

INFO 6205

Program Structures & Algorithms

Fall 2020

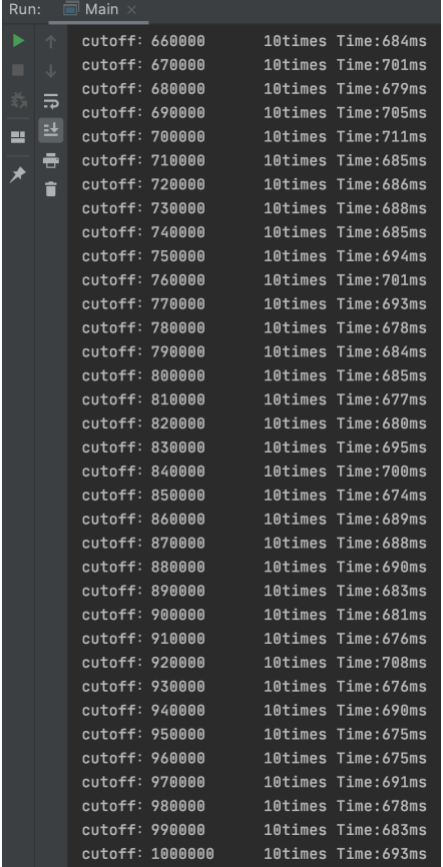
Assignment 5

Task

Implement a parallel sorting algorithm such that each partition of the array is sorted in parallel and draw a conclusion about the efficacy of this method of parallelizing sort.

Evidence

Using merge sort logic for parallel sort to get average times for different cutoff values:



cutoff: 660000	10times Time:684ms
cutoff: 670000	10times Time:701ms
cutoff: 680000	10times Time:679ms
cutoff: 690000	10times Time:705ms
cutoff: 700000	10times Time:711ms
cutoff: 710000	10times Time:685ms
cutoff: 720000	10times Time:686ms
cutoff: 730000	10times Time:688ms
cutoff: 740000	10times Time:685ms
cutoff: 750000	10times Time:694ms
cutoff: 760000	10times Time:701ms
cutoff: 770000	10times Time:693ms
cutoff: 780000	10times Time:678ms
cutoff: 790000	10times Time:684ms
cutoff: 800000	10times Time:685ms
cutoff: 810000	10times Time:677ms
cutoff: 820000	10times Time:680ms
cutoff: 830000	10times Time:695ms
cutoff: 840000	10times Time:700ms
cutoff: 850000	10times Time:674ms
cutoff: 860000	10times Time:689ms
cutoff: 870000	10times Time:688ms
cutoff: 880000	10times Time:690ms
cutoff: 890000	10times Time:683ms
cutoff: 900000	10times Time:681ms
cutoff: 910000	10times Time:676ms
cutoff: 920000	10times Time:708ms
cutoff: 930000	10times Time:676ms
cutoff: 940000	10times Time:690ms
cutoff: 950000	10times Time:675ms
cutoff: 960000	10times Time:675ms
cutoff: 970000	10times Time:691ms
cutoff: 980000	10times Time:678ms
cutoff: 990000	10times Time:683ms
cutoff: 1000000	10times Time:693ms

Figure 1 Execution log

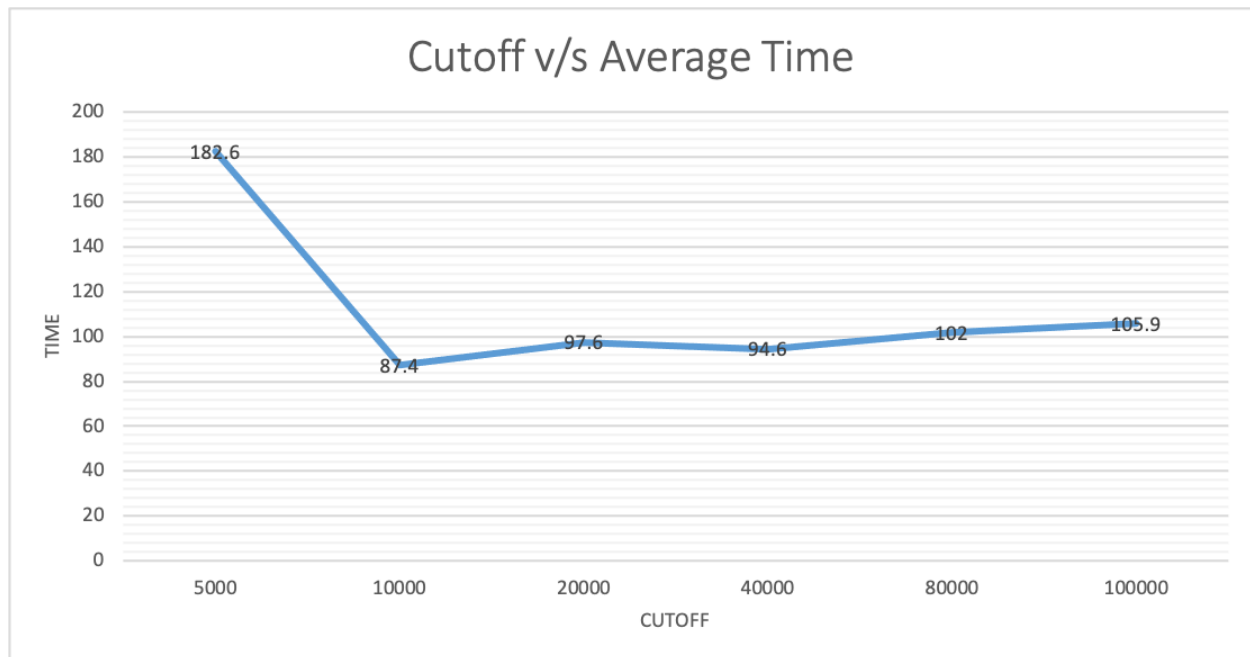


Figure 2 Graph plot of cutoff vs time

Conclusion

1. Implemented parallel sort using divide and conquer (merge sort) method by join and fork in java.
2. Cutoff is introduced to use system sort for array size less than cutoff and use merge sort instead.
3. Average time for various cutoff remains almost constant but considerably faster with 10,000 cutoff.
4. Parallel / Asynchronous merge sort is more efficient than normal merge sort.