

Paper #10

Author: Francesco Spadini et al.

Title: Improving Quasi-Dynamic Schedules through Region Slip

Reviewer: Ilie Savga

Summary:

Dynamic scheduling of modern processors allows to achieve better utilization of execution resources for the price of extra hardware complexity; alternatively, static scheduling requires less hardware complexity but also offers less efficiency. Quasi-dynamic schedule is an attempt to find a trade-off between these two methodologies by occasional (not continuous) regenerating and rescheduling regions, achieving thus performance near that of a fully-dynamic approach, while retaining relatively simple issue hardware. The paper discusses two main problems of static and quasi-dynamic schedules, region boundaries and the decrease of available parallelism towards the end of regions, which considerably contribute to the total number of the empty issue slots upon execution. Then, the authors provide a concept of region slip to overcome these problems; region slip allows one static frame schedule to overlap with another. The concept is then applied to an existing dynamic optimization framework that is used to evaluate the proposed technique against standard benchmarks. The results prove considerable (by 26%) increase of performance by drastical reduction of negative boundary effects.

The main contributions

The core of the paper is the discussion of region slip – a concept that helps to overcome fundamental impediments to effective static scheduling. This, in turn, allows to generate schedules quasi-dynamically and execute them on a statically scheduled machine, almost achieving performance of a fully-dynamic approach without significant extra hardware complexity.

Merits and weaknesses

The concept of region slip as the solution to two main problems of static scheduling, namely region boundaries and the degradation of available parallelism to the end of regions, is well formulated and described. The problems are examined in details, then it is shown how region slip can alleviate them. The paper also comprehensively overviews fundamental principles, advantages and disadvantages of static, dynamic and quasi-dynamic scheduling as well as sufficiently covers the related work. Finally, the paper concludes with an interesting analysis of comparative performance evaluation and a strong summary.

Numerical rating

Significance 8

Originality 6

Interest to a journal on programming languages and compiler technology 9

Quality of experimental evaluation 8

Overall organization 10

Presentation (style and language) 10

Length appropriate 10

References appropriate 10

Overall evaluation 10

Recommendation Accept

Confidence 3

Comments and suggestions for improvement:

- Thank you for an interesting and perfectly written paper