Weekly Report

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In the past one week I read some papers on multi-processor voltage scheduling.

1 Given Task Assignment

A number of papers assume the task-PE mapping is given. Therefore, the focus is to decide the V_{dd} of each tasks while satisfying the performance (deadling) constraint.

A number of papers [1, 2, 3] targeted distributed systems and follow the similar methodologies: first obtain a scheduling result without votlage scheduling, and then adjust the V_{dd} of each tasks depending on the available slack. [1, 2, 3] only considered dynamic power. [4] considered both dynamic and leakage power and combines DVS and ABB for optimization. But the scheduling algorithm is similar to those in [1, 2, 3] . A similar problem of combining DVS and ABB was also solved in [5] using nonlinear programming and mixed integer linear programming.

In [6], a list scheduling technique choosed the supply voltages for each task in a task graph specification. The method walked through each node in the task graph. For each node, a heuristic algorithm tries to slow down the speed (V_{dd}) of that node with slack given by ALAP and ASAP. Dynamic recalculation for previously-scheduled nodes may be necessary when the current node is not scheduling.

[7] developed energy models for buses and repeaters, and use a non-linear programming method to decide V_{dd} for each task, where V_{dd} can be continuously adjusted. When V_{dd} changes from V_1 to V_2, the transistion time is $A \cdot (V_2 - V_1)$ and the transistion energy is $B \cdot (V_2^2 - V_1^2)$, where A and B are constants.

2 To Determine Task Assignment

[8] enhanced [6] by using simulated annealing for task-to-PE assignment. [9] used genetic algorithm for task-to-PE assignment. [10] used the longest task first heuristic to decide the task-to-PE assignment.

References

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