

Kiran Hombal

☎ +1 2175307369 | ✉ kiranhombal98@gmail.com | 📠 KSTARK007 | in kiranhombal | 📍 Champaign, IL

EDUCATION

University of Illinois Urbana-Champaign

Illinois, USA

[PhD - Computer Science]; CGPA: 4.0/4.0

[Aug 2023 - Present]

Specialization: **Disaggregated memory management and Distributed Storage Systems**;

PES University

Bangalore, Karnataka, India

[Bachelor of Technology - Computer Science and Engineering]

[Aug 2016 - May 2020]

Specialization: **Systems and Core Computing**; CGPA: 9.32/10.0

EXPERIENCE

DASSL Lab @ UIUC | Graduate Researcher

Urbana-Champaign, IL [Aug 2023 – Present]

- Working under the guidance of **Ramnatthan Alagappan** and **Aishwarya Ganesan**.
 - Designed and implemented **UniCache**, a unified caching layer using **Replication-Aware Caching (RAC)** to reduce redundancy in replicated storage systems.
 - Contributed to the design of an abstraction for **cache-coherent access** to coarse-grained objects on a CXL-based rack-scale pod without hardware coherence.
 - Designed and building a **fault-tolerant, distributed Linux page cache** using underutilized memory across data center nodes.
 - Exploring **learned indexes** to optimize memory access and data placement in disaggregated memory infrastructures.
 - Collaborating with **ARCANA Research Group** on a novel **clustering-based caching algorithm** exploiting irregular memory co-locality patterns.

VMware (R&D) | Member of Technical Staff - 2

Bangalore, India [Jan 2020 – Aug 2023]

- [MTS-2] Core Storage: ESXi Kernel**
 - Designed and developed a high-performance **NVMe storage stack** in C/C++ for the ESXi kernel, shipped with **vSphere 8.0**, enabling next-gen disk IO for VMs.
 - Chosen as the primary owner for the **SaaS transformation initiative** across the storage division — led kernel-level redesign and service development for **Core Storage**, **iSCSI**, and **vSCSI** components.
 - Implemented multiple scalable and reliable services directly into the kernel to support hyperscale **VMware Cloud** platforms.
 - Acted as the primary on-call engineer — **triaged and resolved 100+ customer escalations**, performed deep kernel-level root cause analyses and handled multi-node cluster crash investigations.
 - Award:** Runner-up, **CTF VMware Global MooseCon 2021**
- [MTS-1] Core Storage: ESXi Kernel**
 - Architected a modular, in-kernel **error injection framework** supporting **NVMe and SCSI error codes**, used by **10+ internal teams** including vSAN, vVOL, and more.
 - Designed and implemented the **Config-Manager service** for device state and configuration orchestration, capable of scaling across **1024-node clusters** and **4K paths per node**; shipped as part of **vSphere 7.0.3**.
 - Award:** Best Coder, **VMware R&D Bootcamp 2020**
- [Intern] Core Storage: ESXi Kernel**
 - Built an **SPDK-based virtual disk prototype** capable of sustaining **7M IOPS**, outperforming the fastest physical SSDs available (**7x improvement**).
 - Enabled internal benchmarking and kernel-path optimization for next-gen ultra-fast NVMe drives not yet released to market.
 - The project became foundational for future storage stack design within the team and was incorporated into performance testing workflows.

Carnegie Mellon University | Research Intern

Pittsburgh, PA [June 2019 – Aug 2019]

- Developed a kernel-aware Linux MMU **page prefetcher** using a proprietary prediction algorithm for improved memory locality and lower latency in real-time applications.
- Extensively studied the Linux memory subsystem and MMU codebase; built a telemetry platform to collect and analyze **memory access patterns** and metadata in production workloads.

PUBLICATIONS

- Replication-Aware Caching in Replicated Storage Systems.**
Kiran Hombal, Henry Zhu, Shreesha G. Bhat, Ramnatthan Alagappan, Aishwarya Ganesan; *Under Submission*, 2025.
- Fault-Tolerant and Distributed Page Cache.**
Kiran Hombal; *SOSP Doctoral Workshop 2024 (SySDW'24)*, Symposium on Operating Systems Principles, Nov 2024.
- IoT Based Road Travel Time Detection.**
Kiran Hombal, Prajwal Nadagouda, Priya Nayak, Preet Shah, Roopa Ravish; *IEEE International Conference on Advances in Computing, Communications and Informatics (ICACCI)*, Aug 2018.

RESEARCH KNOWLEDGE and SKILLS

- **Programming Languages:**
Highly proficient: C, C++; Proficient: Python
- **Databases/Storage Systems:**
MongoDB, WiredTiger, PostgreSQL, SQLite, RQLite, Cassandra, RethinkDB, CockroachDB, DynamoDB, HBase
Current research: [Distributed DB Cache management](#) (1st Author).
- **Write-Optimized Systems:**
LSM Trees, WiscKey, PebblesDB, SplinterDB, LevelDB, RocksDB
- **Memory Disaggregation:**
libfabric, libibverbs, DPDK, SPDK, user-level RDMA stacks, memory tiering, CXL
Key systems *Far-memory(RDMA)*: InfiniSwap, Fastswap, Atlas, Ditto, AIFM, Carbink, RACE.
Key systems *CXL*: TPP, TMO, Memstrata.
Current research: [Disaggregated fault-tolerant caching](#) (1st Author); [CXL-shared memory](#) (Collaborator)
- **Shared Logs:**
Key systems: Corfu, Delos, Scalog, LazyLog, Speclog (OSDI'25), Tango.
- **Distributed Protocols:**
Lamport Clocks, Vector Clocks, Distributed Snapshots, Paxos (incl. Multi, Fast, Generalized), Raft, Viewstamped Replication, Chain Replication, CRAQ, PBFT
- **Learned Indexes:**
ALEX, Bourbon(LI for LSM trees), FINEdex, Hist-Tree, XStore, ROLEX.
- **Tools and Platforms:**
Kubernetes, Mesos, Vagrant, perf, gdb, QEMU, VMware Fusion, vSAN, vCenter, VMC, fio, flame-graph

VOLUNTEERING EXPERIENCES

- [Artifact Evaluation Committee Member](#) for FAST 2025, OSDI 2024, and ATC 2024 [USENIX] [2024 - 2025]
- [Student Volunteer](#) at SOSP 2024 [ACM SIGOPS] [Nov 2024]
- [Delivered a talk](#) on 'Operating Systems in depth' [PES University, India] [May 2022]
- [Delivered a talk](#) on 'Advance Storage Systems' [PES University, India][Feb 2022]
- [Speaker](#) for IEEE International webinar on Introduction to Microservices and Dockers [IEEE][Oct 2021]
- [Mentor](#) New College Graduate Bootcamp both 2021 and 2022 [VMWARE, India] [June 2021 and June 2022]
- [Teaching Assistant](#) for CS202 - Data Structures (2019), CS251 - Design and analysis of algorithm (2019), CS313 - Big data(2020), CS352 - Cloud computing(2020), CS421 - Web Security (2021) [PES University, India] [Jan 2019 - Dec 2021]

AWARDS AND HONORS

- Scholarship: Prof. CNR Rao Merit Scholarship** [Aug 2016 – Jan 2020]
- Scholarship:** iRISE fully funded research internship at [Carnegie Mellon University](#) [June 2019 – Aug 2019]
- Scholarship:** 1st rank Zonal level; 3rd rank internationally in [National Cyber Olympiad](#) [Feb 2016]
- Award: Runner-up**, CTF VMware Global MooseCon 2021 (VMware only) [2021]
- Award: Best Coder**, VMware R&D Bootcamp [Sept 2020]

TECHNICAL ASSOCIATIONS

- [Member] [Distributed and Storage Systems Laboratory](#) [University of Illinois Urbana-Champaign] [Aug 2023]
- [Member] [Linux Kernel Reading Group](#) [VMWARE] [Feb 2021]
- [Member] [ARCANA Research Group](#) [University of Illinois Urbana-Champaign][Aug 2021]
- [Member] [SAFARI Group](#) [Carnegie Mellon University, USA] [June 2019 - Aug 2021]
- [Member] [Free and Open Source club](#), [CSR club](#) and [Alcoding club](#) [PES University, India] [Aug 2018]