# 21st International Workshop on Data Management on New Hardware (DaMoN)

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## Abstract

New hardware, such as multi-core CPUs, GPUs, FPGAs, new memory and storage technologies, and low-power devices, bring new challenges and opportunities in optimizing database systems performance. Consequently, exploiting the characteristics of modern hardware has become an important topic of database systems research. In the last two decades, the DaMoN Workshop has established itself as the primary database venue to present ideas on how to exploit new hardware for data management, in particular, how to improve the performance or scalability of databases, how new hardware unlocks new database application scenarios, and how data management could benefit from future hardware.

## CCS Concepts

• **Information systems** → **Data management systems**; • **Computer systems organization** → **Architectures**.

## Keywords

modern hardware, databases, compilers, networking

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## 1 Introduction

Hardware continues to evolve at high speed. This includes CPU architectures introducing new instructions, e.g., for vectorized processing, hardware transactional memory, or dedicated to machine learning, and new micro-architectural features, e.g., new levels in the memory hierarchies or new bus technologies such as CXL to interact with memory or other devices.

At the same time, new memory technologies, e.g., high-bandwidth memory, persistent memory, or new generations of (smart) DRAM DIMMs, new storage technologies and protocols, e.g., Smart SSDs or NVMe drives, as well as new network technologies, e.g., RDMA, are developed. Furthermore, data center infrastructure incorporates these technologies to become more easily accessible by exposing them as a service in the cloud.

As such, efficient data management at scale, with high performance or low energy consumption, is needed as the volume, variety, and velocity of data keep growing. Consequently, database architects are challenged to exploit new hardware effectively and efficiently.

For the last two decades, DaMoN has established itself as the primary venue for researchers to exchange information, learn from each other, and improve the interaction between the database software and the underlying hardware and devices, as well as discovering and understanding hardware trends and building strong data management systems for the future.

The focus of this workshop is to strengthen the communication between the database community and the broader computer systems communities, specifically the computer architecture, compiler, operating systems, and storage communities. As these fields evolve independently, database software has proven to under-utilize the underlying hardware technology.

## 2 Objective and Topics of Interest

The aim of this one-day workshop is to bring together researchers who are interested in optimizing database performance on modern computing infrastructure by designing new data management techniques and tools.

The continued evolution of computing hardware and infrastructure imposes new challenges and bottlenecks to program performance. As a result, traditional database architectures that focus solely on I/O optimization increasingly fail to utilize hardware resources efficiently. Multi-core CPUs, GPUs, FPGAs, new memory and storage technologies (such as flash and non-volatile memory), and low-power hardware imposes a significant challenge to optimizing database performance. Consequently, exploiting the characteristics of modern hardware has become an essential topic of database systems research.

The goal is to make database systems adapt automatically to sophisticated hardware characteristics, thus maximizing performance transparently for applications. To achieve this goal, the data management community needs interdisciplinary collaboration with researchers from computer architecture, compilers, operating systems, and storage. This involves rethinking traditional data structures, query processing algorithms, and database software architectures to adapt to the advances in the underlying hardware infrastructure.

We seek submissions bridging database systems to computer architecture, compilers, and operating systems. We also invite submissions to our call for papers on hardware/software co-design


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for modern data-intensive workloads, including but not limited to machine learning training and inference, graph analytics, and similar tasks. As these workloads continue to grow in scale and complexity, innovative co-design approaches that tightly integrate hardware architectures and software systems are crucial to achieving breakthroughs in performance, energy efficiency, and scalability. In particular, submissions covering topics from the following nonexclusive list are encouraged:

- Database algorithms and data structures on modern hardware
- Cost models and query optimization for novel hierarchical memory systems
- Hardware systems for query processing
- Data management using co-processors
- Novel application of new storage technologies to data management
- Query processing using computing power in storage systems
- Database architectures for low-power computing and embedded devices
- Database architectures on multi-threaded and chip multiprocessors
- Performance analysis of database workloads on modern hardware
- Compiler and operating systems advances to improve database performance
- New benchmarks for micro-architectural evaluation of database workloads
- Taking advantage of modern network capabilities for data processing
- Hardware/software co-design for modern data-intensive workloads (e.g., machine learning, graph analytics)

## 3 Organization Committee

The organizers of the workshop thank the DaMoN steering committee for their guidance and support:

- Anastasia Ailamaki, EPFL, Switzerland
- Peter Boncz, CWI, Netherlands
- Stefan Manegold, CWI, Netherlands
- Ken Ross, Columbia University, USA

We are very grateful to our program committee members for their help in reviewing the submissions. The program committee members for DaMoN 2025 were:

- Anastasia Ailamaki, EPFL, Switzerland
- Yannis Chronis, Google, USA
- Muhammad El-Hindi, Technische Universität Darmstadt, Germany
- Jana Giceva, Technische Universität München, Germany
- Norman May, SAP SE, Germany
- Beng Chin Ooi, National University of Singapore, Singapore
- Orestis Polychroniou, Amazon Web Services, USA
- Danica Porobic, Oracle, Switzerland
- Tilmann Rabl, Hasso Plattner Institute, Germany
- Kenneth Ross, Columbia University, USA
- Rathijit Sen, Microsoft, USA
- Utku Sirin, Harvard University, USA
- Rebecca Taft, Cockroach Labs, USA
- Pinar Tozun, IT University of Copenhagen, Denmark
- Tianzheng Wang, Simon Fraser University, Canada
- Huanchen Zhang, Tsinghua University, China
- Tobias Ziegler, Technische Universität München, Germany

## 4 Reviewing Process

We follow a single-blind reviewing process with at least three reviews per paper. The goal of the discussion period is to come to a consistent conclusion regarding the acceptance of the papers. For DaMoN 2025, we received 20 long and 5 short paper submissions. The review process is still ongoing as of the time of writing this summary. For further details, we refer the readers to our webpage at https://www.damon-db.org/.