

EFFICIENT ALGORITHM OF SCHEDULING FOR HETEROGENEOUS CLUSTERS BASED ON MAUI

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The aim of paper is to increase the efficiency of scheduling resources for computing clusters, composed of heterogeneous resources. Heuristic algorithms based on the solution of the minimal cover are developed, as well as their integration is implemented in the scheduler MAUI 3.1.1 by modifying the open source community. The algorithm allows to provide management of tasks in queue *MlocalQueueScheduleIJobs*. After the distribution tasks by scheduler MAUI they are passed for the local resource manager (PBS Pro, TORQUE, SLURM, SGE, LoadLeveler).

The effectiveness of the algorithms are researched by analyzing the results of simulation and testing of the scheduler on the computing cluster in situation of changing intensity of incoming workflows. As a basis for comparing the algorithms used Backfill and FCFS. Evaluation of the scheduler's effectiveness based on compared execution time of all jobs arriving at the scheduler and on levels of coefficient of resource's utilization for existing and proposed scheduling algorithms. The experiment was carried out based on clusters of Institute for Scintillation Materials NAS of Ukraine. As a reference for testing, used were data from the existing log files of scheduling system clusters. As a middleware of the Grid segment of the National Academy of Sciences of Ukraine, the package ARC NorduGrid was used to control the loading of nodes using a local resource manager Torque in conjunction with a scheduler MAUI.

In order to obtain comparable results of the algorithms, a built-in test mode of operation (emulation) of the MAUI scheduler was used. Results and statistics based on the plug-in of heuristic algorithms to scheduler show a higher level of load balancing cluster resource scheduling and performance when compared with algorithms Backfill and FCFS.

- [1] Maui cluster scheduler – <http://www.clusterresources.com/products/maui-cluster-scheduler.php>.