Abstract

Power efficient design of real-time embedded systems based on multi-processors becomes more important as system functionality is increasingly realized through heuristic approaches. This paper targets energy-efficient scheduling of tasks over multiple processors, where tasks share a common deadline. It addresses the problem of energy-aware static partitioning of periodic real time tasks on heterogeneous multiprocessor platforms. A modified Particle Swarm Optimization variant based on priority assignment and min-min algorithms for task partitioning is proposed. The proposed approach aims to minimize the overall energy consumption, meanwhile avoid deadline violations. An energy-aware cost function is proposed to be considered in the proposed approach. Extensive simulated experiments and comparisons with related approaches are conducted in order to validate the effectiveness of the proposed technique. The achieved results demonstrate that the proposed partitioning scheme significantly outperforms in terms of the number of executed iterations to accomplish a specific task in addition to the energy savings.

References

- Dawei, L. and Wu, J., (2012). Task Partitioning Upon Energy-Aware Scheduling for Frame-Based Tasks on Heterogeneous Multiprocessor Platforms. 41st Int. Conf. on Parallel
Power Efficient Scheduling Scheme based on PSO for Real Time Systems

- Texas Instruments (TI), OMAP™ Mobile Processors. Available at: http://www.ti.com/general/docs/gencurrent.tif?contentId=46946 [last accessed 15/2/2012].

Index Terms

Computer Science  Information Science

Keywords

Task Partitioning  Task Assignment  Heterogeneous Multiprocessors  Particle Swarm Optimization
Min-min
Priority assignment algorithm