OSCAR 2024: The Third Workshop on Open-Source Computer Architecture Research

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A workshop co-located with ISCA 2024 --- Buenos Aires, Argentina --- June 29, 2024

OSCAR 2024

- OSCAR 2024 is the third edition of a workshop aimed at fostering the community of researchers who are interested in developing and sharing open-source hardware and software for the design of next-generation computer architectures
- Organizers:
  - Pradip Bose (IBM)
  - Luca Carloni (Columbia University), chair
  - Sophia Shao (UC Berkeley)
  - Caroline Trippel (Stanford University)

Why OSCAR?

- The Premise
  - We are in the age of heterogeneous computing. This heterogeneity brings new challenges to hardware designers as well as software programmers
  - Addressing many of these challenges requires collaborative and open-source research
- The Rationale
  - Many innovations are best evaluated in the context of complete system-level implementations, which go beyond traditional simulation methods
  - Most individual research groups do not have the resources to realize such implementations

Why OSCAR?

- The Goal
  - Bring together a community of researchers from academia, industry and government labs who are interested in open-source computer architectures
  - The recent past has seen significant progress in this direction, including contributing open-source hardware components, software tools, as well as integration platforms to simplify the realization of system prototypes with FPGA or ASIC technologies. The number of developers and users of these open-source artifacts has increased substantially
  - It is time to provide a venue that promotes the growth of this community and fosters its efforts!

Today's Program - 1

9:00-9:30: Opening Remarks

9:30-10:30: Session I - Design Frameworks

1. **Kalhan Koul, Jackson Melchert, Keyi Zhang, Taeyoung Kong, Maxwell Strange, Olivia Hsu, Qiaoyi Liu, Jeff Setter, Ross Daly, Caleb Donovick, Alex Carsello, Leonard Truong, Po-Han Chen, Yuchen Mei, Zhouhua Xie, Kathleen Feng, Gedeon Nyengele, Dillon Huff, Kavya Sreedhar, Huifeng Ke, Ankita Nayak, Rajsekhar Setaluri, Stephen Richardson, Christopher Torng, Pat Hanrahan, Clark Barrett, Mark Horowitz, Fredrik Kjolstad and Priyanka Raina**
   AHA: An Open-Source Framework for Co-design of Programmable Accelerators and Compilers

2. **Joren Dumoulin, Ryan Antonio, Xiaoling Yi, Josse Van Delm, Chao Fang, Guilherme Paim and Marian Verhelst**
   SNAX: An Open-Source HW-SW Codesign Framework for Heterogeneous Multi-Accelerator Compute Clusters

3. **Shvetank Prakash, Tim Callahan, Joseph Bushagour, Colby Banbury, Alan V. Green, Pete Warden, Tim Ansell and Vijay Janapa Reddi**
   CFU Playground: Full-Stack Open-Source Framework for Tiny Machine Learning (TinyML) Acceleration on FPGAs

10:30-11:00: Coffe Break

Today's Program - 2

11:00-12:20: Session II – Simulation

1. **Vishnu Ramadas, Matthew Poremba, Bradford Beckmann and Matthew Sinclair**
   Simulation Support for Fast and Accurate Large-Scale GPGPU & Accelerator Workloads

2. **Guillem López-Paradís, Jonathan Balkind, Adrià Armejach and Miquel Moreto**
   Past, Present and Future of Designing, Integrating and Simulating RTL Models

3. **Alex Smith, Bobby Bruce, Jason Lowe-Power and Matthew Sinclair**
   Designing Generalizable Power Models for Open-Source Architecture Simulators

4. **Mahyar Samani, Kyle Roarty, Prajwal Rathnakar Hegde, Galen M. Shipman, Giridhar Chukkapalli and Jason Lowe-Power**
   Developing Known Good HPC Platforms in gem5

12:30-14:00: Lunch

Today's Program - 3

14:00-14:40: Session III – Accelerators

1. **Nicolas Bohm Agostini, Ankur Limaye, Reece Neff, Lakshmi Varshika Mirtinti, Claudio Barone, Vito Giovanni Castellana, Marco Minutoli, Joseph Manzano, Antonino Tumeo, Giovanni Gozzi, Michele Fiorito, Serena Curzel and Fabrizio Ferrandi**
   SODA Synthesizer: Status and Updates

2. **Subhankar Pal, Aporva Amarnath, Behzad Boroujerdian, Augusto Vega, Alper Buyuktosunoglu, John-David Wellman, Vijay Janapa Reddi and Pradip Bose**
   Accelerating the Discovery of Efficient Real-Time Systems-on-Chips in the Heterogeneous Era

Today's Program - 4

15:00-16:00: Poster Session

1. **Jordi Altayo, Yu Yang and Ahmed Hemani**
   Tile-based Heterogeneous Reconfigurable Architecture Template and Its Instruction Set

2. **Ivan Vargas Valdivieso, Julian Pavon and Adrian Cristal**
   Design and Analysis of Processing-in-Memory Sorting Algorithms using UPMEM

3. **Rodolfo Azevedo, Julio Nunes Avelar, Victor Prudente Lago and Angelo Renato Panzin Malaguti**
   FPGA Continuous Integration and RISC-V Processor Design

4. **Leonid Azriel and Avi Mendelson**
   Towards Open Scan for the Open-source Hardware

Today's Program - 5

16:00-17:20: Session IV – Open-Source Hardware for Machine Learning

1. **Varsha Singhania, Nayan Nair, Blaise Tine and Hyesoon Kim**
   DNN Inference on RISC-V GPGPU

2. **Allen Boston, Biruk Seyoum, Luca Carloni and Pierre-Emmanuel Gaillardon**
   Edge ML Acceleration with RISCV-enhanced eFPGA-SoCs

3. **Stefan Abi-Karam, Rishov Sarkar, Allison Seigler, Sean Lowe, Zhigang Wei, Hanqiu Chen, Nanditha Rao, Lizy John, Aman Arora and Cong Hao**
   An Open Source Framework for High-Level Synthesis Dataset Generation for Machine Learning

4. **Kuan-Lin Chiu, Guy Eichler, Chuan-Tung Lin, Giuseppe Di Guglielmo and Luca Carloni**
   Wolt: Transparent Deployment of TFLite Workloads on Lightweight Many-Accelerator Architectures

17:20-18:00 : All-Hands Discussion and Concluding Remarks

OSCAR 2022 vs. 2023

OSCAR Edition	2022	2023	2024
Submissions	22	25	19
Accepted Talks	12	17	13
Accepted Posters	7	6	4

OSCAR Webpage Archive

Open-Source Computer Architecture Research (OSCAR)

OSCAR Workshop - Archive

- 2022 - New York, NY
- 2023 - Orlando, FL

Davide Giri (1990-2021)