

PH510 Assignment 1 - Notes

PyLint

PyLint proved quite useful for cleaning up my code, however it continues to flag the mpi4py module with error E0611. I used the extension command `pylint --extension-pkg-whitelist=mpi4py.MPI a1_pylintcorrection.py` but the issue persisted. I achieved a pylint score of 8.28/10

My approach to parallelization

I began by benchmarking the provided code with 1 and 2 cores using `time python3 assignment1.py` in the job script (I decided later to time the runs inside the code itself). The 2-core run completed in 388 seconds which was 340 seconds longer than 1 core. I decided this was enough evidence to show that the code demonstrates poor parallel performance. To improve upon this code, I restructured the code using MPI commands, but used the provided code as a guide, focusing on splitting the workload into all the ranks and summing the contributions with rank 0. I eventually noticed that for an odd number of processors, the value of the integral would fluctuate slightly. This is because $N = 100$ million does not divide evenly between an odd number, therefore, the final rank must handle slightly more than the rest. This was ensured with a simple if statement.

The improved code demonstrates parallel scaling up to 20 cores, achieving a speedup of 13.85x for 20 processors and the value for the integral is identical for serial and parallel runs.