Rohan Yadav

Education

2020–Present **Ph.D. in Computer Science**, *Stanford University*, Stanford, CA.
Advised by Alex Aiken and Fredrik Kjolstad

2015–2019 **BS in Computer Science**, *Carnegie Mellon University*, Pittsburgh, PA.
Advised by Umut Acar
Dean's List, University and SCS College Honors

Experience

2023- **Research Intern**, *NVIDIA*, Santa Clara, CA.
- Researching compilation-based techniques to compose parallel programs in the Legate framework.

2022 **Research Intern**, *NVIDIA*, Santa Clara, CA.
- Developed `legate.sparse`, a distributed and accelerated drop-in replacement for `scipy.sparse`.

2019-2020 **Software Engineer**, *Cockroach Labs*, New York, NY.
- Improved stability and performance of CockroachDB's distributed SQL engine and schema management infrastructure.
- Contributed to development of a variety of large features in CockroachDB including ENUM types, User Defined Schemas, and Online Primary Key Changes.

2018 **Software Engineering Intern**, *Uber Advanced Technologies Group*, San Francisco, CA.
- Developed infrastructure for a migration from an internal data center to AWS.
- Implemented a file access system within AWS for integration with existing data center services.
- Dramatically enhanced scalability of batch compute jobs processing internal data.

2017 **Software Engineering Intern**, *Facebook*, Menlo Park, CA.
- Developed system to perform disruptive upgrades on network switches.
- Added packet subscription service for network switch agent debugging and maintenance.

Selected Research Projects

2023 **Composing Distributed Computations Through Task and Kernel Fusion** *with Michael Bauer, Shiv Sundram, Wonchan Lee, Michael Garland, Alex Aiken, Fredrik Kjolstad*
Developed dynamic program analysis techniques to fuse computations across library boundaries on distributed machines, enabling applications built through the composition of high-level libraries to approach the performance of hand-written code.

2022 **Legate Sparse** *with Michael Bauer, Wonchan Lee, Manolis Papadakis, Melih Elibol, Michael Garland*
Developing `legate.sparse` a distributed and GPU-accelerated drop-in replacement for `scipy.sparse`, enabling supercomputer scale performance from high-level Python code.

2021-2022 **Compiling Tensor Computations to Supercomputers** *with Fred Kjolstad, Alex Aiken*
Developed DISTAL, a compiler for sparse and dense tensor algebra that targets distributed systems.

2020 **Automated Mapping of Computation and Data** *with Alexandra Henzinger, Thiago Teixeira, Alex Aiken*
Developed system to automatically discover strategies for mapping computation and data onto different processors and memories in a heterogenous system.

2018-2019 **Disentanglement** *with Sam Westrick, Umut Acar*
Designed efficient memory management systems for the memory access patterns of fork-join parallel programs.

Publications

SC 2023 **Legate Sparse: Distributed Sparse Computing in Python** *Rohan Yadav, Wonchan Lee, Melih Elibol, Manolis Papadakis, Taylor Lee-Patti, Michael Garland, Alex Aiken, Fredrik Kjolstad, Michael Bauer*

SC 2023 **Automated Mapping of Task-Based Programs onto Distributed and Heterogenous Machines** *Thiago S. F. X. Teixeira, Alexandra Henzinger, Rohan Yadav, Alex Aiken*

SC 2022 **SpDISTAL: Compiling Sparse Distributed Tensor Computations** *Rohan Yadav, Alex Aiken, Fredrik Kjolstad*

PLDI 2022 **DISTAL: The Distributed Tensor Algebra Compiler** *Rohan Yadav, Alex Aiken, Fredrik Kjolstad*

OOPLSA 2021 **Compilation of Sparse Array Programming Models** *Rawn Henry, Olivia Hsu, Rohan Yadav, Stephen Chou, Kunle Olukotun, Saman Amarasinghe, Fredrik Kjolstad*

POPL 2020 **Disentanglement in Race-Free Nested Parallel Programs** *Sam Westrick, Rohan Yadav, Matthew Fluet, Umut A. Acar*

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Undergraduate Thesis **Disentanglement, Theory and Practice** *Rohan Yadav*

SPAA 2019 **Brief Announcement: A Parallel Algorithm for Subgraph Isomorphism** *Rohan Yadav, Umut A. Acar*

Submitted for Publication (Under Review)

2023 **Composing Distributed Computations Through Task and Kernel Fusion** *Rohan Yadav, Shiv Sundram, Wonchan Lee, Michael Garland, Michael Bauer, Alex Aiken, Fredrik Kjolstad*

Awards

2023 NVIDIA Graduate Research Fellowship

2020 NSF Graduate Research Fellowship

2019 CRA Outstanding Undergraduate Researcher Nominee

2019 Carnegie Mellon Senior Leadership Recognition

2015 Presidential Scholar Semifinalist

Talks

Legate Sparse: Distributed and Accelerated Sparse Computing in Python

- UW PLSE Seminar, December 2023
- SC 2023, November 2023
- UIUC Compilers Seminar, October 2023
- MIT Fast Code Seminar, October 2023
- CMU Catalyst Group Meeting, October 2023
- Berkeley Programming Systems Seminar, September 2023
- Stanford HPC-AI Advisory Council, February 2023

SpDISTAL: Compiling Sparse Distributed Tensor Computations

- Legion Retreat, December 2022
- AHA Affiliates Retreat, December 2022
- SC 2022, November 2022
- Stanford Software Research Lunch, April 2022

DISTAL: The Distributed Tensor Algebra Compiler

- Google Research, November 2022 (Invited)
- PLDI 2022, June 2022
- Vienna University of Technology, April 2022 (Invited)
- Stanford Agile Hardware Project Group Meeting, Jan 2022
- Cerebras Systems, Dec 2021 (Invited)
- Oxford Tensor Computations Seminar, Nov 2021
- Stanford Software Research Lunch, Nov 2021

On the Automated Mapping of Computation and Data Onto Heterogenous Machines

- Stanford Software Research Lunch, Feb 2021
- Legion Developer Meeting, Jan 2021

A Parallel Algorithm for Subgraph Isomorphism

- SPAA 2019, Jun 2019

Disentanglement, Theory and Practice

- CMU Meeting of the Minds, May 2019

Teaching

2023 **Teaching Assistant** *Stanford CS143* Compilers

2021-2022 **Teaching Assistant** *Stanford CS242* Programming Languages

2017-2018 **Head Teaching Assistant** *CMU 15210* Parallel Algorithms and Data Structures

2016 **Teaching Assistant** *CMU 15150* Functional Programming

2018-2020 **Diderot**
Developed and maintained a new course management platform, now used by 1500 students daily at CMU.