Mihir Swarnkar

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PROFESSIONAL SUMMARY

Systems engineer specializing in distributed systems and Linux internals. Built a fault-tolerant key-value database and a Linux container runtime from scratch, working with consensus, replication, namespaces, and cgroups. Strong foundation in operating systems, networking, and failure handling.

PROJECTS

- **Mini-Redis-Cassandra — Distributed Systems Implementation**   Personal Project
  - Designed and implemented a distributed key-value database in **Python** using Raft-style consensus and consistent hashing with virtual nodes.
  - Implemented tunable consistency levels (**ANY**, **QUORUM**, **ALL**) and leader-based replication for coordinated writes and reads.
  - Built fault-tolerance mechanisms including gossip-based membership, read-repair, and automatic leader failover within seconds.
  - Validated correctness and resilience through fault injection, node failures, and network partition testing.
- **Mini-Docker — Linux Container Runtime**   Personal Project
  - Built a Linux container runtime from scratch in **Python** using kernel primitives for process and filesystem isolation.
  - Implemented namespaces, cgroups v2, OverlayFS, and seccomp-BPF to enforce isolation and resource boundaries.
  - Applied defense-in-depth security via syscall filtering, capability dropping, NO_NEW_PRIVS, and rootless containers.
  - Implemented container networking with veth pairs, Linux bridges, and iptables NAT with lightweight startup latency and low memory overhead.

SYSTEMS & INFRASTRUCTURE SKILLS

- **Distributed Systems**: Consensus, replication, sharding, consistency models
- **Operating Systems**: Processes, signals, namespaces, cgroups
- **Networking**: TCP/IP, sockets, client-server architecture
- **Concurrency**: Threading concepts, failure handling, recovery mechanisms
- **Containers**: Isolation primitives, container runtimes

PROGRAMMING LANGUAGES & TOOLS

- **Languages**: Python
- **Tools**: Git, GitHub, Linux CLI
- **Familiarity**: Filesystems, virtual networking, container runtimes

EDUCATION

- **Graphic Era Hill University**   Haldwani, Uttarakhand
  Bachelor of Technology in Computer Science — CGPA: 8.4   *Aug. 2023 – May 2027*

Relevant Coursework: Operating Systems, Computer Networks, Database Management Systems, Data Structures

CERTIFICATIONS

- **AWS Cloud Practitioner Essentials**: Foundational understanding of AWS services, architecture, security, and billing.

ACHIEVEMENTS & ACTIVITIES

- **Outreach Coordinator — Technical Club**: Supported planning and execution of technical events, workshops, and student-led initiatives.