Operating Systems–1: Autumn 2022
Programming Assignment 2: Finding Perfect Number
Submission Deadline: 4th December 2022, 9:00 pm

Goal:- The objective of this assignment is to develop a multi-threaded solution to find a list of perfect numbers.

Details:- *N is a perfect number if the sum of all its factors, excluding itself, is N; examples are 6 and 28.*

This assignment is similar to assignment 1. The difference being that we replace the processes with threads.
The Best of assignment 1 and assignment 2 will be considered.

As a part of this assignment, you need to implement a C program to find perfect numbers till **N** and list them into a single file.

The main thread will read the numbers N and K from an input file. The main thread will create K threads.

The numbers from 1 to N will be partitioned among these threads so that two threads do not work on the same number. Thus each Thread T_i will be responsible for a set of numbers. For each number in its set, the thread T_i will determine if the number is a perfect number or not. If it is, T_i will store it locally. After completion, T_i will share the set of numbers it identified with the main thread.

The main thread will wait until all the threads complete their respective execution. It will then consolidate all the perfect numbers identified and computed by other threads in a single output file.

Input File:- As mentioned above, the input will consist of two parameters **N** and **K.**

Output File:- For ease of understanding, each thread T_i will also create a log file, $OutFile_i$ onto which it will store all the details of its execution. It will log each number it tests and the output it generates. Suppose T_i tests the number 1 to 10, then a sample output can be as follows:
1: Not a perfect number
2: Not a perfect number

.
.
.
6: Is a perfect number
.
.
.

On similar lines, the main thread will create a log file OutMain which will consist of all the perfect numbers less than N and the thread that identified it. A possible output format for two threads is as follows:

Thread1: num1 num2 ….
Thread2: num5 num6 ….

Report Details:- As a part of this assignment, you have to prepare a report which will describe the low-level design of your program and give an analysis of its output.

Submission Format:- You have to upload: (1) The source code in the following format: Assgn2Src-<RollNo>.c (2) Readme: Assgn2Readme-<RollNo>.txt, which contains the instructions for executing the program. (3) Report: Assgn2Report-<RollNo>.pdf. Name the zipped document as: Assgn2-<RollNo>.zip

Please follow this naming convention. Otherwise, your assignment will not be graded.

Grading Policy:- The policy for grading this assignment will be -
(1) Design as described in the report and analysis of the results: 50%; (2) Execution of the tasks based on the description in the readme: 40% (3) Code documentation and indentation: 10%.