Kiran Hombal

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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 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 **caching algorithm** exploiting irregular memory access 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

[1] **Fault-Tolerant and Distributed Page Cache**.
Kiran Hombal; *SOSP Doctoral Workshop 2024 (SySDW'24), Symposium on Operating Systems Principles, Nov 2024.*

[2] **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]*