Zhenhao **He**

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Research Profile

I work in the intersection of data management, distributed systems and specialized hardware. I design hardware accelerators for more efficient data processing in the data center and cloud. I build system infrastructure to enable in-network processing on hardware accelerators for distributed applications.

Education

PhD Candidate in Computer Science *Zurich Switzerland*
SYSTEMS GROUP, ETH ZURICH *Mar. 2019 - PRESENT*
- Advisor: Gustavo Alonso

Master of Science in Information Technology and Electrical Engineering *Zurich Switzerland*
SYSTEMS GROUP, ETH ZURICH *Sep. 2016 - Oct. 2018*
- Master Thesis: Design and Implementation of a Framework for Enabling Distributed FPGA Applications

Bachelor of Science in Electronic Engineering *Milan Italy*
POLITECNICO DI MILANO *Sep. 2015 - Jul. 2016*
- Double Degree Program with Tongji University

Bachelor of Science in Electronic and Information Engineering *Shanghai China*
TONGJI UNIVERSITY *Sep. 2012 - Jul. 2015*
- Outstanding Graduates of Tongji University

Publications

[ASPLOS'22] Enzian: an Open, General, CPU/FPGA Platform for OS Research *Feb. 2022*
DAVID COCK, ABISHEK RAMDAS, DANIEL SCHWYN, MICHAEL GIARDINO, ADAM TUROWSKI, **ZHENHAO HE**, NORA HOSSLE, DARIO KOROLIJA, MELISSA LICCIARDELLO, KRISTINA MARTSENKO, RETO ACHERMANN, GUSTAVO ALONSO, TIMOTHY ROSCOE
27th ACM International Conference on Architectural Support for Programming Languages and Operating Systems

[H2RC'21] ACCL: FPGA-Accelerated Collectives over 100 Gbps TCP-IP *Nov. 2021*
ZHENHAO HE, DANIELE PARRAVICINI, LUCIAN PETRICA, KENNETH O'BRIEN, GUSTAVO ALONSO, MICHAELA BLOTT
7th International Workshop on Heterogeneous High-performance Reconfigurable Computing

[FPL'21] EasyNet: 100 Gbps Network for HLS *Aug. 2021*
ZHENHAO HE, DARIO KOROLIJA, GUSTAVO ALONSO
31th International Conference on Field-Programmable Logic and Applications

[FPL'21] Distributed Recommendation Inference on FPGA Clusters *Aug. 2021*
YU ZHU, **ZHENHAO HE**, WENQI JIANG, KAI ZENG, JINGREN ZHOU, GUSTAVO ALONSO
31th International Conference on Field-Programmable Logic and Applications

[KDD'21] FleetRec: Large-Scale Recommendation Inference on Hybrid GPU-FPGA Clusters *Aug. 2021*
WENQI JIANG*, **ZHENHAO HE***, SHUAI ZHANG, KAI ZENG, LIANG FENG, JIANSONG ZHANG, TONGXUAN LIU, YONG LI, JINGREN ZHOU, CE ZHANG, GUSTAVO ALONSO
27th SIGKDD Conference on Knowledge Discovery and Data Mining

[MLSys'21] MicroRec: Accelerating Deep Recommendation Systems to Microseconds by Hardware and Data Structure Solutions *Apr. 2021*
WENQI JIANG, **ZHENHAO HE**, SHUAI ZHANG, THOMAS B PREUßER, KAI ZENG, LIANG FENG, JIANSONG ZHANG, TONGXUAN LIU, YONG LI, JINGREN ZHOU, CE ZHANG, GUSTAVO ALONSO
4th Conference on Machine Learning and Systems

[TC'21] Shuhai: A Tool for Benchmarking High Bandwidth Memory on FPGAs *Apr. 2021*
HONGJING HUANG, ZEKE WANG, JIE ZHANG, **ZHENHAO HE**, CHAO WU, JUN XIAO, GUSTAVO ALONSO
IEEE Transactions on Computers

[SoCC'20] Specializing the Network for Scatter-Gather Workloads *Oct. 2020*

Catalina Alvarez, Zhenhao He, Gustavo Alonso, Ankit Singla

11th ACM Symposium on Cloud Computing

[FPGA'20] BiS-KM: Enabling Any-Precision K-Means on FPGAs *Feb. 2020*

Zhenhao He, Zeke Wang, Gustavo Alonso

28th ACM/SIGDA International Symposium on Field-Programmable Gate Arrays

[FPL'18] A Flexible K-Means Operator for Hybrid Databases *Aug. 2018*

Zhenhao He, David Sidler, Zsolt István, Gustavo Alonso

28th International Conference on Field-Programmable Logic and Applications

Scholarship & Awards

2021	**Xilinx XACC Outstanding Contributor Award**	*AMD Xilinx*
2016	**Outstanding Graduates**	*Tongji University*
2015	**National Scholarship**	*Chinese Educational Bureau*
2015	**First Prize of Learning Scholarship**	*Tongji University*
2015	**Chinese Government Scholarship for Studying Abroad**	*Chinese Educational Bureau*

Professional Experience

Research Intern *Dublin Ireland*

Research Labs Xilinx (AMD) *Mar. 2021 - Sep. 2021*

- Designed and implemented an open-source FPGA accelerated collective offload engine with 100 Gbps hardware TCP/IP backend.

Research Assistant *Zurich Switzerland*

Systems Group, ETH Zurich *Sep. 2017 - Jan. 2018*

- Designed and implemented a flexible K-Means FPGA accelerator that can accommodate various dimensions and clusters in runtime.

Research Assistant *Zurich Switzerland*

Institute of Electromagnetic Fields, ETH Zurich *Sep. 2016 - Apr. 2017*

- Designed and simulated a novel structure of photonic-plasmonic beam splitter in subwavelength scale realizing low loss transmission.

Invited Talks

Aug. 2021	**Workshop on DevOps support for Cloud FPGA platforms at FPL'21:** XACC-ETHZ cluster	
Jun. 2021	**Xilinx Tech Talk Series:** VNX, EasyNet; Elastic-DF	
Jan. 2021	**Xilinx HACC School:** EasyNet: 100Gbps Network for HLS	

Teaching

2022 Spring	**Lecture: Big Data for Engineers** Head Teaching Assistant	*ETH Zurich*
2021 Fall	**Lecture: Information System for Engineers** Head Teaching Assistant	*ETH Zurich*
2020 Fall	**Lecture: Information System for Engineers** Teaching Assistant	*ETH Zurich*
2020 Spring	**Seminar: Hardware Acceleration for Machine Learning** Teaching Assistant	*ETH Zurich*

Supervision Experience

2021 Fall	**Semester Project** Yu Zhu: *Aggregation Group-by on FPGAs*	*ETH Zurich*
2020 Fall	**Master Thesis** Zhifei Yang: *Accelerating Distributed Group-by Aggregation with FPGA Cluster*	*ETH Zurich*
2020 Fall	**Semester Project** Yu Zhu: *Recommendation Inference Acceleration with FPGA Cluster*	*ETH Zurich*