MSCS Graduate Research Project Opportunity

Mitigating Starvation of Multi-Level Feedback Queue Scheduling with Declining Max Weighted Average

This project is to extend published research with additional simulation, for submission to a conference and a journal. The basis for this work was previously published at a good conference and the reviewers made the suggestion to extend the work (with a comparative set of simulation results) and submit to a journal.

Dr. Ken Hoganson, Professor and Interim Department Chair
khoganso@kennesaw.edu
770-499-3402
This project is available immediately, as of 5/9/13.

Process scheduling algorithms are designed to favor the “shortest CPU-burst first, in order to provide good performance for interactive processes while efficiently allocating CPU processing time. The Multi-Level Feedback Queue (MLFQ) is vulnerable to starvation in the low-priority queues that are running CPU-intensive processes.

This paper presents a technique that mitigates starvation in the MLFQ that has low computation overhead and does not jeopardize the servicing of interactive and high-priority processes. The algorithm adds a second level of feedback using an extension of exponential averaging called Declining Max Weighted Average (DMWA) to redirect CPU time to the lowest priority queue. Feedback involving the execution of the highest-priority processes in the first queue is used to allocate a “safe” quantity of CPU time, without the risk of memory thrashing and increased context-switching overhead.

This project would produce additional simulation data with a direct comparison with the scheduling mechanisms used in Unix/Linux. It is expected that this novel scheduling mechanism will perform close to that of the Unix/Linux scheduling, but with slightly lower processing overhead, which the simulation is intended to explore and reveal: Best case is the novel mechanism turns out to have modest but significant advantages over current scheduling systems. Most likely case is the novel mechanism has slight overall advantages under certain circumstances.

- The original simulation program is available for inspection and extension.
- Or, new simulation data can be generated using a commercially available simulation system.
- Or Dr. Garridos’s PSIM can also be considered.

The project would be very appropriate for a thesis or project, as it is highly likely to result in publication and hopefully, a joint journal publication. A published manuscript of the results of the prior investigation is available, as well as the original simulation program.

This project will be supported with a Graduate Research Assistantship.

Dr. Hoganson will make funds available from his travel and equipment allowance to support student conference travel, and hardware and software as needed.