VISVESWARAIAH TECHNOLOGICAL UNIVERSITY

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PROJECT REPORT ON

"Parallel Genetic Algorithm for Scheduling Parallel Applications on Grid"

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ABSTRACT

GARUDA is a collaboration of science researchers and experimenters on a nation wide grid of computational nodes. Grids consist of both dedicated batch system and non-dedicated time sharing system clusters. Each cluster consists of set of homogeneous machines. Grid resources are submitted to meta-scheduler which provides a single point entry for each user. For effective mapping of parallel applications on grid resources, a grid meta-scheduler has to evaluate different sets of resources in terms of predicted execution times for the applications when executed on the sets of resources.

Scheduling is difficult and challenging in grid computing due to the very dynamic and unpredictable nature of Grid resources. The scheduling problem can be viewed as a multivariate optimization problem. Genetic Algorithm has been popularly used in a number of scheduling problems. The problem with the single threaded Genetic Algorithm is, it takes long time (hours together for large search space) to give near optimal solution. So it is not worth to use single threaded Genetic Algorithm for scheduling decisions.

This work builds parallel framework for Genetic Algorithm which is used in computing to find near optimal schedule with best set of resources in short time for achieving the better performance for parallel applications. The reduction of the scheduling decision time is the basic motivation of this work.

A Genetic Algorithm (GA) is a search technique used in computing, to find exact or approximate solutions to optimization and search problems. We have developed Parallel Genetic Algorithm which provides an efficient way to search for the resources in very short span of time. We also conducted experiments to fix the initial number of chromosomes and mutation rate. Result shows that with increasing number of processors, our parallel Genetic Algorithm generates a near-optimal schedule in short time, which will be reasonable in computational grids.