SHRIRAM CHANDRAN

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EDUCATION

ETH Zürich since Sep. 2022
Master of Science ETH in Computer Science Zürich, Switzerland

- Focus: Secure & Reliable Systems and Theoretical Computer Science.

Indian Institute of Technology Madras Jul. 2018 – Jun. 2022
B. Tech. Computer Science and Engineering Chennai, India

- GPA: 9.04/10
- Thesis: Program Analysis - StarPlat DSL: Grade 9/10

PATENTS AND PUBLICATIONS

M. Kabić, S. Chandran, G. Alonso. "Maximus: A Modular Accelerated Query Engine for Data Analytics on Heterogeneous Systems". *SIGMOD 2025*. (to appear).

Rupesh Nasre et al. "System and method for automatic parallel code generation for graph algorithms for multiple target architectures". *Patent 432922*. 14 November 2022. India

EXPERIENCE

Master Thesis with Prof. Torsten Hoefler since Oct. 2024
Higher-Order Graph Database Engine ETH Zürich

- Designing and implementing a Higher-Order Graph Database Engine with OLTP and OLAP capabilities.
- Designed algorithms to project higher-order graphs as plain graphs, performance models and proofs of correctness.
- Implemented a higher-order database layer with CRUD capabilities on top of Neo4j.
- Currently designing and implementing higher-order OLAP workloads and future plans include benchmarking.

Practical Work with Prof. Gustavo Alonso Oct. 2023 – July. 2024
GPU-Acceleration of the Maximus Database Engine ETH Zürich

- Implemented GPU support to Maximus, a distributed, scalable and heterogeneous database engine.
- Designed Arrow-compatible data structures to store databases on GPUs for GPU processing on various architectures.
- Integrated GPU-accelerated operators with the existing Maximus interfaces.
- Benchmarked Maximus-GPU on the complete TPC-H query set and demonstrated massive performance gains.

Bachelor Project with Prof. Rupesh Nasre Jan. 2022 – Jun. 2022
Program Analysis - StarPlat DSL IIT Madras

- Implemented compiler level optimizations for StarPlat, a graph processing DSL.
- Analyzed and implemented multiple optimizations for the DSL compiler using AST-level analyses.
- Conducted successful testing of the implemented optimizations on multiple large graphs across different algorithms.
- Produced positive performance gains for generated code.

Undergraduate Research with Prof. Raghavendra Rao Aug. 2021 – Nov. 2021
Stability Analysis IIT Madras

- Conducted a comprehensive literature review of previous research on stability of instances for various popular algorithms, in particular Bilu-Linial stability amongst other definitions.

- Analyzed stable instances of Christofides' algorithm under various stability conditions.
- Identified improved approximation bounds for stable instances of metric TSP.
- Developed new approximation algorithms for the vertex cover problem for almost-stable instances in random graphs.

Rubrik May 2021 – Jul. 2021
Software Engineering Intern Bangalore, India

- Developed a statistics system with the Blobstore team for analyzing backup metadata job performance.
- Designed a functional model for storing statistics within their respective databases.
- Enabled access to histograms and statistical data to aid in debugging and data analytics.
- Validated the model on live clusters, demonstrating seamless integration with the main codebase.

Godot Media Nov. 2020 – Jan. 2021
Software Engineering Intern Bangalore, India

- Designed and constructed an automatic plagiarism checker to search text against documents on the internet.
- Implemented heuristics and parallelization to increase accuracy and reduce algorithm latency.
- Developed a graphical UI to accept data from a user and display results with highlighted matching text.
- Achieved highly accurate plagiarism detection on articles of up to 2000 words in just a few seconds.

SKILLS

Programming: (Proficient) C/C++, Python, Scala, Haskell, (Competent) OCaml, Java, C#, RISC-V, x86, SQL, Cypher
Frameworks/Tools: Javascript, Django, HTML / CSS, LaTeX, Git, Coq

TEACHING

Coordinator Programming Club, CFI IIT Madras, Mar. 2019 – Jun. 2020

- Organized educational sessions on data structures and algorithms, fostering a culture of programming excellence in the institute. Organized regular collegiate programming contests to enhance students' programming abilities.

Content Developer Melvano, Dec. 2018 – Mar. 2019

- Mentored JEE aspirants by creating Q&A content and addressing doubts through Melvano, an indigenous startup building an educational social platform. Helped with the app's initial publicity with UI and design suggestions that enhanced its user appeal.

SELECTED COURSE PROJECTS

GPU-Acceleration of an Algorithm Design of Parallel & High-Performance Computing, Sep. 2023 – Dec. 2023

- Implemented a banded matrix inversion algorithm, and performed parallelization using MPI and CUDA to improve the performance of the algorithm.

Building a Program Verifier Program Verification, Apr. 2023 – Jun. 2023

- Designed and implemented a program verification system to translate programs from EVT, an event-based research language, to Viper, a verification backend language, allowing users to attach specifications with EVT programs.

System Level Optimization of an Algorithm Advanced Systems Lab, Mar. 2023 – Jun. 2023

- Implemented the *PolyVest* approximation algorithm for volume estimation of a convex polytope and performed system optimizations including vectorization and cache performance improvement to get more than a 23x speedup.

Approximation Algorithms for b-MST Topics in Design & Analysis of Algorithms, Feb. 2021 – Jul. 2021

- Designed various approximation algorithms for the b-MST problem. Analyzed smoothed performance across multiple custom graph datasets with random perturbations.

Nand2Tetris Computer System Design, Aug. 2019 – Nov. 2019

- Designed a Hack micro-architecture using the Hack Hardware Simulator on Nand2Tetris and implemented an assembler and a compiler for the Jack language.