CDMS Research Seminar

Data-driven Approaches for Energy-aware Application Management in Cloud and Edge Systems

Monday, 29th April 2024, 3:00 pm

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Speaker: Dr Shashikant Ilager, Vienna University of Technology (TU Wien), Austria

Abstract: Contemporary large-scale computing systems are becoming increasingly heterogeneous and decentralized, driven by the growing demand for digitization, particularly for low-latency smart applications. We are witnessing the deployment of new edge micro Data Centers (DCs) alongside existing hyper-scale cloud DCs. These cyber-physical infrastructures consume an enormous amount of energy; a study estimated that cloud DCs alone account for 1-2% of global electricity consumption (up to 400 TWh), contributing significantly to carbon emissions. Assessing and managing energy use in large and distributed systems is challenging due to the hyper-heterogeneity of hardware and their power characteristics, the diversity of user workloads and software stacks, and the fact that certain energy-saving measures can reduce performance, compelling service providers to limit optimizations to avoid performance penalties. Furthermore, existing energy-efficient resource management solutions, which are based on human-designed heuristic algorithms or rule-based policies, are effective in simple and controlled environments but inadequate for dynamic and large-scale complex systems. The advent of machine learning and the availability of monitoring data have created opportunities for data-driven, ML-centric resource management techniques. In this talk, I will talk about our recent research works in developing data-driven models and optimization strategies for efficient energy management in large-scale cloud and edge computing systems.

Bio: Dr. Shashikant Ilager is a postdoctoral researcher in HPC Research group at TU Wien, Austria. Previously, he completed his PhD with a focus on ML-based energy and thermal efficient cloud data center resource management at the CLOUDS Lab, University of Melbourne, Australia. His research interests span the intersection of large-scale distributed systems and machine learning, where he investigates various resource management techniques focusing on sustainability. As a systems researcher, his goal is to design and implement automated, data-driven resource management algorithms and systems. His current research emphasizes green and cost-effective computational methods across the cloud-edge continuum. His work, grounded on characterizing distributed systems and his research methods encompasses the entire computing stack—from individual nodes to large-scale data centers—and extends to the development of hardware-software co-design methods for executing application workloads fast

and resource efficiently. He has published several papers in leading journals and conferences, including IEEE TPDS, IEEE TMC, ACM ASE, IEEE/ACM CCGRID. He is the recipient of Best Paper Awards from the CCGRID20 and UCC23 conferences.

Rodrigo Calheiros is inviting you to a scheduled Zoom meeting.

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