FACULDADE DE
CIÊNCIAS E TECNOLOGIA
DEPARTAMENTO DE INFORMÁTICA

Fundamentos de Sistemas de Operação 24/25

Process files using threads

HOMEWORK 2

To be submitted for evaluation to mooshak.di.fct.unl.pt until end of 18th October 2024

This work is individual and all solutions will be compared. Do not look at other students' code and do not show your own code to others.

Objective

Implement a program in C/Unix that processes a set of text files and count the number of times a specified character appears in all the files. The processing of each file should happen concurrently (in parallel, if possible).

Program

Write a C/Unix program named `count` that takes as arguments the character to be counted, followed by a sequence of filenames. Example: **`count a file1 file2 file3`**

In this example, the number of times the letter 'a' appears in all the files should be printed to standard output, formatted like:

```
Total count: 10
```

Each file must be processed independently using a separate thread and, if the computer has several CPUs/cores, it should take advantage of parallel processing. The program should be protected against race conditions so that the result is always correct. For this, use the functions from the Pthreads interface discussed in classes. No more than 10 file names will be given in the command line.

Your code will be compiled in mooshak with command: `cc -o count count.c -pthread`

Suggestions

Look at the code from Lab 04 and lectures 7 and 8. See also chapter 30 from OSTEP book.

You can start from the following code:

```c
/* count.c
 * Copyright 2024 FSO  FCT Universidade Nova de lisboa
 */
#include <stdio.h>
#include <pthread.h>

int count=0;
char chartofind;


int main(int argc, char **argv) {
    if (argc<3) {
        printf("usage: counter char file1 ...\n");
        return 1;
    }
    chartofind = argv[1][0];

    // TODO: count chartofind using one thread per file
    // file names start at argv[2] ...


    printf( "Total count: %d\n", count);
    return 0;
}
```