

SCIENTIFIC COMPUTING
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Mini-Apps for Modern Architectures

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Abstract: A mini-app is a simulation code that captures the fundamental complexity of some aspect of a full-scale solver. For classified applications, this is advantageous because the mini-app may be shared with vendors or academics, while the original code may not. In this presentation, we describe such a mini-app that is designed to capture the cardinal aspects of an Adaptive Mesh Refinement (AMR) framework for multi-physics problems in astrophysics and weapons science. The approach introduced here can be classified as block-structured AMR with the addition of a novel data decomposition technique that helps address many of the issues that arise when considering the challenges of exascale computing, e.g., fault tolerance, data migration—for load balancing—and adaptability to accelerated architectures. The work discussed in this presentation will be in the context of a multi-physics solver for radiation hydrodynamics simulations to help us better understand Inertial Confinement Fusion (ICF) experiments underway at the National Ignition Facility (ICF) at Lawrence Livermore National Laboratory.

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