

KARAN NEWATIA

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Website: <https://karannevatia.github.io/>

Github: <https://github.com/karannevatia>

EDUCATION

University of Pennsylvania

Jul 2020 - May 2025 (Expected)

PhD in Computer and Information Science

Advised by Prof. Andreas Haeberlen and Prof. Linh Thi Xuan Phan

Research interests: distributed systems, privacy, applied cryptography

Cornell University

Master of Engineering in Computer Science

Jan 2020 - May 2020

Bachelor of Arts in Computer Science

Aug 2016 - Dec 2019

PUBLICATIONS

Solver-In-The-Loop Cluster Resource Management for Database-as-a-Service.

Arnd König, Yi Shan, **Karan Newatia**, Luke Marshall, and Vivek Narasayya.

50th International Conference on Very Large Databases (**VLDB '24**), August 2024.

Arboretum: A Planner for Large-Scale Federated Analytics with Differential Privacy.

Elizabeth Margolin*, **Karan Newatia***, Edo Roth, Tao Luo, and Andreas Haeberlen.

29th ACM Symposium on Operating Systems Principles (**SOSP '23**), October 2023.

Mycelium: Large-Scale Distributed Graph Queries with Differential Privacy.

Edo Roth, **Karan Newatia**, Yiping Ma, Ke Zhong, Sebastian Angel, and Andreas Haeberlen.

28th ACM Symposium on Operating Systems Principles (**SOSP '21**), October 2021.

* = co-first authors

RESEARCH EXPERIENCE

Large-Scale Federated Analytics with Differential Privacy

Oct 2020 - current

Supervised by Prof. Andreas Haeberlen

University of Pennsylvania

- Developed Mycelium, the first system to process large-scale differentially private graph queries, using a combination of cryptographic techniques such as Fully Homomorphic Encryption, Zero Knowledge Proofs, Multi-Party Computation, and MixNets.
- Developed Arboretum, a novel query planner that allows federated analytics systems to automatically optimize query plans for a broad range of differentially private queries, including support for the exponential mechanism and secrecy of the sample, at scale.

Synchronous Data Centers

July 2020 - current

Supervised by Prof. Andreas Haeberlen and Prof. Linh Thi Xuan Phan

University of Pennsylvania

- Developing a new system design for data center networks which aims to capture many of the benefits of the synchronous model such as higher efficiency, better predictability, and support for new kinds of services, while eliminating problems such as congestion and long latency tails.

PROGRAMMING SKILLS

• Python • C • C++ • C# • Java • OCaml

INDUSTRY EXPERIENCE

Research Intern, Microsoft Research

May 2023 - Aug 2023

Supervised by Josh Benaloh (Senior Principal Cryptographer)

Redmond, WA

- Performed research on end-to-end verifiable elections (ElectionGuard) in the Security and Cryptography group at Microsoft Research (MSR).
- Enabled ElectionGuard to efficiently handle complex voting methods such as ranked-choice voting and write-in votes by leveraging re-encryption MixNets.

Research Intern, Microsoft Research

May 2022 - Aug 2022

Supervised by Arnd Christian König (Principal Researcher)

Redmond, WA

- Performed research on cluster management in the Data Systems group at Microsoft Research (MSR).
- Formulated resource management in Database-as-a-Service clusters as an optimization problem amenable to fast solutions.
- Implemented our approach in the Service Fabric codebase using the Gurobi solver, and reduced the number of resource violations by 54% compared to the previous state-of-the-art.

TEACHING EXPERIENCE

CIS 5550: Internet and Web Systems

Jan 2023 - Feb 2023

Guest Lecturer

University of Pennsylvania

- Gave guest lectures on networking and fault tolerance.

CIS 5020: Analysis of Algorithms

Jan 2022 - May 2022

Teaching Assistant

University of Pennsylvania

- Responsibilities included teaching recitation sections, holding weekly office hours, and grading assignments and exams.

CIS 5050: Software Systems

Aug 2021 - Dec 2021

Teaching Assistant

University of Pennsylvania

- Responsibilities included teaching special lab sessions, advising open-ended final projects, holding weekly office hours, and grading programming assignments and exams.

Code Afrique

Jan 2019

Instructor

Ghana

- Taught the basics of Computer Science using Python to over 450 high school students in Ghana at Code Afrique, a program designed to encourage African high school students to pursue Computer Science.

SELECTED PROJECTS

GeoWave-FoundationDB

2019

- Created a data store extension within GeoWave for FoundationDB (a fault-tolerant distributed database) to retrieve and analyze massive geospatial datasets.

Destination Matcher

2019

- Implemented a travel destination recommendation system which returns destinations based on user's interests and preferences (such as activities, climate, local language, drinking age).
- Created a custom metric calculated using the network structure of Wikivoyage to emphasize the "hidden gems" of world travel.