

Bhavana Mehta

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Research Interests. Distributed systems; scalable BFT consensus/SMR; adaptive sharding; workload-aware/runtime switching; machine learning for systems; performance engineering.

EDUCATION

University of Pennsylvania

Ph.D. & M.S. in Computer & Information Science / GPA: 4.0/4.0

2019 – 2025 (*Expected*)

Focus: Distributed Systems, Infrastructure, Fault Tolerance

Nirma Institute of Technology

B.Tech., Electronics & Communication Engineering / GPA: 3.95/4.0

2014 – 2018

EXPERIENCE

Distributed Systems Lab, University of Pennsylvania

PhD Researcher

2019–Present

- **Marlin:** Adaptive sharded database tolerant to Byzantine faults. Designed hypergraph-guided centralized (KaHyPar-based cut minimization) and key-affinity decentralized resharding atop BFT SMR + BFT-2PC; achieved $\sim 16\text{K}$ TPS under adversarial skew, cut cross-shard coordination $\sim 33\%$, and scaled to 32 clusters / 160 nodes with stable tail latency. Built rate-limited migration + safety throttles, fault-injection/regression tests, and profiling harnesses.
- **AdaChain:** Contextual-bandit runtime that switches transaction paradigms per workload episode; improved committed throughput vs static baselines on skewed workloads while preserving correctness. Implemented state featurization, online training loop, and evaluation harness.
- **Kernel-bypass TCP migration:** DPDK prototype to reassign active flows; measured $\sim 4\mu\text{s}$ migration on commodity servers; analyzed tail-latency and failure-recovery impact.
- **Experiment tooling:** Workload generators, client-side log metrics, one-click cluster bring-up, and CI sanity tests; produced reproducible figures and runbooks.

Bluespec Inc.

Design Engineer

2018–2019

- Tuned RISC-V pipeline/branch predictor for compute workloads; improved IPC by 25% on customer traces.
- Built Jenkins+Docker CI for 500+ configurable builds; cut release cycle from 2 weeks to 3 days.

IIT Madras, RISE Lab

Research Intern

Summer 2017

- Prototype implementations for high-speed SRT division and related FPGA arithmetic; explored quotient correction and parallelism trade-offs.

SELECTED PUBLICATIONS

Adaptive Sharding in Untrusted Environments (*SIGMOD'26*)

Bhavana Mehta, Nupur Baghel, Mohammad J Amiri, Ryan Marcus, Boon Thau Loo

Towards Full Stack Adaptivity in Permissioned Blockchains (*VLDB '24*)

Chenyuan Wu, Mohammad J Amiri, Haoyun Qin, **Bhavana Mehta**, Ryan Marcus, Boon Thau Loo

Towards Adaptive Fault-Tolerant Sharded Databases (*VLDB '23*)

Bhavana Mehta, Neelesh C A, Prashanth Iyer, Mohammad J Amiri, Boon Thau Loo, Ryan Marcus

AdaChain: A Learned Adaptive Blockchain (*VLDB '23*)

Chenyuan Wu, **Bhavana Mehta**, Mohammad J Amiri, Ryan Marcus, Boon Thau Loo

SKILLS

Languages: C++, Python, Java, Bash

Systems: Linux, DPDK, Docker, Jenkins, Git, GitHub Actions, CloudLab

Distributed/DB: Raft/Paxos, PBFT/HotStuff, 2PC, KaHyPar, YCSB, Jepsen-style testing

Hardware: Bluespec SystemVerilog, Vivado; Xilinx UltraScale

TEACHING & MENTORING

Mentored 4 graduate students, 2 undergraduates and 2 PhD students.

TA/guest sessions on distributed systems and blockchain internals.