e-Science Activities in Thailand

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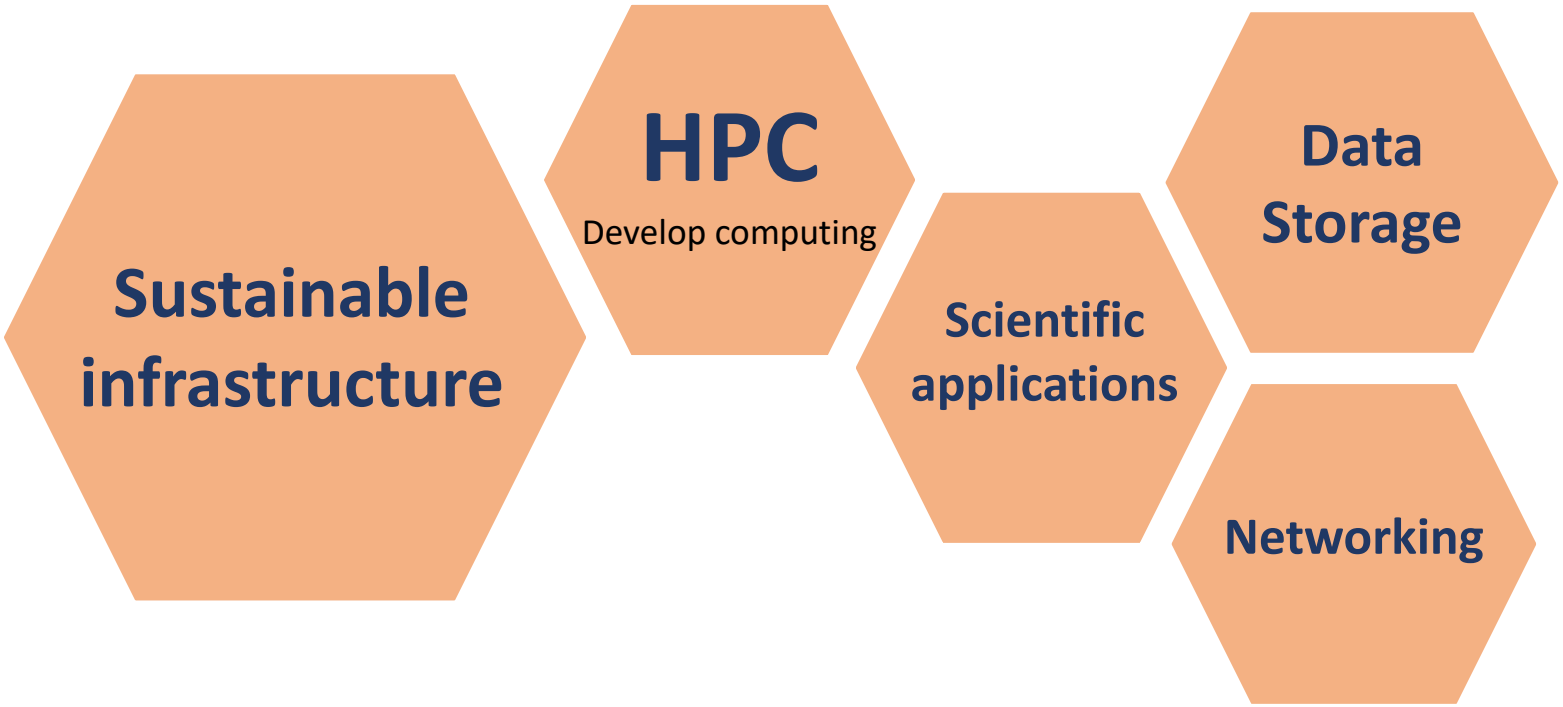
National Electronics and Computer Technology Center, Thailand

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.

A group of Thai universities and research institutes that **collaborate** in this research infrastructure development.



MEMBERS

Regular members

Provide computing resource to the consortium

Associated members

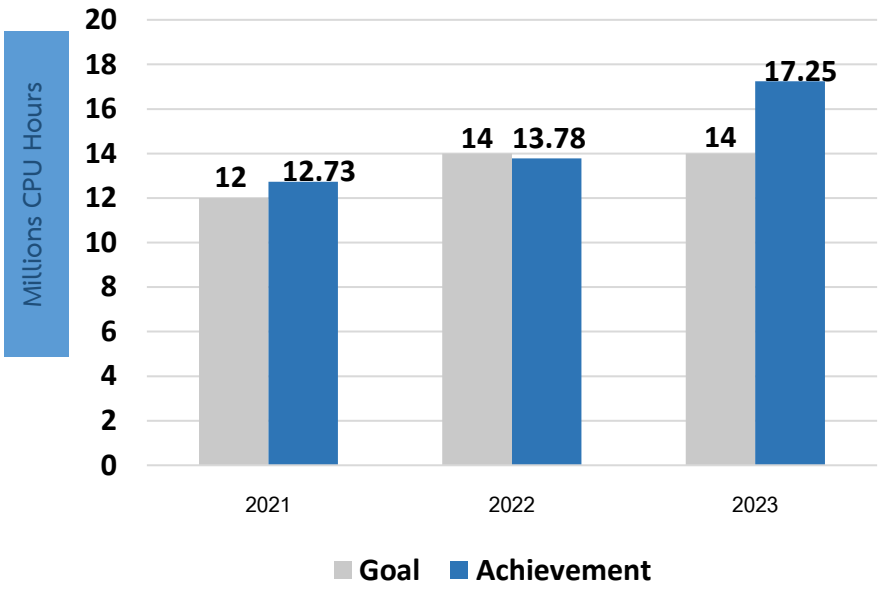
Contribute or Collaborate with the consortium

RESOURCES

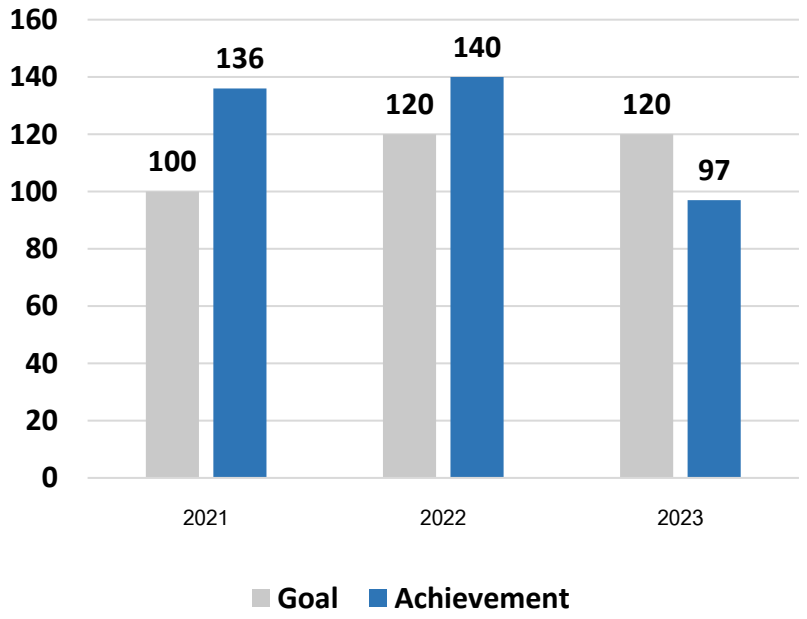
National e-Science Infrastructure Consortium

Members		CPU (cores)	Storage (TB)	GPU	Application
จุฬา		708	405	12 nodes (T4 11 nodes, A2 1 node) 1 x DGX (8 card x A100)	High energy particle physic, Computational chemistry
มทส.		592	150	-	High energy particle physic, Computational chemistry
มจธ.		224	30	-	Computer science and engineering Computational chemistry, Biology
สสน.		1,376	788	-	Weather forecast (WRF-ROMS, SWAN, ROMS), Climate change, Machine learning
สดร.		1,584	3,400	12 x Nvidia Tesla V100	Computational Astrophysics and Cosmology, Astronomical data analysis and modeling, Weather Research
สซ.		168	210	-	Research using Synchrotron light, High energy particle physic, Computational chemistry
สทน.		64	3.8	-	Computational related to Nuclear technology, agriculture product, germ, plant breeding)
สพร.		Open Data		-	Data Lake, Open Data Cloud, Big data, Government data
สวทช. 1		960	400	-	Computational science, Computer engineering, Big data and AI
NSTDA	TARA	4,320	800	4 x Nvidia V100, 28 DGX (card)	
	LANTA	20,480	10,000	704 x Nvidia A100 (card)	

Computing service provisioning (CPU-Hours)

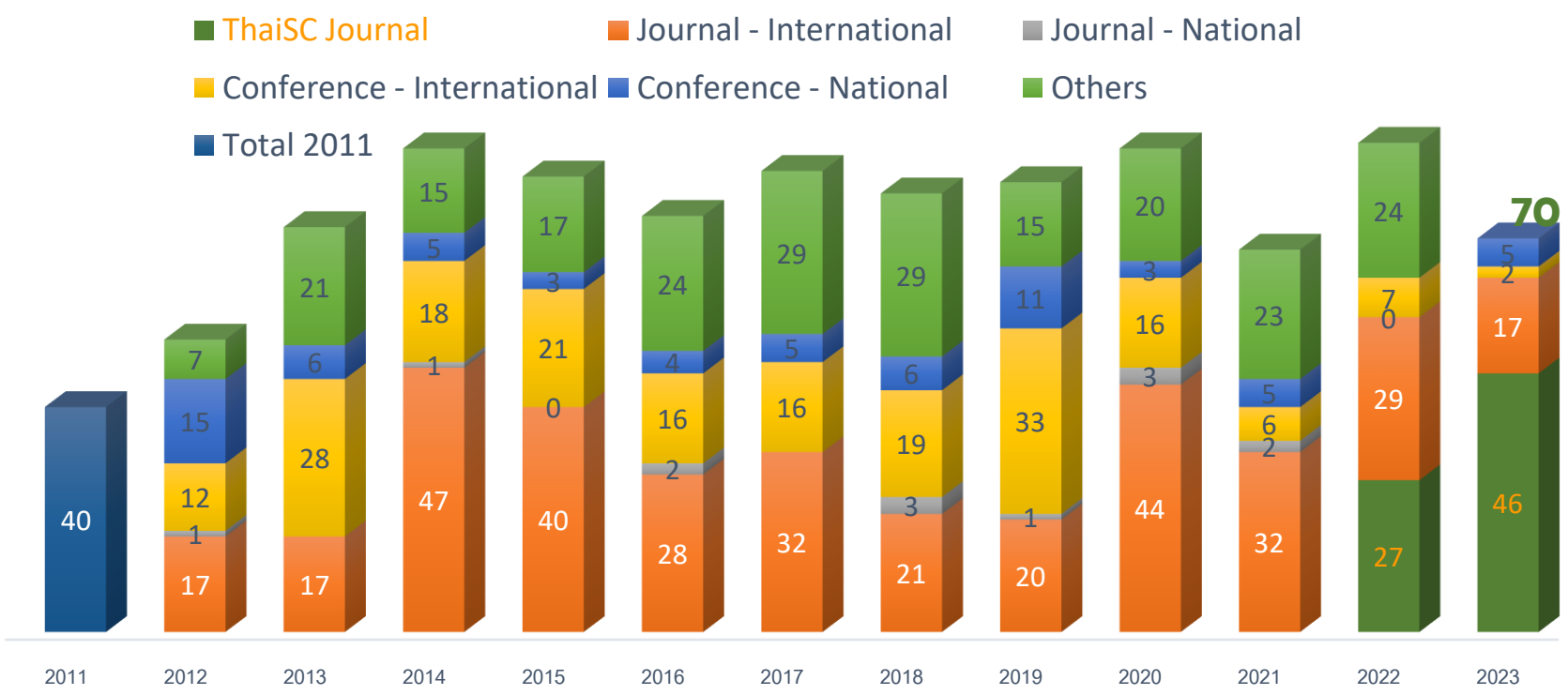


Number of active project



User from 31 Institutes

ผลงานตีพิมพ์ที่เกิดจากผู้ใช้บริการ (ณ ก.ค.66)



Collaboration with WLCG

National e-Science Infrastructure Consortium

T2-TH-CUNSTDA

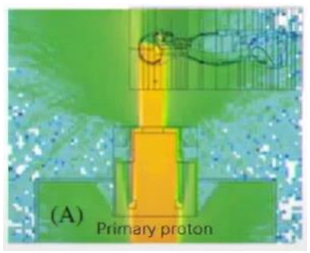
- Production site for CMS experiment since Jun 2014
- Operate by CU and NSTDA
- Upgrading and testing a system (ready for operate again by Jul 2018)
- 260 CPU Cores, 300TB run on GlusterFS

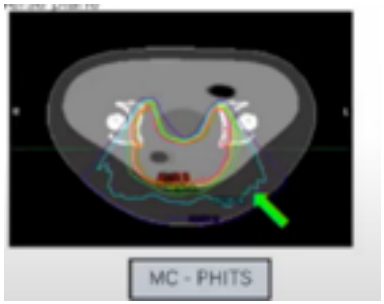
T2-TH-SUT

- Production site of ALICE experiment since Oct 2014
- Operate by SUT
- 99-100% availability
- 256 CPU cores, 100TB on GPFS for stored ALICE data

Ex. of RESEARCH PROJECTS

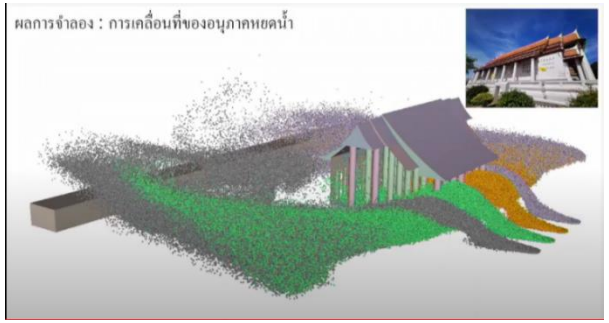
Monte Carlo simulation in radiation therapy





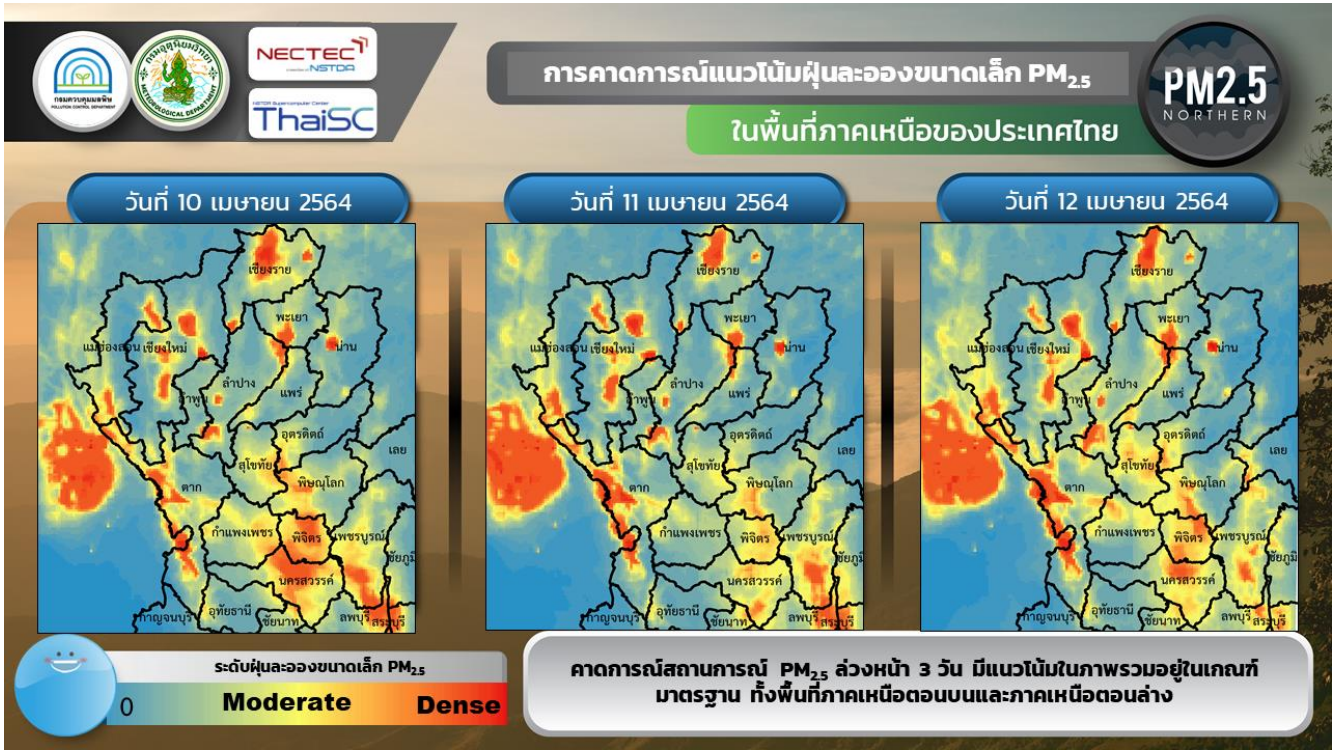
Publication: Sanhanat Chaibura, Thiansin Liamsuwan, Narongchai Autsavapromporn. **Simple Radiation-induced DNA Damage Modeling Approach for Proton Therapy**. Proceedings of the 21st South-East Asian Congress of Medical Physics (SEACOMP); 2023 Aug 10-13; Hotel Lombok Raya, Lombok, Indonesia.)

Computational fluid dynamics for the restoration of ancient mural paintings



Ex. of RESEARCH PROJECTS

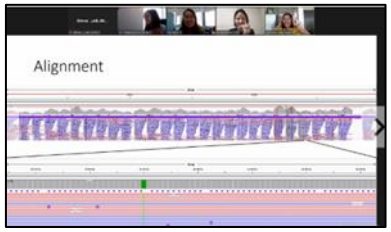
PM2.5 Simulation: Pollution Control Department



Ex. of RESEARCH PROJECTS

National e-Science Infrastructure Consortium

COVID-19 Network Investigations (CONI)



Genome sequencing of the Covid-19 virus for disease investigation
- To determine the origin of the virus
- To find the source of the infection
- To plan to stop the spread of the infection

HPC helps to analyze data at least 80 times faster
- Reduces the time to analyze the genetic sequence of 100 samples from 1 week to just 2 hours

The results are published on the international central database https://gisaid.org
- Thailand is one of the first countries in Asia to do this

Ex. of RESEARCH PROJECTS

National e-Science Infrastructure Consortium

Salinity Intrusion for Lower Chao Phraya Basin

River simulation includes a prediction model for **(1) water current (2) water level (3) salinity**. Information from these simulations helps water management from upper river's dams, water gates, and reservoirs.

- ❑ 7-day prediction with daily automatic update
- ❑ Perform "what-if scenario" for water management
- ❑ Data assimilation for accurate prediction
- ❑ Based on deterministic, and potentially, on ensemble models

Water Current Prediction

Water Salinity Prediction

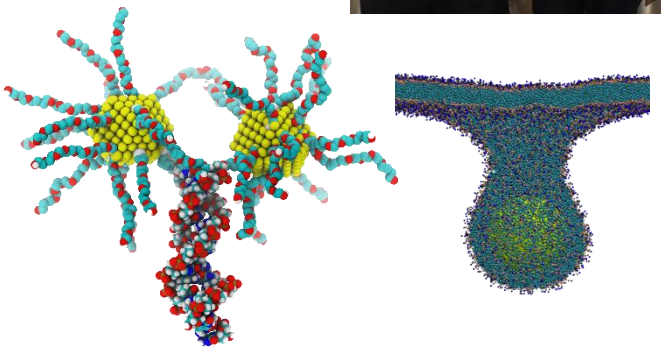
Contact: Dr. Sirod Sirisup, NECTEC

NECTEC a member of NSTDA

Ex. of RESEARCH PROJECTS

Designing Smart Nanoparticles for Nanomedicine

- design the functionalized nanoparticles that can be applied in drug delivery and biosensor
- Researcher: 7 students, (2 PhD, 4 MSc & 1 undergraduate)
- The **undergraduate** student was winner from the research project competition in the Siam Physics Congress 2016 (SPC2016) in Ubonrachathanee and was awarded the royal cup from Her Royal Highness Princess Galyani Vadhana, Princess of Naradhivas.

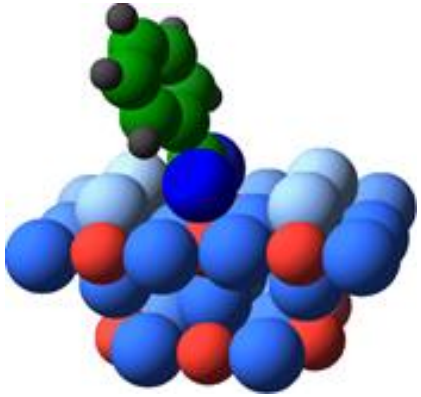


Materials Science and Nanotechnology Program, Department of Physics, Faculty of Science, Khon Kaen University

Ex. of RESEARCH PROJECTS

Combination to develop solar cell efficiency: Structure of a Model Dye/Titania Interface

- Used combination of synchrotron light and DFT to understand geometry of benzoate, dye molecule, on Rutile TiO_2
- Key to improve efficiency of dye sensitized solar
- The result may lead to smart electronics or higher efficiency solar harvest devices in the near future



Thailand Supercomputer Center: ThaiSC

NEEDS

Computing infrastructure service to Thai researchers

Economic/Social Research

Comp. Sci. Research

Trend Big Data & AI

CURRENT LIMITS

In house HPC resources

Small/mid research scale

Lack of global competition

SOLUTIONS

Develop ThaiSC

National computing infrastructure

Large-scale/complex research problem on computational science and DA

BENEFITS

Enhancing national research capability

Increasing cost effectiveness in computational resource

Raising Thailand competitiveness among ASEAN

Thailand Supercomputer Center: ThaiSC

Vision

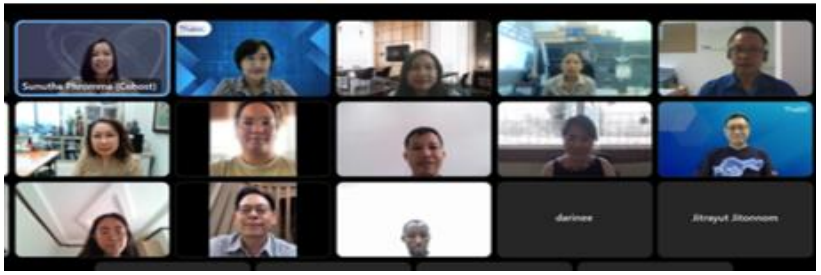
Leading HPC facility and computational science R&D center in ASEAN

Mission

1. **Provide HPC computing service for Thailand R&D**
2. **Perform frontier computational science R&D**
3. **Promote development of HPC workforce**
4. **Develop HPC roadmap for Thailand**
5. **Establish partnership and visibility**

Seminar & Workshop

Infosession for "LANTA Open Bata Test" (Online session) เพื่อประชาสัมพันธ์การใช้บริการ LANTA Supercomputer 23 May 2023



3.eHPC2024:Workshop on e-Science and High Performance Computing วันที่ 29 มกราคม 2567 (Hybrid)

Thank You