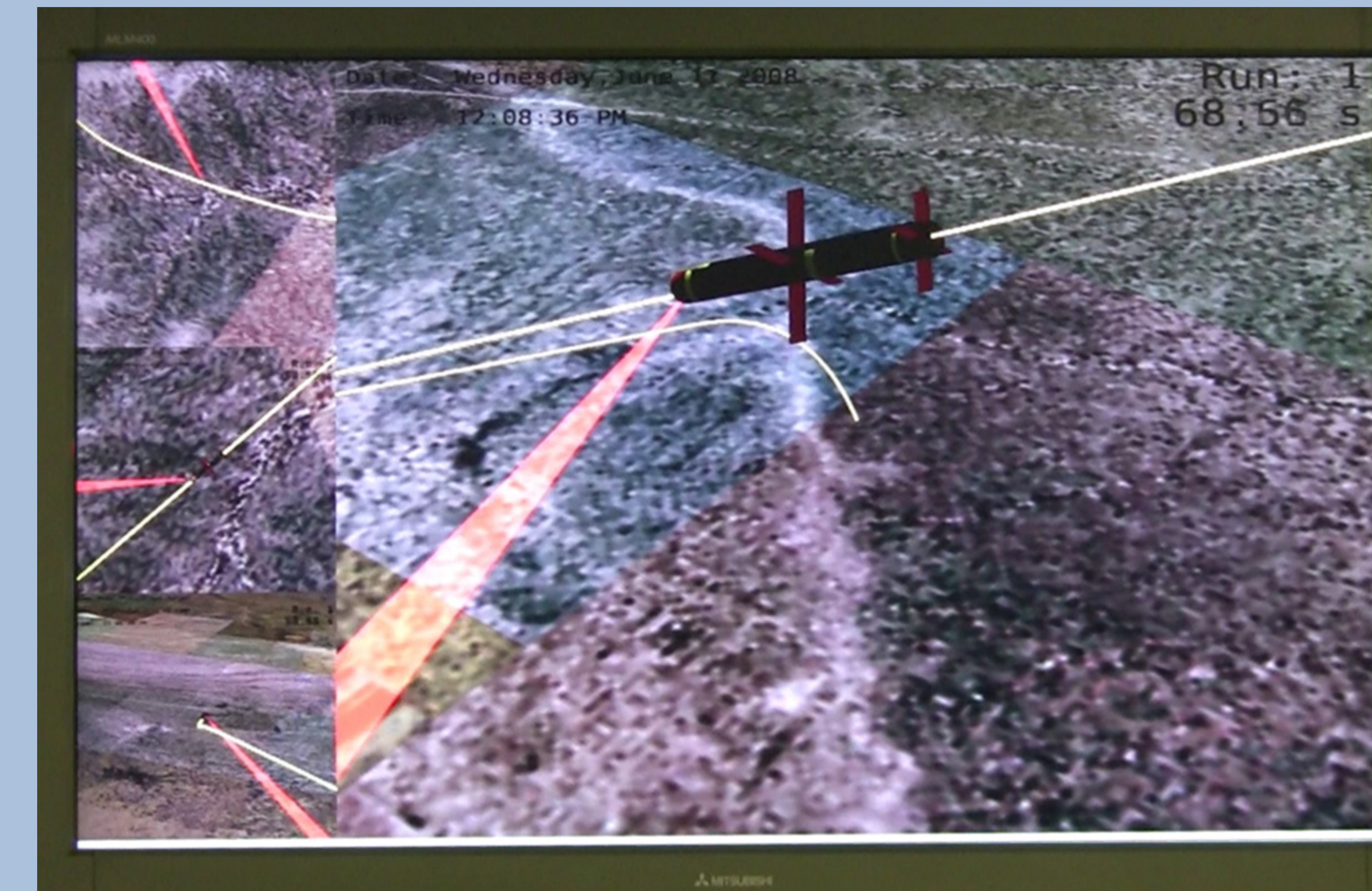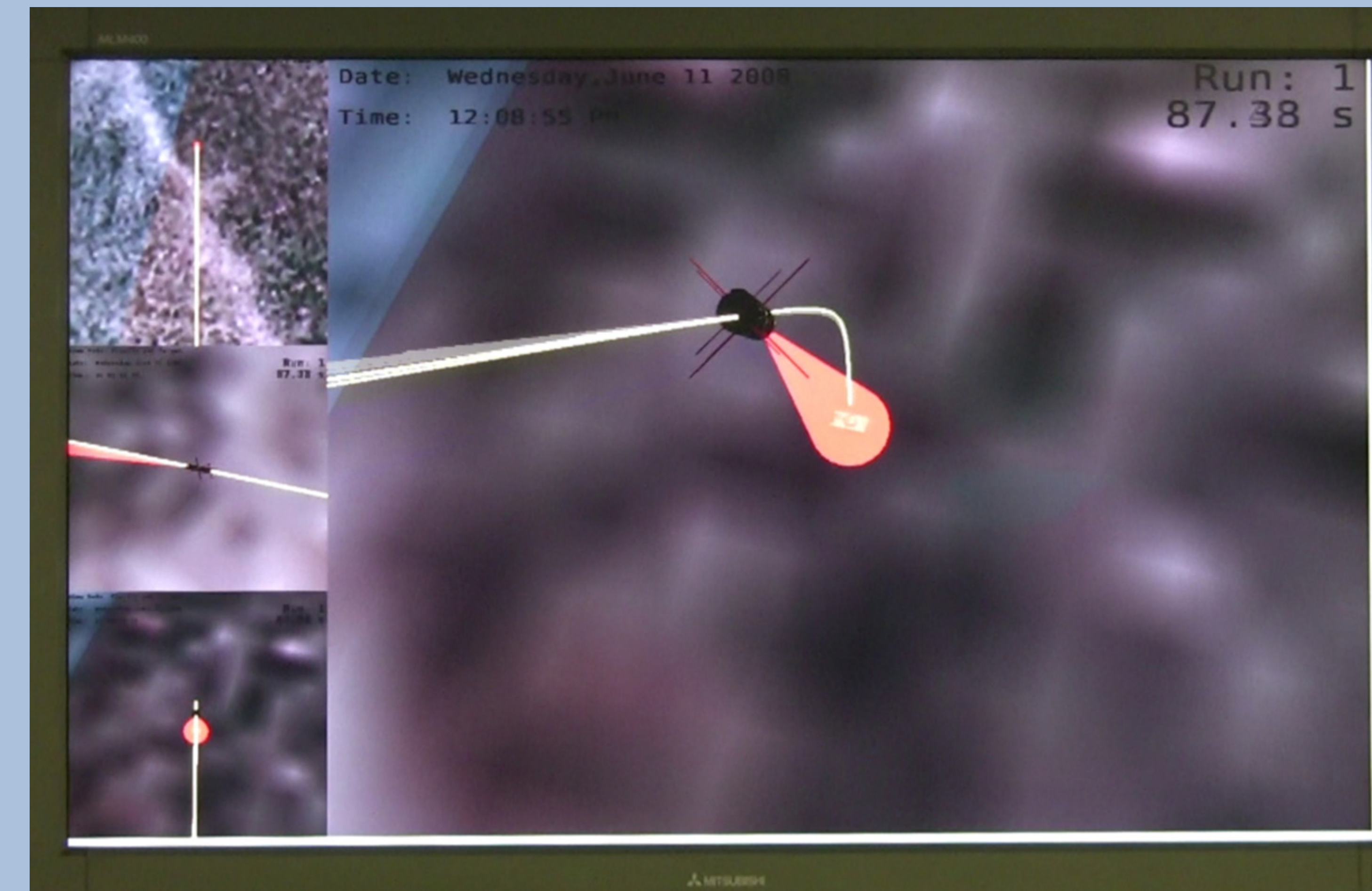Flight Table Images

Visualizations of the Trajectory

Introduction

Simulation is used extensively in the acquisition, development, and testing of systems by the DoD. The Common Simulation Framework (CSF) provides a unified framework for developing and testing simulation models. CSF facilitates live, virtual, and constructive (LVC) simulation of a complete missile deployment system. It includes some support for real-time operation but not enough to allow hardware-in-the-loop (HWIL) testing.

Objective

Our objectives were to enhance the real-time support provided in CSF and demonstrate its effectiveness for hardware-in-the-loop (HWIL) testing. The goal was to create software that can be efficiently reused and adapted for other simulations. Success of the project was to be demonstrated by using CSF to control a flight simulator table at the Redstone Technical Test Center (RTTC) in Huntsville, AL.

Methodology

A real-time monitoring function was added to CSF to watch for frame overruns and optionally terminate a simulation if an overrun occurs. A demonstration was created to drive a flight simulator table through a preprogrammed six-degree-of-freedom (6DOF) trajectory. The demonstration system was an Intel® Core™2 Quad processor running RedHawk real-time Linux.

Results

We successfully demonstrated the effectiveness of CSF in a real-time HWIL environment. The real-time extensions to CSF were developed as components running within the CSF framework. Minor changes were required to the CSF core, but these changes were not specific to any particular hardware or operating system. The demonstration running under CSF drove the table at an update rate of 600 Hz using only 2% of the processing time available for each update.

The extensions and modifications to CSF will be offered to the CSF steering committee for acceptance in the standard distribution.

Acknowledgments
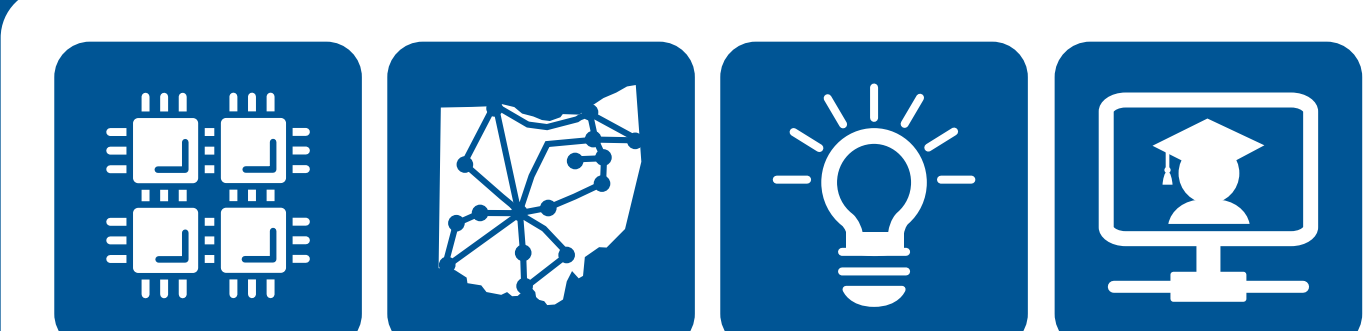
Ohio Supercomputer Center

Test Facility: AMSTAR Production Facility,
RTTC, Huntsville, AL
"Best in the Business at HWIL" (Mac Lowry)