

Concurrent Systems: Laboratory Assignment 3 (OpenMP)

Y. Simonov, 2019

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1 Question 1

| Run | 1 Thread (s) | 2 Threads (s) | 4 Threads (s) | 8 Threads (s) |
|-----|--------------|---------------|---------------|---------------|
| 1 | 36.87 | 20.78 | 17.13 | 15.48 |
| 2 | 36.62 | 21.72 | 16.09 | 15.46 |
| 3 | 36.59 | 19.93 | 15.77 | 15.92 |

2 Question 2

| Run | 1 Thread (s) | 2 Threads (s) | 4 Threads (s) | 8 Threads (s) |
|-----|--------------|---------------|---------------|---------------|
| 1 | 13.63 | 7.20 | 3.96 | 3.94 |
| 2 | 13.47 | 7.12 | 4.13 | 3.87 |
| 3 | 13.78 | 7.14 | 3.96 | 3.77 |

3 Question 3

| Run | 1 Thread (s) | 2 Threads (s) | 4 Threads (s) | 8 Threads (s) |
|-----|--------------|---------------|---------------|---------------|
| 1 | 0.446 | 0.290 | 0.196 | 0.175 |
| 2 | 0.450 | 0.295 | 0.194 | 0.178 |
| 3 | 0.445 | 0.287 | 0.195 | 0.180 |

4 Question 4

| Run | 1 Thread (s) | 2 Threads (s) | 4 Threads (s) | 8 Threads (s) |
|-----|--------------|---------------|---------------|---------------|
| 1 | 0.560 | 0.298 | 0.221 | 0.219 |
| 2 | 0.559 | 0.298 | 0.223 | 0.224 |
| 3 | 0.562 | 0.297 | 0.219 | 0.220 |

Table 1: Parallel run time

$$T_{qsort,avg} = \frac{1.2090 + 1.2138 + \dots}{12} = 1.3163 \text{ [ms]}$$
$$T_{serial,avg} = \frac{0.552 + 0.521 + 0.522 + \dots}{12} = 0.5288 \text{ [s]}$$

5 Question 5

| Run | 1 Thread (s) | 2 Threads (s) | 4 Threads (s) | 8 Threads (s) |
|-----|--------------|---------------|---------------|---------------|
| 1 | 1.563 | 0.835 | 0.771 | 0.846 |
| 2 | 1.560 | 0.842 | 0.766 | 0.845 |
| 3 | 1.598 | 0.847 | 0.776 | 0.834 |

Table 2: Gaussian elimination, 1000x1000

| Run | 1 Thread (ms) | 2 Threads (ms) | 4 Threads (ms) | 8 Threads (ms) |
|-----|---------------|----------------|----------------|----------------|
| 1 | 2.110 | 2.158 | 2.087 | 22.54 |
| 2 | 2.109 | 2.036 | 2.113 | 21.35 |
| 3 | 2.141 | 2.011 | 2.285 | 21.54 |

Table 3: Back substitution, 1000x1000

| Run | 1 Thread (s) | 2 Threads (s) | 4 Threads (s) | 8 Threads (s) |
|-----|--------------|---------------|---------------|---------------|
| 1 | 1.565 | 0.837 | 0.773 | 0.869 |
| 2 | 1.562 | 0.844 | 0.768 | 0.866 |
| 3 | 1.600 | 0.849 | 0.778 | 0.856 |

Table 4: Total time, 1000x1000