# CS 475/575 -- Spring Quarter 2017

# Project #1

### OpenMP: Numeric Integration with OpenMP

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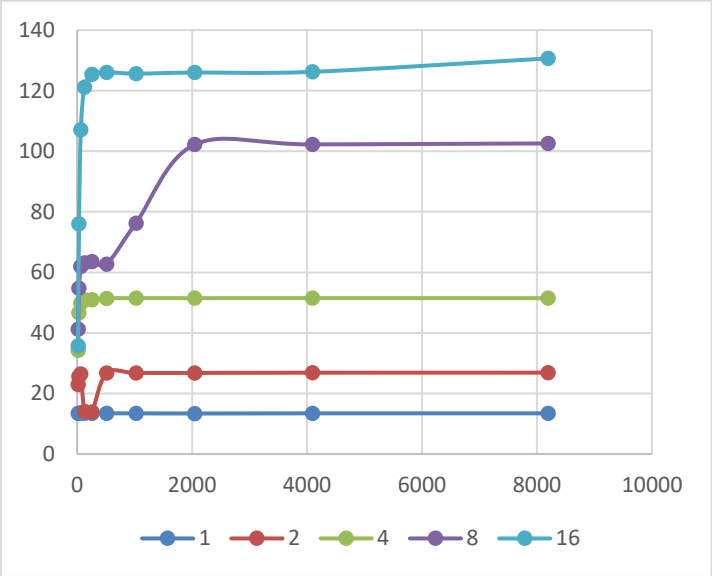
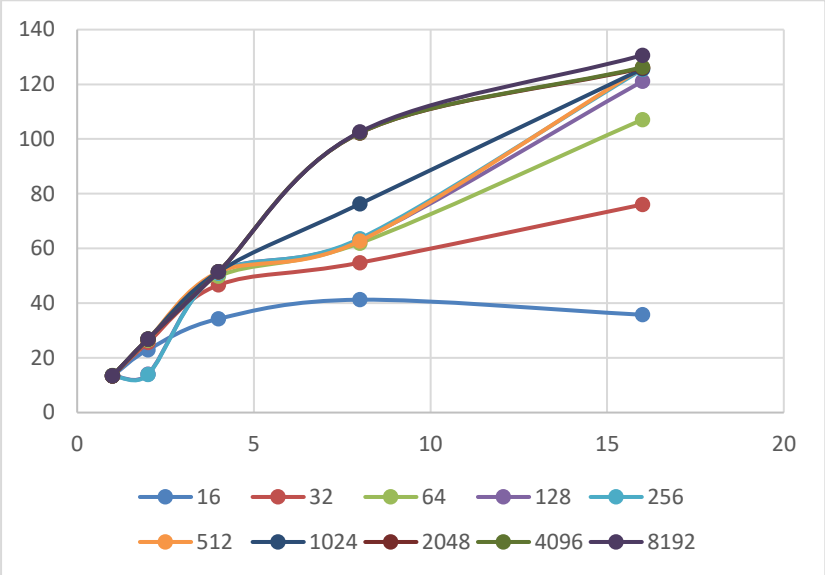
In this project, I run my program on server (flip.engr.oregonstate.edu). After I run my program, I got the volume is around 25.32, which is got when I set subdivisions as 8192, this result should be the most precise in my results.

After I run my script, I got several results of the performances of different threads or subdivisions, the following table shows the result I've got.

| | 16 | 32 | 64 | 128 | 256 | 512 | 1024 | 2048 | 4096 | 8192 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 13.41 | 13.4 | 13.52 | 13.47 | 13.44 | 13.43 | 13.44 | 13.38 | 13.44 | 13.44 |
| 2 | 22.93 | 25.6 | 26.49 | 14.03 | 13.86 | 26.74 | 26.78 | 26.78 | 26.87 | 26.88 |
| 4 | 34.27 | 46.63 | 49.79 | 50.98 | 50.92 | 51.4 | 51.49 | 51.47 | 51.49 | 51.47 |
| 8 | 41.25 | 54.78 | 61.95 | 63.17 | 63.59 | 62.71 | 76.28 | 102.21 | 102.24 | 102.57 |
| 16 | 35.75 | 76.06 | 107.12 | 121.12 | 125.44 | 126.05 | 125.63 | 125.98 | 126.22 | 130.64 |






The first column is the numbers of threads, and row presents the numbers of subdivisions.

I saw when the subdivision rise, the performance will be some increase till they got a boundary. Moreover, when the threads numbers increased twice between the previous one, the performance will be double, I think it because threads doubled, so that system can spilt tasks to half, two threads can work parallel. However, 16 thread is different, it not increases that much, I presume that because the parallel portion not be dominant that much, sequential portion got more dominant while increasing to 16 threads.

According to the Inverse Amdahl equation F = $\frac{n}{n-1}\ \frac{T_1-T_n}{T_1}$, use the data shows in the previous table, and T = 1/P, so that when n = 2, 4, 8, 16, $F_p$ = 1, 0.985, 0.99, 0.95. so $\bar{F}$ = 0.98

Furthermore, according to the speed-up equation S = $\frac{T_1}{T_n}$ , so the maximum speed-up I ever got is 9.7 while I set threads number is 16.