NECTEC
a member of NSTDA

International Symposium on Grids & Clouds (ISGC) 2025

16-21 March 2025
BHSS, Academia Sinica

e-Sciences Activities in Thailand

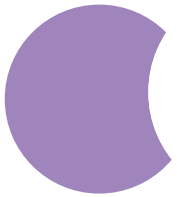
Piyawut Srichaikul, Ph.D.
Deputy Executive Director, NECTEC

Agenda

- About ThaiSC
- National e-Science Infrastructure Consortium
- Local Landscape and Trend of HPC in Thailand

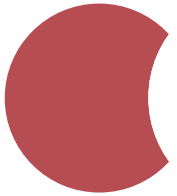
About ThaiSC

ThaiSC A National Science and Technology Infrastructure of NSTDA



Ministry of Higher Education, Science, Research and Innovation

National Science and Technology Development Agency



The National Electronics and Computer Technology Center

NSTDA Supercomputer Center*

*ThaiSC is one of the National Science and Technology Infrastructure (NSTI)

ThaiSC Leadership

NSTDA Supercomputer Center
ThaiSC

Director
Dr. Rattapoom Tuchinda

Technical Advisor
Dr. Piyawut Srichaikul

Technical Advisor
Dr. Manaschai Kunaseth

Supercomputing Infrastructure and Operation Team (SIO)
Dr. Putt Sakdhnagool

- HPC Setup & HPC Operation
- HPC Maintenance
- HPC Standardization
- (User portal & Helpdesk)

Taking care of machines

Scientific Support and Domain Research Team (SSD)
Dr. Viwan Jarerattanachat

- Workshop & Training
- Technical Training & Support
- Technical Sale Support

Taking care of software/users

Supercomputing operation support and Business Development Team (SBD)
Mr. Kirk Pandhumapol

- CRM
- Business plan
- Funding Ecosystem
- HPC Ecosystem

Taking care of business

HPC Thailand Timeline

1995

HPCC

first on-line supercomputing services

CPU 8 MIPS-R10000
1 GB memory
50 GB disk storage

2005

Thai Grid

large-scale computing resource project 14

members and expand to 22 members in 2008

2011

National e-Science Infrastructure Consortium

H.R.H. Princess Maha Chakri Sirindhorn that collaborating with CERN

5,020 CPU core; 1,455 TB

2019

ThaiSC (TARA)

0.2 petaFLOPS

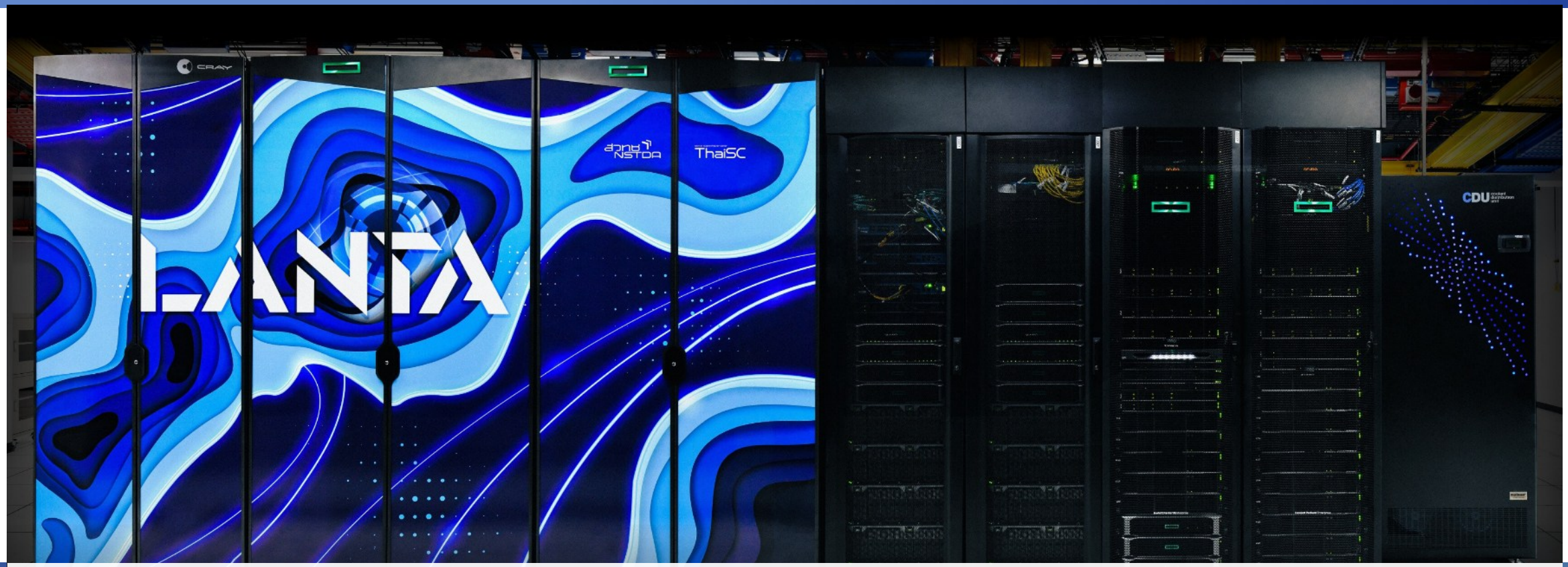
4,320 compute cores
28 NVIDIA V100

2022

LANTA

8 petaFLOPS

31,744 compute cores
704 NVIDIA A100



*Peak performance at 8.15 PFLOPS

TOP 500 The List.

Rank 70th (Nov 2022)

Rank 142nd (Nov 2024)

THE GREEN 500

Rank 24th (Nov 2022)

Rank 65th (Nov 2024)

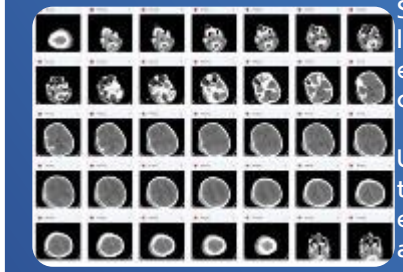
- 346 nodes Heterogeneous HPE Cray EX cluster
  - 176 GPU nodes with 704 NVIDIA A100 GPUs
  - 160 CPU nodes with 20,480 CPU-cores
  - 10 High-memory nodes, each contains 4TB of memory
- 10 PB of high-performance parallel storage
- High-performance interconnect using 200 Gbps

Some interesting projects portfolio

NECTEC a member of NSTDA

2023

Deep Learning for Brain Hemorrhagic Stroke Detection



Stroke occurs suddenly and can lead to paralysis, disability, or even death. Rapid and accurate diagnosis is therefore crucial.

Utilizing Deep Learning techniques in Machine Learning enhances diagnostic accuracy and reduces the time required, enabling quicker advancements and applications.

Project by: Mahidol University

TRL 4

OpenThaiGPT: Developed for all Thai people

Creating an LLM with capabilities similar to ChatGPT requires a significant investment in experts, datasets, and the number of GPUs used for processing.

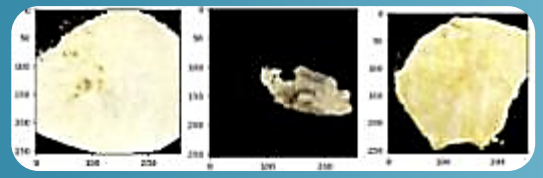
OpenThaiGPT will be developed as open-source software, available for free to everyone.

Project by: AIAT

TRL 9

2024

Generative AI for Clinical Imaging (Infant pale stools)



The AI model for medical images can generate 256x256 resolution images of infant pale stools to assist in diagnosing Biliary Atresia in 1 in 10,000 children (aged 3-12 months), which signals a bile duct obstruction. Immediate treatment is required to prevent death and increase the chances of a complete recovery.

Project by: Looloo Technology Co., Ltd.

TRL 6

Discovery of new anti-tuberculosis agents using virtual screening

Tuberculosis caused by *Mycobacterium tuberculosis* is a global health issue. Treatment lasts more than 6 months and involves multiple drugs, which is complicated by drug resistance.
The goal is to discover new drugs that are more effective, reduce treatment duration, and have fewer side effects compared to current medications, which previously took years to develop.

Project by: Nakhon Phanom University

TRL 3

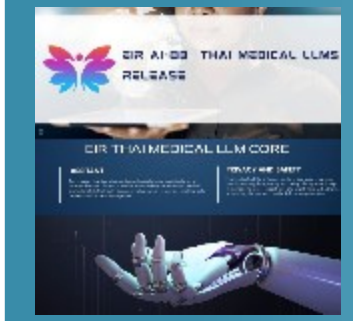
SARS-CoV-2 3CLPro Inhibition by Thai Plant Flavonoids

The SARS-CoV-2 virus spread rapidly worldwide, and existing antivirals like Favipiravir and Remdesivir have low efficacy and high side effects. Developing antiviral drugs from Thai herbs faces challenges in structure, mechanism, and synthesis, but this knowledge will help create more effective treatments in the future.

Project by: Chiang Mai University

TRL 3

Thaimedical LLM



The application of AI in the medical field aims to integrate AI technology into workflows to help reduce the workload of healthcare professionals and add value, without affecting the treatment process timeline.

Project by: Thonburi Thungsong Hospital

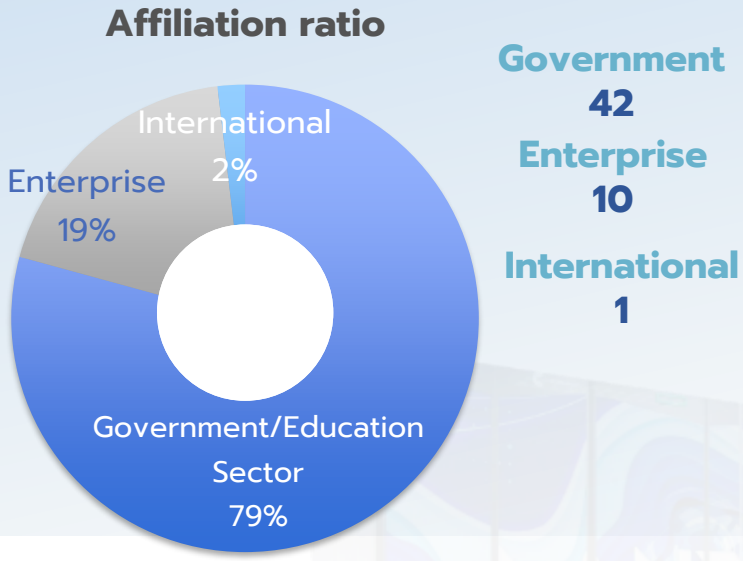
TRL x

User Profile & Project Type Breakdown

User group type/number of projects

Affiliated	Number	Projects
NSTDA	6	62
Education Sector	31	88
Government Sector	5	3
Enterprise	10	8
International	1	1
Total	53	162

Updated on 5 February 2025

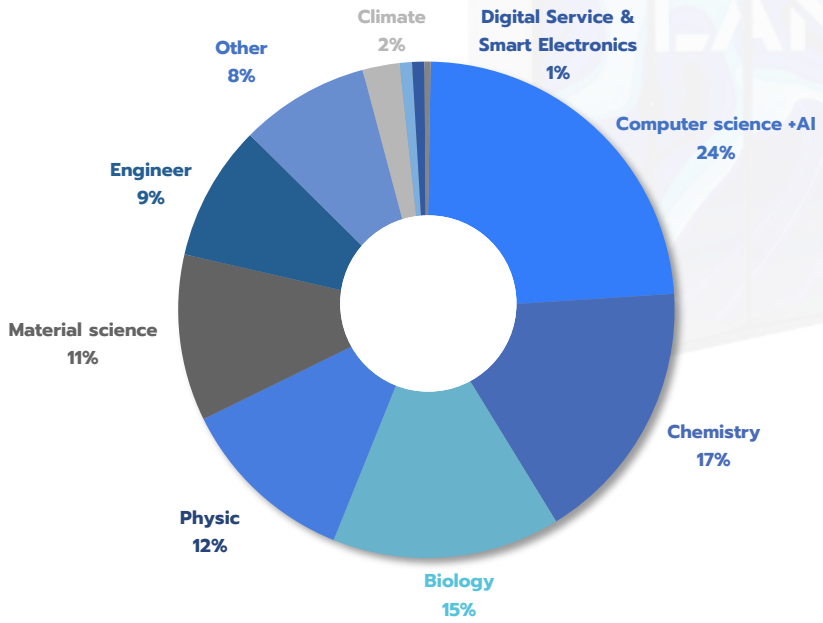


Project type/project proportion

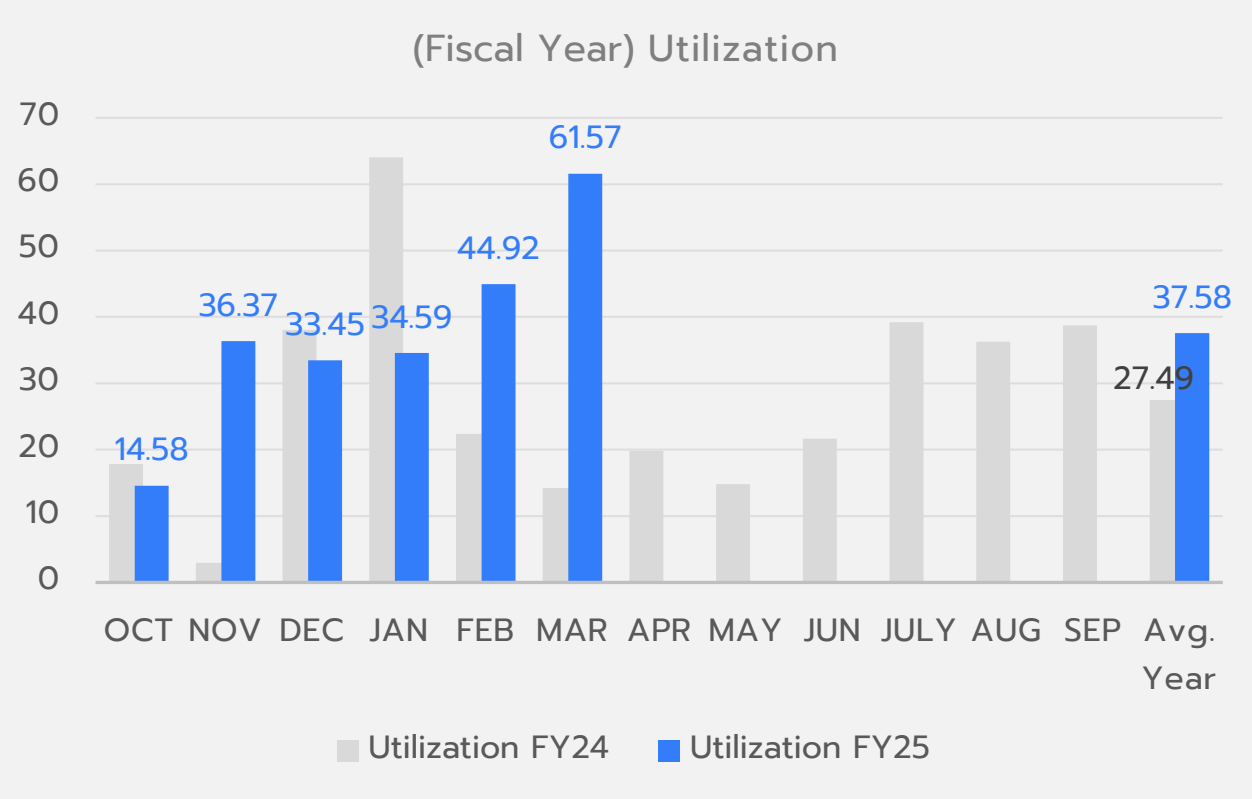
Domain	Projects
Computer science +AI	59
Chemistry	43
Physic	29
Material science	27
Biology	37
Engineer	22

Domain	Projects
Digital Service & Smart Electronics	2
Cancer	1
Climate	6
Bioinformatics	2
Other	21
Total	249

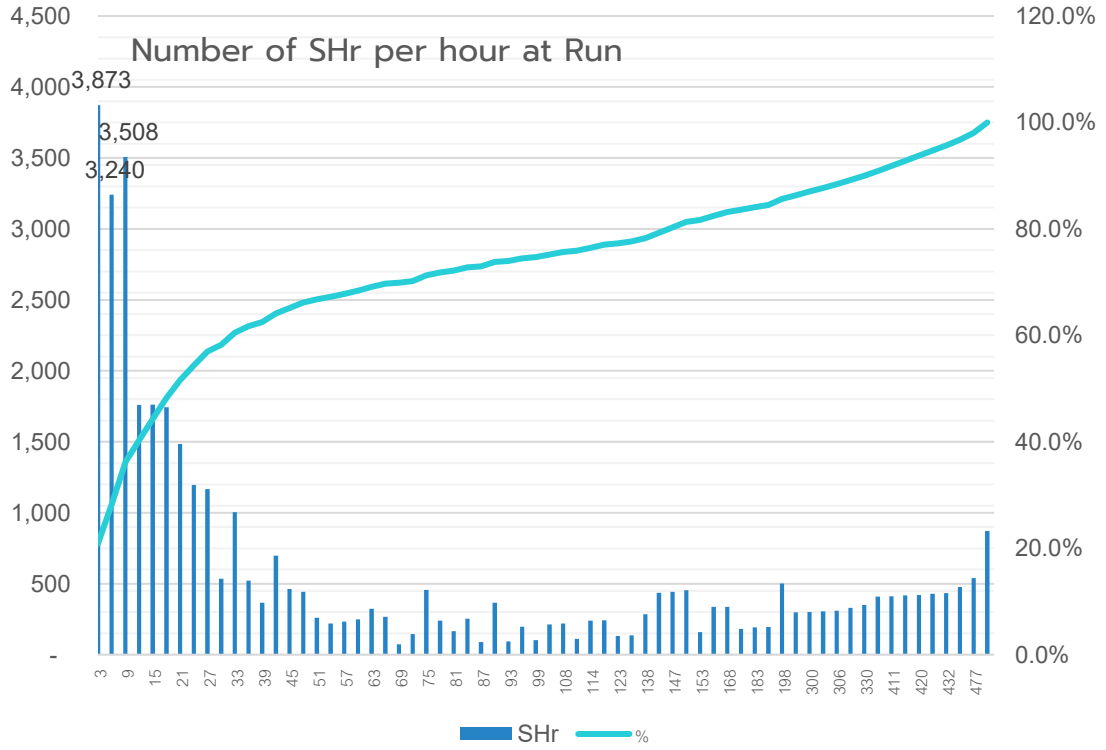
Updated on 7 February 2025



Utilization & Job Size Breakdown



UPDATE 5/3/2025



SHr used for each number of hours of Job

Presence and Partnership (1)

ASEAN HPC Task Force

EU-ASEAN Collaboration on HPC: within framework of Enhanced Regional EU-ASEAN Dialogue Instrument (E-READI)

A notable highlight was the 12th Alliance of Supercomputing Centres (ASC) meeting, which convened on 13 November 2023. The meeting was attended by 17 key stakeholders representing prominent HPC centres from Saudi Arabia, Australia, South Korea, Finland, Ireland, Taiwan, Japan, and the United States. Discussions were centred around the exchange of HPC resources and knowledge, identification of collaborative research opportunities, and the exploration of potential staff exchanges.

The 12th Alliance of Supercomputing Centres (ASC) meeting with key representatives from the various HPC centres.

Leaders from various HPC centres mingling at the NSCC Networking Dinner.

Alliance of Supercomputing Centres (ASC)

15th meeting at SC24 in Atlanta

Presence and Partnership (2): International & Local

International

Local

HPC Centre Leaders Forum

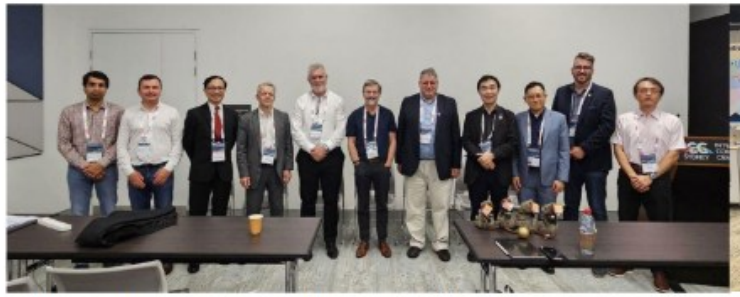
2023-2024

Like-minded leaders from HPC Centres in Asia, Australia, Europe and USA provided updates on their respective centres and discussed common areas of interest as well as challenges faced.

An MoU was signed between NSCC and ThaiSC to explore further collaborations between the two HPC centres in the ASEAN region. The collaboration will explore promoting and nurturing HPC partnership in areas like HPC resource and capability development, joint training and staff upskilling.

HPC Centre Leaders Forum

Professor Satoshi Matsuoka (left), Associate Professor Tan Tin Wee (middle), and Mr Mark Stickells (right) presenting on the latest development of the respective HPC centres during HPC Leaders Forum.



HPC leaders from various global HPC centres at 2024 HPC Centre Leaders Forum.

Looking forward to SCA25 in Singapore

The 2024 edition of the HPC Centre Leaders Forum brought together global HPC Centre leaders from Australia, Finland, Japan, Poland, Singapore, Taiwan, Thailand, and the United States to discuss the latest updates from the respective centres and their regions. The leaders also expounded on the challenges faced and opportunities for collaboration, which leveraged HPC centre partners to foster the growth and cooperation. The track held on 20 February 2024 featured a four-hour session, which was Chaired in part by Professor Chennupati Jagadish, the President of the Australian Academy of Science, and Mr Eugene Low, Deputy Director at NSCC Singapore.

EU ASEAN HPC School

2022-2023

Between 5 – 10 December 2022, Kasetsart University (KU), together with National Science and Technology Development Agency leading by NSTDA Supercomputer Center (ThaiSC), co-hosted the EU-ASEAN HPC School 2022 to facilitate the development of HPC skills and capacity growth in ASEAN and its applications to critical problems of major social and economic importance, such as the fight against COVID-19 and natural disaster prevention. The school was endorsed by ASEAN HPC Task Force and funded by the EU through the Enhanced Regional EU-ASEAN Dialogue Instrument (E-READI).

The ASEAN High-Performance Computing (HPC) School 2022

Bogor, Indonesia, 11 December 2023 – For the third year in a row, the week-long High-Performance Computing (HPC) School for South-East Asian researchers kicked-off, this time in Bogor, Indonesia. The Association of Southeast Asian Nations (ASEAN) is set to continue to inspire researchers in the region, following the HPC School's successful first two editions, organised by the European Union (EU) in collaboration with Japan and ASEAN.

The ASEAN High-Performance Computing (HPC) School 2023

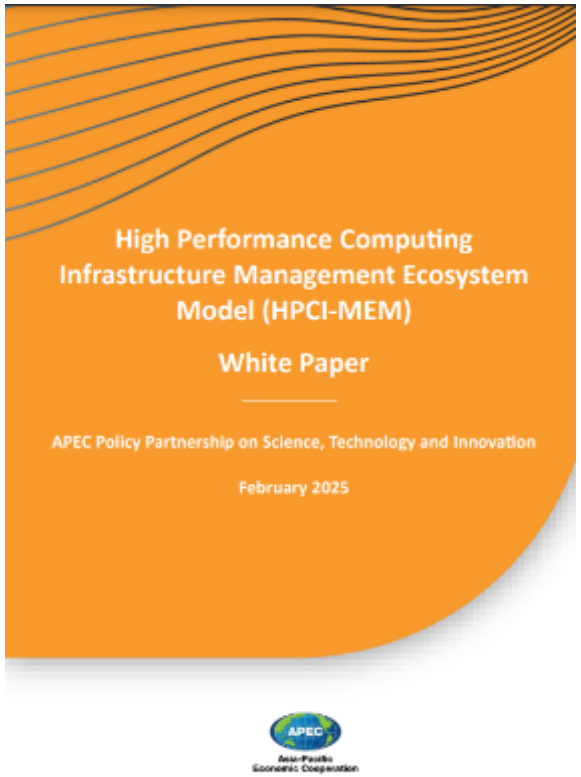
EU-ASEAN-Japan Symposium: HPC School Resumption

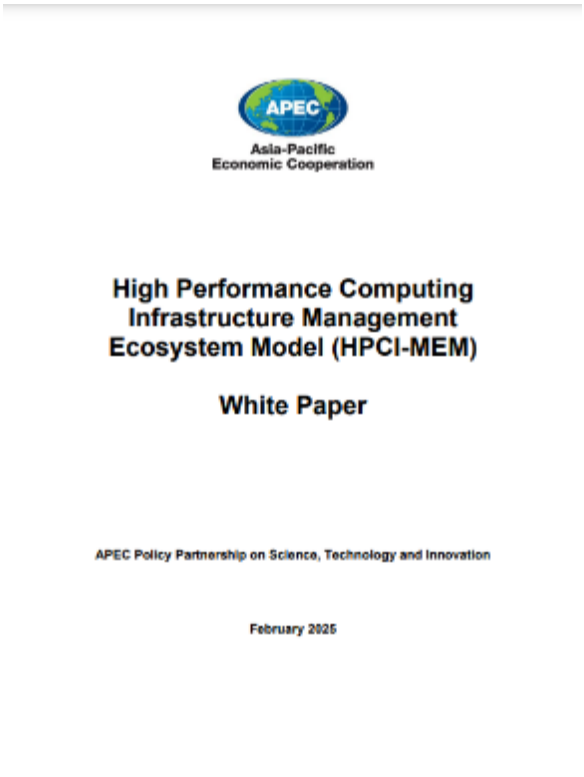
2023

SINGAPORE, 1 March 2023 – The continuation of the High-Performance Computing (HPC) School in 2023 to be held in Jakarta, Indonesia was announced during the EU-ASEAN-Japan Symposium at the Supercomputing Asia Conference (SCA) 2023.

Promoting: HPCI-MEM whitepaper (Funded by APEC)

2024-2025



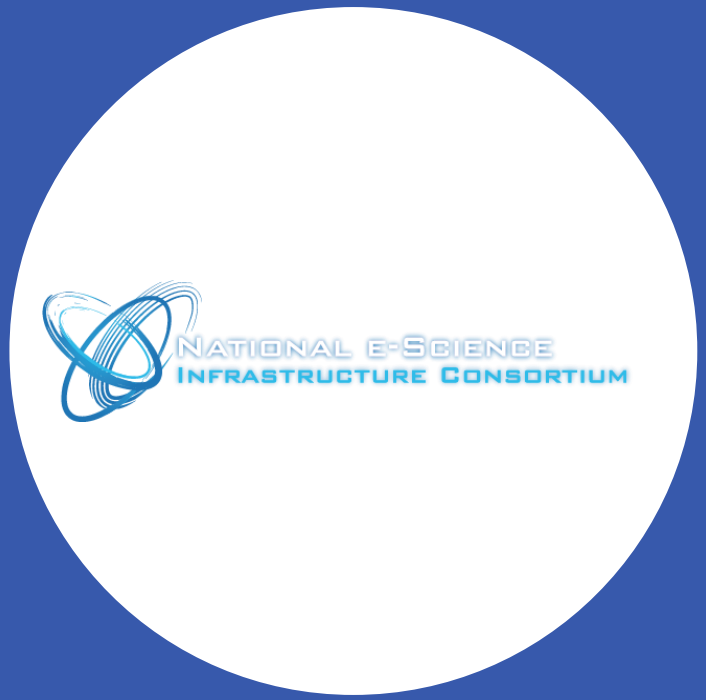


Description

This publication, developed under APEC Project PPSTI 10 2022A, presents a comprehensive ecosystem model designed to support the effective management and utilization of High-Performance Computing (HPC) facilities. It emphasizes the dynamic interactions among key stakeholders, including policymakers and funding authorities, HPC facility providers and operators, end-users and application developers, regulatory and compliance bodies, research and academic institutions, industry partners, commercial vendors, and the broader HPC community.

The publication offers detailed guidance on critical ecosystem components that influence the utility and effectiveness of HPC facilities. These components include the setup, management, and operation of HPC facilities; public policies supporting HPC; and community-driven agendas for advancing HPC. Tailored recommendations are provided to address each of these key aspects, ensuring a holistic approach to maximizing the potential of HPC infrastructure.

National e-Science Infrastructure Consortium



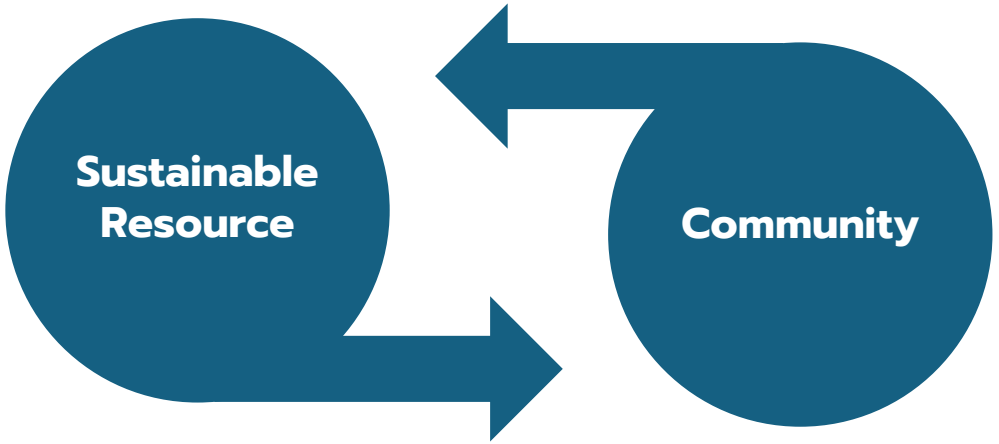
E-Sciences Activities in Thailand

“With the great vision of **H.R.H. Princess Maha Chakri Sirindhorn** who see the importance in building strong foundation for scientific research across the nation. Collaborating with CERN, National e-Science Infrastructure Consortium was formed with the objectives to support research projects in Thailand by providing the computing infrastructure service.”

National e-Science Infrastructure Consortium

founded in 2011 from 5 founding members institutes and expand to 9 members in 2019

- HPC research facilities shared by the members
  - Computing power
  - Data storage
  - Scientific applications
  - Networking
- Collaboration with, CERN: Build Tier2 supercomputer center for WLCG in Thailand
  - T2-TH-CUNSTDA
  - T2-TH-SUT



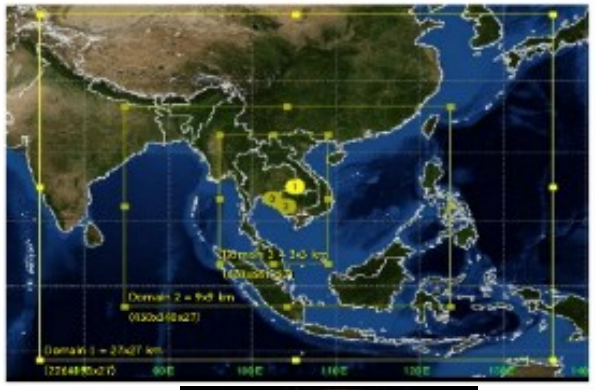
- Support collaboration with the research network
- Organize activities to promote the use of HPC
- Establish a committee to supervise and oversee operations

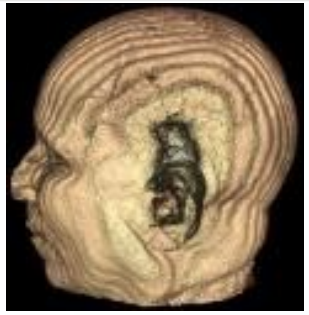
Resource from E-Science Members (2025)

หน่วยงาน	CPU (cores)	Storage (TB)	GPU	Application
Chula	708	405	12 nodes (T4 11 nodes, A2 1 node) 1 x DGX (8 card x A100)	High energy particle physic, Computational chemistry
SUT	592	150	-	High energy particle physic, Computational chemistry
KMUTT	224	30	-	Computer science and engineering Computational chemistry, Biology
HII	1,376	788	-	Weather forecast (WRF-ROMS, SWAN, ROMS), Climate change, Machine learning
NARIT	1,584	3,400	12 x Nvidia Tesla V100	Computational Astrophysics and Cosmology, Astronomical data analysis and modeling, Weather Research
SLRI	168	210	-	Research using Synchrotron light, High energy particle physic, Computational chemistry
TINT	64	3.8	-	Computational related to Nuclear technology, agriculture product, germ, plant breeding)
DGA	Open Data		-	Data Lake, Open Data Cloud, Big data, Government data
NSTDA	20,480	10,000	704 x Nvidia A100 (card)	Computational science, Computer engineering, Big data and AI

Project Category (Not including ThaiSC)

HPC research facilities shared by the members, and support for 3 application areas





High Energy Particle Physic

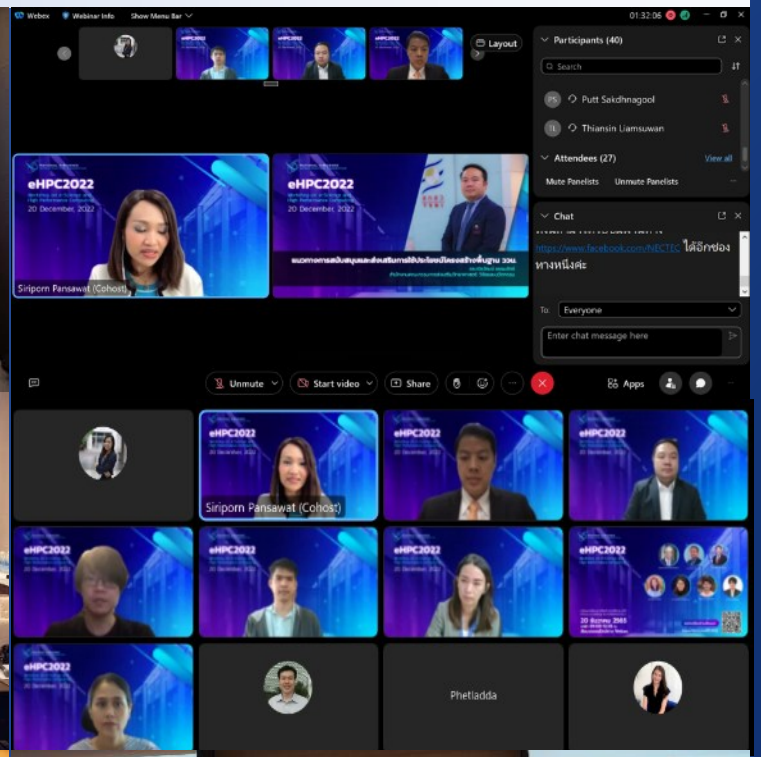
Computational Science & Engineering

Computer Science & Engineering

(at Sep 2024)

Project category	No. project (126)	% Resource used in the projects
WLCG computer center : T2-TH-CUNSTDA	1	12%
WLCG computer center : T2-TH-SUT	1	
Other Particle Physics	3	
Computational Chemistry	36	88%
Nanotechnology and Material Simulation	15	
Astronomical	15	
Computational Biotechnology	12	
Mechanical engineering	11	
Nuclear Physic	9	
Social Science	5	
Computational Physics	4	
Pharmacautical	4	
Computer Science & Engineering	10	2%

Workshop on e-Science and High-Performance Computing (2013-2024)



HPC User Training

Promote/Encorage development of HPC and Community

Exabition, Promote use of HPC

Local Landscape and Trend of HPC in Thailand

General Update & Cloud First Policy

Thailand has another HPC system in TOP 500

TOP500 LIST - NOVEMBER 2024

HPC TOP500 Ranking	#91	#92	#142
System	ASPIRE 2A+	THE CRUST 2.5	LANTA
Manufactured by	NVIDIA	HPE Cray	HPE Cray
Total Pflops	14.20	13.85	8.15

RANKING

List	Rank	System	Vendor	Total Cores	Rmax (PFlop/s)	Rpeak (PFlop/s)	Power (kW)
11/2024	92	HPE Cray XD665, AMD EPYC 9354 32C 3.25GHz, Nvidia H100 SXM5 94Gb, Infiniband NDR400, RHEL 8.9	HPE	47,360	13.85	21.68	

RANKING

List	Rank	System	Vendor	Total Cores	Rmax (PFlop/s)	Rpeak (PFlop/s)	Power (kW)
11/2024	142	HPE Cray EX235n, AMD EPYC 7713 64C 2GHz, NVIDIA A100 40GB, Slingshot-11	HPE	87,296	8.15	13.77	310.46

Cloud First Policy and its implication

- Thailand's "Cloud First" policy mandates that government agencies prioritize cloud services for their IT infrastructure needs, aiming to modernize public administration, improve efficiency, and enhance cybersecurity, all while positioning Thailand as a regional leader in cloud technology.
- Staring from 2026 Fiscal Year Budget, there will be a formal budgeting process
- HPC - Cloud Infrastructure implication/challenges?

The investment in data centers and cloud services in Thailand.

Based on the available information, investment in data centers and cloud services in Thailand has been growing rapidly, with several global technology companies investing, as shown in the following table:

Company	Investment Value (Million Baht)	Details
Amazon Web Services (AWS)	200,000	Investing in building Data Centers in Thailand by 2037, with the first phase investing 25,000 million Baht, preparing to open AWS Asia Pacific (Bangkok) Region in 2025
Google	36,000	Building the first Data Center in WHA Industrial Estate, Chonburi Province, and a Cloud Region in Bangkok to support increasing cloud demand
Microsoft	Not Specified	Announced plans to build Data Centers in Thailand, focusing on developing cloud and AI infrastructure and enhancing AI skills for over 100,000 Thai people
Equinix	16,500	Planning to invest in Thailand within 10 years, with the first phase receiving approval for 7,180 million Baht, planning to open services in 2027 to support digital business and AI
NextDC	13,700	Australian company investing in building Data Centers in Thailand
STT GDC	4,500	Singaporean company investing in Data Centers in Thailand
Evolution Data Centres	4,000	Singaporean company investing in Data Centers in Thailand
Supernap (Switch)	3,000	American company investing in Data Centers in Thailand
Telehouse	2,700	Japanese company investing in Data Centers in Thailand
One Asia	2,000	Hong Kong company investing in Data Centers in Thailand

Source: Thailand Board of Investment & techsauce

ThaiSC and HPC-AI (Local)

Investment Level: International Players + Local Players

- **AWS** launches cloud region in Thailand
- **Google** Cloud Unveils $1B Thailand Investment
- **Microsoft** announced “significant commitments” to build a new regional data center in Thailand
- **SiamAI** (Gulf) partnered with NVDIA to open data center in Thailand

Organization/Project Level: Booming

- Big organization in Thailand starts acquiring bigger / new HPC systems (e.g., PTT: Rank 92 of TOP 500)

User Level: Can’t catch up!

- Vacancies positions
- Researchers playing catch up, especially AI

NECTEC

a member of NSTDA