

Important Information about SNSWP3D (v1.0)

The UMT “microkernel” benchmark consists of a single routine, SNSWP3D, from the full UMT version 1.3 benchmark. SNSWP3D is responsible for the bulk of the time spent in the full benchmark.

The SNSWP3D routine includes the most challenging loops that govern overall performance **and** the greatest opportunity for speeding up the benchmark. In the full UMT benchmark, all parallelism (both MPI and OpenMP) is controlled outside of the SNSWP3D routine. Even so, there still remains significant potential for lightweight thread parallelism in this one routine. This being the case, UMTmk should be viewed as an auto threading compiler challenge.

The nature of ASC code development efforts at LLNL do make use of compiler flags, including for individual compilation files and, when necessary, simple compiler directives before individual loops. Whole-scale algorithm changes are not practical for ASC-LLNL’s very large installed code base, so major algorithm changes will be scored as having much less value than the above-mentioned parallelization techniques during procurement evaluations.

UMT version 1.3 differs from earlier versions in the following two ways. First, version 1.3 uses a somewhat different “centering” in the numerical discretization of the underlying radiation transport equations. The total amount of arithmetic has been reduced somewhat, but the essential character of the challenging loops in SNSWP3D and the potential for lightweight thread parallelism has not changed. Second, much generality has been removed from the benchmark in an effort to simplify the operational issues of running large parallel problems. This is not important for this microkernel benchmark, but it does have an impact on the full UMT benchmark.