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**Program Structures & Algorithms**

**Fall 2021**

**Assignment No.5**

GitHub: [https://github.com/pngchen/INFO6205-Assignments/tree/main/assignment](https://github.com/pngchen/INFO6205-Assignments/tree/main/assignment3)5

**Task:**

* A cutoff (defaults to, say, 1000) which you will update according to the first argument in the command line when running. It's your job to experiment and come up with a good value for this cutoff. If there are fewer elements to sort than the cutoff, then you should use the system sort instead.
* Recursion depth or the number of available threads. Using this determination, you might decide on an ideal number (t) of separate threads (stick to powers of 2) and arrange for that number of partitions to be parallelized (by preventing recursion after the depth of lg t is reached).
* An appropriate combination of these.

**Conclusion:**

My computer is MacBook Pro with 8-Core Intel Core i9 and 32 GB memory.

At first, I set threads equal to 16 to find a good cutoff value. You can see the figure below, I test several array sizes like 500000, 1000000, etc. I set the number of threads as 16, and the initial cutoff ratio as 0.02, the step as 0.02 in a for loop. Then I find the better and more stable cutoff ratio is around 0.22.

About the threads, because I find 0.22 is a good cutoff ratio, I set cutoff ratio as 0.22. And I also tried several array sizes like 500000, 1000000, etc. You can see in the picture below. If the number of threads equal to or bigger than 4, it could get very similar good performances. Because using redundant thread would cause a waste, I think the thread number should be 4.

I also run a warm-up before the main loop, in the result\*\*\_thread.csv, you can see the first number of the first row is 0, that means a warm-up run.

So, I think an appropriate combination of these should be 0.22 cutoff ratio and 4 threads.

**Evidence:**

If you want to see more raw data, you can check the csv files under the /assignment5/src. If the file name is like result\*\*.csv, the file is used to determine the cutoff value. If the file name is like result\*\*\_thread.csv, the file is used to determine the threads’ number. And the sheet 1 in the result.xlsx is about the cutoff value, the sheet 2 is about the threads’ number.

Text

Description automatically generated

Graphical user interface, application

Description automatically generated

Chart

Description automatically generated