Mikael Zayenz LAGERKVIST

CONTACT INFORMATION

PLACE AND DATE OF BIRTH:	Stockholm May 5 1981
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WORK EXPERIENCE

2023-current	Senior Principal Developer at SambaNova Systems
	SambaNova Systems develops advanced chips for modern machine learning and AI de- livering record breaking performance at low electricity usage. Work includes: Develop and maintain ML infrastructure for models and variants (Hug- ging Face Transformers, PyTorch, Python, LLMs); The compiler stack that transforms mod- els into code for the chip (C++, MLIR); Process automation for model delivery (Python, constraint programming). Significant focus on testing, code review, knowledge sharing, and driving systematic improvements to the code base.
2021-2024	Co-founder and R&D at Optischedule AB
	Optischedule develops solutions, systems, and products for scheduling and optimization. Worked mainly on optimization systems (Java and Kotlin, constraint programming, local search), but also included contributions across the full stack, including architecture and cloud services (AWS), back-end and databases (PostgreSQL), as well as front-end develop- ment (Remix, TypeScript, Zod). Consulting in constraint programming and optimization.
2019-current	Part-time independent research zavenz se/research/
	Independent research, mostly in constraint programming. Recent projects have included new ideas for incomplete solving in constraint programming and constraint program- ming models for board games. Includes development and project maintenance for the Gecode system.
2020-2021	Software developer, RaySearch Laboratories AB
	Software developer working on RayCare, an oncology information system. General development and testing of RayCare, mostly using C# and TypeScript. System is a microservices architecture built with event sourcing and CQRS with MS SQL Server as the database back-end and RabbitMQ for messaging. Special focus on scheduling and resource allocation for clinics.
2011-2019	Research and development, Tomologic AB
	Research and development in algorithms, optimization, search methods, and heuristics. Responsibilities included planning, design, requirements collection, implementation, testing, and evaluation of a large and complex high performance distributed AI geomet- ric optimization system that is used to replace human expertise in sheet metal cutting. Primarily Java, with some Scala. Related activities included mentoring and onboarding new colleagues, developing inter- nal tools (Django, PostgreSQL), packaging (Docker, Kubernetes), and GUI programming.
	Additional long projects: Personell rostering for retail using local search and con- straint programming; Industrial image feature detection using deep neural networks in Keras/TensorFlow and C++ on embedded; Time series analysis of accelerometer sensor data.

2005-2011 | PhD student, KTH - Royal Institute of Technology

	Research in constraint programming, and in particular constraint propagation systems. Topics include theoretical models for propagation systems, new system architecture for lowering complexity, and practical implementation and evaluation in a realistic system (Gecode)
	Development of Gecode (in addition to core research) included: planning and design; high and low level programming in C++; testing and quality assurance; documentation; user support; etc.
	20% teaching duties. Courses: Computer Science II; Applied Programming; Compilers and Virtual Machines; Constraint Programming.
003-2004	Teaching assistant KTH - Royal Institute of Technology

2003-2004 Teaching assistant, KTH - Royal Institute of Technology Courses: Introduction to Computer Science; Algorithms, Datastructures and Complexity.

EDUCATION

2005-2011	PhD studies in Constraint Programming KTH - Royal Institute of Technology, Stockholm, Sweden
	My research area is constraint programming, and in particular constraint propagation systems. Topics include theoretical models for propagation systems, new system ar- chitecture for lowering complexity, and practical implementation and evaluation in a realistic system (Gecode).
Nov 2008	Licentiate (Swedish intermediate postgraduate degree) Thesis: Techniques for Efficient Constraint Programming
2000-2005	Master of Science and Engineering in Computer Science, KTH - Royal Institute of Technology, Stockholm, Sweden Swedish title: Civilingenjör i Datateknik Specialization: Formal methods Thesis: Machine Assisted Reasoning for Multi-Threaded Java Bytecode

PROJECTS AND ACTIVITIES

GECODE	Constraint programming system, www.gecode.org One of three main developers of Gecode, an open source constraint programming system. Gecode is written in C++ and is an industrial strength library that is fully open and modifiable for users and researchers. Significant technical documentation is available (Modelling and Programming with Gecode). Since the initial release in 2006, Gecode has become widely used in research (many 100's of citations), for teaching, and in industry. Gecode won the international MiniZinc Challenge the first five years in a row (2008-2012). The library is licensed under the MIT license.
Event website	Website for a wedding Sole developer of website for a wedding, including account handling, registration, cus- tomization of pages for guests (messages, room and table, etc.), reports for various roles, and a photo sharing system with tagging and categories. System developed in Python and Django backed by PostgreSQL, front end layout using Bootstrap.
Kattis	Programming contest system Contributed to the development of the KATTIS programming contest system, including support at the ACM ICPC World Finals (2010-2013). Work involved Linux system adminis- tration, programming (PHP, Python, and Java), and databases (PostgreSQL).
δ^2	Restructuring the basic block of the Computer Science program at KTH As student representative (PAS), contributed to a four-student group restructuring the basic block of KTH's Computer Science program.

LANGUAGES

SWEDISH | Native language

ENGLISH | Fluent

COMPUTER SKILLS

PROGRAMMING LANGUAGES	SIGNIFICANT EXPERIENCE: Java, C++, Python, MiniZinc REGULARLY USED: Kotlin, TypeScript, Rust, C#, Shell scripting /Unix), Scala
Specialities	Constraint programming systems, optimization systems, library design, compilers, formal methods, artificial intelligence including Large Lan- guage Models and machine learning, multi-threaded and distributed programming
VARIOUS	Gecode, IntelliJ, CLion, Docker, Hugging Face transformers, Unix, Git, PostgreSQL, ध्राट्2X.

RESEARCH

Community service Program Committee: Principles and Practice of Constraint Programming (CP, 2020, 2023, 2024, 2025); AAAI Conference on Artificial Intelligence (AAAI, 2024). Publicity Chair, Principles and Practice of Constraint Programming (CP, 2006).

Publications

• Half-checking propagators, Mikael Z. Lagerkvist and Magnus Rattfeldt

In: The 19th workshop on Constraint Modelling and Reformulation 2020 [summary] [pdf]

• Nmbr9 as a Constraint Programming Challenge, Mikael Z. Lagerkvist

Poster at The 25th International Conference on Principles and Practice of Constraint Programming 2019 [summary] [pdf] [arxiv]

• State Representation and Polyomino Placement for the Game Patchwork, Mikael Z. Lagerkvist

In: The 18th workshop on Constraint Modelling and Reformulation 2019 [summary] [pdf] [arxiv]

• *Monte Carlo Methods for the Game Kingdomino,* Magnus Gedda, Mikael Z. Lagerkvist, and Martin Butler

In: IEEE Conference on Computational Intelligence and Games 2018, Maastricht, The Netherlands. [summary] [pdf] [arxiv]

• *Laser Cutting Path Planning Using CP,* Mikael Z. Lagerkvist, Martin Nordkvist, and Magnus Rattfeldt

In: Christian Schulte, editor, *19th International Conference on Principles and Practice of Constraint Programming*, Uppsala, Sweden, volume 8124 of Lecture Notes in Computer Science. Springer-Verlag, September, 2013. [summary] [pdf]

• Modelling and Programming with Gecode, Christian Schulte, Guido Tack, Mikael Z. Lagerkvist.

Technical documentation for the Gecode system. More than 500 pages of in-depth documentation of the Gecode system. [pdf]

• Propagator Groups, Mikael Z. Lagerkvist and Christian Schulte.

In: Ian Gent, editor, *Fifteenth International Conference on Principles and Practice of Constraint Programming*, Lisbon, Portugal, volume 5732 of Lecture Notes in Computer Science. Springer-Verlag, September, 2009. [summary] [pdf]

• Techniques for Efficient Constraint Propagation, Mikael Z. Lagerkvist.

Licentiate thesis, KTH - Royal Institute of Technology, Stockholm, Sweden. November 2008. [summary] [pdf]

• *Modeling Irregular Shape Placement Problems with Regular Constraints, Mikael Z. Lagerkvist and Gilles Pesant.*

First Workshop on Bin Packing and Placement Constraints (BPPC'08), associated with *CPAIOR'08*, Paris, France. May 2008. [summary] [pdf]

• Advisors for Incremental Propagation, Mikael Z. Lagerkvist and Christian Schulte.

In: Christian Bessière, editor, *Thirteenth International Conference on Principles and Practice of Constraint Programming*, Providence, RI, USA, volume 4741 of Lecture Notes in Computer Science. Springer-Verlag, September, 2007. [summary] [pdf]

• Machine Assisted Reasoning for Multi-Threaded Java Bytecode, Mikael Z. Lagerkvist.

Masters thesis, KTH - Royal Institute of Technology, Stockholm, Sweden. May 2005. [summary][pdf]