Programming Assignment 3

CSCE 313-503

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I have implemented the SafeBuffer class with all the functions needed to create multiple worker threads. That allows the program can run faster with large number of n requests. All the functions SafeBuffer::pop(), SafeBuffer::push\_back(), SafeBuffer::size() and frequency\_count vectors are guarded with pthread\_mutex\_lock and pthread\_mutex\_unlock to avoid race condition. I also created a timer to observe the efficiency of having more threads in the program.

Result table collected when I ran the program on unix.cse.tamu.edu server. The server only allowed me to run it up to 47 threads.

|  |  |  |
| --- | --- | --- |
| w (number of threads) |  | Time(s) |
| 5 |  | 21.54874 |
| 7 |  | 15.388716 |
| 9 |  | 12.29127 |
| 11 |  | 9.794712 |
| 13 |  | 8.325531 |
| 15 |  | 7.205072 |
| 17 |  | 6.336332 |
| 19 |  | 5.682988 |
| 21 |  | 5.144861 |
| 23 |  | 4.709214 |
| 25 |  | 4.319872 |
| 27 |  | 4.22587 |
| 29 |  | 3.757309 |
| 31 |  | 3.492765 |
| 33 |  | 3.295093 |
| 35 |  | 3.288575 |
| 37 |  | 3.28482 |
| 39 |  | 3.283577 |
| 41 |  | 3.298902 |
| 43 |  | 3.29277 |

The performance of the program is greatly increased with more threads running. When the number of threads increases from 5 to 33, the runtime is greatly reduced, performance is significantly improved. After I increased w more than 33, the runtime pretty much stayed the same. The graph behaved as I have expected.

When I go beyond 47 number of threads on the host server (unix.cse.tamu.edu), I received the message "SERVER:cread: broken/closed pipe detected, exiting thread...:". It’s because the number of File Descriptors is limited on the server.

When I tried to create more threads than the limit range (40-50), the server just gave me an segmentation fault message.