COMP303 – Operating Systems : Homework 1

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According to the output above, the performance of the algorithms can be shown as follows:

sentimentCal1.c → sentimentCal4.c → sentimentCal3.c → sentimentCal2.c

Methodology	Benefits	Drawbacks
sentimentCal1.c	- Simple to implement using multiple processes. - Easy separation of tasks as each child processes one input file. - Clear parent-child relationship for task management.	- File I/O operations can become slow when handling many input files. - Communication between parent and child processes through temporary files can be slow.
sentimentCal2.c	- Faster communication via shared memory. - Reduced overhead since multiple processes do not need to be created for file handling. - Better memory utilization than using temporary files.	- More complex to implement with mmap() - Possible race conditions if not properly synchronized. - Difficult to manage in larger inputs.
sentimentCal3.c	- Efficient communication through unnamed pipes. - Simple implementation of pipe-based communication.	- Pipe limits might become a bottleneck for larger files. - More complex than simple file I/O.
sentimentCal4.c	- Threads provide a lightweight solution compared to - Shared memory allows all threads to access data directly, improving efficiency.	- Requires careful synchronization (e.g., semaphores). - Higher complexity due to multithreading.

```
tolgahan-ubuntu@tolgahan-ubuntu-LOQ-15IRH8:/media/tolgahan-ubuntu/New Volume/projects/comp303/homeworks/hw1$ make
gcc   sentimentCal1.c -o sentimentCal1
gcc   sentimentCal2.c -o sentimentCal2
gcc   sentimentCal3.c -o sentimentCal3
gcc   sentimentCal4.c -o sentimentCal4
./sentimentCal1 Your have 4 input1.txt input2.txt input3.txt input4.txt output1.txt
---------------------------------------------------------------------
sentimentCal1.c |
---------------
Total sentiment score for input4.txt: -4
Total sentiment score for input3.txt: -44064
Total sentiment score for input2.txt: -21600
Total sentiment score for input1.txt: -84240
Execution time: 60359 µs
---------------------------------------------------------------------
./sentimentCal2 Your have 4 input1.txt input2.txt input3.txt input4.txt output2.txt
---------------------------------------------------------------------
sentimentCal2.c |
---------------
Total sentiment score for input4.txt: -4
Total sentiment score for input3.txt: -44064
Total sentiment score for input2.txt: -21600
Total sentiment score for input1.txt: -84240
Execution time: 354393 µs
---------------------------------------------------------------------
./sentimentCal3 Your have 4 input1.txt input2.txt input3.txt input4.txt output3.txt
---------------------------------------------------------------------
sentimentCal3.c |
---------------
Total sentiment score for input4.txt: -4
Total sentiment score for input3.txt: -44064
Total sentiment score for input2.txt: -21600
Total sentiment score for input1.txt: -84240
Execution time: 144289 µs
---------------------------------------------------------------------
./sentimentCal4 Your have 4 input1.txt input2.txt input3.txt input4.txt output4.txt
---------------------------------------------------------------------
sentimentCal4.c |
---------------
Total sentiment score for input4.txt: -4
Total sentiment score for input3.txt: -44064
Total sentiment score for input2.txt: -21600
Total sentiment score for input1.txt: -84240
Execution time: 71145 µs
---------------------------------------------------------------------
```