

General Project Description

Project title: Development of tests for loop optimizers
Project kind: Industrial project
Contractor: Zelenova S.A. (ISP RAS)
Customer: Intel Corporation
Project start date: January 4, 2003.
Project end date: March 28, 2003.

Project goals

The main goal of the project was development of models and test generators using OTK tools and methods for several modules concerning loop optimizer in Intel C-compiler for ia64 platform, as well as estimation of code coverage obtaining by the generated tests.

Project input

Models and test generators were developed for the following modules concerning loop optimizer:

- Loop fusion (Fusion)
- Loop rerolling (Reroll)
- Loop data dependence analyzer (DD analyzer)

Code coverage was estimated on the following modules of Intel instrumented C-compiler for Linux (ia64 cross-compiler on ix86):

Module	Functions	Basic Blocks
Fusion	135	4393
Reroll	80	3205
DD analyzer	144	6670

The following documentation was used:

- R. Allen, K. Kennedy. *Optimizing Compilers for Modern Architectures*. // Morgan Kaufmann Publishers, 2002.
- Short description of Reroll optimizer.

Process used

Models and test generators were developed amenably to UniTesK methodology for model-based compiler testing using OTK-tool's core of version 1.0.

Project effort

Models and test generators were developed by 1 man in 2 months.

Project results

The project demonstrated high efficiency of OTK tools and methods for development of targeted test sets on the basis of abstract description of components under test.

The following models and test generators were developed:

Identifier	Number of model elements	Value of generator's Java-code				
		Classes	Methods	Stmts	Lines	Size
fuse	20	41	390	1506	3658	114 Kb
lper	10	45	292	1479	3924	111 Kb
ndd	11	10	104	342	1013	28 Kb
reroll	14	14	124	422	1161	33 Kb
separ	3	4	28	151	344	9.5 Kb
sivt	2	11	60	298	750	21 Kb

As a result of compilation of generated tests, the following code coverage was achieved:

Module	Function coverage	BB coverage
Fusion	71,11 %	45,91 %
Reroll	68,75 %	36,51 %
DD analyzer	75,69 %	49,91 %