

Introduction to NSCC Singapore

presented at the

HPC-AI Online Webinar

24 Mar 2020

National Supercomputing Centre Singapore (NSCC)

- A national research infrastructure providing supercomputing solutions.
- Resource open to all public and private IHLs, RIs, companies.
- Ultra high speed networks for HPC and research - locally and globally.
- Singapore's first national petascale facility.

Founding Stakeholders



New Stakeholders



Vision

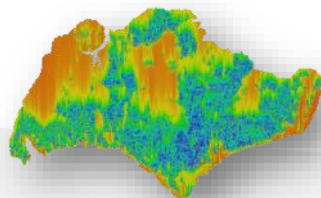
Democratising Access to Supercomputing



**Support Singapore's
R&D Initiatives**



**Attract Industrial Research
Collaborations**



**Enhance Singapore's
Research Capabilities**

Current Infrastructure: ASPIRE 1+ and NSCC Data Centre



1 PFLOP System

- **1,288 nodes** (dual socket, 12 cores/CPU E5-2690v3)
- **31,320 cores**
- **128 GB DDR4 RAM/node**



Large Memory Nodes

- **9 Large memory nodes** (1x6TB, 4x2TB, 4x1TB)



13PB Storage

- I/O bandwidth up to 500GB/s
- GPFS and Lustre File System



EDR InfiniBand 100G Interconnect

- EDR (100Gbps) Fat Tree within cluster
- InfiniBand connection to remote login nodes at stakeholder campuses



Accelerator nodes

- **128 nodes with GPUs**
- 1 x Tesla K40 per node



Visualisation nodes

- 2 nodes R940 graphic workstations
- Each with 2 x NVIDIA Quadro K4200
- NVIDIA Quadro Sync support

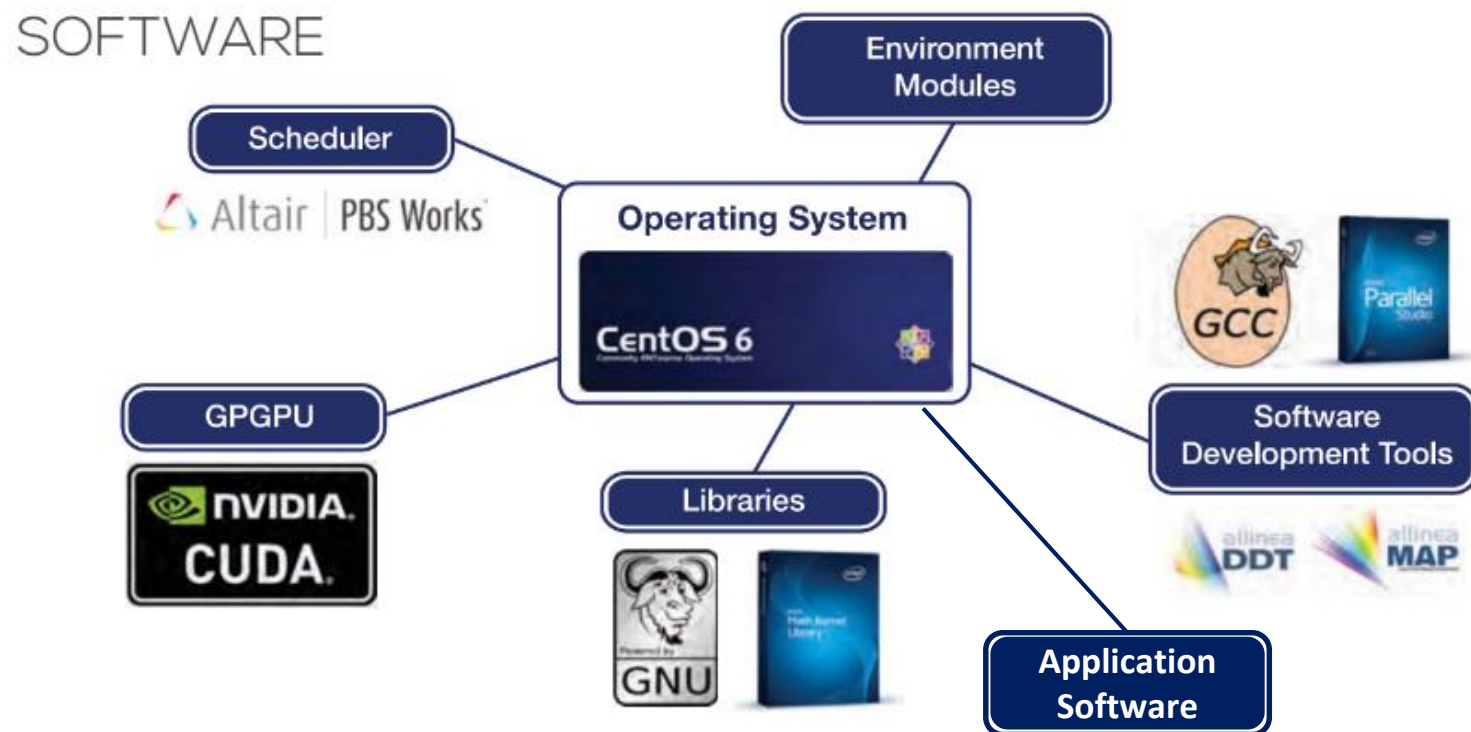


New Systems

- AI Platform (6 x DGX-1)
- 1,000 core HTC System
- 160 TFLOPS Climate System

ASPIRE 1 and NSCC Data Centre

Meeting various user software requirements



- For the complete NSCC Software list, please visit:

<https://help.nscg.sg/software-list/>



NSCC STAR-N Co-funded International Links

To connect Singapore to **Established HPC Centres** worldwide.

To position Singapore as a **Strategic Hub** in the region.

In Partnership with



NSCC 2.0 : S\$182M Grant (2019 to 2024)

Supercomputing gets \$200m boost in Smart Nation journey

Funds to come from \$19 billion set aside to develop new tech under RIE 2020 plan

Hariz Baharudin

Regular computers would take 30 years to scan the genetic material of over 200 gastric cancer tumours. But supercomputers using artificial intelligence (AI) can get the job done in just a few months, a significant development in the fight against the disease.

Finance Minister Heng Swee Keat yesterday cited this as one example of the role supercomputers play as he announced a \$200 million boost to further develop the field of supercomputing.

It is one of the areas that Singapore is focused on to achieve its Smart Nation goals.

The funds will come from the \$19 billion the Government has set aside to develop new technologies under the Research, Innovation and Enterprise (RIE) 2020 plan, said Mr Heng, who is also chairman of the National Research Foundation board.

Speaking at the launch of the Supercomputing Asia 2019 conference, Mr Heng said: "To support the next phase of this development, the National Research Foundation will allocate \$200 million under the RIE 2020 plan to upgrade both our supercomputing capability and network speed and quality for access by all institutions of higher learning and research institutions."

Supercomputers perform at the current highest operational rate for computers. They enable problem-solving and data analysis that would be impossible, too time-consuming



STAYING ON COURSE

As we embark on our journey as a Smart Nation and digitalise our economy, we must upgrade our supercomputing resources to keep up with our partners globally and to solve complex national challenges more quickly and effectively.



FINANCE MINISTER HENG SWEE KEAT

Finance Minister Heng Swee Keat checking out the IBM Q universal quantum computer model on display at the Supercomputing Asia 2019 conference yesterday. Mr Heng says the \$200 million investment will significantly increase the speed of supercomputers here and help Singapore stay connected globally. ST PHOTO: KELVIN CHENG

or costly for regular computers. This allows them to carry out high-level processes and effectively use technologies such as AI. Supercomputers can be used in climate research, molecular modelling, physical simulations and quantum mechanics, which is the field of science concerning the smallest

scales of energy levels of atoms and subatomic particles. Mr Heng said that supercomputers are an important tool in helping Singapore to continue its economic growth, and the field's potential for innovation makes investment in it critical. Referencing petaflops, a widely

recognised unit to measure high-level computational ability, Mr Heng elaborated on how the \$200 million investment will significantly increase the speed of supercomputers here and help Singapore stay connected internationally.

"This will provide 15 to 20 petaflops of high-quality, high-end computing performance."

"This is equivalent to having a million laptops that are equipped with extensive high-performance network connectivity to our global partners," he added.

Mr Heng said Singapore needs to continue to allocate time, money and effort to the field of supercomputing in order to realise its Smart Nation goals, upgrade its economy and remain competitive with other countries that are also developing capabilities in this field.

He said: "As we embark on our journey as a Smart Nation and digitalise our economy, we must upgrade our supercomputing resources to keep up with our partners globally and to solve complex national challenges more quickly and effectively."

The annual conference, jointly organised by the National Supercomputing Centre Singapore (NSCC) and Japanese and Australian supercomputing associations, sees experts from around the world giving lectures and holding discussions aimed at promoting the field of supercomputing in Asia.

Big names in the tech world such as AMD, Amazon Web Services and Alibaba are taking part in discussions about the latest advances and future trends for high-performance computing (HPC). The conference, being held at Suntec Singapore Convention and Exhibition Centre, runs until tomorrow.

A competition, which will involve teams from tertiary institutions in the region, was launched at the event yesterday.

The competition, which will run until July 26, will see student teams submitting solutions that they will program and develop to address challenges around AI development and testing, and high-performance computing workloads.

It is organised by the NSCC and the Asia-Pacific HPC-AI Advisory Council – an organisation dedicated to high-performance computing and artificial intelligence research, outreach and education.

harizbah@sph.com.sg

Speaking at the launch of the Supercomputing Asia 2019 (SCA19) conference, Minister Heng said: "To support the next phase of this development, the National Research Foundation will allocate \$200 million under the RIE 2020 plan to upgrade both our supercomputing capability and network speed and quality **for access by all institutions of higher learning and research institutions.**"