Two Phase Merge Sort Analysis

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1. Configuration of the system:

Intel Core i5 10th Gen, 8 GB RAM DDR4, 512 GB SSD Storage

2. Observations:

2.1 Part-1 (without multi-threading):

Table1: Main memory fixed as 100 MB

File Size	Time
5 MB	0.716s
50 MB	8.4s
500 MB	107.4s
1 GB	221.3s
2 GB	452.8s
3 GB	683.5s

Table 2: Input file size fixed as 500 MB

Main Memory	Time
25 MB	105.9s
100 MB	103.6s
250 MB	98.8s
500 MB	93.7s

2.2 Part-2 (with multi-threading): Number of threads taken = 7.

Table3: Main memory fixed as 100 MB

File Size	Time
5 MB	0.738s
50 MB	5.5s
500 MB	66.7s
1 GB	152.6s
2 GB	321.5s
3 GB	518s

Table 4: Input file size fixed as 500 MB

Main Memory	Time
25 MB	77.6s
100 MB	66.4s
250 MB	65.7s
500 MB	63.5s

3. Explanation:

Multi-threaded model takes lesser execution time, specially in the cases with large file size, where concurrent sorting and storing temporary files helps out.