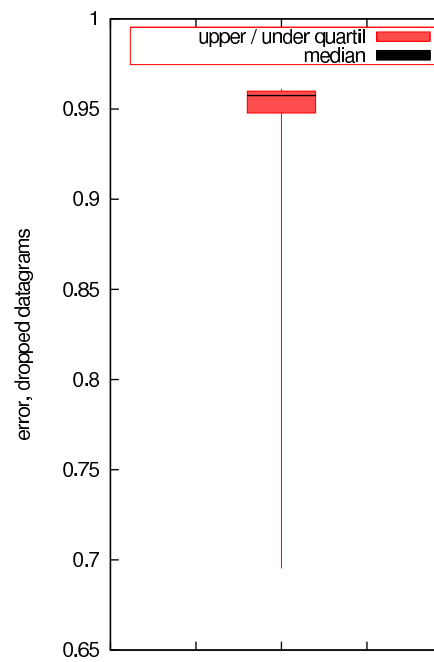


Figure 2: The observed error rate distribution

As one can check, the error rate of the UDP is substantial. A decent explanation is that the connecting routers follow a strict pro active congestion avoidance policy and drop most of the UDP datagrams, because they were received so fast.

To explain why the HTTP connection is so fast one can consider that server and client (Apache and wget) have a considerable better implementation than server and client in the other two cases.