Zsolt István

Contact Information

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Research Profile

My research interests lie in the intersection of distributed systems, databases and specialized hardware. I explore and combine ideas from these areas in order to overcome the compute/data gap that modern data centers face.

Education

Ph.D., Computer Science 2013 – 2018
Systems Group, ETH Zürich, Switzerland
Advisor: Prof. Gustavo Alonso

M.Sc., Computer Science (Distributed Systems) 2011 – 2013
ETH Zürich, Switzerland

B.Sc., Computer Science 2007 – 2011
UTCN Cluj-Napoca, Romania

Professional Experience

IMDEA Software Institute, Madrid, ES September 2018 – Present
Assistant Research Professor
Working in the area of distributed systems and hardware acceleration for data processing.

IBM Research, Rüschlikon, CH May 2018 – July 2018
Visiting Researcher
Topic: Exploring software and hardware acceleration opportunities for Blockchains.

Microsoft Research, Redmond, WA June 2014 – August 2014
Research Intern
Supervisor: Ken Eguro
Topic: Adding support for B-tree indexes and a local cache to the FPGA in Cipherbase.

Xilinx Labs, Dublin, Ireland September 2012 – March 2013
Research Intern (Master Thesis)
Supervisor: Michaela Blott
Topic: Design of a hash table for an FPGA-based key-value store optimized for caching scenarios. Helped in overall prototype implementation.

INRIA, Sophia-Antipolis, France July 2011 – August 2011
Research Intern (OASIS Group)
Supervisors: Ludovic Henrio and Fabrice Huet
Topic: Annotation-based automatic parallelization of Active Objects in ProActive.

INRIA, Sophia-Antipolis, France June 2010 – August 2010
Research Intern (OASIS Group)
Supervisor: Denis Caromel
Topic: Parallel programming and scheduling for multicores in the ProActive Framework

MaxIQ Computer, Oradea, Romania 2008 – 2009
Junior Software Engineer
Role: Backend (Java EE) and frontend (HTML, Javascript) developer.

Funding and Projects

ACCORD: Accelerated Ordering Service for Distributed Ledgers.
Marie Curie Individual Fellowship *2018. Ref: EU Project 842956*
Principal Investigator: Z. István.
Mentor: M. Hermenegildo.

BLOQUES-CM: Intelligent Contracts and Scalable Blockchains and Insurance through Verification and Analysis.
Community of Madrid*, Call for R&D Activities 2019. Ref.: P2018/TCS-4339*
Coordinator: J. Caballero (IMDEA Software). Shared grant between UCM, UPM and IMDEA Software.

Conference Publications

Design Patterns for Code Reuse in HLS Packet Processing Pipelines.
H. Eran, L. Zeno, Z. István, M. Silberstein. *27th IEEE Int'l Symposium on Field-Programmable Custom Computing Machines (FCCM'16), 2019.*

A Flexible K-Means Operator for Hybrid Databases.
Z. He, D. Sidler, Z. István, G. Alonso. *International Conference on Field Programmable Logic and Applications (FPL), 2018.*

Providing Multi-tenant Services with FPGAs: Case Study on a Key-Value Store. Z. István, G. Alonso, A. Singla. *International Conference on Field Programmable Logic and Applications (FPL), 2018.*

Accelerating Pattern Matching Queries in Hybrid CPU-FPGA Architectures.
D. Sidler, Z. István, M. Ewaida, G. Alonso. *ACM SIGMOD/PODS Conference (SIGMOD'17), 2017.*

Low-Latency TCP/IP Stack for Data Center Applications.
D. Sidler, Z. István, G. Alonso. *26th Int'l Conference on Field Programmable Logic and Applications (FPL'16), 2016.*

Runtime Parameterizable Regular Expression Operators for Databases.
Z. István, D. Sidler, G. Alonso. *24th IEEE Int'l Symposium on Field-Programmable Custom Computing Machines (FCCM'16), 2016*

Consensus in a Box: Inexpensive Coordination in Hardware
Z. István, D. Sidler, G. Alonso, M. Vukolic. *13th USENIX Symposium on Networked Systems Design and Implementation (NSDI '16), 2016.*

Histograms as a Side Effect of Data Movement for Big Data.
Z. István, L. Woods, G. Alonso. *ACM SIGMOD/PODS Conference (SIGMOD'14), 2014.*

A Flexible Hash Table Design For 10Gbps Key-value Stores on FPGAs.
Z. István, G. Alonso, M. Blott, K. Vissers. *23rd Int'l Conference on Field Programmable Logic and Applications (FPL'13), 2013.*

Achieving 10Gbps Line-rate Key-value Stores with FPGAs.
M. Blott, K. Karras, L. Liu, K. Vissers, Z. István, J. Bar. *5th USENIX Workshop on Hot Topics in Cloud Computing (HotCloud'13), 2013.*

Multi-threaded Active Objects.
L. Henrio, F. Huet, Z. István. *15th Int'l Conference on Coordination models and Languages (COORDINATION), 2013.*

Adapting Active Objects to Multicore Architectures.
L. Henrio, F. Huet, Z. István, G. Sebestyen. *Int'l Symposium on Parallel and Distributed Computing (ISPDC 2011), 2011.*

Journal Publications

The Glass Half Full: Using Programmable Hardware Accelerators in Analytics.
Z. István. *IEEE Data Engineering Bulletin March 2019.*

Active Pages 20 Years Later: Active Storage for the Cloud.
Z. István, D. Sidler, G. Alonso. *IEEE Internet Computing July/Aug 2018.*

Caribou: Intelligent Distributed Storage.
Z. István, D. Sidler, G. Alonso. *Proceedings of VLDB Endowment, Volume 10, No. 11 (VLDB'17), 2017.*

A Hash Table for Line Rate Data Processing.
Z. István, G. Alonso, M. Blott, K. Vissers. *ACM Transactions on Reconfigurable Technology and Systems (TRETS), March 2015.*

Ibex – An Intelligent Storage Engine with Support for Advanced SQL Off-loading.
L. Woods, Z. István, G. Alonso. *Proceedings of VLDB Endowment, Volume 7, No. 11 (VLDB'14), 2014.*

Workshops, Posters and Demos

Something New Under The Sun: Thoughts on Optimizing the Performance of Blockchains. Z. István. *The 9th Workshop on Systems for Multi-core and Heterogeneous Architectures (SFMA) at EuroSys'19.*

StreamChain: Do Blockchains Need Blocks?
Z. István, A. Sorniotti, M. Vukolic. *2nd Workshop on Scalable and Resilient Infrastructures for Distributed Ledgers (SERIAL) at Middleware'18.*

Enzian: a Research Computer for Datacenter and Rackscale Computing.
D. Cock, R. Achermann, M. Owaida, Z. Istvan, T. Grosser, Z. Wang, G. Alonso, T. Roscoe, D. Sidler, A. Turowski. *Poster at EuroSys'18.*

Caribou: A Platform for Building Smart Storage
Z. István, D. Sidler, G. Alonso. *Poster at EuroSys'17.*

doppioDB: A Hardware Accelerated Database
D. Sidler, M. Ewaida, Z. István, K. Kara, G. Alonso. *Demo for SIGMOD'17 and FPL'17.*

Specialized Microservers for the Data Center
Z. István, D. Sidler, G. Alonso. *Demo for FPL'15. Poster at EuroSys'15.*

Hybrid FPGA-accelerated SQL Query Processing
L. Woods, Z. István, G. Alonso. *Demo for FPL'13.*

Patents

Systems and Methods for Providing Distributed Tree Traversal Using Hardware-Based Processing. K. Eguro, Z. István, A. Arasu, R. Ramamurthy, K. Shriraghav.
US 20160147779 A1, Patent application filed 11/26/2014

Scholarships and Awards

EuroSys Roger Needham PhD Award 2019 – Honorable Mention

ETH Zürich Medal for Doctoral Dissertation 2018

ETH Zürich Excellence Scholarship for Master's Studies 2011-2013

"Grigore Moisil" National Programming Competition (3rd Place), Romania, 2007

Teaching Experience

Teaching at **IMDEA Software**
Building Data Processing Systems with FPGAs (Seminar at UPM Madrid) Spring 2019
Performance Analysis and Modeling of Software Systems (Seminar at UPM) Fall 2018

Student Supervision at **IMDEA Software**

Internship: Eva Garcia (UAM, Madrid) — Autumn 2018
Topic: Porting a benchmarking suite to Hyperledger Fabric

Master Thesis: Lucas Kuhring (UPM, Madrid) — Spring 2019
Topic: Optimizing the performance of Hyperledger Fabric

Master Thesis: Srivatsan Lakshmi (UPM, Madrid) — Spring 2019
Topic: Evaluation of distributed ledger platforms as a replacement for relational databases

Teaching Assistant at **ETH Zürich**

Advanced Systems Lab — Fall 2013, Fall 2014, Fall 2015, Fall 2016, Fall 2017
Data Modeling and Databases — Spring 2016, Spring 2017
Programmieren und Problemlösen — Spring 2014, Spring 2015

Student Supervision at **ETH Zürich**

Semester Project: Zhenhao He (co-advised with David Sidler) — Spring 2018
Topic: A flexible K-Means operator for hybrid databases

Bachelor Thesis: Mickey Vanska (co-advised with David Cock) — Spring 2017
Topic: Program Trace Analysis on an FPGA

Bachelor Thesis: Tim Taubner — Spring 2015
Topic: Accelerating statistical methods using an FPGA

Semester Project: Jakub Szymanek — Spring 2014
Topic: Indexes and caching in IBEX

Community Service

Co-Chair for SFMA'19 Workshop at EuroSys'19.

PC Member for Eurosys'19 Doctoral Workshop, SFMA'19 Workshop at EuroSys'19.

Reviewer for ACM Journal of Architecture and Code Optimization (TACO) (02.2019), IEEE Transactions on Knowledge and Data Engineering (TKDE) (09.2017), IEEE International Symposium on Circuits and Systems (ISCAS'18) (external), ACM Journal of Architecture and Code Optimization (TACO) (06.2017).

Shadow PC Member for ASPLOS'18, EuroSys'18, EuroSys'17.

Selected Invited Talks

About Multes and providing multi-tenant services with specialized hardware in the cloud:
UAM, Madrid, Spain. October 2018.
UPB, Bucharest, Romania. September 2018.

About Caribou, an intelligent distributed storage solution:
Technion, Haifa, Israel. November 2018
IMDEA Software Institute, Madrid, Spain. February 2018
KAUST, Thuwal, Saudi Arabia. October 2017
TU Dresden, Germany. July 2017
Swiss Joint Research Center Workshop, MSR, Cambridge, UK. February 2017

About inexpensive coordination (consensus) in hardware:
UTCN Cluj-Napoca, Romania. November 2018
IBM Research Rüschlikon, CH. October 2016
Xilinx Labs, San Jose, CA. March 2016
IBM Research Almaden, San Jose, CA. March 2016

About accelerating string matching queries with hybrid CPU-FPGA multicores:
Oracle Labs, Belmont, CA. March 2016

About building specialized microservers:
University of Washington, Seattle, WA. June 2015
Microsoft Research, Redmond, WA. June 2015
Oracle Labs Zürich Kickoff Workshop, Zürich, CH. January 2015

LANGUAGES

Hungarian, Romanian, English – Proficient
German – Intermediate
Spanish – Beginner