Program Structures and Algorithms

Summer I 2023(SEC – 1)

Assignment-5 (Parallel Sorting)

NAME: Amrita Dubey

NUID: 002760658

**Task:**

* **Implement a parallel sorting algorithm such that each partition of the array is sorted in parallel.**
* **Find a good cutoff value for switching to system sort.**
* **Determine an ideal number of threads for parallelizing.**
* **Prepare a report that shows the results of your experiments and draws a conclusion.**

**Relationship Conclusion:**

The parallel efficacy can be analysed by measuring the execution time for various cutoff settings with different degree of parallelism. Theoretically, more parallelism should lead to quicker execution times. But as we can observe in report that performance improves till certain number of threads and then start decreasing. This behaviour could be due to various reason such as overhead of large number of thread creation, synchronization, and various system characteristics, such as the number of available threads, CPU architecture etc.

The parallel efficiency can be assessed by comparing the execution time with the number of threads used along with different cutoff values. After running multiple experiments by changing array size, cutoff values, and number of threads. it has been observed that increasing parallelism results in faster execution times. However, there is diminishing returns beyond a certain degree. For Array size 5120000, We can observe that the highest performance is attained with a degree of parallelism of 16 or 32 with cutoff value 1280000. But it is important to note that the optimal configuration may vary depending on the specific hardware, software environment, and input data characteristics.

**Evidence to support that conclusion:**

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**Graphical Representation:**

**Screenshots of runs:**

**A screenshot of a computer

Description automatically generated with medium confidence**