

Feedback-Directed Selection Techniques of Compiler Directives

Motive of This Research

Purpose of This Research

number of tuning parameters:

The combination of optimizations

The parameters of each optimization.

and their application order,

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For obtaining the optimal code, we must try a large

To develop a tool that enables users to select the

number of trials and the performance of their codes

Project Goal

To boost an effective performance of applications.

Problem

Compiler's static analysis is not enough to obtain maximal performance.

Challenge maximum

1980

To develop an interactive, platform-free parallelizing

tuning tool that accelerates performance.

Effective Performance

1990

Features and Structure of Our Tool

Features

- **1.** Reduction of the combination of optimizations Fractional Factorial Design is applied.
- 2. Reduction of the combination of loops See below.
- 3. Reduction of the number of target loops Profile information is used.
- 4. Reduction of the number of target optimizations Parallelization, Interchange, Tiling, and Unrolling

Whole Structure





Structure of 1st Phase

PC WS SMP Start I/F WPP(*2) SeqProg SeqProg AnaRes Compile **Apply Fractional** & Exec. **Factorial Design** $\left|\right\rangle$ Use of Profile JMP(*1) Profile Plan Send I/F Send Loop Trans. Start OpenMP Parallelization, Interchange, Compile Tilling & Exec. Send I/F Directive ExecTime Decision Directives For Each SeqProg Loop Loop AnaRes Trans. OpenMP Program (*1)JMP(TM):a tool creating Experiment Design (*2) WPP:automatic parallelizing module data flow control flow access JMP(TM) is a trademark of SAS Institute Inc., in U.S.

Reduction Method of the Combination of Loops

Step1: On one trial, the same optimization is applied to all nested loops

and the execution time of each nested loop is measured. Step2: After all trials, the best optimization is selected for each nested loop.



(*3) UNR(n) : n times unrolling directive.