Pranav Dani

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Education

SUNY – Stony Brook University **Aug 2023 - May 2025**
Master of Science, Computer Science *New York, USA*

- Courses: Computer Architecture, OS, Distributed Systems, System Security, Theory of Databases, Analaysis of algorithms
- Teaching Assistant: (CSE - 316) Fundamentals of Software Development

University of Mumbai – Thadomal Shahani Engineering College **Aug 2019 - May 2023**
Bachelor of Engineering, Information Technology *Mumbai, India*

- Courses: Computer Architecture, OS, DBMS, DSA, Computer Networks, Network Security, Data Mining

Experience

Graduate Research Assistant - Advisor: Prof. Dongyoon Lee **May 2024 – Present**
GPU/CPU Profiling - Energy Flamegraphs *New York, US*

- Developed an Energy Flamegraph tool using Linux perf_events and PowerAPI to trace CPU call chains and monitor power consumption per cgroup. This tool generates both CPU and energy flamegraphs from the same execution trace.
- Currently developing a tool to collect GPU API and kernel launch traces, along with power consumption data, using CUPTI and NVML to generate Energy Flamegraphs.

Software Intern **Jun 2021 – Aug 2021**
Suven Consultants *Mumbai, India*

- Collaborated on a Home Inventory and Loan Management tool using Java, SQLite3, JavaFX, and Java Swing components.
- Integrated **Printable interface** to generate printable reports in PDF format using Java AWT and Graphics Library.

Skills

Languages: C, C++, Java, Python, JS, Verilog
Databases: PostgreSQL, MySQL, MongoDB
Web: React.js, Node.js, Flask, HTML, CSS, JS
Tools: qemu, perl, bash, GTKWave, Git
Platforms: GitHub, Firebase, Heroku
CI/CD: GitHub Actions

Projects and Research

Computer Architecture - RV64IM - RISCV - CPU | *Verilog, GTKWave* **Jun 2024 – Present**

- Designed a five + stage in-order pipeline for RV64IM spec extension which talks to the physical memory over AXI4 protocol.
- Implemented an ALU to execute instructions, and interact with reg file, supporting pipeline stalls on RAW data hazards.
- Added branch prediction, Set-Associative cache, and support for load/stores and ECALL instructions with pipeline flush.

Kernel Programming - File System | *C, qemu* **Mar 2024 – May 2024**

- Developed an asynchronous disk logging protocol for xv6, optimizing write efficiency by caching writes and writing to disk when writing, achieving a 94% reduction in write latency.
- Implemented small file support with file type conversion handling, optimizing disk space utilization and reducing disk I/O.
- Implemented *ftruncate()* syscall for file truncation and transition between "small" and regular files.

Distributed Systems - Raft Implementation - Consensus Algorithm | *C++* **Aug 2023 – Dec 2023**

- Created a persistent linearizable key-value store using the Raft consensus algorithm for leader election and data replication in an asynchronous environment. Implemented log compaction with Snapshots.
- Engineered sharding using consistent hashing, ensuring efficient data distribution across nodes. Automated partition rebalancing during node joins and departures.
- Implemented a versioned key-value store that supports cross-shard Transactions using 2-Phase Locking and 2-Phase Commit with Optimistic Concurrency Control.

BackGen - Backend Generator | *ICT4SD* | *Springer* **Aug 2023**

- Developed a software tool that helps with the process of writing repetitive backend code for web applications.
- Creates data models and RESTful API endpoints, and generates executable code for the same in Golang.
- Generates approximately 48% of the code. (Result evaluated for creating a backend for a simple Todo application.)

Expense Tracker | *Flask, PostgreSQL, Heroku, HTML, CSS, JS* | GitHub **Apr 2021 – Jun 2021**

- Designed and built a web app for recording and managing personal expenses with support for creating bulk expenses and exporting user data in CSV and Excel formats using Flask and PostgreSQL and hosted on Heroku.
- Provides the functionality to create personalized budgets based on multiple categories.

Extracurricular Activity

Our Tech Community (OTC) | ourtech.community | *Admin* **May 2022 - present**

- Hosted 300+ hours of weekly OTC CatchUp sessions, organized two in-person OTC MeetUp events with 60+ attendees.