Poster Title: X-MOF Interface Reconstruction Method and its Massively Parallel Implementation in Tangram.

Poster Abstract:
X-MOF is a 2D interface reconstruction method based on the Moment-Of-Fluid (MOF) technique, which is second-order accurate and material-order independent. The purpose of X-MOF is to reconstruct material interfaces in multi-material cells based on volumes and centroids of materials, while concurrently establishing connectivity between material polygons in a robust and efficient way. This results in a hierarchical mesh: the base mesh with multi-material cells, and minimeshes inside those cells. Minimeshes have full internal topology, and establish parent-child relations between corresponding mesh entity types (e.g. parent face in the base mesh and its child subface in the minimesh), which is required by such applications as high-contrast multi-material diffusion.
Tangram is a massively parallel interface reconstruction framework templated on the interface reconstruction method and mesh infrastructure used for the base mesh. Tangram takes care of the distributed parallelism using MPI and threaded parallelism using NVIDIA Thrust to scale the interface reconstruction process to many thousands of cores.
We present the results for the X-MOF method deployed as the interface reconstruction component in Tangram with Jali mesh infrastructure used for the base mesh. We also show its scaling results for distributed (MPI) and on-node parallelism (OpenMP) on LANL's HPC machines.