Project2 (Semaphores)

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Introduction

In this project, we are introduced to working with threads and semaphores to protect a limited size resource in a C program. We created a circular buffer of 15 positions and created two threads, a producer thread that reads characters from a file and stores them inside of the buffer, and a consumer thread that reads form the buffer and prints out the character to the screen. The producer will read all characters from the file and when done, stick a null character to notify the consumer to stop reading from the buffer and exit. The consumer thread also has a 1 second sleep before each read to allow the consumer to be slower than producer. I also time the program takes to run to compare run times of 5 different runs to get an average runtime of the program.

Code

See p2.c in zip file

Results

What is within file mytest.dat:

abcdefghijklmnopqrstuvwxyz0123456789zywxvutsrqponmlkjihgfedcba9876543210qwertyuiopa
sdfghjklzxcvbnm[]{}\|/?;:'",.<>/ !@#$%^&*()-=_+`~0987654321

Output of the five runs:

~~~~~~1~~~~~~

From Buffer:
abcdefghijklmnopqrstuvwxyz0123456789zywxvutsrqponmlkjihgfedcba9876543210qwertyuiopa
sdfghjklzxcvbnm[]{}\|/?;:'",.<>/ !@#$%^&*()-=_+`~0987654321

End of program, Time Taken : 143.048828 seconds

~~~~~~2~~~~~~

From Buffer:
abcdefghijklmnopqrstuvwxyz0123456789zywxvutsrqponmlkjihgfedcba9876543210qwertyuiopa
sdfghjklzxcvbnm[]{}\|/?;:'",.<>/ !@#$%^&*()-=_+`~0987654321

End of program, Time Taken : 143.047213 seconds

~~~~~~3~~~~~~

From Buffer:
abcdefghijklmnopqrstuvwxyz0123456789zywxvutsrqponmlkjihgfedcba9876543210qwertyuiopa
sdfghjklzxcvbnm[]{}\|/?;:'",.<>/ !@#$%^&*()-=_+`~0987654321

End of program, Time Taken : 143.048985 seconds

~~~~~~4~~~~~~

From Buffer:
abcdefghijklmnopqrstuvwxyz0123456789zywxvutsrqponmlkjihgfedcba9876543210qwertyuiopa
sdfghjklzxcvbnm[]{}\|/?;:'",.<>/ !@#$%^&*()-=_+`~0987654321

End of program, Time Taken : 143.045155 seconds

~~~~~~5~~~~~~

From Buffer:
abcdefghijklmnopqrstuvwxyz0123456789zywxvutsrqponmlkjihgfedcba9876543210qwertyuiopa
sdfghjklzxcvbnm[]{}\|/?;:'",.<>/ !@#$%^&*()-=_+`~0987654321

End of program, Time Taken : 143.045556 seconds

Average Running Time: 143.0471474 seconds

Conclusions

We can see from the results that the program is correctly outputting what is originally in the file. I included most of the printable characters and put them in patterns to see if anything is miss aligned but we can see it is not. Also, we have the average running time to be 143.045556 seconds. The program does take a hit in runtime form the 1 second sleep that the consumer has to take before each read and possibly a thread is waiting on the other thread to signal the semaphore. It is really consistent with each of their run times never going above or below 1 second of each other.
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