

The 2023 Energy HPC Conference: Taking Supercomputing Further in the Face of the Energy Transition

[The Ken Kennedy Institute](#) hosted the 16th annual [Energy High Performance Computing Conference](#) on February 28 - March 1, 2023. The Energy HPC Conference is the premier meeting place for key stakeholders to engage in conversations about challenges, opportunities, and new developments advancing high performance computing in the energy industry. This annual gathering, which began in 2008 as the Rice Oil & Gas HPC Workshop, takes a critical look at — as put by *HPCwire* editor Addison Snell — “strategic directions for traditional and evolving definitions of energy and HPC,” especially in the face of the energy transition to welcome renewable alternatives through the influence of both the current political and environmental climate.

Over 550 leaders in high performance computing, information technology, academia, and the energy sector gathered at the BioScience Research Collaborative on Rice University’s campus in Houston, TX to participate in the discussion and learn from experts at the core of energy and HPC innovation. The 2023 conference welcomed 33 international attendees and 137 from out of state, with attendance from Brazil, Canada, France, Germany, Great Britain, Iceland, Israel, Italy, New Zealand, and Ukraine.



Discovering Developments in HPC

“Seven of the most powerful 50 supercomputers on the November 2022 Top500 list are at energy companies – and those are just the ones we know about.” – Addison Snell

The intersection of the energy industry and high performance computing requires constant innovation to meet the changing demands of the industry, environment, global community, and workforce. Supercomputing is and continues to be pivotal in taking energy capabilities further. Each year at the conference we learn of something new emerging in the industry beckoning to be discussed, challenged, and applauded before the next innovation comes to fruition, be it new technology, processes, concepts, or applications.

This year, the 2023 Energy HPC Conference featured keynote speakers **Henri Calandra**, Expert in Numerical Methods and HPC for Geoscience at TotalEnergies, and **John Etgen**, Distinguished Advisor for Geophysics at bp, on Tuesday to discuss “What Really Matters to our Industry in the Area of HPC and the Era of Exascale,” from cloud computing to the emergence of artificial intelligence in HPC. Wednesday’s keynote speaker **Bronson Messer**, Director of Science at the Oak Ridge Leadership Computing Facility (OLCF) at Oak Ridge

National Laboratory (ORNL), spoke on “Frontier: The World’s First Exascale Supercomputer,” highlighting its architecture and capabilities.

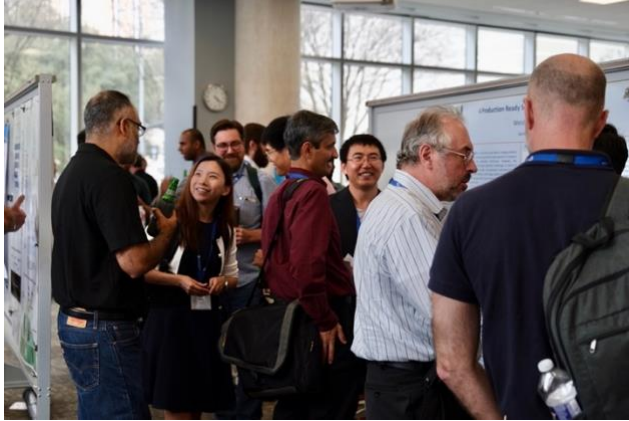
Other invited speakers included **Wafik Beydoun**, International Association of Oil & Gas Producers (IOGP); **Gibby Dunleavy**, Constant Impact LLC; **Gary Grider**, Los Alamos National Lab (LANL); **Samir Khanna**, bp; **Partha Routh**, ExxonMobil Engineering and Technology Company; and **Dan Stanzone**, Texas Advanced Computing Center (TACC), The University of Texas at Austin.



In addition to invited speaker sessions, the conference featured parallel technical sessions focused on algorithms, machine learning, optimization, and systems. The conference also created a gathering space for breakout discussions on niche topics of interest to start the mornings, with conversations on large-scale data management, building better collaborations, communicating the value of HPC, and supporting diversity in the workforce.

Filled with rich insights and hours of content, the 2023 Energy HPC Conference was not short of entertainment and engagement, with each day of the conference concluding in afternoon receptions. Tuesday’s Sponsor Networking Reception allowed attendees to meet with over 30 conference sponsors including Lenovo, the 2023 Platinum Sponsor. To pair with the evening’s fruitful conversations, the reception included a specialty wine, cheese, and heavy appetizer selection along with magic and entertainment from the Crescent Circus. Wednesday’s Poster Presentation Reception showcased exciting research happening in the field by future leaders in high performance computing.





Post-Conference Workshops

The conference also featured three post-conference workshops on March 2, 2023 where attendees could choose their own agenda, whether it be through an interest in HPC trends and best practices, Devito code training, or physics-informed machine learning through NVIDIA Modulus.



Best Practices in HPC Systems Management

The “Best Practices in HPC Systems Management” workshop, organized by conference founder and advisor at Intel, Keith Gray, included panels discussing trends, best practices, and challenges discovered across facilities, as well as sessions dedicated to standardized cross-platform benchmarking, SysAdmin automation, Linux distribution, telemetry, and monitoring. The workshop heard from practitioners and experts from industry, academia, and national labs.

Workshop Speakers:

- **Kent Blancett**, bp
- **Gerard Gorman**, Devito Codes

- **Fabio Luporini**, Devito Codes
- **Wade Vinson**, HPE
- **Keith Gray**, Intel
- **Tim Osborne**, ORNL
- **David Baldwin**, Shell
- **Tommy Minyard**, TACC
- **Donny Cooper**, TotalEnergies
- **Russell Jones**, Total Energies

Devito Training

Those interested in expanding their technical skill could attend the “Devito Training” workshop organized by Devito Codes co-founders Gerard Gorman and Fabio Luporini, as well as representatives from Chevron and Imperial College London. Attendees learned to develop finite-difference solvers and design a basic FWI (Full-Waveform Inversion) framework with Devito, a Domain-Specific Language (DSL) and code generation framework. Through a parallel track, attendees also discussed standardized cross-platform benchmarking and learned to develop new benchmarks.

Workshop Speakers:

- **Luke Decker**, Chevron
- **John Washbourne**, Chevron
- **Gerard Gorman**, Devito Codes
- **Fabio Luporini**, Devito Codes
- **Rhodri Nelson**, Imperial College London
- **Ed Caunt**, Imperial College London
- **Zoe Leibowitz**, Imperial College London

Introduction to Physics-Informed Machine Learning with Modulus

The “Best Practices” and “Devito Training” workshops are returning themes for the Energy HPC Conference, but they were joined by an additional theme in 2023: “Introduction to Physics-Informed Machine Learning with Modulus.” This workshop was organized by NVIDIA representatives including Pavel Dimitrov, Sr Solutions Architect. The workshop introduced NVIDIA Modulus, a machine learning platform that turbocharges quick iterative use cases by building physics-based deep learning models — that are 100,000x faster than traditional methods — and offers high-fidelity simulation results. Attendees learned techniques to solve data-driven and physics-driven problems using Modulus through hands-on application sessions, and they left with an understanding of how the Modulus framework integrates with the overall Omniverse platform.

Workshop Speakers:

- **Pavel Dimitrov**, NVIDIA
- **Ken Hester**, NVIDIA

- **Fatmir Hoxha**, NVIDIA
- **Guillaume Barnier**, NVIDIA
- **Guillaume Thomas Collignon**, NVIDIA
- **Igor Terentyev**, NVIDIA
- **Kashif Chauhan**, NVIDIA

Scott Morton Memorial Graduate Fellowship

The Ken Kennedy Institute would be remiss if we did not recognize Scott Morton and his bountiful contributions to the conference over the years, especially in founding the original “Rice Oil & Gas HPC Workshop” in 2008, paving the way for a successful conference to continue evolving more than 15 years later.

[Scott Morton, Ph.D.](#) was an Adjunct Professor of Computational & Applied Mathematics at Rice University and served as a dedicated speaker, planner, and friend on the conference committee until his passing in 2022. Scott’s career in energy and HPC was distributed between Shell, Thinking Machines, Cray Research and SGI for seven years before spending the next 19 years at Hess Corporation.

In his honor, the Ken Kennedy Institute will annually award the Scott Morton Memorial Graduate Fellowship in the amount of \$7,500 to a well-qualified graduate student at Rice University. The fellowship is part of the Ken Kennedy Institute’s [Industry-Sponsored Graduate Fellowship Program](#) available to graduate students pursuing research related to high performance computing, computational science and engineering, and data science. The first recipient of the Scott Morton Memorial Graduate Fellowship is Chen Chen, a graduate student in the Department of Civil and Environmental Engineering at Rice University. This fellowship in particular is made possible through the Energy HPC Conference fund, which has previously funded one-year supplemental fellowships for 23 students since 2012.

ICYMI: Recorded Sessions

You can watch the recordings of presentations from the 2023 Energy High Performance Computing Conference (February 28 - March 1) and the post-conference workshops (March 2) on the Ken Kennedy Institute YouTube channel. See what you missed or go back to watch key insights from our invited speakers, technical sessions, and workshop discussions.

View the recorded sessions here: <https://bit.ly/3n02HWD> | [@RiceKenKennedyInstitute](#)

You can also read through conference highlights on this [HPCwire article](#), "Rice Energy HPC Conference Expands Horizons of ‘Energy,’ ‘HPC’" by Addison Snell, CEO of *Intersect360 Research* and a veteran of the high performance computing industry.

Looking to the Future of Energy HPC

The conclusion of the 2023 Energy HPC Conference is met with anticipation for the next iteration, where boundaries of what's possible will continue to be pushed, allowing new developments and new technologies to define the future state of high performance computing and energy.

Save the date for the **17th annual Energy HPC Conference**, happening **March 5-7, 2024** at the BioScience Research Collaborative at Rice University in Houston, TX. We look forward to having you join us!



Join the Ken Kennedy Institute [HPC Community](#) to be the first to know details about the 2024 Energy HPC Conference and other HPC-related events. You can also join the general [Ken Kennedy Institute Community](#) mailing list to stay in the know on all other news and events happening through the Ken Kennedy Institute, or follow along with us on [Medium](#), [LinkedIn](#), [Twitter](#), and [YouTube](#).

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Conference Website: energyhpc.rice.edu

View 2023 Program: <https://bit.ly/3jrv8V3>