

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 Profs. Andreas Haeberlen and Linh Thi Xuan Phan

Research interests: distributed systems, system security, 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

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

E. Roth, **K. Newatia**, Y. Ma, K. Zhong, S. Angel, and A. Haeberlen.

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

RESEARCH EXPERIENCE

Massive-Scale Differentially Private Analytics

Oct 2020 - current

Supervised by Profs. Andreas Haeberlen and Sebastian Angel

University of Pennsylvania

- Developed Mycelium, the first system to process large-scale differentially private graph queries, using a combination of cryptographic techniques (Fully Homomorphic Encryption, Zero Knowledge Proofs, Multi-Party Computation, and Verifiable Secret Re-sharing). Worked on optimizing query processing, handling special queries, ensuring the security of our novel mix-net communication protocol, and led the implementation and evaluation of the system.
- Developing a new query planner that allows federated analytics systems to efficiently answer a broader 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 Profs. Andreas Haeberlen and Linh 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.

Blockchain

Jun 2019 - Dec 2019

Supervised by Profs. Robbert van Renesse and Hakim Weatherspoon

Cornell University

- Developed Vegvisir, a partition-tolerant blockchain for use in power-constrained IoT environments with limited network connectivity. Built Android apps for emergency response and healthcare using the blockchain system.

INDUSTRY EXPERIENCE

Research Intern, Microsoft Research

May 2022 - August 2022

Supervised by Arnd Christian König (Principal Researcher)

Redmond, WA

- Performed research on cluster management in the Data Systems group at Microsoft Research (MSR).

SELECTED COURSEWORK

- Operating Systems, Distributed Computing, System Security, Databases, Cryptography
- ML, Computational Linguistics, Language & Information, Large-Scale ML
- Algorithms, Functional Programming, Open-Source Software Engineering, Game Theory

PROGRAMMING SKILLS

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

SELECTED PROJECTS

GeoWave-FoundationDB

Sep 2019 - Dec 2019

Project for CS 5152 (Open Source SWE)

Cornell University

- Worked on creating a data store extension within GeoWave for FoundationDB (a fault-tolerant distributed database) to retrieve and analyze massive geospatial datasets. Implemented reader, writer and deleter for FoundationDB using transactions.

Destination Matcher

Apr 2019 - May 2019

Project for CS 4300 (Language & Information)

Cornell University

- 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 nicheness metric calculated using network structure of Wikivoyage to emphasize the "hidden gems" of world travel.

TEACHING EXPERIENCE

CIS 502: Analysis of Algorithms

Jan 2022 - May 2022

Teaching Assistant

University of Pennsylvania

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

CIS 505: Software Systems

Aug 2021 - Dec 2021

Teaching Assistant

University of Pennsylvania

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

CIS 555: Internet and Web Systems

Jan 2023

Guest Lecturer

University of Pennsylvania

- Gave a guest lecture on networking in CIS 555: Internet and Web Systems.

Code Afrique

Jan 2019

- 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.