

CONSORTIUM COMMUNICATION ASSET



AERO Project - Press Release

AERO Advances HPC Innovation with TornadoVM

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Lead organisation(s)	The University of Manchester (UNIMAN)
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The AERO project announces significant technological progress in heterogeneous computing through the continued evolution of TornadoVM, culminating in its latest major release. This milestone highlights AERO's commitment to enabling high-performance and energy-efficient computing by extending TornadoVM support to the ARM Rhea processor and related processor families (e.g., ARM Neoverse V1, ARM Neoverse N1, ARM Neoverse V2), while simplifying how applications leverage modern heterogeneous hardware platforms.

TornadoVM allows developers to transparently accelerate Java applications across CPUs, and GPUs, eliminating the need for complex hardware-specific programming.

Technological Advancements in AERO

Enhancing Performance Portability and Developer Productivity

TornadoVM has steadily evolved into a mature framework for performance portability. With its latest release, the platform has introduced key advancements that improve both usability and execution efficiency across heterogeneous systems.

Key features include:

- SDK distribution (TornadoVM Download Website, SDKMAN!)
- Support for JDK 25
- Improved CI/CD for regression tests across multiple Operating Systems
- Integration with RISC-V 64 systems that support RVV
- Support for AI types (FP16, Tensors)
- Memory management improvements, including fields accessors, buffer accessors and data reusability)

Driving AERO's Vision for Efficient Computing

Within the AERO project, TornadoVM is a core enabling technology that supports efficient execution of data-intensive and compute-intensive applications. It contributes to improved energy efficiency, scalability, and performance portability across heterogeneous environments.

It is being evaluated in domains such as data analytics, scientific computing, and AI workloads.

TornadoVM lets a Java team run GPU-accelerated workloads without leaving Java. We proved it in ESA Gaia variability studies on AERO: on the best GPU setup the Period Search algorithm runs up to 88x faster than on CPU, and a production campaign projected to take a month now completes in just over four days, on far more objects than originally planned. The TornadoVM team's fast iteration, making the platform production-class while adding powerful new features, was central to getting there. Compute time stopped being the constraint on what we could analyze.

Krzysztof Nienartowicz | Tech Head of ESA Gaia Variability studies unit | CEO & Founder of Sednai Sarl | AERO Consortium Partner

About the AERO project

AERO is a Horizon Europe research and innovation project focused on advancing next-generation computing systems with improved performance, scalability, and energy efficiency.

About TornadoVM

TornadoVM is an open-source runtime system that enables transparent acceleration of Java applications on heterogeneous hardware.

Impact / Closing statement

Through AERO, the University of Manchester partnered with Sednai Sarl to deliver the first production deployment of TornadoVM, accelerating Sendai's data pipeline and reducing processing time from 30 days to 5 days via GPU offloading (6x performance speedup).