

XS Benchmark Summary

Summary Version

1.1

Purpose of Benchmark

XSbench is a mini-app representing a key computational kernel of the Monte Carlo neutronics application OpenMC. The purpose of this benchmark is to evaluate the performance of the memory subsystem of a node. This is a single node benchmark.

Characteristics of Benchmark

The XSbench proxy app models the most computationally intensive part of a typical MC transport algorithm - the calculation of macroscopic neutron cross sections - a kernel which accounts for around 85% of the total runtime of OpenMC. The essential computational conditions and tasks of fully featured MC neutron transport codes are retained in the mini-app, without the additional complexity of the full application. This provides a much simpler and more transparent platform for determining performance benefits resulting from a given hardware feature or software optimization.

Mechanics of Building Benchmark

The XSbench code is an MPI+OpenMP code. There is a makefile to build the benchmark.

Mechanics of Running Benchmark

The benchmark takes in a number of command line parameters. These include the number of OpenMP threads (-t), size of the benchmark (-s), Gridpoints (-g), the number of lookups performed (-l)

CORAL runs:

There are three problem sizes (-s): Large, XL (120GB), XXL (256GB)

If some of the above sizes do not fit into the memory of the proposed system or a larger problem can be fit, the results for this problem size should be reported.

The number of lookups = 30,000,000

To run:

```
./XSbench -t <# of OpenMP threads> -s <size of problem> -l 30000000
```

The benchmark reports a summary of the input parameters used, and outputs the total runtime, the total number of lookups, and the number of lookups/s.

Verification of Results

The benchmark has the capability to verify the results by altering the VERIFY=YES in the makefile