

SPECIAL ISSUE

From High-Level Specification to High-Performance Code

Edited by F. Franchetti, J. M. F. Moura, D. A. Padua, and J. Dongarra

1879 Machine Learning in Compiler Optimization

By Z. Wang and M. O'Boyle

| INVITED PAPER | This paper discusses machine-learning-based compilation techniques, which have become mainstream.

1902 Domain-Specific Optimization and Generation of High-Performance GPU Code for Stencil Computations

By P. S. Rawat, M. Vaidya, A. Sukumaran-Rajam, M. Ravishankar, V. Grover, A. Rountev, L.-N. Pouchet, and P. Sadayappan

| INVITED PAPER | This paper discusses the compilation of a domain-specific language used to target graphics processors.

1921 The Sparse Polyhedral Framework: Composing Compiler-Generated Inspector-Executor Code

By M. M. Strout, M. Hall, and C. Olschanowsky

| INVITED PAPER | This paper discusses an inspector-executor approach for sparse polyhedral programs.

1935 SPIRAL: Extreme Performance Portability

By F. Franchetti, T. M. Low, D. T. Popovici, R. M. Veras, D. G. Spampinato, J. R. Johnson, M. Püschel, J. C. Hoe, and J. M. F. Moura

| INVITED PAPER | This paper provides an end-to-end discussion of the SPIRAL system, its domain-specific languages, and code generation techniques.

1969 Automating the Development of High-Performance Multigrid Solvers

By C. Schmitt, S. Kronawitter, F. Hannig, J. Teich, and C. Lengauer

| INVITED PAPER | This paper discusses domain-specific languages and code generation targeting stencil computations in the context of the German ExaStencil effort.

1985 The Long and Winding Road Toward Efficient High-Performance Computing

By W. Jalby, D. Kuck, A. D. Malony, M. Masella, A. Mazouz, and M. Popov

| INVITED PAPER | This paper provides a mainly European perspective on the road to ExaScale.

2004 The Ongoing Evolution of OpenMP

By B. R. de Supinski, T. R. W. Scogland, A. Duran, M. Klemm, S. Mateo Bellido, S. L. Olivier, C. Terboven, and T. G. Mattson

| INVITED PAPER | This paper discusses the OpenMP framework's past, current status, and anticipated future in the face of the evolving CPU and accelerator landscape.

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Data Transparency: Concerns and Prospects
By N. Laoutaris

1872 EDITORIAL

H. J. Trussell and V. Damle

1875 SCANNING THE ISSUE

From High-Level Specification to High-Performance Code
By F. Franchetti, J. M. F. Moura, D. A. Padua, and J. Dongarra

2084 SCANNING OUR PAST

Between Performance and Complexity:
G. David Forney, Jr., and the Utility of Information Theory
By A. B. Magoun

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On the Cover:
To highlight the topic of this month's special issue, our cover image juxtaposes today's complex hardware against the required high-performance code.

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2020 Navigating the Landscape for Real-Time Localization and Mapping for Robotics and Virtual and Augmented Reality

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| INVITED PAPER | This paper shows for the important example of simultaneous localization and mapping (SLAM) the compilation and tuning techniques necessary to reach high performance.

2040 Autotuning Numerical Dense Linear Algebra for Batched Computation With GPU Hardware Accelerators

By J. Dongarra, M. Gates, J. Kurzak, P. Luszczek, and Y. M. Tsai

| INVITED PAPER | This paper discusses automatic performance tuning for small linear algebra kernels, which are important building blocks in many engineering and science applications.

2056 Japanese Autotuning Research: Autotuning Languages and FFT

By T. Katagiri and D. Takahashi

| INVITED PAPER | This paper discusses the Japanese automatic performance tuning research landscape.

2068 Autotuning in High-Performance Computing Applications

By P. Balaprakash, J. Dongarra, T. Gamblin, M. Hall, J. K. Hollingsworth, B. Norris, and R. Vuduc

| INVITED PAPER | This paper discusses how to make automatic performance tuning a standard technique for high-performance computing applications.

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