



Purple Dragon Book

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Chapters 10.3, 10.4 abstract

Abstract

Chapters 10.3 and 10.4 from Purple Dragon Book talk about code scheduling in a compiler. Chapter 10.3 called Basic block scheduling describes how statements in a basic block can be represented. An easy way of visualising resource demands of a statement is to use Resource-Reservation Tables. Assuming operations that never use more than one unit of a resource, these tables represent reservation needs of all the operations with solid and open squares. Having the table, the chapter explains the use of a data dependence graph and shows that a list-scheduling algorithm utilizes data-dependence graph in a prioritized topological order. It does that by choosing the longest critical path, while computing the earliest time each node can be executed in. After that, it points out that scheduling instructions in a basic block is not enough for a machine with even moderate level of instruction-level parallelism. In these cases there are strategies needed for moving instructions between the basic blocks themselves. Chapter 10.4 called Global code scheduling talks about such techniques, specifically, about how to move statements from a block in which they appear, to a predecessor or to a successor block in a way, so that instructions are being executed in parallel at the new location that does not exist at the original location. Namely it describes downward code motion and upward code motion techniques to move a statement from a block, down or up the control flow path, respectively. Finally, it points out an algorithm for global scheduling called Region-based scheduling algorithm. In this algorithm, each function is represented as a hierarchy of regions. By that the algorithm proceeds from the innermost regions to the outermost, treating each nested subregion as a black box, which helps not to schedule any basic block until all the instructions it depends on have been scheduled.