**CS575 Project 2**

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**Apr. 26, 2022**

**1. Machine Configuration: OSU ENGR**

**Text

Description automatically generated**

**2. Results**

Table

Description automatically generated with medium confidence

**3. Statistics**

|  |  |  |  |
| --- | --- | --- | --- |
| **NumThreads** | **NumNodes** | **Volume** | **Performance** |
| 1 | 256 | 3.8788 | 2.868 |
| 1 | 512 | 3.879 | 3.588 |
| 1 | 1024 | 3.8778 | 3.198 |
| 1 | 2048 | 3.8901 | 3.043 |
| 1 | 3072 | 3.9168 | 3.606 |
| 1 | 4096 | 3.7771 | 3.577 |
| 1 | 5120 | 4 | 3.326 |
| 1 | 6144 | 3.1967 | 3.439 |
| 2 | 256 | 3.8788 | 5.538 |
| 2 | 512 | 3.8789 | 7.356 |
| 2 | 1024 | 3.878 | 4.031 |
| 2 | 2048 | 3.8779 | 6.207 |
| 2 | 3072 | 3.8665 | 6.37 |
| 2 | 4096 | 3.8119 | 4.004 |
| 2 | 5120 | 3.6867 | 5.954 |
| 2 | 6144 | 3.9985 | 6.112 |
| 4 | 256 | 3.8788 | 5.396 |
| 4 | 512 | 3.8789 | 4.779 |
| 4 | 1024 | 3.8789 | 10.817 |
| 4 | 2048 | 3.8797 | 8.123 |
| 4 | 3072 | 3.8701 | 12.1 |
| 4 | 4096 | 3.8769 | 10.419 |
| 4 | 5120 | 3.8634 | 9.217 |
| 4 | 6144 | 3.9359 | 7.493 |
| 8 | 256 | 3.8788 | 9.83 |
| 8 | 512 | 3.8789 | 11.854 |
| 8 | 1024 | 3.8789 | 10.912 |
| 8 | 2048 | 3.8782 | 12.87 |
| 8 | 3072 | 3.8787 | 11.972 |
| 8 | 4096 | 3.8803 | 11.515 |
| 8 | 5120 | 3.8817 | 12.149 |
| 8 | 6144 | 3.881 | 18.163 |
| 12 | 256 | 3.8788 | 6.73 |
| 12 | 512 | 3.8789 | 5.87 |
| 12 | 1024 | 3.8789 | 9.652 |
| 12 | 2048 | 3.8787 | 11.101 |
| 12 | 3072 | 3.8795 | 14.423 |
| 12 | 4096 | 3.8793 | 13.976 |
| 12 | 5120 | 3.8803 | 16.033 |
| 12 | 6144 | 3.8659 | 20.497 |
| 16 | 256 | 3.8788 | 3.411 |
| 16 | 512 | 3.8789 | 6.516 |
| 16 | 1024 | 3.879 | 22.103 |
| 16 | 2048 | 3.879 | 12.1 |
| 16 | 3072 | 3.8795 | 13.383 |
| 16 | 4096 | 3.8787 | 23.617 |
| 16 | 5120 | 3.8778 | 23.999 |
| 16 | 6144 | 3.8695 | 28.26 |

**Table 1: Performance vs number of nodes and number of threads**

**Figure 1**

**Figure 2**

**As shown in Figure 1, as the number of nodes increases, there is no significant pattern to learn how the performance behave. The reason why is probably because at the time I am running this program, there might be some students are running theirs too.**

**As shown in Figure 2, as the number of threads increases, the performance increases. However, the patterns are still short in consistency. It is reasonable probably because there is synchronous operation of tasks at the same time.**

* **The average volume is about 7.73**
* **In 6144 node: 16-thread-to-1-thread speedups = 28.26 / 3.439 = 8.217505089 ≈ 8.22**
* **Parallel fraction = 16 / 15 \* (1 – 1 / 8.22) = 0.936901865 ≈ 0.94**
* **Maximum speedup = 1 / (1- 0.94) = 16.6666667 ≈ 16.67**