

### National Supercomputing Centre (NSCC) Singapore

7 Feb 2017

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DMF Users Group Meeting #9 University of Tasmania, Hobart, Tasmania 7-8 February 2017



# **National Petascale Facility**

The National Supercomputing Centre Singapore is a national petascale facility established to support high performance science and engineering computing needs

for academic, research and industry communities in Singapore.



## **Introduction: Vision & Objectives**

# Vision of NSCC

#### **Democratising Access to Supercomputing**

# **Objectives of NSCC**

Support Singapore's R&D Initiatives



Attract Industrial Research

Collaborations

Enhance Singapore's Research Capabilities



# **Historical Trajectory**



### **Milestones / Tender Process**



Tender awarded to Fujitsu Asia Pte Ltd in June 2015 for:

- PetaScale Supercomputer;
- Data Centre retrofitting; and
- Managed Services (3 years)







Centre

# **High Bandwidth Multi-Gigabit** Network

Our facility is linked by high bandwidth multi-gigabit networks (STAR-N) to provide high speed access to users everywhere locally & globally.



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#### Top500 List - June 2016

**R**<sub>max</sub> and **R**<sub>peak</sub> values are in TFlops. For more details about other fields, check the TOP500 description.

**R**<sub>peak</sub> values are calculated using the advertised clock rate of the CPU. For the efficiency of the systems you should take into account the Turbo CPU clock rate where it applies.

RANK	SITE	SYSTEM	CORES	RMAX (TFLOP/S)	RPEAK (TFLOP/S)	POWER (KW)
93	National Supercomputing Centre Singapore Singapore	NSCC - PRIMERGY CX2550 M1 LC & CX2570 M1 LC, Xeon E5-2690v3 12C 2.6GHz, Infiniband EDR Fujitsu	30,912	1,010.0	1,285.9	



## **HPC** Hardware



## List of installed software... and growing





For the complete NSCC Software list, please visit: https://help.nscc.sg/software-list/

## **NSCC** Utilization Statistics





#### Where Are We?



### **NSCC** Data Centre @ Fusionopolis



#### **NSCC Data Centre**



## **HPC** Hardware



## **High-speed InfiniBand for Data Transfers**

 NSCC leverages on long-haul InfiniBand switches which deliver high-bandwidth and low-latency between different geographic locations.





- Particularly between stakeholder remote login nodes/fat nodes and NSCC HPC centre.
- Also for Data Transfer Nodes overseas

#### **NSCC Co-Funded International Links** for Inter-Connecting Supercomputers





#### Federated Identity Management (FIM) for Stakeholders

- Leveraging on SingAREN's Singapore Access Federation (SGAF) service, NSCC enables seamless access to its resources for our stakeholders.
- SGAF uses Shibboleth-based authentication and authorisation systems to enable scalable, trusted collaborations among Singapore's R&E community.
- The authentication is performed by the user's home institution (maintains control of its users' information). NSCC grants authorised service access based on specific user attributes.



https://user.nscc.sg

## Federated Identity Management (FIM)



SO National Supercomputing Centre

## Outreach

Local & Overseas

Conference

**Participation** 

#### Conduct Regular Training Workshops

#### Workshops

- Introductory
- Optimisation Techniques
- Parallel Profiling &
  Debugging
- Advanced Job Mgmt.

#### A\*STAR





NTU



1 – 5 Aug 2016 Hong Kong



5 21–23 Sep 2016 Singapore



Singapore

SC16 Soit Lake City Inport

13 – 18 Nov 2016 Salt Lake City, Utah, USA



20 – 22 Jun 2016 Frankfurt, Germany



4 – 5 Oct 2016 Melbourne, Australia

#### Roadshows / Collaborations / DC Visits

MOU with Industry (Mar 2016)



Visit by MP Japan Mr. Kawai (Aug 2016)



NSE Big Data Challenge Workshop (Oct 2016)



#### Collaborative Project (NTU-NSCC-GenomeAsia 100K consortium)

- Aim: To sequence 100,000 genomes from various South, North & East Asia populations
- Goal: To accelerate precision medicine and clinical applications for Asian patients
- NTU acts as the host and NSCC provides the HPC resources
- **68TB** of genome data from USA and Korea aggregated and hosted on NSCC platform



 Using NSCC HPC resources, total compute time to process genome data for 100,000 genomes will only take up 1.1% of the 4-year project, thus providing more time for novel downstream analysis and experiments

## **Collaborative Project**

**Technology Centre for Offshore and Marine Singapore (TCOMS)** 

#### **COUPLED EXPERIMENTAL - NUMERICAL WAVE FLUME TEST**



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# UPERCOMPUTING FRONTIERS -**INGAPORE 2017** 13-17 March 2017 Singapore Matrix Building @ One-North

http://www.supercomputingfrontiers.com



#### GORDON BELL

Microsoft Research, USA



ALESSANDRO CURIONI

IBM Research Laboratory, Switzerland



#### THOM H. DUNNING, JR.

Northwest Institute for Advanced Computing, USA



#### **HAOHUAN FU**

NSCC Wuxi (#1 TOP500 since June 2016), China

