Energy-Aware Scheduling in Real-Time Systems: An Analysis of Fair Share Scheduling and Priority-Driven Preemptive Scheduling

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Abstract : Energy-aware scheduling in real-time systems aims to minimize energy consumption, but issues related to resource reservation and timing constraints remain challenges. This study focuses on analyzing two scheduling algorithms, Fair-Share Scheduling (FFS) and Priority-Driven Preemptive Scheduling (PDPS), for solving these issues and energy-aware scheduling in real-time systems. Based on research on both algorithms and the processes of solving two problems, it can be found that Fair-Share Scheduling ensures fair allocation of resources but needs to improve with an imbalanced system load, and Priority-Driven Preemptive Scheduling prioritizes tasks based on criticality to meet timing constraints through preemption but relies heavily on task prioritization and may not be energy efficient. Therefore, improvements to both algorithms with energy-aware features will be proposed. Future work should focus on developing hybrid scheduling techniques that minimize energy consumption through intelligent task prioritization, resource allocation, and meeting time constraints.

Keywords : energy-aware scheduling, fair-share scheduling, priority-driven preemptive scheduling, real-time systems, optimization, resource reservation, timing constraints

Conference Title : ICESET 2023 : International Conference on Education, Science, Engineering and Technology

Conference Location : Kuala Lumpur, Malaysia

Conference Dates : December 04-05, 2023