

PROJECT INTRODUCTION

Objectives

To develop a reusable Grid-based Problem Solving Environment (PSE) for solving complex applications in science and engineering, focusing on engineering and material design.

Project Investigator / Manager

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Period of Project

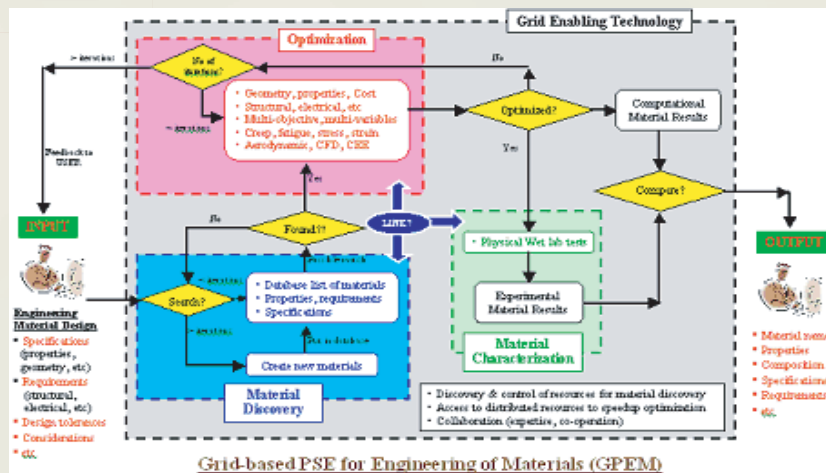
19 Sep 2005 – 18 Dec 2005

Abstract

The emphasis of the project is to explore and establish a standards-based problem-oriented computing environment that supports a wide range of scientific computational problem-solving activities in science and engineering. It aims to develop a truly pervasive and reusable PSE with the novel use of Grid Computing as the underlying technology. Grid Computing will integrate the different pieces of middleware components, material discovery, engineering optimization and collaboration, together in a coherent manner, to support cooperation among engineers, researchers and scientists in a seamless manner.

PROJECT DETAILS

Description



Over the last three decades, the process of design in science and engineering has been transformed by the introduction of massive computing power. There has been a move away from paper-based systems towards 3D models and computer simulations. This has allowed the development of increasingly sophisticated products such as the space telescope, large airliners and discovery of new materials. It remains the case that we still desire to produce ever-more complex science, engineering systems and novel nanomaterials. To support ever more complex systems, this project aims to develop a grid-based PSE that is flexible enough and has the ability to grow and improve in its capabilities, with the incorporation of a standards-based plug-n-play feature. This project leverages from initial work of the PI and Co-PI's on Grid-based PSE's with Nanyang Technological University, National Grid Office, A*STAR, E-science (UK), University of Southampton, Honda Research

Institute Europe and the industrial expertise residing in Institute of High Performance Computing on science and engineering problems. The Grid-based PSE will be demonstrated for the Engineering of Materials (GPEM). The proposed workflow for GPEM as shown above begins with the user attempting to discover new complex materials and products according to the given specifications (properties, geometry, etc) and requirements (structural, electrical, thermal, etc). The ultimate goal is to derive at a digital design, which complies with those specifications and requirements. In achieving this, engineering multi-objective and multi-variable optimization techniques, from both commercial and in-house codes, will be used to explore the design solution space.

Collaborating Organization:

Institute of High Performance Computing