

CS60026: Parallel and Distributed Algorithms

Autumn 2016-17

Programming Assignment-2

Abstract. This assignment is aimed at implementing the recursive parallel merge sort algorithm discussed in the class.

1 Assignment Description

You are provided with an incomplete program *msort-assignment.cc* that has implementations of the following functions:

1. **mergesort-parallel**: A recursive function that takes pointers to arrays **a** and **b**, sorts **a** using **numThreads** threads and stores the output in **b**.
2. **mergesort-serial**: A recursive function that takes pointers to arrays **a** and **b**, sorts **a** serially and stores the output in **b**. Used by **mergesort-parallel** as its base case.
3. **merge-serial**: A serial function to merge two sorted arrays **a** and **b**. Used by **mergesort-serial** to merge the recursively sorted arrays.

2 Your Task: Part-1

1. Complete the implementation of the incomplete function **merge-parallel** used by **mergesort-parallel** to merge the recursively sorted arrays.
2. Run your program with $1, 2, \dots, 24$ threads and observe the performance scaling with the number of threads.
3. Write a short report for the performance results observed by you. Explain the result with emphasis on the performance trends for different number of threads.

3 Your Task: Part-2

1. Implement a second version of the program *msort-assignment.cc* replacing the function **mergesort-serial** with a different sorting algorithm of your choice that is expected to give better performance. Name the modified program *alt-msort-assignment.cc*.

2. Run your second program with $1, 2, \dots, 24$ threads and observe the performance scaling with the number of threads.
3. Write a second short report for the performance results observed by you. Explain the result with emphasis on the difference in performance for the two versions of the same program.

4 Submission Details

You are expected to submit *separate files* for the completed codes and the corresponding reports. Submission deadline is **November 8th**. The submission link will be open soon on Moodle. Enjoy!

A (Just to Ignore) Suggestion: To avoid unforeseen problems with submission, please plan to avoid submitting in the last 5 mins.