Project Information

Company Name: RNET Technologies Inc.
Project Title: SASI: Smart Algorithm Selection through Inference
Principal Investigator: Dr. Ben O'Neill
Topic Number/subtopic letter: 7b (Technologies for Extreme Scale Computing (Software))

Problem Statement

While much work has taken place in optimizing the specific numerical algorithms for specific problems and architectures, there is no simple governing theory for determining the best algorithm and configuration for a given situation. Rather, the optimal method is, in practice, determined by experimentation and numerical folklore. As such, it is desirable to have toolkit-enabled functionality that automatically chooses the algorithm that is both appropriate for the computational problem at hand *and* the computer architecture that will be used.

General Statement

The SASI framework is a simple, robust set of tools designed to guide users through the process of building a smart algorithm selection model for generic numerical algorithms. Through SASI, users will be able to develop tools that adapt to the computational model and the chosen architecture, thereby reducing the overall time to solution for numerical simulations.

Phase I Workplan

Commercial Applications and Other Benefits

SASI automates the process of fine tuning simulations each time the model or architecture changes, allowing developers to focus on creating high fidelity, high accuracy and high impact numerical simulations capable of fully utilizing the nations computational resources. SASI has applications across the broad spectrum on numerical simulation including in nuclear engineering, oil and gas, and computational fluid dynamics.

Key Words

Machine learning, numerical simulation, smart algorithm selection

Summary for Members of Congress

Performance tuning of numerical simulations based on changes in the problem being solved or the computer being used is a tedious and time consuming task. SASI uses machine learning to remove this burden, allowing developers to focus on creating game changing, high fidelity simulations.