

**Multi-Core Programming**  
**EE 5885 – 04**  
**Dept. of Electrical and Computer Engineering**  
**ASSIGNMENT 2, Points: 30, Due Date: 03/06/2021 by 4:00 PM**

**Note: The project template titled “ParallelSum” is loaded onto the “ClassPostings Folder” inside the “Assignment2” folder. Please read my comments in the project template to understand the flow of the program.**

Develop a program to compute the sum of the elements of a single dimension array satisfying the following requirements using the project template:

- **The vector is initialized with random real numbers of double precision numbers between RANGE\_MIN and RANGE\_MAX defined in the header file. Initialization function code is provided as part of the project template.**
- **Version 1: Sequential code to compute the sum is provided as part of the project template.**
- **Version 2** **Points: 7.5**  
Parallel code with manual partitioning and without race condition. The function prototype is provided in the template and you need to complete the body of the function.
- **Version 3:** **Points: 7.5**  
Parallel code with manual partitioning and reduction without race condition. The function prototype is provided in the template and you need to complete the body of the function.

**Constraints:**

- **Implicit partitioning is not allowed.**
- **Do not change any code in the main section of the template.**

**Execution and Report:**

**Points: 15**

1. Execute the program for array sizes of 9600, 96000, 960000, 9600000, and 96000000 with number of threads spawned equal to the number of logical processors on the system. And collect the timing statistics.
2. Compute the speedup achieved between the sequential and parallel versions using the average computation time.
3. Provide a plot of the variation of the speedup with increasing vector sizes for the fixed number of threads spawned.
4. Fix the array size corresponding to a significant speedup. Execute the program for increasing number of threads (multiples of the number of logical processors).
5. Provide a plot of the variation of the speedup with increasing number of threads for the fixed array size.
6. Submit a report with embedded plots. Do not provide spreadsheets.
7. The plots should have appropriate axis labels, units etc.
8. Submit the completed project with **commented code**.
9. **Uncommented code will be awarded zero credits.**