Air University

Final Semester Examination Fall 2023

Subject:- Parallel & Distributed Computing Lab
Total Marks: 100
Course Code: CS- 426L
Class: BSCS
Semester: 7th
Section(s): C

Date: 04/01/2024
Time: 02:00-4:50
Max Time Allowed: 3 Hrs
FM(s) Name: Ms. Sobia Dastgeer
FM Signature:

Instructions:

- Attempt all questions.
- Copied paper will be getting zero marks and further action will be taken as per university policy.
- Submit the word file with output screenshots.

Question 1	CLO 1	PLO 4	C3	Marks 50

Assume there are three coffee fans seated around a table, each equipped with an infinite supply of one of three ingredients: coffee beans, milk, and sugar. Additionally, a non-coffee-drinking person is present to facilitate the coffee-making process.

In this scenario, the non-coffee-drinking person role is to randomly select two individuals from the group, take one ingredient from each of their supplies, and place the selected ingredients on the table. The non-coffee-drinking person then notifies the third individual that this has been done. The third coffee fan removes the two items from the table and combines them with their own supply to make a cup of coffee. Subsequently, they enjoy their coffee for a random period. Meanwhile, the non-coffee-drinking person upon seeing the table empty, repeats the process by choosing two individuals at random and placing their ingredients on the table. This cycle continues indefinitely.

It's essential to note that a coffee fans only begins to make a new cup of coffee once they have finished enjoying the last one. For instance, if the non-coffee-drinking person places coffee beans and milk on the table while the sugar-supply coffee fan is enjoying their coffee, the coffee beans and milk will remain untouched on the table until the sugar-supply coffee fan finishes their cup and collects the items for the next coffee making session.

Construct a multithreaded C++ program that simulates this coffee-making system to synchronize the interactions. The non-coffee-drinking person and the three coffee fans should each be represented by individual threads within your program. Ensure that your program

waits for all threads, even though they will run forever. Check for any errors produced by system calls and include all required libraries.

Question 2	CLO 1	PLO 4	C3	Marks 50

To write an OpenMP program to perform vector addition of two one-dimensional arrays of size 5 using 5 [illegible] OpenMP 5