

# NEWSBYTES

September 2022



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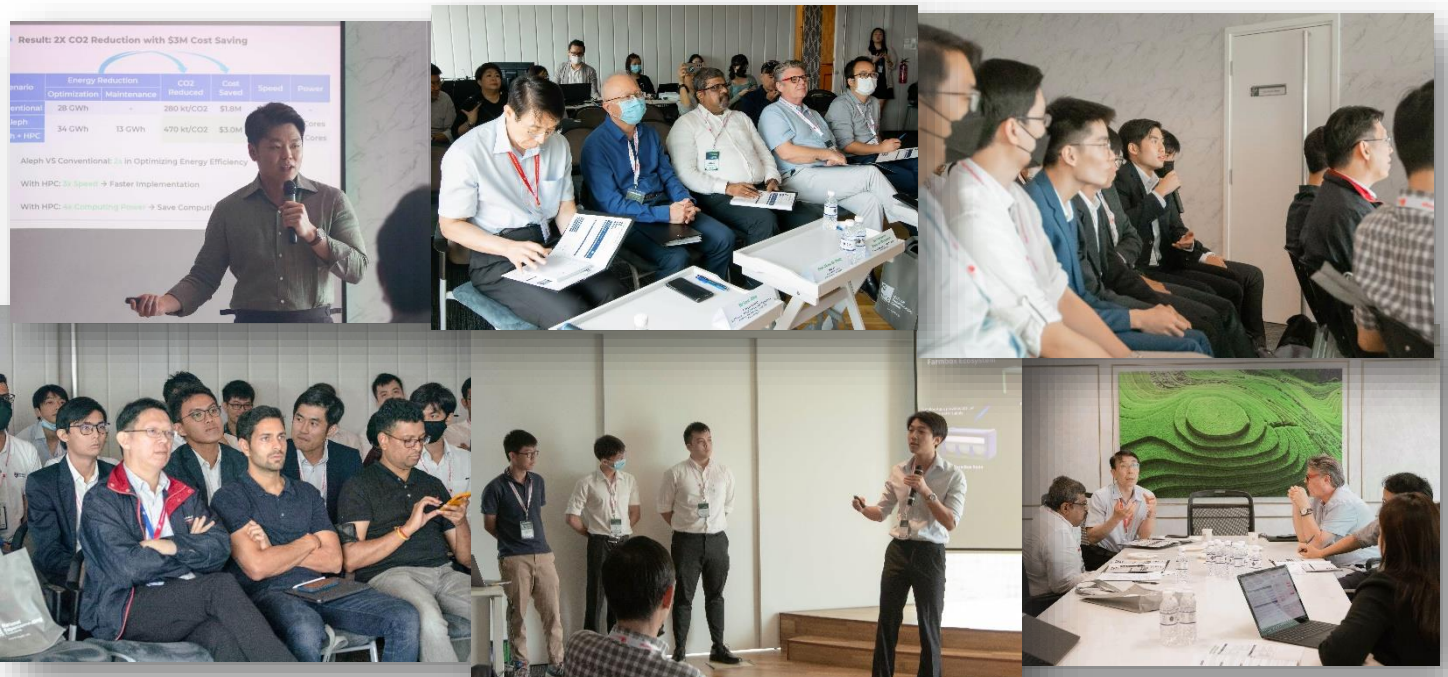
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## CONGRATULATIONS! Presenting the winners of NSCC's first-ever HPC Innovation Challenge for the Environment

*The top ten finalists presented their transformative and innovative solutions to build a more sustainable future for Singapore.*



After 7 intense weeks of developing their solutions, the top ten shortlisted finalists gathered together on 16 Sep 2022 to showcase their work at the HPCIC Demo Day. Teams were tasked to innovate using HPC and apply HPC to address one or more of the following areas for our environment – **1) Enabling a Data-Centric Approach to Manage Our Environment, 2) Reducing Carbon Footprint, 3) Planning Our Urban Environment Better** and

**4) Building Greater Resilience for Climate Change.** The teams were provided with access to NSCC's supercomputing resources and an experienced HPC mentor was assigned to help the teams refine their ideas.

The teams presented their solutions to our panel of esteemed judges and the top 3 teams from each category were crowned the winners of the HPCIC.

**HPC Innovation Challenge Winners**

	<b>Winner</b>	<b>1<sup>st</sup> Runner Up</b>	<b>2<sup>nd</sup> Runner Up</b>
<b>Student Category</b>	<p><b>Viridis</b> from Nanyang Technological University (NTU) &amp; Singapore Management University (SMU)</p> <p>The team developed a numerical assessment tool that automatically assigns walkability, bike-ability and drivability scores to evaluate transport flow.</p>	<p><b>Bellman Ford</b> from Singapore University of Technology &amp; Design (SUTD) &amp; National University of Singapore (NUS)</p> <p>The team developed an analytics platform which will aid the decision-making process of urban planners in determining which walking paths to improve on and the best way to do so.</p>	<p><b>FRG Team</b> from Singapore University of Technology &amp; Design (SUTD)</p> <p>The team proposed to use HPC to efficiently design new fluorophores by conducting virtual screening and systematic data analysis. The new method will reduce chemical waste by eliminating the need to carry out trial-and-error methods.</p>
<b>Open Category</b>	<p><b>Aleph Technologies</b> from Aleph Digital Technologies Pte. Ltd.</p> <p>The startup sought to utilise HPC to empower the AI-engine capability and speed in suggesting the optimal operating parameter of their current platform, so that their solution can help factories further reduce energy consumption and CO2 generation.</p>	<p><b>GeoPulse</b> from HSC Pipeline Engineering Pte Ltd</p> <p>The engineering company sought to utilise HPC to carry out automated subsurface utility mapping by compiling and analysing large volumes of GPR, drawing and digital twin data.</p>	<p><b>DBF Minds</b> from Digital Blue Foam Pte. Ltd, Singapore</p> <p>DBF, an AI-Architecture startup, collaborated with Karamba3D to explore ways of generating synthetic data-sets to reduce the carbon impact of new and existing building designs.</p>

The six winning teams walked away with cash and prizes including:

- Up to SGD5,000 in cash
- A chance to showcase their solution on an international stage
- A chance to be featured in NSCC's Supercomputing Asia magazine
- Commercialisation and market access opportunity for their solution
- An internship opportunity at NSCC (Student category only)

***Well done to all participants and we hope to see you again for the HPC Innovation Challenge next year!***



## HPC Asia 2023 Call for Papers

**Abstract and paper submissions are now open!**



High performance computing is a key technology to solve large problems in science, engineering, and business by utilizing continuously evolving computing power. HPC Asia, which is an international conference series on HPC technologies in the Asia Pacific region, has been held several times in various countries in Asia, to discuss issues in HPC and to exchange information on research and development results.

For the first time ever, HPC Asia 2023 (HPCA23) will be co-located and held in conjunction with the international [SupercomputingAsia 2023 \(SCA23\)](#) conference from **27 February – 2 March 2023**. The SCA conference is co-organised by supercomputing centres of the region including those in Australia, Japan, Singapore and Thailand and anchored by the National Supercomputing Centre (NSCC) Singapore. SCA incorporates a number of important supercomputing and allied events that together aim to promote a vibrant and shared high-performance computing (HPC) ecosystem, for both the public and private sectors, in Asia. Like HPCA23, SCA23 also seeks to nurture an exchange of ideas, case studies, and research results related to all issues of HPC.

The HPCA23 consists of four tracks:



Details for topics of interest include, but are not limited to:

### Applications & Algorithms

- High performance applications (high speed, low memory, low power simulations)
- Computational science
- Numerical linear algebra and its applications
- High performance library and software framework for applications
- Parallel and vectorization algorithms
- Hybrid/heterogeneous/accelerated algorithms
- Fault-tolerant algorithms
- Graph algorithms

### Programming Models & System Software

- Programming languages and compilation techniques
- Tools and libraries for performance and productivity
- Performance portability
- System management, resource management and scheduler
- Optimization for communication and memory
- Techniques for testing, debugging, reproducibility and determinism
- Techniques for fault tolerance and energy efficiency

### Data, Storage & Visualisation

- Big data processing with emerging hardware
- Parallel and distributed file systems
- Storage networks
- Storage systems
- Visualization and image processing
- Reliability and fault tolerance
- Scalable data management
- Transaction processing
- Integration of non-volatile memory
- I/O performance tuning, benchmarking and evaluation
- Provenance
- Experience and application studies on large-scale storage architectures

### Architectures & Networks

- Memory architectures
- Interconnect/Network architectures
- Acceleration technologies (e.g., GPUs, FPGAs)
- Power/Energy-aware high-performance computing
- Dependable high-performance computing
- Architectures for emerging device technologies

### Programme Chair



**Dr. Dhabaleswar K. (DK) Panda**  
Professor and Distinguished Scholar,  
Computer Science and Engineering  
The Ohio State University (OSU),  
United States of America

### Proceedings Chair



**Prof Ryohei Kobayashi**  
Center for Computational Sciences,  
University of Tsukuba

**Abstract Submissions Due: 3 October 2022**

**Paper Submissions Due: 10 October 2022**

**Notice of Acceptance: 30 November 2022**

*We welcome new abstract submissions until the paper submission deadline. Please submit abstracts and papers together via the same [Linklings submission form](#) by the deadline.*

**SUBMIT HERE**

All accepted papers will be published by [ACM](#), and included in [ACM digital library](#) if presented at the conference. More information about HPCA23 Call for Papers available [here](#). Please contact the Programme Chair at [hpcasia23papers@sc-asia.org](mailto:hpcasia23papers@sc-asia.org) for any questions/clarifications.

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## Supercomputers aid in research to control ozone pollution

**Researchers from NTU leverage high-performance computing resources to better understand the effects of ozone pollution and develop tools to control emissions in Southeast Asia.**

Ambient air pollution has become one of the greatest risks to human health. According to the World Health Organization (WHO), around 4.2 million premature deaths are caused by air pollution every year, with Ozone (O<sub>3</sub>) being one of the most serious air pollutants, which is detrimental to both human health and the natural ecosystem.

With substantial anthropogenic and biogenic emissions, Southeast Asia (SEA) experiences serious O<sub>3</sub> pollution problems at an increasing rate of +0.45 ppb every year. However, the understanding of O<sub>3</sub> pollution in SEA remains limited and is insufficient to support governments in developing effective air pollution control policies.



O<sub>3</sub> is a secondary air pollutant that is formed and transformed through complex photochemical reactions. Reducing the precursors may not necessarily reduce O<sub>3</sub> emissions. To effectively control the O<sub>3</sub> pollution and to decrease the mortality rate caused by excessive O<sub>3</sub> exposure in SEA, it is critical to investigate the relationship between O<sub>3</sub> pollution and its precursors' emissions, as well as the subsequent impact to human health in the region.

A team of researchers at [The Asian School of the Environment at Nanyang Technological University](#) are leveraging NSCC's high-performance computing resources to simulate O<sub>3</sub> concentrations and evaluate the O<sub>3</sub> sensitivity to each precursor emission species in SEA. The team also seeks to apportion the contribution of emission sources based on local and transboundary O<sub>3</sub>. Additionally, the researchers are quantifying the impact of O<sub>3</sub> in SEA and the effects of the precursors' emissions on human health. Their research will advance the understanding of the relationships between health impact, O<sub>3</sub> and the precursors' emissions in SEA, which provides a useful reference to guide for regional policymakers on how to effectively control O<sub>3</sub>. This will be particularly useful in controlling the precursors' emissions to protect human health and achieve the global UN Sustainable Development Goal.

*"Our project adopts the Community Multiscale Air Quality Modeling System (CMAQ) model with the embedded photochemical reactions to simulate the daily O<sub>3</sub> concentrations in Southeast Asia with 30m spatial resolution. While the CMAQ model is a powerful chemical transport model solving a series of governing equations that represent how the atmosphere works, it requires a large amount of computational resources to capture the dynamic atmospheric conditions and conduct a simulation. With the support of NSCC's HPC resources the simulation speed of our research was increases by nearly 20 times."*



**Steve Yim**

Associate Professor, The Asian School of the Environment, Nanyang Technological University

To find out more about how NSCC's HPC resources can help you, please contact [e-news@nscg.sg](mailto:e-news@nscg.sg).

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*Shared articles and news from the HPC world.*

## **Finland and Singapore to collaborate on quantum technologies**

*Finland and Singapore's National Quantum Office ink MoU to strengthen research cooperation on quantum technologies. The collaboration aims to accelerate the development of quantum technology hardware components, as well as algorithms and applications.*

The National Quantum Office of Singapore, VTT Technical Research Center of Finland, IQM Quantum Computers, and CSC Finland signed an MoU paving the way for versatile technology development and knowledge exchange on national strategic roadmaps for quantum technologies. Under the MoU, the parties aim to accelerate the development of quantum technology hardware components, algorithms and applications, and collaborate in the areas of quantum-accelerated high-performance computing and both terrestrial and satellite quantum communications. Read more at Tech Wire Asia [here](#).



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## **KAUST Selects HPE to Build the Middle East's Most Powerful Supercomputer**

*King Abdullah University of Science and Technology's Shaheen III will accelerate scientific discovery and enable AI-at-scale through advanced modeling, simulation, analytics and neural network training capabilities.*

Shaheen III, set to be 20 times faster than KAUST's existing system, will be the most powerful supercomputer in the Middle East to address critical areas that have a societal and environmental impact. Built by HPE, the world's leading supercomputer provider, the new Shaheen III system will revolutionize KAUST's ability to process vast amounts of data at immense speed and scale, enabling its users to unlock discoveries that it could not have before, and realize new potentials for AI. Read more at Business Wire [here](#).



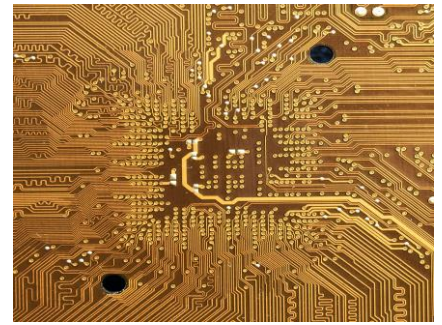
Credit: KAUST

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## **How quantum computing could change daily life**

*Singapore is stepping up its investments in quantum computing.*

Chiefly, it will have a foundry to develop the components and materials needed to build quantum computers to establish an ecosystem of activities in the emerging field. Like a handful of other nations – including the United States, China, France, Finland, Germany, South Korea and Japan – the Republic is building its own quantum computer to gain first-hand experience with the technology. Read more at The Straits Times [here](#).



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**Powering Innovation**  
**Supercomputing in Asia**

**National Supercomputing Centre (NSCC) Singapore**

1 Fusionopolis Way, Connexis South, #17-01 Singapore 138632