System Programming
3rd Laboratory (9 and 11 March 2016)

I

The **lab3_1.c** program prints the amount of multiples of 7 and 19 betwee 0 to UINT_MAX.
Compile the program and execute the following command:
time ./lab3_1
Take note of the time it takes do compute the values.
Using the **time** man page verify what each value means.

II

Since current computers have more than one core, it is possible to take advantage of them to parallelize this code.
Create three child processes and each one one third of the numbers to be verified.
After the conclusion, each process should print the partial computed values.
Define a data structure that will be used to transfer the limits from the parent to the child.

0 UINT_MAX/3	UINT_MAX/3+1 UINT_MAX*2/3	UINT_MAX*2/3+1 UINT_MAX
P1	P2	P2

III

Change the previous program so that the parent prints the total number multiples after the conclusion of all child.
Change the previously defined data structure to store the three computed results.
Create a shared memory region before doing the fork. The parent will write the limits befir the fork and read the partial results after the wait.
Use the following functions:
   • **exit**
   • **wait**

IV

Implement a program called **gen_random** that generates random numbers and writes them sequentially in a shared memory region. This program will terminate after 10 seconds printing how many odd and even numbers were generated.
Implement two other programs:
   • **count_even** – that reads the shared memory and counts how many even numbers were written by gen_random
   • **count_odd** – that reads the shared memory and counts how many odd numbers were written by gen_random
The three processes are not related should be lauched from command line (NOT by fork).
Can you guarantee that all generated number are counted by **count_odd** or **count_even**?

References
https://www.cs.cf.ac.uk/Dave/C/node27.html
http://menehune.opt.wfu.edu/Kokua/More_SGI/007-2478-008/sgi_html/ch03.html
http://www.ibm.com/developerworks/aix/library/au-spunix_sharedmemory/
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