Mikael Zayenz Lagerkvist

Contact Information

Place and Date of Birth:	Stockholm | May 5 1981
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Work Experience

2021-current — Co-founder and R&D at Optischedule AB

Optischedule develops solutions, systems, and products for scheduling and optimization. Work mainly on optimization systems, but also includes all parts of the stack such as architecture and cloud services, back-end and databases, as well as front-end development.
Consulting in constraint programming and optimization.

2019-current — Part time independent research, zayenz.se/research/

Independent research, mostly in constraint programming. Recent projects have included new ideas for incomplete solving in constraint programming and constraint programming models for board games.
Development of, and project maintenance for, the Gecode system included.

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. Work includes planning, design, requirements collection, implementation, testing, and evaluation of a large and complex AI geometric optimization system that is used to replace human expertise in sheet metal cutting. Mostly in Java, with some Scala.
Related activities include teaching and on-boarding of new colleagues, internal website development with Django and PostgreSQL, packaging using Docker for deployment in Kubernetes, simple GUI programming, and so on.

Additional long projects: Personell rostering for retail using local search and constraint 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.

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 architecture 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, customization 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
I have been involved in the development of the Kattis programming contest system, including helping out at the ACM ICPC World Finals in from 2010 to 2013. The work has involved Linux system administration, programming (PHP, Python, and Java), and databases (PostgreSQL).

δ^2 | Restructuring the basic block of the Computer Science program at KTH
As PAS (ProgramAnsvarig Student, student contact for strategic program development) in 2003, I was part of a group of four students that restructured the basic block of the Computer Science program at KTH.

Languages

Swedish | Native language

English | Fluent

Computer Skills

Programming languages	Significant experience: Java, C++, MiniZinc Regularly used: Kotlin, TypeScript, Rust, Python, C#, Unix shell scripting, Scala
Specialities	Constraint programming systems, optimization systems, library design, compilers, formal methods, artificial intelligence, multi-threaded and distributed programming
Various	Gecode, IntelliJ, CLion, Docker, GNU/Linux (especially Ubuntu), Emacs, Git, PostgreSQL, LaTeX.

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]