SINGAPORE'S NATIONAL RESOURCES

Advanced **S**upercomputer for **P**etascale
Innovation **R**esearch & **E**nterprise **2A**

Find out more about **Singapore's supercomputers** and **data centre**

Specifications

105,984 Cores
CPU (AMD EPYCTM 7713)
800 Nodes

1,024 Cores
High Frequency Nodes
(AMD EPYCTM 75F3)
16 Nodes

352 GPUs
Accelerated Nodes
GPU (NVIDIA A100)
82 Nodes

476 TB
Total System Memory

25 PB
Storage (Spinning + Nearline)

10 PB
Scratch Disk

Advancing local research with national HPC resources

ASPIRE 2A is a warm water-cooled system and provides an aggregate of up to 10 PFlop/s of raw compute power. It serves as the current HPC workhorse for Singapore's research community, supporting computationally intensive research in fields such as climate and weather research, materials and chemical sciences, genetics and healthcare, advanced modelling and simulation, and big data analytics. **ASPIRE 2A** is ranked 301st in the November 2024 TOP500 list of the world's most powerful supercomputers.

- DMF hierarchical storage system with remote backup
- Parallel high I/O (320GB/s) storage flash module
- Kubernetes Containerisation for HTC workflows
- Direct-to-Chip Aircon-less green cooling
- Rear door heat exchange thermosiphon cooling system
- Visualisation Lab

ASPIRE 2A+

ASPIRE 2A+ is a new system launched in 2024 with capabilities to support advanced accelerated computing in areas like AI, large language models and machine learning. With an estimated 316 PFlop/s of raw compute power at FP16 precision, it will significantly enhance Singapore's ability to lead research in emerging technologies.

ASPIRE 2A+ is ranked 90th in the November 2024 TOP500 list of the world's most powerful supercomputers.

320 GPUs
NVIDIA DGX H100
40 Nodes

27.5 PB
Home Storage

2.5 PB
Scratch Storage

8 x 400 Gb/s InfiniBand
Networking

80 TB
Total System Memory

DATA CENTRE FEATURES

Award-winning green data centre

The data centre at the National University of Singapore (NUS) innovation 4.0 Building has won sustainability awards, including Singapore's Building Construction Authority (BCA) Platinum Green Mark Award certification, the W.Media Southeast Asia 2022 award for Energy Efficient Innovation and the Singapore Business Review Technology Excellence Awards 2023. Key features of the data centre include an aircon-less compute area, locally-designed rear-door heat exchanger and is warm-water cooled.

IoT-enabled and digitally monitored smart data centre

Equipped with intelligent monitoring AI-assisted tools, advanced data centre infrastructure management (DCIM) and leveraging Digital Twin technology with integrated IoT sensors, data analysis with CFD and AI, which help facilitate operations and optimise real-time supercomputer and data centre operations.

Linked via 100Gbps network fabric

The new data centre forms part of a high-speed, resilient research network of distributed data centres and systems connected by 100Gbps research links between major research nodes in Singapore.

Find out more about **NSCC Singapore's** resources and how Singapore's supercomputers are helping to solve the most complex and computationally challenging research across different sectors.

CULTIVATING HPC TALENT AND CAPABILITIES

Empowering Users with Essential HPC Skills

NSCC Singapore is committed to equipping users with the knowledge and skills necessary to fully leverage HPC resources. Through workshops and training programs, NSCC Singapore caters to users at all levels, from beginners to advanced researchers, covering essential topics such as job scheduling, performance profiling, parallel debugging and data management, helping participants efficiently run workloads on NSCC Singapore's supercomputers. These sessions simplify complex HPC concepts, making supercomputing more accessible to researchers, engineers, and industry professionals.

Beyond foundational training, NSCC Singapore fosters collaboration by supporting specialised groups of users through our Community of Practice (CoP) programme in fields such as first-principles calculations, molecular dynamics and AI. Each CoP serves as a platform for knowledge exchange and collaboration among experts and new users. The NSCC team also engages such users on an individual basis to ensure maximum efficiency and impact, thereby enabling researchers to push the boundaries of scientific discovery.

NSCC Singapore has also set up a "Frontier" team to support research groups and advance HPC technology by focusing on energy efficiency, especially in GPU-intensive tasks. Our research initiatives aim to enhance the performance and sustainability of supercomputing resources, driving advancements in computational studies.

By bridging academia and industry, NSCC Singapore fosters a highly skilled, HPC-ready workforce, strengthening the local research and innovation ecosystem.

Nurturing Young Minds to Leverage HPC

NSCC Singapore is committed to developing the next generation of HPC professionals by working closely with universities, industry partners, and research institutions to build a strong pipeline of computational talent. This includes provisioning of compute resources to support academic projects, coursework, co-development of curriculum and training workshops covering key HPC applications, including AI, simulations and modeling, high performance data analytics, high performance visualisation, advanced networking for data transfer, high performance storage and next-generation data centres.

Beyond academia, NSCC Singapore actively supports students in international HPC competitions, providing mentorship, sponsorships, and hands-on technical training. These platforms allow students to apply supercomputing techniques to real-world problems, refining their skills while expanding professional networks. By bridging industry and academia, NSCC Singapore ensures that future generations are equipped with the expertise needed to drive Singapore's leadership in HPC, AI, and next-generation computing technologies.

Join Us in Shaping the Future of Supercomputing
If you're passionate about HPC and excited to contribute to Singapore's supercomputing journey, we'd love to hear from you. Be part of a dynamic team driving innovation, collaboration, and discovery. Email your CV to **recruit@nscc.sg**

SUPERCOMPUTING ASIA

Gathering the best of HPC in Asia

The SCA conference is an annual international HPC event that encompasses an umbrella of notable supercomputing and allied events in Asia. Established in 2018, the conference is co-organised by HPC centres from Australia, Japan, Singapore, and Thailand and has become a key networking and collaboration platform for the regional and global supercomputing community. The event attracts HPC thought leaders, decision-makers, academics, multinational corporations, commercial partners, and industry professionals.

Industry
HPC Technology Updates & Innovations

Scientific
Technical Conference with Paper and Poster Presentations

Strategic Showcase
A Hub for Business and Collaboration on the Exhibition Showfloor

Co-located HPC Events
Integrating the regional HPC ecosystem

Tutorials & Workshops
Learn from the best in HPC, AI and Quantum

Co-organised by:

RIKEN Center for Computational Science · RIST · Pawsey · ThaiSC · NCI Australia · National Supercomputing Centre

SG NSCC SINGAPORE National Supercomputing Centre

FROM RESEARCH TO IMPACT

POWERING INNOVATION

About the National Supercomputing Centre (NSCC) Singapore

NSCC Singapore was established to manage Singapore's national high performance computing (HPC) resources, a critical asset that drives the advancement of cutting-edge research, technology and innovation. As a National Research Infrastructure funded by the National Research Foundation (NRF), NSCC Singapore allocates HPC resources to support key National Research & Development (R&D) programmes and projects in achieving significant economic outcomes and scientific imperatives for Singapore.

NSCC Singapore has been tasked to leverage HPC to advance Singapore's strategic interests, boost national research initiatives, and facilitate industry transformation using HPC in areas like computational science, artificial intelligence (AI), visualisation, modelling & simulation, climate research, biomedicine, genetics, and big data analytics. NSCC Singapore works with domain experts and coordinators in various R&D fields to achieve its goals and seeks to develop, nurture and train an HPC-enabled workforce to maintain Singapore's global competitiveness.

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WHAT CAN THE NATIONAL SUPERCOMPUTERS DO FOR YOU?

1 Supersize Your Research

Bigger Aspirations And More Rewarding Challenges.

Most modern world-changing projects require vast amounts of computational power to succeed. NSCC Singapore offers petascale supercomputing resources, structured planned queues, and dedicated support to give your extremely data-intensive, complex research projects that competitive edge to scale new heights.

2 Accelerate Your Research

With Accessible, High Performance Computing.

NSCC Singapore delivers petascale computing power with high-speed 100Gbps InfiniBand connections, enabling faster data processing, scalability, and seamless collaboration. We welcome conversations with researchers, entrepreneurs, and educators to co-create and build flexible collaboration models and initiatives, reducing the time needed to innovate new products and services by leveraging supercomputers to experiment with ideas in a virtual environment.

3 Transform Your Research

The Possibilities Are Endless.

Supercomputing is a vital aspect of Singapore's digital transformation and a key scientific resource. NSCC Singapore supports this transformation in research and business, with a strong track record of powering high-resolution virtual modelling and simulation solutions, enabling digital twin technology, and supporting a rapidly increasing number of innovations in data-driven AI as well as quantum technology initiatives across various sectors and industries.

STRATEGIC PARTNERSHIPS

Connectivity
Ahead of the curve

NSCC Singapore's supercomputing power is augmented by a network of local and global connectivity resources that enable the quick, safe, and efficient transfer of large packets of data — a critical enabler for academia, research, and industry. NSCC Singapore collaborates with the Singapore Advanced Research and Education Network (SingAREN) to continually upgrade high-performance local and global network connectivity to anticipate growing needs, and enable our collaborations with international research platforms and partners.

Islandwide Network
Encouraging accessibility and collaboration

A high-speed, high-bandwidth network fabric traversing Singapore, the dedicated 100Gbps InfiniBand network enables seamless data sharing and now connects major research institutions.

Global Research & Education Network
Advancing global research and education

A fabric of interconnected high-speed, high-bandwidth, fibre optic networks for advancing global research and connecting national research & education networks (NRENs).

Alliance of Supercomputing Centres (ASC)
An international partnership of HPC centres

NSCC Singapore establishes partnerships with a network of HPC centres and professionals seeking to build a collaborative, dynamic platform that focuses on mutual support and cooperation, talent development and sharing of best practices across borders. The goal is to build a global community centred on the betterment of research and society through the development and promotion of HPC as well as its related activities.

POWERING RESEARCH AND INNOVATION WITH HPC

NSCC Singapore provides world-class HPC capabilities to drive cutting-edge research and technological advancements across multiple disciplines. By offering state-of-the-art supercomputing resources and integrated solutions, NSCC Singapore enables government agencies, research institutions, and industry partners to scale up projects, accelerate discoveries, and enhance computational efficiency. These capabilities empower researchers to tackle complex challenges that require massive data processing, high-speed simulations, and AI-driven analysis.

NSCC Singapore supports a diverse range of research areas that are critical to Singapore's scientific and economic growth, including:

- Advanced Manufacturing and Engineering
- Aerospace
- Bioinformatics and Medical Informatics
- Climate Modelling and Weather Forecasting/Prediction
- Computational Finance/Fluid Dynamics/Material Science
- Data Analytics
- Data Centre and Networking
- Deep Learning Machine/Artificial Intelligence
- Genomics & Precision Medicine
- Immersive Media Production
- Life Sciences
- Offshore & Marine
- Quantum Physics/Chemistry
- Scientific Analysis

DRIVING HIGH-IMPACT RESEARCH

NSCC Singapore's supercomputing resources have been instrumental in enabling high-impact research and innovation across various sectors, including climate science, biomedical research and quantum computing. From refining climate models for better predictions of extreme weather and urban heat effects to supporting advanced genomics and medical research, NSCC Singapore continues to power high-impact research that strengthens Singapore's position as a regional innovation hub.

MERaLiON: Advancing Multimodal AI for Singapore's Future in Language Processing

*A programme led by A*STAR Institute for Infocomm Research (A*STAR I²R), develops advanced Multimodal Large Language Models (MLLMs) to expand Singapore's capabilities in Generative AI research and innovation.*

Supercomputers Critical in Building Singapore's Latest Climate Projection Model

Supercomputing resources were pivotal in streamlining the V3 study's computational demands to produce extensive weather simulations and regional climate modelling that will significantly impact Singapore's policy and planning in the years to come.

Supercomputer Sequences Genome of Singapore's Multi-Ethnic Asian Population for More Accurate Diagnosis of Genetic Diseases and Targeted Therapeutic Intervention for Chronic Diseases

The analysis of this genetic data helps researchers expand the understanding of the biology of diseases that affect Singaporeans.

Harnessing Supercomputers to Correct Quantum Errors and Reduce Noise on the Quantum Computing System

Researchers are tapping HPC resources to study the occurrence of errors in quantum computations and devise models to better correct errors.

Find out more about how supercomputers are helping Singapore scientists and researchers here.

If you know of any HPC research which will be of interest to our HPC community, please drop us an email at **markengage@nscc.sg**.

STRATEGIC RESOURCE ALLOCATION FOR NATIONAL IMPACT

As a National Research Infrastructure, NSCC Singapore prioritises the allocation of its HPC resources to support key national R&D programs and high-impact research projects that drive Singapore's scientific and economic growth. By providing computational power to projects aligned with national priorities, NSCC Singapore enables groundbreaking research in fields such as artificial intelligence, biomedical science, climate modeling, and advanced engineering. Resources are strategically distributed to ensure that research institutes, government agencies, and industry partners can access the HPC capabilities they need to accelerate discoveries and innovation. This structured allocation framework maximises the efficiency and effectiveness of supercomputing resources, fostering collaboration and driving technological advancements that contribute to Singapore's long-term competitiveness.

Driving Innovation Across Key Research Pillars

NSCC Singapore's HPC infrastructure underpins Singapore's national R&D priorities across the four pillars of the Research, Innovation, and Enterprise (RIE) framework, which is essential to Singapore's development as a knowledge-based, innovation-driven economy:

Manufacturing, Trade, and Connectivity

- Optimises supply chains and logistics efficiency
- Enhances automation in advanced manufacturing
- Strengthens Singapore's position as a global trade hub

Smart Nation and Digital Economy

- Powers AI, big data analytics, and cybersecurity advancements
- Accelerates digital transformation and tech-driven innovation
- Supports the development of a future-ready digital society

Urban Solutions and Sustainability

- Develops climate-resilient cities and sustainable infrastructure
- Improves energy efficiency through digital twin simulations
- Advances environmental modeling for better urban planning

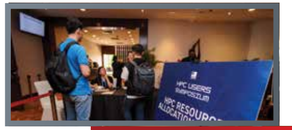
Human Health and Potential

- Enables breakthroughs in precision medicine and genomics research
- Drives AI-powered diagnostics and biomedical advancements
- Enhances personalised healthcare and medical innovations

NSCC Singapore's Strategic Resource Allocation

Singapore's national supercomputing resources are strategically allocated to support a broad spectrum of research—from large-scale, nationally funded projects to early-stage ideas with strong potential. The majority of HPC resources (60%) support RIE-funded initiatives aligned with national priorities. Additional allocations support young investigators at Institutes of Higher Learning (IHLs), HPC-focused R&D, and programmes that strengthen the local talent pipeline.

To broaden impact, HPC resources are also available on a paid basis for non-RIE-funded academic research, as well as for SMEs and startups engaged in R&D. Training and outreach initiatives further expand access, ensuring that Singapore's supercomputing infrastructure continues to advance scientific excellence, develop talent, and support innovation across sectors.



Accessing NSCC Singapore's HPC Resources Through Call for Projects

NSCC Singapore allocates its HPC resources through a structured Call for Projects process, ensuring support for impactful, nationally relevant research. Researchers must apply through this process, which prioritises proposals aligned with Singapore's strategic R&D objectives. Up to two Calls for Projects are conducted annually, subject to resource availability.

Successful applicants will receive full access to their requested HPC resources for the duration of their project. Information on application timelines, eligibility, and submission requirements will be shared in due course. Researchers are encouraged to stay updated and prepare proposals early to maximise their chances of success.

Find out more about **NSCC Singapore's Strategic Resource Allocation and Call for Projects**