Florida Polytechnic University – Computer Science Department
Programming Assignment 1 Spring 2020 - Process API for UNIX

Submission deadline: Jan 23rd 11:59 pm

Deliveries:
- **Code**: a .c program following the format described below.
- **Report**: Brief report explaining how you address the problem, and screenshots of the output. Include this paragraph in your report, and sign (failing in include the paragraph and signing will result and total grade of zero in this homework.

Requirements: The program should use the POSIX api from unix/linux, and should run in the university UNIX system (ember).
Note: Use your student ID number as your program name.

_____
I certify that I coded this program by myself and this code doesn't correspond to the intellectual work of someone else.
Signature: _____

Rubric

Item	Value
Program	75
Report	25
Total	**100**

Description (Part A)

This program should use the fork() instruction to create 1 or 2 children. If the parent creates just a child, the parent will send the array to the child. The child will receive the array and it will add its elements. Then the child will send the summation to the parent who will print that summation.   Now if the parent creates two children, it will send the first half of the array to one child and the second half to the another one. Each child will receive the corresponding half of the array, and it will compute it sum. Each child will send the partial sums to the parent who will collect and will add them. Finally, the parent will print the final sum. (Note: Use arrays of even length).

Approach: This program solves the base condition and the enthusiast challenge in the same program. This is achieved by nesting the entire forking logic in a for loop, iterating for every child that needs to be created. The parent, however, sends the data through the constructed pipes before the fork to eliminate an off-by-one error. The parent after the fork only prints (asynchronously) the values sent. When all children complete their computation and submit their result to the parent, the parent computes and prints the sum.

```
[pdranishnikov5258@ember ~]$
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[pdranishnikov5258@ember ~]$ ./U0000005258 1 2 5 3 10 20 40 80 100 9 10
I am the parent pid: 7176 sending the array: 2 5 3 10 20 40 80 100 9 10 to child 7177.
I am child with pid: 7177 adding the array 2 5 3 10 20 40 80 100 9 10 and sending partial sum 279.
I am the parent pid 7176: receiving partial sum 279 and printing 279.
[pdranishnikov5258@ember ~]$ ./U0000005258 2 2 5 3 10 20 40 80 100 9 10
I am the parent pid: 7181 sending the array: 2 5 3 10 20 to child 7182.
I am the parent pid: 7181 sending the array: 40 80 100 9 10 to child 7183.
I am child with pid: 7182 adding the array 2 5 3 10 20 and sending partial sum 40.
I am child with pid: 7183 adding the array 40 80 100 9 10 and sending partial sum 239.
I am the parent pid 7181: receiving partial sum 40 and 239 and printing 279.
[pdranishnikov5258@ember ~]$ ./U0000005258 5 2 5 3 10 20 40 80 100 9 10
I am child with pid: 7203 adding the array 2 5 and sending partial sum 7.
I am the parent pid: 7202 sending the array: 2 5 to child 7203.
I am the parent pid: 7202 sending the array: 3 10 to child 7204.
I am the parent pid: 7202 sending the array: 20 40 to child 7205.
I am child with pid: 7205 adding the array 20 40 and sending partial sum 60.
I am the parent pid: 7202 sending the array: 80 100 to child 7206.
I am child with pid: 7204 adding the array 3 10 and sending partial sum 13.
I am the parent pid: 7202 sending the array: 9 10 to child 7207.
I am child with pid: 7206 adding the array 80 100 and sending partial sum 180.
I am child with pid: 7207 adding the array 9 10 and sending partial sum 19.
I am the parent pid 7202: receiving partial sum 7 and 13 and 60 and 180 and 19 and printing 279.
[pdranishnikov5258@ember ~]$ ./U0000005258 3 2 5 3 10 20 40 80 100 9
I am the parent pid: 7220 sending the array: 2 5 3 to child 7221.
I am child with pid: 7221 adding the array 2 5 3 and sending partial sum 10.
I am the parent pid: 7220 sending the array: 10 20 40 to child 7222.
I am the parent pid: 7220 sending the array: 80 100 9 to child 7223.
I am child with pid: 7222 adding the array 10 20 40 and sending partial sum 70.
I am child with pid: 7223 adding the array 80 100 9 and sending partial sum 189.
I am the parent pid 7220: receiving partial sum 10 and 70 and 189 and printing 269.
[pdranishnikov5258@ember ~]$
```