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Program Structures & Algorithms
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Assignment 5

Code has been pushed to github.com

Link: <https://github.com/Sunil-Y/INFO6205/tree/assignment5>

- **Task**

- Parallel Sort

- **Relationship conclusion**

Recursion depth

Recursion depth d has a relationship with the number of available threads t :

$$t = 2^d$$

Max depth possible: **\lg (array size / cutoff)**

Any depth larger than this max depth is meaningless because the partitioned arrays already hit the cutoff and turn into system sort.

- Screenshots of output

```
Degree of parallelism: 7
Number of Threads: 8      Array Size: 72000
cutoff: 1000             10times Time:72ms
cutoff: 2000             10times Time:64ms
cutoff: 4000             10times Time:62ms
cutoff: 8000             10times Time:39ms
cutoff: 16000            10times Time:94ms
cutoff: 32000            10times Time:63ms
cutoff: 64000            10times Time:64ms
cutoff: 128000           10times Time:83ms
cutoff: 256000           10times Time:56ms
cutoff: 512000           10times Time:46ms

Degree of parallelism: 7
Number of Threads: 8      Array Size: 216000
cutoff: 1000             10times Time:131ms
cutoff: 2000             10times Time:104ms
cutoff: 4000             10times Time:92ms
cutoff: 8000             10times Time:95ms
cutoff: 16000            10times Time:106ms
cutoff: 32000            10times Time:123ms
cutoff: 64000            10times Time:154ms
cutoff: 128000           10times Time:157ms
cutoff: 256000           10times Time:144ms
cutoff: 512000           10times Time:139ms
```

```
cutoff: 4000             10times Time:92ms
cutoff: 8000             10times Time:95ms
cutoff: 16000            10times Time:106ms
cutoff: 32000            10times Time:123ms
cutoff: 64000            10times Time:154ms
cutoff: 128000           10times Time:157ms
cutoff: 256000           10times Time:144ms
cutoff: 512000           10times Time:139ms

Degree of parallelism: 7
Number of Threads: 8      Array Size: 648000
cutoff: 1000             10times Time:390ms
cutoff: 2000             10times Time:304ms
cutoff: 4000             10times Time:291ms
cutoff: 8000             10times Time:357ms
cutoff: 16000            10times Time:357ms
cutoff: 32000            10times Time:364ms
cutoff: 64000            10times Time:424ms
cutoff: 128000           10times Time:535ms
cutoff: 256000           10times Time:611ms
cutoff: 512000           10times Time:597ms

Process finished with exit code 0
```

```
C:\Users\yadav\.jdk\openjdk-15\bin\java.exe "-javaagent
Degree of parallelism: 7
Number of Threads: 8      Array Size: 8000
cutoff: 1000             10times Time:46ms
cutoff: 2000             10times Time:21ms
cutoff: 4000             10times Time:17ms
cutoff: 8000             10times Time:13ms
cutoff: 16000            10times Time:15ms
cutoff: 32000            10times Time:11ms
cutoff: 64000            10times Time:11ms
cutoff: 128000           10times Time:14ms
cutoff: 256000           10times Time:12ms
cutoff: 512000           10times Time:13ms

Degree of parallelism: 7
Number of Threads: 8      Array Size: 24000|
cutoff: 1000             10times Time:52ms
cutoff: 2000             10times Time:29ms
cutoff: 4000             10times Time:23ms
cutoff: 8000             10times Time:24ms
cutoff: 16000            10times Time:27ms
cutoff: 32000            10times Time:17ms
cutoff: 64000            10times Time:15ms
cutoff: 128000           10times Time:13ms
cutoff: 256000           10times Time:16ms
```