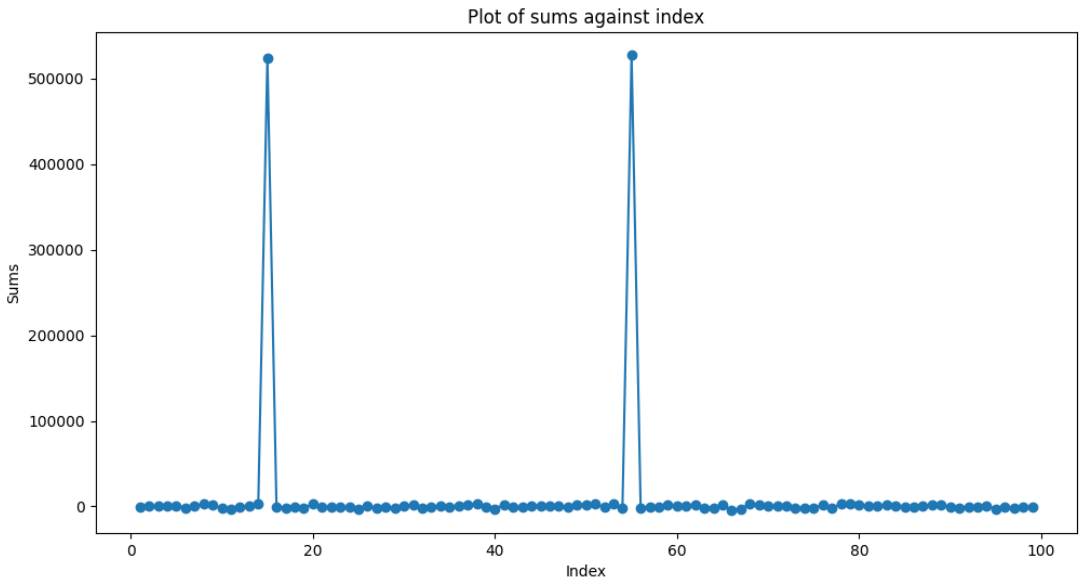
CS 475 Parallel Computing
Project 7
6/9/2023

Aaron Frost
frostaa@oregonstate.edu

1. **Show the Sums[*] scatterplot.**

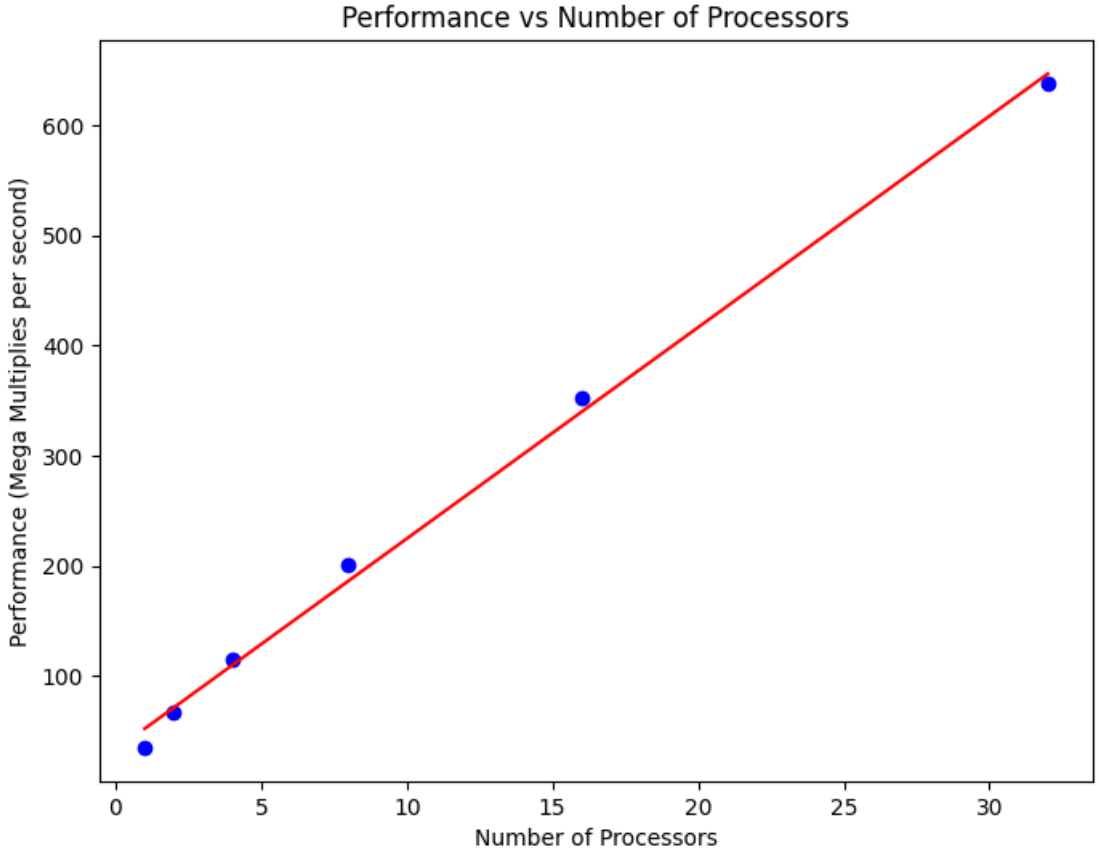


2. **State what the secret sine-waves' periods are**

15 and 55

3. **Show your graph of Performance vs. Number of Processors used.**

In this graph are 1,2,4,8,16,32 processors.



4. **What patterns are you seeing in the performance graph?**

I see a linear relationship between the performance and the number of processors used.

5. **Why do you think the performances work this way?**

I think that the performance works this way because the code divides the input signal into smaller segments based on the number of CPUs. Each MPI rank performs a local Fourier transformation on its assigned segment of the signal, and then computes the fourier transform for different p values. Then the PPSums arrays from each MPI rank are gathered on the BOSS rank and combined into BigSums. The workload is evenly distributed among the ranks which ensures that there is no time waiting for other ranks to complete. The algorithm is also very scalable since the task can be evenly divided and the overall computation time thus reduces linearly with the amount of processors.