Taylor Johnston

# Performance Evaluation

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| Performance evaluation | | | | | | | |
| Test # | Type | Nbufs | Bufsize | # Reads | RTT (usec) | Client receiving time (usec) | Server receiving time (usec) |
| 1 | 1 | 15 | 100 | 2005 | 485 | 110709 | 110507 |
| 2 | 1 | 30 | 50 | 5273 | 156 | 203210 | 202976 |
| 3 | 1 | 60 | 25 | 8952 | 137 | 418482 | 417550 |
| 4 | 2 | 15 | 100 | 353 | 4598 | 48409 | 52624 |
| 5 | 2 | 30 | 50 | 311 | 4257 | 49305 | 53221 |
| 6 | 2 | 60 | 25 | 282 | 467 | 71409 | 71335 |
| 7 | 3 | 15 | 100 | 368 | 4615 | 51473 | 55443 |
| 8 | 3 | 30 | 50 | 317 | 3783 | 47918 | 51390 |
| 9 | 3 | 60 | 25 | 338 | 3024 | 46851 | 49442 |

# Performance Discussion

The performance evaluation compares three methods of sending data. These are, respectively, multi-writes (send each buffer individually), writev, and single-write (send all buffers at once). On average, type 1 has far slower receiving time than type 2 and 3. Type 3 appears to have a slightly faster receiving time than type 2, but this difference doesn’t seem to be significant. In types 2 and 3, sending a greater number of smaller buffers causes an increase in receiving time. This is likely because it increases the number of TCP packets that need to be sent, making the transmission less efficient, which is also likely the reason type 1 has higher receiving times. This is not the case for type 3 because the buffers are sent all at once, making buffer size irrelevant. Additionally, type 1 needs far more server reads than type 2 or 3. Lower receiving time seems to be correlated with higher RTT, possibly because faster sending/receiving of data makes the connection busier, increasing the amount of time between when the transmission finishes sending and when the server can reply.

A slower network would primarily increase receiving time, as it would take longer to send the same number of bytes. RTT may also increase as network congestion increases transmission delays. Increasing the RTT would also have the effect of slowing type 1 more than types 2 and 3, as it requires more ACKs, and thus is influenced more by RTT. In this program the connection was served using a thread to facilitate multi-threaded connections, as threading allows for a new connection to be accepted while the previous connection is still active. This allows multiple clients to be served simultaneously, increasing availability.

# Program Output

Text

Description automatically generated

Text

Description automatically generated