

General Project Description

Project title: Testing Intel C-compiler
Project kind: Industrial project
Contractor: Zelenova S.A. (ISP RAS)
Customer: Intel Corporation
Project start date: July 11, 2003.
Project end date: November 10, 2003.

Project goals

The main goal of the project was to test several versions of Intel C-compiler for ia64 platform (Itanium) on various optimization levels. Creation of support for automated test execution and test results analysis was also included in the goals of the project.

Project input

The following seven different versions of Intel C-compiler for Linux were tested:

- 7.1
- 8.0 beta (build 20030710), instrumented
- 8.0 beta (version 038)
- 8.0 beta (version 047)
- 8.0 beta (build 20031009)
- 8.0 beta (version 049)
- 8.0 release (version 055)

The system under test was accessible in binary form. Sizes of installation packages are from 36 Mb to 93 Mb. In all cases the command line interface was used.

The following test sets developed with the help of OTK tools and methods were used for testing:

Test set	Target module of the compiler
cse	Common subexpression elimination
jump	Jump optimizations
fuse	Loop fusion
lper	Linear loop transformations
ndd	Loop carried dependence detection
regal	Register allocation
reroll	Loop rerolling
sivt	Subscripts dependence detection
separ	Separable and coupled subscripts detection

Process used

An oracle built according to architecture that is suggested by UniTesK methodology for testing optimizing compilers was used: co-testing and comparison of the trace with reference.

Project effort

Test execution and test results analysis for 7 versions of the compiler was performed by 1 man in 1 month.

The project was implemented in two stages:

1. Development of scripts supporting automated test execution and test results analysis; testing of the first 3 versions of the compiler – 3 weeks.
2. Testing of the remaining 4 versions of the compiler (in this stage, the scripts developed during the 1 stage were used) – 4 days (1 day per 1 version).

Project results

The project demonstrated high efficiency of OTK tools and methods, as well as test sets obtained with the help of OTK. 26 kinds of incorrect behavior of the compiler under test on various optimization levels were detected (including the release of the compiler).

Principal kinds of detected errors are the following:

- Compiler runs too long
- Compiler does not stop (hangs)
- Compiler aborts
- Compilation terminated abnormally by unknown signal
- Test terminates abnormally
- Test output is wrong