

# HP/Gelato Workshop: Improving the GNU Compiler Collection (GCC) on Itanium

January 26-27, 2005, Geneva, Switzerland

## Attendees

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**Arutyun Avetisyan**  
Russian Academy of Science  
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*Project(s):*

Arutyun Avetisyan's research focuses include parallel and distributed programming, cluster technologies, compiler technologies, and software quality. Current compiler-related work includes C++ compiler optimization.

*Role(s):*

Arutyun is the Deputy Director of the Institute for System Programming of Russian Academy of Sciences (ISP RAS) in Moscow, Russia.

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**Andrew Belevantsev**  
Russian Academy of Science  
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*Project(s):*

The current project is titled "Improving GCC instruction scheduler on ia64 platform." The project goals are: (1) Adding control & data speculation support to GCC instruction scheduler. (2) Improving alias analysis information used in scheduler (propagating alias information from tree level to RTL level is proposed for this). (3) Improving probability analysis using in scheduler.

*Role(s):*

Andrey Belevantsev is a Project Manager for the GCC Itanium project with a team of four. His responsibilities include: general project management, designing of propagation of alias information mechanism, and implementing the patch improving probability analysis.

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**Michel Benard**  
Hewlett-Packard  
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*Role(s):*

Michel Benard facilitates contacts between HP entities and universities and research centers.



**Wenguang Chen**  
Tsinghua University  
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*Project(s):*

The team at Tsinghua University is currently working on two compiler projects: (1) OpenMP for ORC, which is an open source OpenMP compiler module for the Itanium 2 architecture. (2) Software pipelining optimization for the Itanium 2 architecture.

*Role(s):*

Dr. Chen is involved in extending OpenMP runtime library to support CMP architecture more efficiently, which includes binding OpenMP threads to specific processors and coordinated data prefetching for OpenMP threads. He has also investigated relative-debugging techniques for OpenMP techniques.



**Shin Yee Chung**  
Institute of High Performance Computing  
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*Project(s):*

Adaptive and Portable Cache-Efficient Algorithms: Memory bandwidth is limiting the performance of many compute-intensive applications. We focus on cache-oblivious algorithms for matrix computations, which are optimized for hierarchical memory. We are also interested in adaptive and self-optimizing strategies for portable performance across multiple platforms, and the interactions between compiler-level and algorithm-level optimizations.

*Role(s):*

Shin Yee Chung is the leader of this project. He is responsible for designing cache-oblivious algorithms for matrix computations which work well in multiple platforms. He will also analyze the impacts of compiler optimizations on the Itanium 2 platform. When the implementations mature, he will distribute and maintain the implementations as a high-performance scientific library.



**Patrick Demichel**  
Hewlett-Packard  
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*Project(s):*

Patrick Demichel has worked on IA-64 compilers since the beginning of the project for HP. He submitted many performance problems for compilers at HP and Intel labs, and worked also on performance tools for IA-64, processors, and chipsets. Patrick is working on superdome/Linux scalability, and the benchmarking of multiple platforms, in particular IA-64 clusters and big SMP machines (mostly Linux now). He is an expert on processor architectures.

*Role(s):*

Patrick's most important compiler-related role was his work done to improve HP and Intel compilers. He analyzed a large number of applications, and isolated many problems related to the compilers' capacity to generate the best performing code. A big part of the project was to develop some performance tools that help to understand the limitations of our compilers.



**Wen-Mei Hwu**  
University of Illinois at Urbana  
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*Project(s):*  
The OpenIMPACT compiler has features proven effective on Itanium platforms for SPEC 2000 benchmarks, including: interprocedural pointer analysis, array dependence analysis, profile-based optimizations, cross-file function inlining, hyperblock formation, hyperblock scheduling, modulo scheduling, and instruction-level parallelism increasing transformations, and accurate machine description. We have experience in fitting these optimizations into the GCC compilation makefile models. My intention for attending this workshop is to help formulate a plan to incorporate some of these features into the GCC with minimal change to its internals and disturbance to the stability of the compiler.

*Role(s):*  
Leader of the OpenIMPACT C/C++ compiler project.



**Sverre Jarp**  
European Organization for Nuclear  
Research  
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*Project(s):*  
In general, Sverre assists CERN in running C++ benchmarks on relevant platforms using multiple compilers. In particular, he leads a joint project with Intel to improve their icc compiler on the Itanium platform. This work is based on the technique of inspecting the generated code from frequently executed source sequences inside the CERN benchmarks.

*Role(s):*  
Knowing Itanium assembler/microarchitecture "by heart," Sverre uses the straight-forward technique of analyzing the in-order assembly code generated by the compiler and comparing it to what humans would propose. He also uses the technique of comparing code from different compilers (GCC, icc, and aCC).



**Ping-Hui Kao**  
Hewlett-Packard  
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*Role(s):*  
Ping-Hui Kao is in charge of Collaborative Engineering in the Worldwide Linux R&D Lab of HP. His role is to initiate the Gelato Tool Chain Focus Group, which will initially focus on GCC.



**Bob Kidd**  
University of Illinois at Urbana  
Champaign  
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*Project(s):*  
Bob Kidd has done work on the user interface (compiler driver) of the OpenIMPACT compiler. He implemented a new front end library to support a wider range of optimizations. He has done some cleanup work on the code generator and a little optimization work on the register allocator. He is currently working to improve C++ support in the OpenIMPACT compiler.

*Role(s):*  
Software Engineer working on the OpenIMPACT compiler.



**Shing-Ming Liu**  
Hewlett-Packard  
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*Project(s):*

Shin-Ming Liu led the development effort for the high-level optimization and code generator project in compiler targeted for the Itanium processor. In this project, he helped redesigned the high-level optimization into a highly-robust, scalable, and efficient component by rearchitecting the infrastructure, from which many new techniques were developed. Many highly-recognized programming analysis methods were adopted as well. Liu led the reinvention of compiler development methodology by focusing on modulization, memory footprint control, canonical internal representation, and automatic error detection.

*Role(s):*

Shin-Ming Liu is the Project Manager for High-Level Optimization and GCC of the Itanium C/C++ Compiler Section of the Java, Compiler, and Tools Lab at HP in Cupertino, California, USA.



**Michael Matz**  
SUSE LINUX GmbH  
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*Project(s):*

Michael Matz's personal project is mainly a new register allocator, although it's mostly inactive due to time constraints. Additionally, we (the toolchain team inside SUSE) work on whole program optimizations and the tree based loop optimizer.

*Role(s):*

Inside the SUSE Labs, Michael leads the toolchain (and hence compiler) team, which mainly develops various enhancements for GCC and ensures correct working of it for building the Linux distribution on seven different platforms.



**Kalyan Muthukumar**  
Intel Corporation  
Kalyan@Muthukumar@intel.com

*Project(s):*

Kalyan Muthukumar is working in Intel's Code Generator Group primarily on the schedulers: Global Code Scheduler, Software Pipeliner (SWP), and Local Post-pass scheduler.

*Role(s):*

Kalyan Muthukumar is a Technical Lead of the Worldwide Itanium Compiler Group at Intel Corporation. He works in the Code Generator Group and primarily works on the schedulers. He has implemented several optimizations in these schedulers. Some examples are SWP riffling, and SWP early exits.



**Gerald Pfeifer**  
SUSE LINUX GmbH  
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*Project(s):*

Gerald Pfeifer is responsible for the Web presence at gcc.gnu.org (including generation of weekly snapshots of the release branches) and takes care of Web and documentation patches, in addition to regular contributions on the QA front.

*Role(s):*

At SUSE, Gerald is responsible for all Itanium-related projects, including SUSE LINUX Enterprise Server (SLES), and the SLES SDKs. In the community, he is the Web and doc maintainer of GCC and the package maintainer of some GCC ports.



**Suresh Rao**  
Intel Corporation  
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*Project(s):*

Suresh Rao is a Manager in the Intel Compiler Lab where he manages a team responsible for development of C++ and FORTRAN compilers. Suresh is also the Manager of a small GCC/Binutils enabling team responsible for directly enabling IA in the GNU tool chain, and working with the GNU/Linux community to enable IA through technology disclosures, etc.

*Role(s):*

As the Manager of a GCC/Binutils enabling team, Suresh is responsible for ensuring IA support for stability and performance in the GNU tool chain. He manages the team that works directly on GNU code, and works with the GNU community and distributors to enable and optimize IA.



**Mark Smith**  
Gelato  
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*Project(s):*

Mark K. Smith is the Director of the Gelato Federation. Mark and the Gelato Central Operations staff will help facilitate the formation of the Gelato Tool Chain Focus Group, working with the focus group leader and group members.



**Al Stone**  
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*Project(s):*

(1) Evaluating current source tree against posted patches; have all patches been incorporated? If not, why not? (2) Automating build and benchmarking processes. (3) Looking for compile-time performance improvements.

*Role(s):*

Project lead and investigator



**Weimin Zheng**

Tsinghua University  
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*Project(s):*

The team at Tsinghua University is currently working on two compiler projects: (1) OpenMP for ORC, which is an open source OpenMP compiler module for the Itanium 2 architecture. (2) Software pipelining optimization for the Itanium 2 architecture.

*Role(s):*

Prof. Zheng is the general leader for both Tsinghua compiler projects. He is the decision maker on research directions and resource allocation.