

# Hardware Acceleration and a Grateful Goodbye

**Lieven Eeckhout**  
Ghent University

After two terms and a four-year stint, this issue is my last as Editor-in-Chief of IEEE MICRO. It has been an amazing and rewarding experience with 24 issues in total. A couple theme issues are recurring annually such as Top Picks and Hot Chips—both are widely known and considered prestigious and important for our community. The other issues were focusing on specific themes and new emerging trends, including near-data processing, heterogeneous computing, mobile systems, security, Internet of Things, cognitive architectures, ultra-low-power processors, post-Moore era architectures, automotive computing, approximate computing, memristor-based computing, etc. I hope you have seen new ideas and gained additional insight from reading papers in these issues, which you could apply in your research or in your practice.

The last issue of my tenure focuses on another major (r)evolution in our field, namely hardware acceleration. Challenges in device scaling have motivated the need for hardware specialization in general-purpose processors to improve the performance and power/energy efficiency of contemporary computer systems. Across the wide spectrum of modern-day computing platforms, from mobile processors to high-end servers and datacenters, we note that hardware accelerators have become absolutely critical components in general-purpose processors. We have witnessed a tremendous flurry of efforts in recent years in hardware specialization both in academic research as well as in commercial innovation and development.

This Special Issue on Hardware Acceleration, guest-edited by Martha Kim (Columbia University) and Yakun Sophia Shao (NVIDIA), focuses on this important trend in our field. The issue includes five very interesting and timely articles. The paper focus on various topics of interest in this space including hardware accelerator architectures, system impact of accelerators, applications in hardware specialization, and more. I want to wholeheartedly thank Martha and Sophia for having done such a fantastic job. I refer you to their guest editorial for a proper introduction to the five theme articles.

This special issue comes with an expert opinion by Wen-mei Hwu and Sanjay Patel, both from the University of Illinois at Urbana-Champaign. Interestingly, Wen-mei and Sanjay coedited an IEEE MICRO special issue on the same topic ten years ago. At that time, hardware acceleration was not as commonplace as it is today. The expert opinion reflects on the amazing trajectory GPUs and FPGAs have made over the past decade. Other accelerators have emerged more recently, with Google's Tensor Processing Unit and Apple's A11 Neural Engine being the most notable examples. No doubt that accelerators will continue to play a critical role (and become even more critical) moving forward.

This issue also includes two feature articles on approximate computing. Omid Akbari *et al.* propose an approximate coarse-grain reconfigurable architecture in which the output quality can be managed at

runtime to tradeoff performance versus energy consumption. Renyuan Zhang *et al.* propose a programmable analog calculation unit for approximating arbitrary functions with two operands.

Finally, this issue includes an award testimonial by Sandhya Dwarkadas (University of Rochester) about Gabriel Loh from AMD who won the 2018 ACM SIGARCH Maurice Wilkes Award “for outstanding contributions to the advancement of die-stacked architectures.” Big congrats to Gabe and thank you to Sandhya for the contribution.

As noted at the outset, this issue is the last of my tenure as Editor-in-Chief of IEEE MICRO. I am grateful and I feel very fortunate to have had such a strong team behind me, which made my job both pleasant and rewarding. I would, therefore, like to wholeheartedly thank the Editorial Board, the Advisory Board, the guest editors of the various special issues, all the authors, all the reviewers, as well as the fantastic IEEE Computer Society staff members, who all have been essential and tireless in producing high-quality content in a timely fashion.

What makes this end of tenure especially easy is that I have a superb successor in Professor Lizy Kurian John from the University of Texas at Austin. Lizy has been very active as associate editor of IEEE MICRO for a long time and has served our community in various roles. Lizy has a clear vision and various novel ideas for further elevating the quality and relevance of IEEE MICRO for our community at large, both in academia and industry. I wish Lizy all the best!

With that, I wish you all a grateful goodbye, and a happy reading.

## ABOUT THE AUTHOR

**Lieven Eeckhout** is a professor in the Department of Electronics and Information Systems at Ghent University. Contact him at [lieven.eeckhout@ugent.be](mailto:lieven.eeckhout@ugent.be).