CS3500 - Operating System, August 2022

Lab 2: Shell Scripting, Processes and Threads

Due Date: Friday, 19th August 12PM in Moodle.
Evaluation: Friday, 19th August 2-5pm at DCFE (CSE) Lab, timing -Batchwise

1. Write a shell script to search for the file 'Assignment1_data.txt' and read its content. Find the top 3 most occurring unique words in it along with its count.

   3 marks

2. Write a shell script to sort an array using merge sort. **3 marks**

3. A pipe is a method to pass information from one process to another process. It offers only one way communication and the passed information is held by system until it is read by the receiving process. Write a C/C++ program to read a string from the user. Create a child process using fork and form a pipe between the parent and child process. The child process should write the string from one end of the pipe and the parent process read the string from the other end of the pipe.

   Reference:
   https://man7.org/linux/man-pages/dir_section_2.html
   https://man7.org/linux/man-pages/man2/fork.2.html
   https://man7.org/linux/man-pages/man2/pipe.2.html **5 marks**

4. **Searching Array using Threads**

   Given a large sized integer array arr, a number N and an integer 'element'. Write a multithreaded program that works as follows:
   The array is divided into two sub lists of equal size. Create two threads called Sorting Threads - that sorts the first and second half of the array respectively. You are free to choose any sorting algorithm. A third thread called Merger Thread is merge the two sorted arrays into a single array.
   The sorted array is then divided into N parts and N separate thread search and count numbers which are multiple of element in the sub arrays and returns the count. Print the total number of elements present in the array.
   The implementation will use multiple threads using the Linux pthreads API. The implementation will be done in Linux/C/C++ platform.

   6 marks