

Implementing High-Performance Grid Computing in Student Computer Labs

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ABSTRACT

Information technology infrastructure consumes significant resources at most higher education institutions. Innovative ways to more efficiently use this infrastructure are always being sought. Research universities must balance resource consumption between their research and teaching and learning missions.

The University of Florida recently installed a grid computing client software product in the University's student computer labs. This product allows faculty with large data analysis research projects to take advantage of the tremendous computing power available through the harvesting of unused CPU capacity available in the University's student computer labs. The grid computing client software runs on the lab computers, and accepts computational jobs from programs submitted to the grid computing system by research users, devoting system resources from each lab PC to the computations whenever they are not being used by the local student user.

This presentation will describe the system architecture, costs, implications, and strengths and weaknesses that are important for implementation, including the technical requirements and management system, and will be focused on providing operational staff from other institutions with useful information to help in the evaluation of whether such a system would be effective at that their institution.

Categories and Subject Descriptors

Computer Applications

General Terms

Management

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Keywords

grid, parallel, computer lab, cluster, BLAST, HMMER

1. INTRODUCTION

The University of Florida provides a wide variety of computing resources to its faculty, staff, and students. In particular, around 350 Pentium-4 class computers are provided in five separate computer lab facilities. These facilities include five computer classrooms of between 24 and 32 computer seats, as well as open access computing areas. These facilities are available for student usage at least until 10:00pm, with one facility being open until 2:00am, and one facility operating 24 hours per day.

Even with normal usage, these computers spend a large portion of their day doing a minimal amount of CPU work, either between users, overnight, or even while students are typing papers.

The University's grid computing system is designed to take advantage of this situation by allowing research faculty to submit jobs for parallel processing by these lab computers, during times they are not being used heavily by their local users. By making a relatively simple system for research faculty to use, the usual impediments to maximizing utilization of CPU resources are avoided.

The first applications purchased from the vendor are for the HMMER and BLAST applications. These applications provide mechanisms for searching large databases with statistical models.

Applications for porting general-purpose computations to the grid system, as well as applications for teaching parallel processing and programming to students, are in development.

Grid software provides an effective means of utilizing computing systems more efficiently without reducing the quality of the experience for the lab user. This provides an excellent justification for not only increasing the level of technology in computer labs for student usage, but also to support the research needs of the University at the same time.