

Operating Systems

Midsem Exam - Section 1

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Thu Oct 14 2021

Write a parallel version of the `wc` command using C language. The file is processed simultaneously by each child process. Each child process should return the data via a pipe and the parent should process the total.

The program should take two parameters as input from command line arguments:

- Path of file
- Number of child processes to spawn

The program should compile with one of the following commands:

```
gcc -std=c11 -O2 -Wall -Wpedantic -Wextra file.c
```

```
clang -std=c11 -O2 -Wall -Wpedantic -Wextra file.c
```

All the work should be done by the child processes only. The result should be transferred back to the parent via a use of `pipe`. The parent should only be responsible for spawning new processes, and calculating and returning the final result.

Use the `time` command to compare the parallel implementation with the regular one. Try different values for the number of child processes and explain your observations. Explain your interprocess communication pipeline and how multiple processes are handled. Mention the references you used in the report it with output screenshot.

You are supposed to count three quantities: char count, word count, and line count.

Marking distribution:

Category	Marks
Name and Roll number in comments	2
Comments	5
Formatted and well-structured code (<code>clang-format</code>)	3
Writing a report on the questions asked	5
Working code with proper output	15
Handling all memory leaks, closing all open files, and compiler warnings	5

```
dhruvil c > time ./a.out charts.csv 1
3261980908 114249635 24501829
./a.out charts.csv 1 16.95s user 0.64s system 97% cpu 17.962 total

dhruvil c > time ./a.out charts.csv 4
3261980908 114249635 24501829
./a.out charts.csv 4 4.29s user 0.13s system 85% cpu 5.194 total
```

Figure 1: Sample Output
