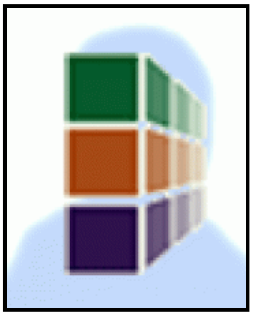

CCT Colloquium Series

Component-Based Mesh Services for SciDAC Applications

Timothy Tautges, Sandia National Laboratories

Johnston Hall 338
December 01, 2006 - 11:00 am

Abstract:
Geometry and mesh, both representations of the spatial domain, play an important role in many classes of SciDAC applications, from E&M calculations in accelerator modeling to fusion MHD to radiation transport. For these applications, the accuracy which can be obtained with today?s massively parallel systems is often limited by the fidelity of the geometry and mesh models compared to the actual domain being modeled. Furthermore, techniques like adaptive mesh refinement and efficient geometry evaluation are difficult to incorporate into existing codes in a non-intrusive fashion, especially in a parallel computing environment. To meet these needs, the TSTT SciDAC center has developed common interfaces to geometry and mesh data. Services for mesh smoothing, geometry and mesh modification, and adaptive mesh refinement have been developed as components operating through these interfaces. I will describe the design and implementation of the MOAB mesh database library, which implements the TSTT mesh interface. Performance and application of MOAB will also be described. I will conclude by describing planned design changes for making MOAB perform better in parallel environments.

Speaker's Bio:
Dr. Timothy J. Tautges received his PhD in Nuclear Engineering and Engineering Physics from the University of Wisconsin-Madison in 1990, performing his dissertation on parallel computing applications to nuclear reactor safety. After a one year visiting scientist position at CEC Joint Research Centre, Isrpa, Italy, he joined Sandia National Labs. For the past twelve years, Dr. Tautges has performed research and development on mesh generation algorithms, geometry for mesh generation, and component-based geometry and meshing. Dr. Tautges lead the CUBIT mesh generation project at Sandia from 1996-1998. For the past eight years, Dr. Tautges has telecommuted from the University of Wisconsin-Madison, where he holds an adjunct professor appointment in Engineering Physics. Dr. Tautges will join Argonne National Laboratory in early December.

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