Support for Compiler Optimizations and Related Tools

by

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General Research Topics

- compiler development tools
  - visualization of compiler optimizations
  - automatic isolation of compiler optimization errors
  - automatic validation of compiler optimizations
- performance evaluation
  - design environment for addressing architecture and compiler interactions
  - relating static and dynamic machine code measurements
  - fast instruction cache performance evaluation

General Research Topics (cont.)

- compiler optimizations
  - — reducing the cost of branches
    - avoiding unconditional jumps by code duplication
    - avoiding conditional branches by code duplication
    - coalescing conditional branches into indirect jumps
    - reordering sequences of branches
  - — overlapping program portions to decrease process memory requirements
  - — improving memory hierarchy performance for irregular applications
  - — automatic exploitation of a zero overhead loop buffer

General Research Topics (cont.)

- predicting execution time
  - — analyzing architectural features
    - instruction cache
    - pipeline
    - data cache
  - — automatic detection of constraints
    - loop constraints
    - branch constraints
  - — specification and analysis of timing constraints