Two Functional MDD's for the Price of One - Part 2

TODO add list of authors

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Outline

Symphony - Modeling Language for Non-Linear Optimization

- Models linear and non-linear programming problems
- Simple declarative language
- Support for bounded parameters and constraint programming
- Generates performance oriented c code
- Solver Agnostic (plug into your solver of choice)

Instruction Scheduling

Problem

Given a set of instructions and dependencies, designate an order (find a schedule) satisfying the dependencies and optimizing performance

Known NP-Complete

Practically solved by

- Heuristics
- Approximation Algorithms

Example Instruction Dependency DAG

Figure: Vector Instruction Dep. Graph

Types of Scheduling Algorithms

- Basic Block: break code into blocks within branches (most commonly performed scheduling)
- Global Scheduling: schedule across basic block boundaries
- Modulo Scheduling: schedules basic blocks inside of a loop, seeking to optimize by interleaving iterations
- Trace Scheduling: tries to optimize control flow by predicting routes taken on branches

Graph Colouring

Figure: Register Allocation via Graph Coloring

Find a k-Colouring for the dependency graph, where $k = \#Registers$

Hashed Expression - Symphony's Backend

- Embedded Language in Haskell

References