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**Program Structures & Algorithms**

**Fall 2021**

**Assignment No. 5**

* **Task (List down the tasks performed in the Assignment)**

**1．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.**

**2．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).**

**3．An appropriate combination of these**

* **Relationship Conclusion: (For ex : z = a \* b)**

**Cutoff = Array.length / thread.number**

* **Evidence to support the conclusion:**

1. **Output (Snapshot of Code output in the terminal)**

**if we set the threadpool number is 2, it should have a good performance when using 2 threads. Yeah, it worked.**

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**if we set the threadpool number is 4, it should have a good performance when using 4 threads. Yeah, it worked. But interesting thing is that when cutoff increase to about 500000, although threadpool has 4 threads, it only uses 2 threads. So the time will increasing at this special point .**

图形用户界面

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**When we choose the large number thread, we found that the conclusion is correct. However the time cost of the best cutoff is greater than the time of small thread number. So we indicate that it may be limited to the CPU.**

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**when we use 8, 16 threads , we found that all the result are similar, I think that is because of my cpu only have 6 cores. Also, when we choose a large thread number, it performance will drop dramatically. It is because stack depth and new thread cost will increase.**

图形用户界面

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1. **Graphical Representation(Observations from experiments should be tabulated and analyzed by plotting graphs(usually in excel) to arrive on the relationship conclusion)**

* **Unit tests result:(Snapshot of successful unit test run)**