Nikolaj Hey Hinnerskov

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Education

University of Copenhagen

PhD in Computer Science — *2022 – Present (Expected Dec 2026)*
MSc in Computer Science — *2021 – 2024*
BSc in Computer Science — *2018 – 2021*

Experience

Microsoft — *Summer 2022*

Software Engineer Intern

- Implemented version control and deployment system for internal Microsoft projects, eliminating manual coordination overhead for the team's engineers.

Dbc Digital — *2019 – Jul 2022*

Part-time Software Developer in Infrastructure Team

- Developed declarative builds and deployments using Nix, NixOS, Go and Rust.
- Implemented Kubernetes admission controller for linting deployments, enforcing best practice across the production cluster.
- Built internal alarm reporting web service, simplifying incident response workflow.

Publications

1. **N. Hinnerskov**, R. Schenck, C. Oancea. *Verifying Array Properties in Pure Data-Parallel Programs*. **PLDI '26**. (pdf)
   Summary: Static analysis in Futhark: proving properties at compile time for functional correctness and program optimization.
2. R. Schenck, **N. Hinnerskov**, T. Henriksen, M. Madsen, and M. Elsman. *AUTOMAP: Inferring Rank-Polymorphic Function Applications with Integer Linear Programming*. **OOPSLA '24**. (pdf)
   Summary: Static inference of numpy-style broadcasting in Futhark.
3. L. Bruun, U. Larsen, **N. Hinnerskov**, and C. Oancea. *Reverse-Mode AD of Multi-Reduce and Scan in Futhark*. **IFL '23**. (pdf)
   Summary: Automatic differentiation optimized for execution on GPUs.
4. D. Serykh, S. Oehmcke, C. Oancea, D. Masiliūnas, J. Verbesselt, Y. Cheng, S. Horion, F. Gieseke, and **N. Hinnerskov**. *Seasonal-Trend Time Series Decomposition on Graphics Processing Units*. **BigData '23**. (pdf)
   Summary: Large-scale time series analysis on GPUs.

Open source

- **MLX**, a machine learning framework (in C++): Implemented proof-of-concept runtime bounds checking for array indexing in MLX's metal backend with an average overhead of 3%. **Not merged**, as it was decided that bounds checking is a non-goal. (https://github.com/ml-explore/mlx/pull/3091)

- **Futhark**, an array programming language (in Haskell): data-dependency tracking and AD optimizations + ~7000 lines of research code (https://github.com/diku-dk/futhark/commits/master/?author=nhey; https://github.com/diku-dk/futhark/tree/indexfn.)
- **Nixpkgs & other**: Features and bug fixes to nixpkgs and Rust crates vaultrs and slack-morphism-rust while at Dbc Digital.

Teaching

- Teaching Assistant, 2025, Programming Massively Parallel Hardware.
- Teaching Assistant, 2024, Programming Massively Parallel Hardware.
- Teaching Assistant, 2023, Programming Massively Parallel Hardware.
- Teacher, 2023, Introduction to Computer Science.
- Co-supervised MSc thesis: Application of Probabilistic Machine Learning Methods for Protein Generation, Peter Kanstrup Larsen, 2023

Technical skills

- Research: compilers, static analysis, array programming, data-parallel programming.
- Technology: Haskell, Python, JAX, PyTorch, CUDA, GPU, Nix/NixOS, Git.

Further experience

- I provide academic support to neurodiverse students in one-on-one sessions through the government-funded Student Counselling Service (since 2023).