

# Vinay S Banakar

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## EDUCATION

University of Wisconsin-Madison

Ph.D in Computer Science

M.S. in Computer Science

Advisors: [Andrea Arpaci-Dusseau](#) & [Remzi Arpaci-Dusseau](#)

2020 (ongoing)

2020 - 2023

PES University

B.E in Computer Science and Engineering

2013-2017

## AREAS OF INTEREST

## PUBLICATIONS

- [1] **Address-Space-Engineered Data Structures for Memory Efficiency** *Under submission*  
*Vinay Banakar et al.*
- [2] **Tidying Up the Virtual Address Space** *DIMES'25*  
*Vinay Banakar, Suli Yang, Kan Wu, Andrea Arpaci-Dusseau, Remzi Arpaci-Dusseau, and Kimberly Keeton*
- [3] **WiscSort: External Sorting for Byte-Addressable Storage** *VLDB'23*  
*Vinay Banakar, Kan Wu, Yuvraj Patel, Kimberly Keeton, Andrea Arpaci-Dusseau, and Remzi Arpaci-Dusseau*
- [4] **Understanding and Benchmarking the Impact of GDPR on Database Systems** *VLDB'20*  
*Supreeth Shastri, Vinay Banakar, Melissa Wasserman, Arun Kumar, and Vijay Chidambaram*
- [5] **CIED - Rapid Composability of Rack Scale Resources Using Capability Inference Engine Across Datacenters** *IEEE Infra'20*  
*Vinay Banakar, Pavan Upadhy, and Maneesh Keshavan*
- [6] **Analyzing the Impact of GDPR on Storage Systems** *ACM HotStorage'19*  
*Vinay Banakar, Aashaka Shah, Supreeth Shastri, Melissa Wasserman, and Vijay Chidambaram*

## PATENTS

- [1] **Intent driven hardware placement using rack capability inference engine across datacenters, 2019** *US20210014998A1*  
*Vinay Banakar, Pavan Upadhy, and Maneesh Keshavan*
- [2] **Intelligent orchestration of disaggregated applications based on class of service, 2019** *US20200249999A1*  
*Tom Golway, Vinay Banakar, and Sandeep Panda*
- [3] **Preemptive compatibility failure detection using graph structure learning in datacenters, 2018** *US10938623B2*  
*Vinay Banakar, Pavan Upadhy, and Maneesh Keshavan*
- [4] **Topology based root cause triangulation of hardware issues** *US10831587B2*  
*Pavan Upadhy, Maneesh Keshavan, Naveena Kedlaya, and Vinay Banakar*

## RECENT PROJECTS

- *OCC hierarchical validation*: Designed a new hierarchical validation scheme for databases that use optimistic concurrency control [Fall'22].
- *Disaggregated-PM aware datastructures*: Explored the performance v/s functionality trade-offs and skewed read/write performance of a disaggregated-PM architecture by implementing a B+-tree and distributed external sort over InfiniBand RDMA [Fall'21].

- *RecoverKV*: Strongly consistent, partition tolerant Key-Value store built in Go using quorum protocol [Spring'21].
- *DIAS*: Distributed machine learning Inference as A Service [Spring'21].
- *AutoTune-IO*: Optimizing Linux IO scheduler parameters using Bayesian Optimization [Fall'20]

## TEACHING EXPERIENCE

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|---------------------------------|------------------------------|
| • CS739: Distributed Systems    | TA (UW Madison, Spring 2022) |
| • CS537: Operating Systems      | TA (UW Madison, Fall 2021)   |
| • ECE252: Computer Organization | TA (UW Madison, Spring 2021) |
| • CS220: Data programming       | TA (UW Madison, Fall 2020)   |

## RESEARCH & INDUSTRY EXPERIENCE

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<b>Google</b> Student Researcher <i>Systems Research Group</i> Summer 2023 - Present	Advisor: <a href="#">Dr. Kimberly Keeton</a> - Developed ML models to improve memory efficiency and reliability in Borg. - Built a compiler-runtime system, for hot/cold object separation within application address spaces. Achieved up to 70% memory footprint reduction. - Developed a framework to help optimize memory tiering for Spanner using LLVM program analysis and TcMalloc allocation hints.
<b>UW Madison</b> Research Assistant <i>Advanced Systems Lab</i> Summer 2021 - Present	Advisors: <a href="#">Prof. Andrea Arpaci-Dusseau</a> and <a href="#">Prof. Remzi Arpaci-Dusseau</a> Designed <i>WiscSort</i> , a high-performance concurrent sorting system for byte-addressable storage that is 7x faster than state-of-the-art. Bridging the semantic gap between application and kernel memory management to achieve peak memory efficiency through dynamic layout optimization.
<b>Microsoft</b> Research Assistant <i>Gray Systems Lab</i> Spring 2023	Advisor: <a href="#">Dr. Jesús Camacho Rodríguez</a> - Investigated new HTAP designs for CXL memory and storage devices. - Extended SCAN, JOIN, and SORT operations to support persistent memory. - Optimized DB operations to exploit hardware heterogeneity.
<b>HPE RnD Labs</b> Senior Systems Engineer 2017-2020	Advisors: <a href="#">Dr. Kimberly Keeton</a> Developed applications for disaggregated persistent Fabric Attached Memory ( <i>openFAM</i> ) to evaluate it against traditional cluster-based HPC programming models ( <i>openSHMEM</i> and <i>MPI</i> ). Also, built features for large scale datacenter management software (OneView) and developed Redfish compliant server hardware simulator.
<b>UT Austin</b> Research Fellow <i>Systems and Storage Lab</i> 2018-2019	Advisor: <a href="#">Prof. Vijay Chidambaram</a> - Demonstrated the pitfalls of retrofitting existing systems to comply with GDPR. Modified Redis, Postgres, etc to showcase feasible alternatives. - Built <i>GDPRBench</i> , a benchmark that lets user to assess compliance level of storage systems and help evaluate compliance-performance tradeoff.
<b>HPE RnD Labs</b> Research intern 2017	Implemented a virtual host simulation platform that mimics ESXi instances as hosts in VMware vCenter clusters. Scaled up to 1000+ simulated hosts that were leveraged for performance evaluation in OneView.

## AWARDS AND ACCOMPLISHMENTS

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- Silver award for innovation at Hewlett Packard Enterprise, 2020
- First prize at *8th IEEE conference on Cloud Computing in Emerging Markets*, 2019.
- Second place at Open hack 2016 and SimpliHack 2015.

## SERVICE

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- Poster presentation: VLDB 2023, Database Affiliates 2022, UW Madison.
- Program committee: *HPE TechCon'20*, *IEEE HiPC (2024, 2025)*, *EuroSys'25 (shadow)*, *IPDPS'25*
- Artifact evaluation review Committee: *ASPLOS 2020*, *SOSP 2019*
- Book Contribution: *Effective Cybersecurity - Understanding and Using Standards and Best Practices*.
- Open source contributions: *Apache Ratis*, *Postgresql* and *YCSB*