Abstract

Parallel space-sharing job scheduling algorithms play an indispensable role in efficient allocation of processors of PC-cluster to the competing jobs to achieve one of the performance objective(s) viz. minimized mean response time (MRT), minimized average bounded slowdown or maximized throughput. Traditional performance modeling and evaluation studies of parallel
space-sharing job scheduling algorithms are incompetent of predicting the combined or interaction effect on the response resulting due to simultaneous variation of two process variables. Present work is undertaken to predict and quantify the influence of main and interaction effects of the input scheduling process variables on the output MRT values using statistical approach of design of experiments (DOE). DOE based Response surface methodology (RSM) oriented experimental design is chosen to evaluate MRT values for two scheduling algorithms namely First Come First Serve (FCFS) and Fit Processors First Served (FPFS). Two empirical interaction models are suggested for both scheduling algorithms that predict MRT on the basis of multiple regression equations involving main and interaction effect terms of scheduling process variables. High value of adjusted coefficient of determination R² and insignificant lack of fit represent the goodness of fit of both the models to accurately predict the MRT values. Both the empirical interaction models are validated against additional experimental results. The comparative performance evaluation study on the basis of MRT reveals that the FPFS algorithm tends to outweigh the traditional FCFS policy.

**Reference**

Statistical Modeling and Evaluation of Parallel Space-sharing Job Scheduling Algorithms for PC-cluster using Design of Experiments (DOE)

- Design Expert Software version 8.0 user’s guide 2009.

Index Terms

Computer Science

Parallel Computing

Key words

Statistical Modeling

First Come First Serve

Fit

Processors First Served

DOE

RSM