

e-Science Activities in Singapore Prof Tan Tin Wee | Chief Executive, NSCC Singapore

International Symposium on Grids & Clouds (ISGC) 2022 Virtual Conference | 24 March 2022



Who We Are

- National Supercomputing Centre (NSCC) Singapore
- <u>National Research</u>
 <u>Infrastructure</u> funded by the government's National Research Foundation
- Home of <u>Singapore's first</u> <u>petascale</u> and <u>national HPC</u> <u>resources</u>
- HPC resources made available to <u>all researchers</u> from Singapore universities, research institutes, government agencies and industries





Singapore Upgrades HPC Infrastructure to Support Future Research Demands

UPGRADED INFRASTRUCTURE

- From ASPIRE 1, AI Platform@NSCC, HTC1000 to ASPIRE 2A
- GROWING LOCAL HPC COMMUNITY
 - e.g. Edge Supercomputing @ Singapore Hospitals
- DEMOCRATISING ACCESS TO RESOURCES
 - Resources allocated every six months through Call for Research

Projects, and Call for Educational Projects

PLANNING FOR THE FUTURE

- HPC Research Cloud, Quantum Computing and beyond

UPGRADED INFRASTRUCTURE From 1 PFLOP (2016) to 10-20 PFLOPS (2025) & Beyond





current Top 500 supercomputers today are minimally in the PFLOPS range.



CC Supercomputing

GROWING LOCAL HPC COMMUNITY



Our Partners



Edge supercomputing for Singapore healthcare clusters

SingHealth-NSCC-NVIDIA partnership to support advanced healthcare research

To develop a new supercomputer and access to advanced software, training and high-performance computing (HPC)enabled pre-trained AI models to significantly accelerate large-scale and complex healthcare research.



National AI Healthcare Initiatives get boost from new national supercomputer resource at NUHS

NSCC and National University Health System (NUHS) will develop a supercomputing infrastructure, named "PRESCIENCE", which will be used to train AI models that predict patient health trajectories and recommends when a patient's condition may deteriorate.

DEMOCRATISING ACCESS TO RESOURCES



Diversifying HPC resource access

LOCAL

Call for Research Projects

- Ongoing cycles: Jul'21 Cycle (1 Jul 2021 30 Jun 2022) and Jan'22 (1 Jan – 31 Dec 2022)
- Upcoming cycle: Jul'22 cycle (1 Jul 2022 30 Jun 2023); Application period from 1 – 31 Mar 2022
- Call for Educational HPC Projects
 - Ongoing cycles: Nov'20 Round (Mar 2021 Mar 2022), May'21 Round (Aug 2021 – Aug 2022)
 - Ongoing application: Accepting ad-hoc applications
- Upcoming Calls
 - Call for Projects: Preliminary Use of ASPIRE 2A – in preparation
 - Call for Software Development Projects in preparation





JOINT CALLS (OVERSEAS)

- Call for Fugaku Projects via NSCC Collaboration with RIST
 - Selected projects: 5 out of 16 submissions

Project Name	Affiliation
Excitonic effects in nonlinear optical processes of emerging materials	National University of Singapore
Ultralarge molecular dynamics simulations of complex concentrated and gradient nanostructured alloys for engineering applications	IHPC, A*STAR
Designing Stable, Active, and Selective Ni-based Nanoparticles for Dehydrogenation of Liquid Organic Hydrides	Nanyang Technological University
Big HPC Code Implementing the Adjoint-state Traveltime Tomography Method	Nanyang Technological University
Simulation of Air-Sea Interactions with Al- Accelerated Computational Fluid Dynamics	Senior Research Fellow, Department of Civil and Environmental engineering, National University of Singapore





HPC Research Cloud, Quantum Computing and beyond



HPC RESEARCH CLOUD

Explore potential solutions for HPC cloud service options such as hybrid HPC systems with cloud bursting capabilities, business continuity plan / disaster recovery, workload automation, etc.

National Quantum Computing Hub



SUPPORTING QUANTUM **COMPUTING IN S'PORE**

Supercomputing is key resource in building capabilities for quantum computing and communications in areas like quantum computing infrastructure, talent development, quantum encryption technologies, etc.



INTERNATIONAL PARTNERSHIPS

Explore collaborations in development of exascale systems, green data centre technologies, greater research network connectivity, QKD, talent development & training, connectivity, joint project calls, etc.



QEP: the Quantum Engineering Programme

h of harnessing solar power as on-site power source "Waste Cold" for energy-efficient cooling



For Singapore, proposal takes advantage of: SPACE / LAND TEMPERATURE / WEATHER UNDANT RENEWABLE ENERG Climate – eg. Kajaani, Finlan Avg. temperature of -10°C to 15°C supports 100% passive Renewable energy po bundance of hydroeled plants, carbon negative ecosystem (Finland) and growing enewable energy sector (eg



GREEN DCs

Exploring innovative green DC solutions including Proof-of-Value (POV) for a Green Modular Data Centre System, floating DCs, and collaboration with overseas partners



Thank You

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