

## **Interoperability of Unstructured Mesh Tools and Their Use in Applications: ITAPS Successes**

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Over the course of the SciDAC-2 program, the Interoperable Tools for Advanced Petascale Simulations (ITAPS) project has made considerable progress in the development of a suite of interoperable tools suitable for use in managing unstructured meshes on massively parallel computers. We have achieved this through the development of common data models and interfaces for representing and accessing mesh, geometry, and field data, along with the relations among them. Several reference implementations and services built on these interfaces exist that provide application developers access to sophisticated functionality, such as mesh quality improvement through smoothing and swapping, mesh adaptation and partitioning, front tracking, and visualization and analysis. These services have been shown to scale to tens and, in some cases, hundreds of thousands of processors, and we highlight these results in this poster. We also highlight the uses of these services in DOE applications ranging from accelerators (particle accelerator design, liquid metal targets) and fusion (tokamak modeling, ITER fueling) to ice sheet models, subsurface mineral precipitation, and nuclear reactor accident scenarios.