**CENG 313 – Operating Systems**
**Homework 2**

**Due Date:** **27/11/2016, 23:55**

Implement a C program that is explained below using WinAPI. In this homework, we want you to create "n>=5" pipes. These pipes should send information from parent process to child processes. The pipes should send information about what kind of operation it will perform (producer, consumer or swapper) and the value it produces if it is a producer process.

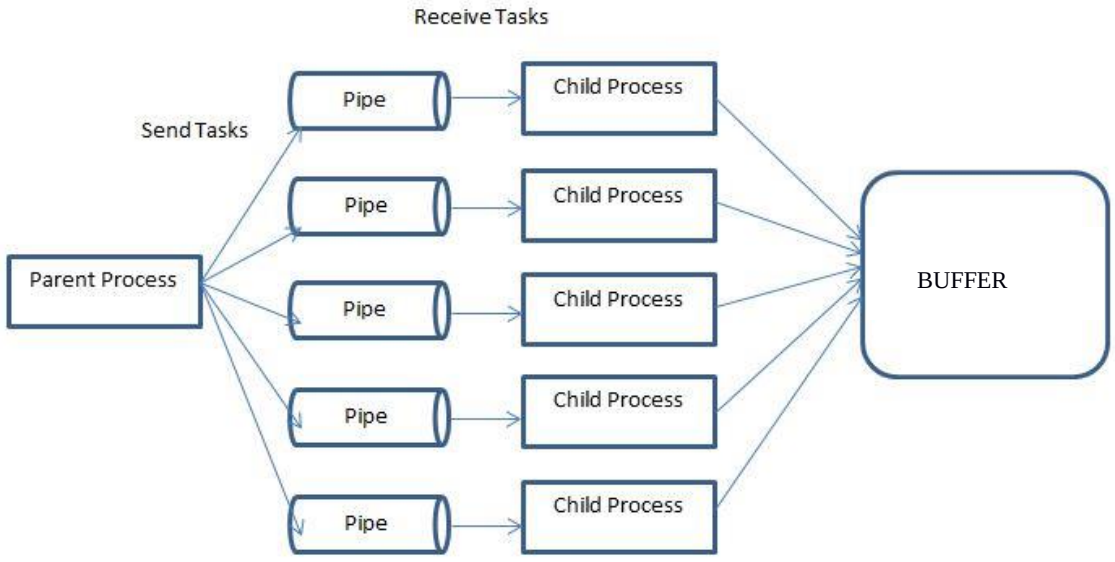
The pipes will carry out three types of data;

- {char* producer}
- {char* consumer}
- {char* swapper}

Different from the Producer/Consumer problem you have an additional task called the "*Swapper*". The "*Swapper*" has a task to swap index values. However, while performing the swapping task, **at least one of the indexes should be full**. Deciding the indexes should be random, therefore, your "*Swapper*" should generate two random indexes, based on your buffer size.

The tasks of child processes should be given only once and decided by the parent process. The decision should be generated randomly and passed their tasks through a pipe to its child processes. Make sure that there is at least one of each task.

After each process obtain their tasks from the pipes. All the child processes should try to perform their given operation concurrently on buffer. The buffer should be a shared memory that will give access for the child processes and your buffer size should be equal to the number of processes that you have created. You should print every operation on the console to show which child is doing which operation on the buffer. The architecture of your software should behave like the below figure:



Your output should look like this:

*child 1 produced 8 as 5$^{th}$ entry in the buffer*
*child 2 consumed 8 from 5$^{th}$ entry from the buffer*
*child 5 produced 11 as 4$^{th}$ entry in the buffer*
*child 3 produced 2 as 9$^{th}$ entry in the buffer*
*child 4 swapped 4$^{th}$ index with 9$^{th}$ index*
*child 2 consumed 2 from 4$^{th}$ entry from the buffer*
*child 4 swapped 9$^{th}$ index with 3$^{rd}$ index*
*child 2 consumed 11 from 3$^{rd}$ index*
.
.
.

**ASSIGNMENT RULES!**

- Cheating will **NOT** be tolerated!
- For any detected cheating will be **graded as 0.**
- Late Submissions will not be allowed.
- Your solution must be in WinAPI, otherwise you will not be graded.
- Please submit your homework on CMS as ***StudentID_Name_Lastname.zip or StudentID_Name_Lastname.rar***

**GRADE REDUCTIONS**

Since you are Junior students you are expected that you are aware of; error handling, controls, software design etc. This lecture should be taken seriously and will take a crucial part in your work lives. Please code your programs wisely. Possible grade reductions,

- **Lack of comment usage!**
- **Missing controls!**
- **No error handling!**
- **Unused/dead codes!**
- **Naming conventions!**

Please do not discuss with us why your grades decreased just because you have done the programming sins listed above!

**NOTE:** Do not ask from us about the possible errors that could occur. From this lecture and labs, you are expected to be aware of the possible errors.