Relation-Aware Scheduler
in Symmetric Multiprocessor Machine

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Abstract: Task scheduling is a big problem in operating system. A good scheduler is ruled by many factors: kinds of task (CPU consuming task or interactive task), CPU architecture, I/O system, user purpose, etc. Solving problem of scheduling tasks can improve system performance and use system resources effectively. Although this problem can be solved efficiently in a single processor architecture, it still lacks good solution methods in multiprocessor architecture, which becomes popular today.

Our work tries to enhance throughput and performance of computing system. The problem is that it is difficult to schedule efficiently tasks which must be executed in precedence constraints. We have done some evaluations in Linux operating system, and realize that the original Linux scheduler cannot operate with the optimal result. To get better result, operating system needs specific information that cannot be collected at kernel space. There are some improvements of Linux scheduler, such as discovering process dependencies on resources, developing cache-aware scheduler or energy-aware scheduler, but they still do not solve this problem completely.

In this paper, we propose a mechanism for applications to load information of precedence constraints into kernel space for better scheduling. With these data, the scheduler tries to increase weight of process which others are waiting for its finish. By doing this, we do not need to modify Linux scheduler but still reach our purpose. Our results show that the application-level information can help the scheduler to operate better than the original scheduler.

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