Fine

|  |  |
| --- | --- |
| Number of processors | Seconds |
| 1 | 66.233 |
| 2 | 33.968 |
| 5 | 93.828 |
| 10 | 81.871 |
| 100 | 285.983 |
| 1000 | 863.974 |

Coarse

|  |  |
| --- | --- |
| Number of processors | Seconds |
| 1 | 65.619 |
| 2 | 21.126 |
| 5 | 21.743 |
| 10 | 21.423 |
| 100 | 20.647 |
| 1000 | 20.588 |

Time Charts

|  |  |  |  |
| --- | --- | --- | --- |
|  | Number of processors | Fine (Time) | Course (Time) |
| Real | 1 | 1m6.236s | 1m5.623s |
| User | 1 | 1m6.082s | 1m5.585s |
| Sys | 1 | 0m0.108s | 0m0.004s |

|  |  |  |  |
| --- | --- | --- | --- |
|  | Number of processors | Fine (Time) | Course (Time) |
| Real | 2 | 0m34.483s | 0m23.889s |
| User | 2 | 1m8.468s | 0m46.880s |
| Sys | 2 | 0m0.096s | 0m0.012s |

|  |  |  |  |
| --- | --- | --- | --- |
|  | Number of processors | Fine (Time) | Course (Time) |
| Real | 5 | 1m33.832s | 0m21.747s |
| User | 5 | 2m8.211s | 0m41.641s |
| Sys | 5 | 0m13.875s | 0m0.008s |

|  |  |  |  |
| --- | --- | --- | --- |
|  | Number of processors | Fine (Time) | Course (Time) |
| Real | 10 | 1m21.874s | 0m21.426s |
| User | 10 | 1m33.515s | 0m41.464s |
| Sys | 10 | 0m17.533s | 0m0.048s |

The performance speedup issue is that on a single core system, the program takes a certain amount of time to complete. When the same program is run in a 4 core system the speedup only increases by 2x as opposed to 4x which is what you would expect. This happens because of the overhead associated with running a program on multiple cores such as setting it up and bringing everything back together.

When using fine-grained parallelism, performance increased as the number of processors increased up to 8 processors. Any more than that would decrease performance at a fast rate. This could be happening because of the amount of overhead associated with joining all the threads together after the program is ready to complete, causing the program to be drawn out.

When using coarse-grained parallelism, performance was worse for a low number of cores, approximately 1-5 cores, however, when using more than 10 cores, the performance levels out at a constant amount of time regardless of how many cores are added. This could be happening because the outermost loop is parallelized on the coarse-grained solution resulting less to be happening concurrently than if you parallelized the innermost loop like in the fine-grained solution.