

# LUKE TONG

## EDUCATION

### University of Pennsylvania

BSE in Computer Science

August 2023 – May 2027

GPA: 3.93, Major GPA: 4.00

- Data Structures & Algorithms, Linear Algebra, Probability, Scalable and Cloud Computing, Databases, Numerical Optimization, Big Data Analytics, Compilers, Operating Systems

## EXPERIENCE

### Compiler Research Intern

Penn Programming Language Group & National Science Foundation

May 2025 – PRESENT

Philadelphia PA

- Contribute to formalization of  $\lambda^O$ , an "opportunistically parallel" lambda calculus that evaluates concurrently
- Design and implement a novel, low-level, functional IR based on  $\lambda^O$  that preserves programmer's intent
- Write compiler from Python to IR, allowing network-bottlenecked "glue" scripts to be automatically parallelized
- Achieved significant performance gains on real-world scripts, reducing latency by  $12.7\times$  and running time by  $6.2\times$

### Software Team Lead

Penn Labs, University of Pennsylvania

January 2024 – PRESENT

Philadelphia PA

- Lead team of 10+ developers maintaining core university products used by 100,000+ students
- Reduced database load by 95% by statically generating and caching course review data in Django
- Improved frontend load times by 60% through middleware refactors, ISR, and framework migration
- Collaborated with University Provost's Office to launch comments feature in official course review platform

### Committee Head, Undergraduate Teaching Assistant

Computer & Information Science Department, University of Pennsylvania

August 2024 – May 2025

Philadelphia PA

- Teach weekly recitation, lead office hours for discrete math, Penn's largest CS course (200+ students per semester)
- Lead a 20-member TA committee in writing problem sets, solutions, and grading rubrics
- Collaborate with faculty to refine course materials, exploring concepts like graph theory and probability

## PROJECTS

### Netstagram | AWS CDK, OAuth, SQL, ChromaDB, Apache Kafka, Apache Spark

May 2024

- Created scalable Instagram clone, including authentication, post rank, and friend recommendation microservices
- Implemented real-time data streaming with Apache Kafka and adsorption using Apache Spark
- Developed RAG facematch feature utilizing image vector embeddings stored in ChromaDB
- Utilized AWS CDK (RDS, S3, EMR, ECS Lambda, SES, CloudFront, API Gateway) and Terraform for deployment

### Sparkify | PyTorch, AWS Lambda, AWS S3, Docker, Svelte

September 2023 – December 2023

- Developed a web application to generate complex album art collages from user music tastes
- Implemented API integrations such as Spotify OAuth to fetch user's music taste profile
- Developed a Python script using PyTorch and Pillow deployed on AWS Lambda to manipulate album covers

### One Million Checkboxes Clone | WebSockets, Go, Redis, AWS

November 2024 – December 2024

- Create website with 1 million checkboxes, synced for all users in real time using WebSocket
- Leveraged Redis Pub/Sub and concurrency to send/receive real-time update batches and full-state snapshots
- Utilize Terraform for declarative and scalable deployment on AWS ECS and Fargate

## TECHNICAL SKILLS

**Languages:** Java, Python, C, SQL, JavaScript/TypeScript, Rust, Go, HTML/CSS, Ruby

**Frameworks:** React, Node.js, Django, Next.js, Rails

**Developer Tools:** Git, Docker, AWS CDK, Linux, Kubernetes, Terraform

**Libraries:** PyTorch, numpy, pandas, scikit-learn, Apache Spark, LLVM