Operating Systems

Laboratory 6

Learning goals: In this laboratory activity, you will learn how to use the system call `pipe`.

Exercise 1

Write a C program in which a parent process creates two processes, a producer and a consumer.
The producer reads lines of text from **`stdin`** and writes them to a pipe.
The consumer process reads data from the pipe and writes them to **`stdout`**, converting text lines to capital letters.
Introducing the "**`end`**" string terminates both the child processes and the parent process.

Exercise 2

Write a C program that takes as arguments a number **`C`** and a directory name **`dir`**.

The main program, using the system call **`system`**, outputs in a file **`list.txt`** the list of files in directory **`dir`**. Then it forks **`C`** children, and loops

- waiting on a pipe **`request_pipe`** that a child asks the filename of the file that it will sort,
- reading the next filename from file **`list.txt`**, and passing it the queue represented by pipe **`data_pipe`**
- waiting on another pipe **`answer_pipe`** the child identifier, and the number of lines that the child has sorted

until all the files have been sorted.

Finally, it prints the total number of files sorted, the total number sum of the lines that have been sorted, and the sum of the lines that each child has sorted.

Each child process loops

- sending a request (just a byte) to the parent process through **`request_pipe`**
- waiting on **`data_pipe`** the filename passed by the parent
- sorting the file by means of a system call **`system`**
- sending through **`answer_pipe`** its identifier, and the number of lines that it has sorted

until it receives a signal **`SIGPIPE`**, which inform it that the parent process has closed the read terminal of **`request_pipe`**.

After all files listed in **`list.txt`** have been sorted, the main process must produce a single file **`all_sorted.txt`**, where all the numbers appearing in all the sorted files are sorted in ascending order. Do this by using again system call **`system`** with the appropriate **`sort –m`** command.