CS 475 Parallel Programming: Project 7 - Fourier Analysis (MPI)

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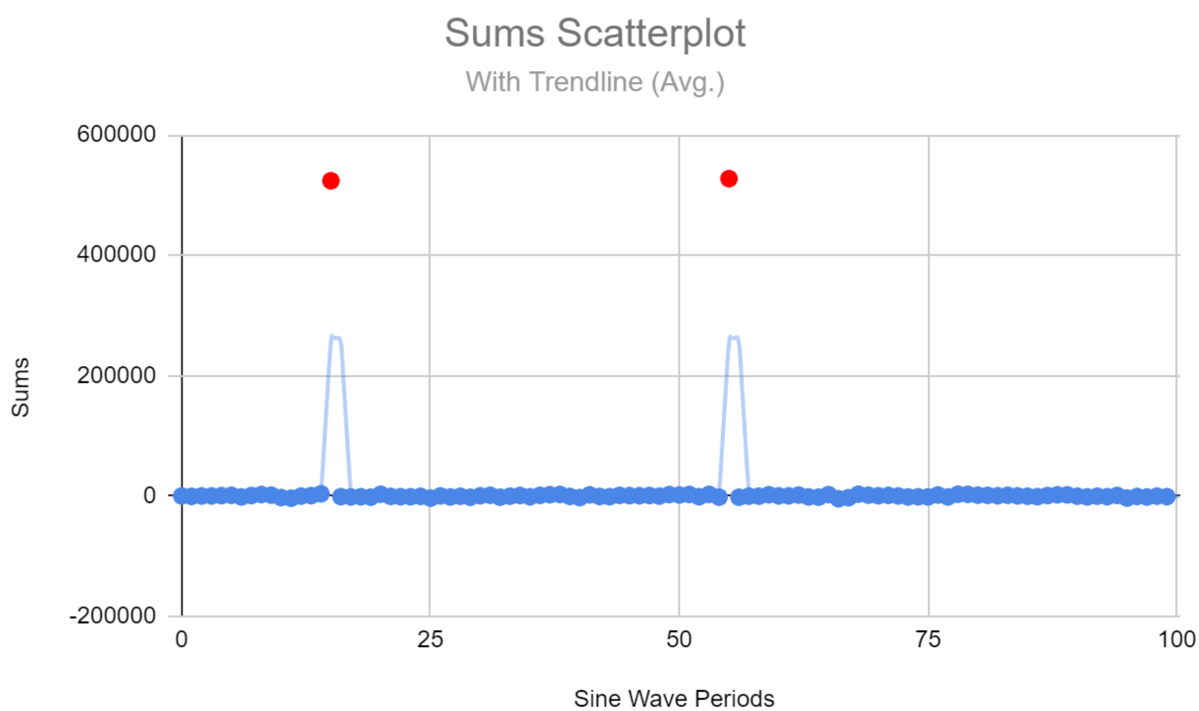
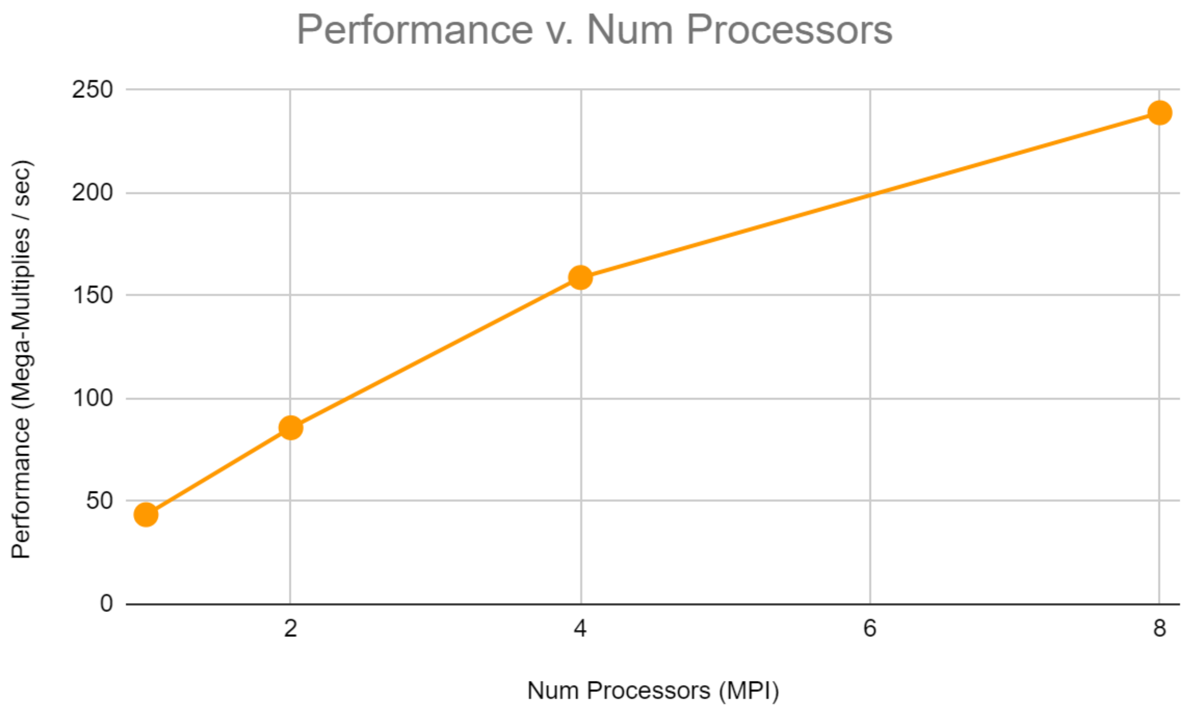
1. Sums Scatterplot



2. The secret sine waves occur on periods 15 and 55, which is very easy to see due to the huge spike on those specific frequencies. Since the sum becomes so large in those specific periods, we know that frequency occurs in the original signal despite the noise.

3. Performance Plot



4. Taking a look at our performance numbers we can see that performance almost doubles with each increase in number of processors, just barely missing the mark which would imply that at least for the first few steps, most of the work can be handled in parallel, however these increases do begin to fall off after 4 processors, though still significantly better, there may be diminishing returns beyond this, it almost ends up being a linear increase!
5. MPI Parallelism seems strong and by jockeying between multiple CPU's in this format allows performance levels that are almost linear, which is frankly pretty insane. By allowing the other CPU's to handle calculations while reporting to a single BOSS CPU, the performance gains skyrocket, allowing for more granular multitasking. The slides pointing out that modern supercomputers are typically arranged like this makes a lot of sense after witnessing its power first hand!