Oregon State University

CS 475 - Spring 2021

Professor

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Project #7B

Autocorrelation Using MPI

by

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June 1, 2021

Setup:

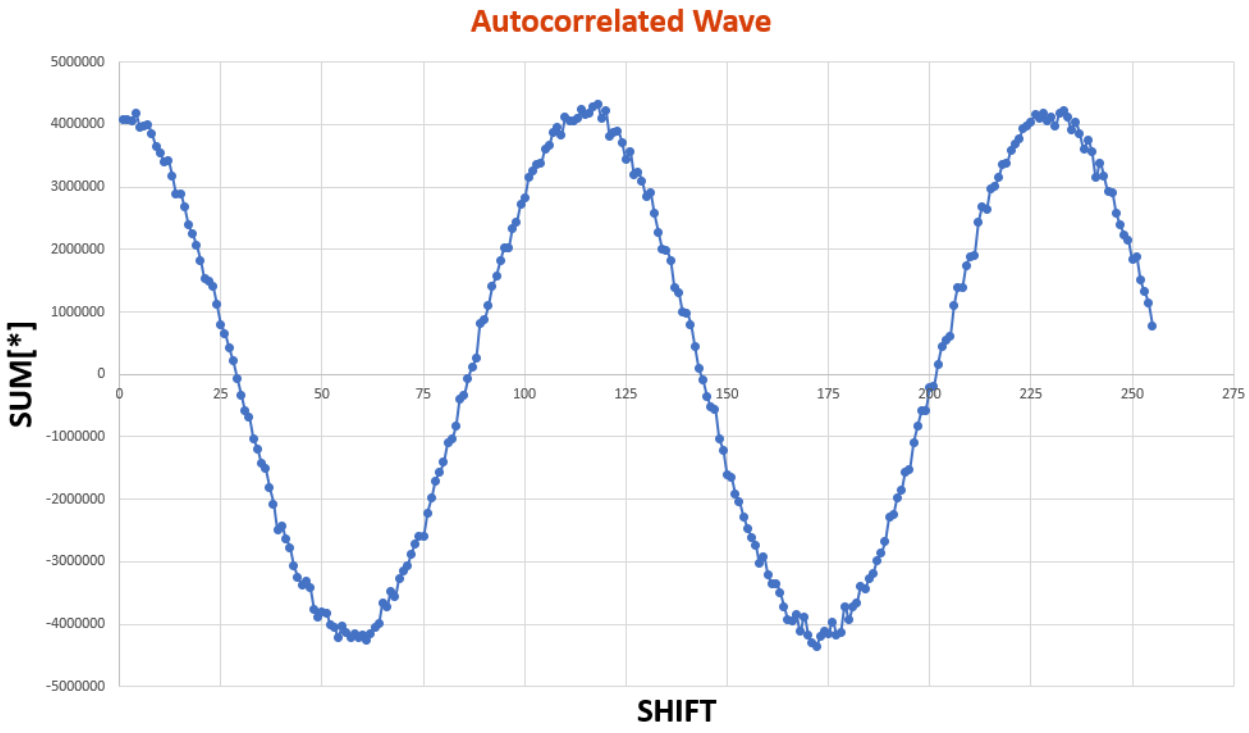
I used rabbit for this experiment because DGX was constraining me to 8 cores. Load average was *%1*. I believe this is a near-perfect load for doing an experiment.

```
rabbit ~/cs475/mpirabbit 835$ uptime
 08:50:21 up 78 days, 18:19, 12 users,  load average: 1.12, 0.81, 0.57
rabbit ~/cs475/mpirabbit 836$
```

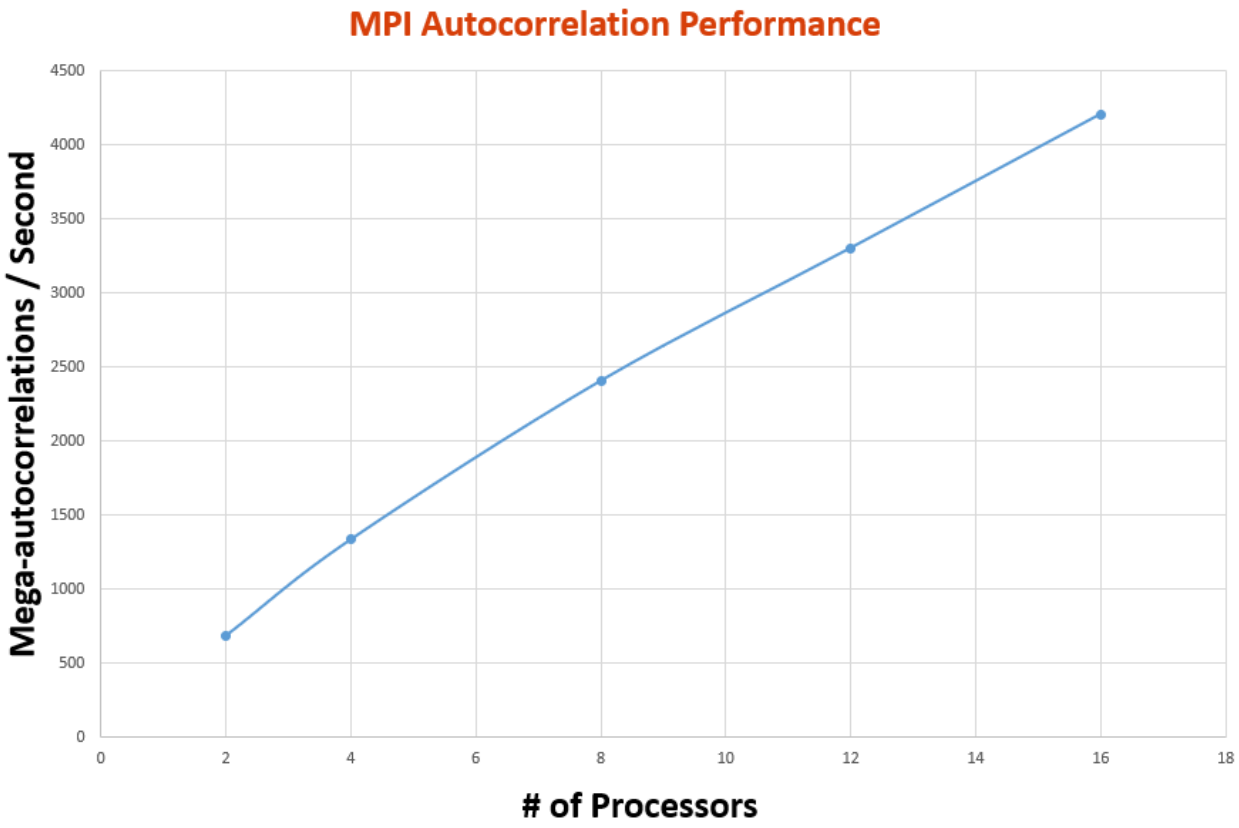
PROCESSORS = [2, 4, 8, 12, 16]
ELEMENTS = 8388608

Results:

Here is the Sums[1]...Sums[255] vs shift scatterplot. The period of the sine wave is around 115.



Here is the performance vs number of processors graph.



The graph is pretty much linear since the program is data parallel and we have enough data. As we increase the number of processors the performance increases. I don't know whether the graph would continue to be linear if we increased the number of processors to a really high number. I think after some point the data we scatter and gather will be so small that sending and receiving will become a burden.

That's why supercomputers use MPI. They have an excessively large amount of highly parallelizable data and millions of processors are waiting for some part of it. If you have a supercomputer and terabytes of data why wouldn't you use MPI?