**ASSIGNMENT 3 - Report**

**Question 2:**

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| --- | --- | --- |
| Threads | timings (sec) | speedup |
| 1(original) | 12.591 | 1 |
| 1 | 12.584 | 1.000556262 |
| 2 | 6.307 | 1.996353258 |
| 3 | 4.31 | 2.921345708 |
| 4 | 3.325 | 3.786766917 |
| 6 | 3.052 | 4.125491481 |
| 8 | 2.657 | 4.738803161 |
| 12 | 2.67 | 4.715730337 |
| 16 | 2.669 | 4.71749719 |
| 24 | 2.658 | 4.737020316 |
| 32 | 2.656 | 4.740587349 |

1. No.
2. This is because there are limited number cores and thus an upper limit of threads we can use, thus after a few threads there is almost no significant impact on the timings. Also the more threads we use, the CPU utilization increases, so after some point we might also see time increase as the utilization gets close to 1.

**Question 4:**

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| --- | --- | --- | --- |
| Number of threads | Observed timings | Observed speedup compared to original | Expected speedup |
| 1(original) | 18.865 | 1 | 1 |
| 1 | 18.88 | 0.999205508 | 1 |
| 2 | 10.186 | 1.852051836 | 2 |
| 3 | 6.808 | 2.7710047 | 3 |
| 4 | 5.235 | 3.603629417 | 4 |
| 8 | 3.719 | 5.072600161 | 8 |
| 16 | 3.839 | 4.914040115 | 16 |

No, the observed speedup differs from what was expected. It can be observed that for the first 4 threads, the observed speedup was close to the expected, but when there are more threads like 8 or 16, the speedup almost was the same (or even increases) and there was not a significant speed up after a certain number of threads. So trend-wise, we see it was at its max speedup that is around 5 times. This could be because there are only 4 cores with 2 threads each . So we see the speedup coming to a stop. Also after some threads, the CPU utilization shoots up, resulting in no change in speedup or even can increase time.