

Maximilian Böther

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MaxiBoether

Education

- Oct 2020 – present **M.Sc. in IT-Systems Engineering**, *Hasso Plattner Institute*, Potsdam, Germany
- GPA: 1.0/1.0, Focus on machine learning and data processing
 - Thesis: Designing a CPU-aware Hash Table for Hash Joins
- Oct 2017 – Sep 2020 **B.Sc. in IT-Systems Engineering**, *Hasso Plattner Institute*, Potsdam, Germany
- GPA: 1.1/1.0, Thesis: Heuristic Optimization of Strategic Alternative Routes in Traffic Networks Using Evolutionary Algorithms (published at GECCO'21, **Best Paper Award**)
- Aug 2009 – Jun 2017 **Abitur**, *Goethegymnasium*, Hildesheim, Germany
- GPA: 1.0/1.0 (884/900 points, fourth-best student of entire state)

Experience

- Jul 2018 – Aug 2022 **Student Assistant**, *Hasso Plattner Institute*, Potsdam, Germany
- System administrator (System Analysis and Modeling Group)
 - Developed and maintained Ansible rules for six high-performance compute servers
- Sep 2019 – Jun 2021 **Student Research Assistant**, *Hasso Plattner Institute*, Potsdam, Germany
- Supported research activities at the Data Engineering Systems group
 - Published a paper on distributed system-on-chip clusters at BiDEDE'21
- Aug 2020 - Oct 2020 **Entrepreneur in Residence Intern**, *EMIL Group GmbH*, Berlin, Germany
- Projects regarding strategy, investor relations, and IT-security of a B2B SaaS startup
 - Used Amazon QuickSight, R, Python to create insurance benchmark product, used immediately by two major insurance companies
- Dec 2016 – Aug 2020 **Member of Federal Board**, *Junge Liberale e.V.*, Berlin, Germany
- Position in the board of an organization with > 10 000 members, frequent meetings
 - Responsible for coordinating the IT team and mediation between board and IT
- Jul 2017 – Jul 2020 **Software Engineer (Working Student)**, *Universum AG*, Berlin, Germany
- Developed social-media software used in the German federal election (Javascript, Elastic)
 - Implementation of e-learning platform for major German textbook publisher (PHP, Drupal)
- Oct 2018 – Aug 2019 **Teaching Assistant (Mathematics 1 and 2)**, *Hasso Plattner Institute*, Potsdam, Germany

Scholarships & Awards

- Oct 2020 – present **Hasso Plattner Scholar**, *Scholarship for graduating top of the year at HPI*
- Nov 2017 – present **Scholar of the German Academic Scholarship Foundation (Studienstiftung)**, *Germany's largest, oldest and most prestigious scholarship foundation*
- Jul 2021 **GECCO'21 Best Paper Award**
- Jul 2021 **ISMB/ECCB'21 Best Poster Award**
- Nov 2019 – Nov 2020 **IT-Talents Scholar**, *Sponsor: Robert Bosch GmbH*
- Oct 2017 – Oct 2020 **Scholar of the Friedrich-Naumann-Foundation for Freedom**
- Sep 2020 **MLP Scholarship**
- Sep 2019 **Winner HackZurich 2019 Challenge 'LegalTech'**, *Europe's largest hackathon*
- Dec 2018 – May 2019 **Kearney Scholar**
- Sep 2017 – Sep 2018 **IT-Talents Scholar**, *Sponsor: EBP Deutschland GmbH*
- 2016 **1st Prize Jugend Forscht "Youth Researches" Regional Competition**

Skills

Languages	C, C++, Python, Java, SQL, JavaScript, Squeak/Smalltalk
ML Stack	Tensorflow, PyTorch, Deep Graph Library (DGL), MXNet, Pandas, Numpy, scikit-learn
Tools/Libraries	OpenMP, OpenMPI, Akka, Hadoop, Spark, Gurobi, \LaTeX
Software	Docker, Apache HTTP Server, nginx, MariaDB, PostgreSQL, Postfix, VMware vSphere, Ansible

Selected Projects

- Feb 2022 – Aug 2022 **Vectorized Hash Tables on Modern CPUs**
- Implementation of novel vectorized hash maps on six different vector ISAs (SSE, AVX2, AVX-512, NEON, SVE, Power/VSX); tuning the algorithms towards specific CPUs
 - Comparison and thorough evaluation of the vectorized hash maps to classical ones, showing that the vectorized hash maps often have 2x to 9x higher throughput, compared to classical ones
- Oct 2021 – Feb 2022 **Stream Processing on Modern Hardware**
- Implementation of the core execution environment of a novel *scale-in* C++ stream processing engine
 - The focus was on highly efficient data exchange mechanisms for local and remote pipelines with a focus on maximum throughput and low latency, to fully utilize the individual cluster nodes
- Mar 2021 – Jan 2022 **Maximum Independent Set Benchmark Framework**
- Comparison and re-implementation of published deep learning-guided algorithms for finding Maximum Independent Sets using PyTorch and Deep Graph Library
 - Published results as full paper at ICLR, made benchmarking suite available to support future MIS research

Publications

- Jun 2022 **Law Smells - Defining and Detecting Problematic Patterns in Legal Drafting**
C. Coupette, D. Hartung, J. Beckedorf, *M. Böther*, D.M. Katz. In: Artificial Intelligence and Law.
- Apr 2022 **What's Wrong with Deep Learning in Tree Search for Combinatorial Optimization**
M. Böther, O. Kißig, M. Taraz, S. Cohen, K. Seidel, T. Friedrich. In Proceedings of the International Conference on Learning Representations (ICLR) 2022.
- Jul 2021 **Evolutionary Minimization of Traffic Congestion**
M. Böther, L. Schiller, P. Fischbeck, L. Molitor, M. Krejca, and T. Friedrich. In Proceedings of the Genetic and Evolutionary Computation Conference (GECCO) 2021. **Best Paper Award.**
- Jul 2021 **Learning Languages with Decidable Hypotheses**
J. Berger, *M. Böther*, V. Doskoč, J. GadeaHarder, N. Klodt, T. Kötzing, W. Löttsch, J. Peters, L. Schiller, L. Seifert, A. Wells, and S. Wietheger. In Proceedings of the Conference on Computability in Europe (CiE) 2021.
- Jun 2021 **Drop It In Like It's Hot: An Analysis of Persistent Memory as a Drop-in Replacement for NVMe SSDs**
M. Böther, O. Kißig, L. Benson, and T. Rabl. In Proceedings of the International Workshop on Data Management on New Hardware (DaMoN) at ACM SIGMOD 2021.
- Jun 2021 **Scale-Down Experiments on TPCx-HS**
M. Böther and T. Rabl. In Proceedings of the Workshop on Big Data in Emergent Distributed Environments (BiDEDE) at ACM SIGMOD 2021.
- Oct 2020 **Maps for Learning Indexable Classes**
J. Berger, *M. Böther*, V. Doskoč, J. GadeaHarder, N. Klodt, T. Kötzing, W. Löttsch, J. Peters, L. Schiller, L. Seifert, A. Wells, and S. Wietheger. arXiv Preprint.
- Sep 2020 **A Strategic Routing Framework and Algorithms for Computing Alternative Paths**
T. Bläsius, *M. Böther*, P. Fischbeck, T. Friedrich, A. Gries, F. Hüffner, O. Kißig, P. Lenzner, L. Molitor, L. Schiller, A. Wells, and S. Wietheger. In Proceedings of the Symposium on Algorithmic Approaches for Transportation Modelling, Optimizations, and Systems (ATMOS) 2020.

Extracurricular Activities

- Sep 2021 - Jul 2022 **Member of Appointment Committee for Professorship Digital Technology, Governance and Policy**, *Hasso Plattner Institute, University of Potsdam*
- Oct 2020 - Feb 2022 **Member of Appointment Committee for Professorship Digital Health and AI**, *Hasso Plattner Institute, University of Potsdam*
- Feb 2017 – Feb 2019 **Member of City Board**, *Free Democratic Party Hildesheim*
- Dec 2016 – Dec 2018 **Head of Think Tank**, *Internet Policy & Digital Society, Junge Liberale Niedersachsen*