# Shyam Mehta

(973) 641-2989 • shyam.mehta@hotmail.com • GitHub • LinkedIn

## EDUCATION

**University of Pennsylvania** – Philadelphia, PA May 2024

*M.S.E. in Computer Science | B.S.E. in Computer Science | Minors in Mathematics, Statistics, and Data Science | GPA*: 3.91/4.00

- *Relevant Coursework:* Data Structures & Algorithms; Distributed Systems; Machine Learning; Randomized Algorithms; Big Data Analytics; Operating Systems; Compilers & Interpreters; Computer Organization; Computer & Network Security; Convex Optimization; Advanced Linear Algebra; Real Analysis; Probability; Stochastic Processes; Bayesian Statistics

## TECHNICAL SKILLS

*Languages:* Java, C/C++, Python, Kotlin**,** OCaml, Haskell, Go, TypeScript, SQL, CodeQL, Bash, (subset of) x86 Assembly
*Frameworks:* Spring, React, Express, Django, PySpark, PyTorch, Tensorflow, MXNet, OpenCV, Scikit-learn, Guice
*Cloud:* AWS CDK/CloudFormation, EC2, Lambda, AppConfig, EventBridge, CloudWatch, SQS, DynamoDB, S3
*Databases/Other:* MySQL, MongoDB, Redis, Cassandra, Docker, Kubernetes, Jenkins (CI/CD)

## PROFESSIONAL EXPERIENCE

**Amazon, Alexa AI** | Software Development Engineer Intern May 2023 – August 2023

- Designed and deployed (for beta-testing) a low-latency, massively scalable AWS service to process, store, and delete data involved in the Entity Resolution (ER) pipeline at adjustable time intervals, allowing a throughput of 8,000 write requests per second from external services, generalized for all services using the Alexa ER data lake
- Resulted in an average cost reduction of $20,000 per year for the ER Search team

**Moderne, Inc.** | Software Engineer (Part-time) September 2022 – January 2023

- Focused on OpenRewrite recipe development and expanding OpenRewrite's language support beyond Java

**HUMAN Security, Inc.** | Software Engineering Intern May 2022 – August 2022

- Contributed to the OpenRewrite project, a format-preserving Abstract Syntax Tree transformer for scalable code refactoring
- Implemented control and dataflow analyses to allow for guard and taint tracking analysis, as well as a visualizer for control/dataflow analyses to assist users of OpenRewrite in constructing custom recipes
- Received a bounty from the GitHub Security Lab for identifying *Partial Path Traversal* (CWE-23) vulnerabilities in Java projects across GitHub using CodeQL and remediating them using custom OpenRewrite recipes

## TEACHING

**University of Pennsylvania** | CIS Teaching Assistant

*Courses:* CIS 5050 – Distributed Systems (Spring 2024), CIS 3800 – Computer Operating Systems (Fall 2023, Spring 2024)

## PRESENTATIONS

Leitschuh, J., Way, P., & Mehta, S. (2022, August 11). *Scaling the Security Researcher to Eliminate OSS Vulnerabilities Once and For All* [Conference presentation]. Black Hat USA 2022, Las Vegas, NV, United States.

## PROJECTS

**Tidal Translator** | *Haskell, Stack* November – December 2023

- Built a transpiler from Tidal Cycles (a DSL to create musical compositions) to LilyPond (a DSL for writing musical score)
- Developed an interactive environment for real-time score generation, which accepts Tidal patterns among other commands; upon the termination of an interactive session, the Tidal composition provided is exported as a Lilypond file
- Utilized monadic QuickCheck for round-trip testing to verify correctness of the transpiler

**PennCloud** | *C++, C, React, HTML/CSS, JavaScript, gRPC, Make, Bash* April – May 2023

- Designed and implemented a scalable, fault-tolerant distributed system hosting a platform akin to Google Apps (with storage and SMTP-driven email services), backed by a simplified, BigTable-type data store using primary-based replication
- Employed a frontend load balancer and backend master node to redirect requests, manage nodes, and track node statuses
- Utilized gRPC for inter-server communication and multithreading to handle multiple simultaneous requests

**COVID-19 Treatment Prioritizer** | *Python, Scikit-learn, MXNet, Spark, Pandas, NumPy, Seaborn, Matplotlib* November 2022

- Modelled patient admittance to the ICU (i.e., the severity of a patient's condition) using a voting ensemble of classifiers with optimized hyperparameters, including linear SVM, *K*NN, logistic regression, feedforward neural networks, and random forests, achieving an average of 90% accuracy on test data

**Oat Compiler** | *OCaml, ocamllex, menhir, LLVM, x86 Assembly, C* February – April 2022

- Developed a fully functional compiler for Oat, a type-safe language (similar to C) featuring structs, function pointers, arrays, and subtyping, using the LLVM compiler infrastructure (with ocamllex and menhir used for lexing and parsing)
- Implemented optimizations at the LLVM level using several dataflow analyses, including liveness, alias, and constant propagation analysis, to allow for constant folding and dead code elimination
- Utilized Kempe's graph coloring algorithm within the compiler backend for register allocation

**Participatory Learning Platform** | *React, Express, Node.js, MySQL, Redis* March 2018 – January 2022

- Developed an online platform to facilitate the Participatory Learning (PL) educational model, allowing for custom (potentially student-driven) assignment creation and workflows; to date, it supports 1,000+ students and 20+ courses