ABSTRACT:

WORKLOAD CHARACTERISTICS OF THE NIIF SUPERCOMPUTER FOR REALIZATION OF THE ADAPTIVE GRID SCHEDULER

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Distributed computer systems are becoming prominent in various application areas. An important requirement is to create such large, geographically distributed systems (grids) whose elements are connected by a wide-area network, heterogeneous in every aspect, yet provide a traditional desktop environment for users. These systems must support various tasks, such as execution of computation intensive and data intensive applications, supporting distributed collaboration and providing problem solving environments, whose resource demand and execution characteristics are very different.

There are many unsolved problems in large distributed heterogeneous environments. One of the most important ones is grid scheduling. It is not enough to know the hardware parameters of the resources for the best scheduling; we also need to estimate the complete run time (waiting + wallclock time) of a job of a given queue. Job execution is a stochastic process; therefore the grid scheduler needs to be an adaptive system. The adaptive grid scheduler estimates the distribution of the typical run time of the system as a random variable, after this – taking the length of the queue into consideration – it chooses the queue (grid resource) for job execution that guarantees shortest completion time.

The first step of creating the intelligent scheduling model based on statistical methods (ISSM) is the determination of the model's characteristic input parameters.

For this purpose we have performed a comprehensive workload characterization of the NIIF supercomputer based on log data obtained in the period of April 5, 2003 – September 23, 2005. The analysis includes the usage of resources (memory, cpu), degree of parallelism, job arrival rate, and especially the job queue wait time and the run time.

In the final paper and the presentation we will describe the analysis results in details as well as the conclusions that can be drawn from the findings. Finally we will provide an overview of the architecture and the operation mechanism of the planned grid scheduler.