

PROJECT INTRODUCTION

Objectives

To design a Grid system that uses the compute power of idle workstations as well as their graphics cards. The system will be applied to cutting-edge computational problems in biology and nanotechnology.

Project Investigator / Manager

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Period of Project

15 Oct 2005 – 14 Oct 2007

Abstract

Using processor cycles from idle workstations as in the “@home” approach is currently the most effective way to gain supercomputer power at low cost for certain types of applications. Installing in addition massively parallel processor cards within each workstation can further improve the cost/performance ratio significantly. With the enhanced programmability of commodity graphics processing units (GPUs), these chips are now capable of performing more than the specific graphics computations they were originally designed for. The objective of this project is the design and implementation of a new grid-enabled “@home” system that uses graphics cards of idle workstations as parallel accelerators.

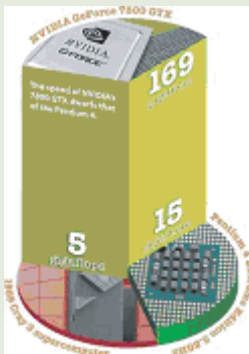
PROJECT DETAILS

Description

We want to improve the price/performance ratio of @home application even further by including the compute power of commodity graphics cards. Our approach is motivated by the fast increasing compute power of the GPU (see figure). Its streaming architecture opens up a range of new possibilities for a variety of applications. With the enhanced programmability of commodity GPUs, these chips are now capable of performing more than the specific graphics computations they were originally designed for.

An important question is which applications can benefit from this type of processing power. We have identified the following applications in the areas of protein folding, nanotechnology, and large-scale biological sequence analysis:

- Application 1: Folding/Unfolding studies of protein WW Domain.
- Application 2: Multi-scale modeling of time-dependent behavior of carbon nanotubes.
- Application 3: Whole-Genome discovery of transcriptional factor binding sites.



Comparison of the peak performance of a modern GPU to a PC

Collaborating Organization:

Genome Institute of Singapore