ECE Computes Faculty Search Candidate Seminar

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2:00 P.M. • MSEE 112

Systems-Architecture Co-Design for AI and Large-Scale Data Analytics

Abstract
Modern computing systems are increasingly bottlenecked by the demands of dataintensive applications such as AI, data analytics, and scientific computing. These challenges stem from both the massive scale of data and inefficiencies caused by irregular access patterns. In this talk, I will present my research on innovative co-design approaches to systems and architectures that tackle these pressing issues. First, I will introduce Vortex, a system that accelerates large-scale data analytics on GPUs by orchestrating efficient data transfers across multi-GPU systems, proposing a concept called GPU resource disaggregation. Then, I will discuss Prodigy, a hardware-software co-design framework that minimizes memory stalls in irregular workloads on CPUs through advanced workload analysis and prefetching techniques. Together, these advances highlight how domain-specific co-design can drive transformative improvements, addressing fundamental bottlenecks in modern computing. Finally, I will share my vision for tackling future challenges in scaling AI capabilities and the research directions I am eager to pursue to address them.

Bio
Nishil Talati is an Assistant Research Scientist in the Computer Science and Engineering department at the University of Michigan, where he also earned his PhD. His research focuses on computer architecture and systems software design to enhance the efficiency of modern data-driven applications. Nishil's work has been featured in top-tier venues such as ISCA, MICRO, HPCA, ASPLOS, and VLDB, and has made a significant impact through industry tech-transfers, inspiring follow-up research, and earning several accolades. These include the 2021 HPCA Best Paper Award, honorable mentions at DATE 2023 and IISWC 2023, recognition as a 2023 ProQuest Distinguished Dissertation Award finalist, the Best Faculty Research Pitch Award at MIDAS event in 2023, and finalist status in the 2022 CSE Honors Competition.

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