



HPC and AI : Accelerating Discovery Enabling Trust



NIAR NATIONAL INSTITUTES OF APPLIED RESEARCH
**National Center for
High-performance Computing**



NCHC Website



NCHC



HPC and AI :
Accelerating Discovery
Enabling Trust

AI HPC in TAIWAN

Nation-wide Computing and Data Centers
Public-Private Partnership

National Science and Technology Council

TAIWANIA 2	9 PF
TAIWANIA 3	2.7 PF
Forerunner 1	3.5 PF
Taiwan Chip-based Industrial Innovation Program	Estimated 280 PF
NANO 5	13.06 PF
NANO 4	H200: 80 PF GB200: 4.5 PF
Shalun Smart Green Energy Science City	Estimated 200 PF

Public Sector

Central Weather Bureau
National Chung-Shan Institute of Science & Technology AI Computing Center

Private Sector

Wistron
UBILINK
FOXCONN
AMD
NVIDIA Taipei-1
Konsttech
Enlight AI Computing Center
GMI Cloud
Vantage Data Center
ASE AI Energy Saving Data Center

Public Cloud

Azure
AWS
Google

SOVEREIGN AI in TAIWAN

NCHC Strategy for Trusted AI



AI HPC Computer Power
AI from training to inference



Domestic Data
Traditional Chinese
Indigenous languages
Hokkien language



Model
Local deployment of models:
TAIDE, Gemma, Llama...



TAIWAN AI RAP
TAIWAN Resilient and high-performance AI Platform (RAP)



System Overview



H200 : 117 PF (Rpeak)/80 PF (Rmax)
GB200 : 5.7 PF (Rpeak)/4.5 PF (Rmax)

- 220 Nodes of NVIDIA H200 +
2 Rocks of NVIDIA GB200 NVL72
- Storage: 25 PB
- Interconnect: InfiniBand NDR400
- Cooling: direct-to-chip + rear door
- PUE: 1.21

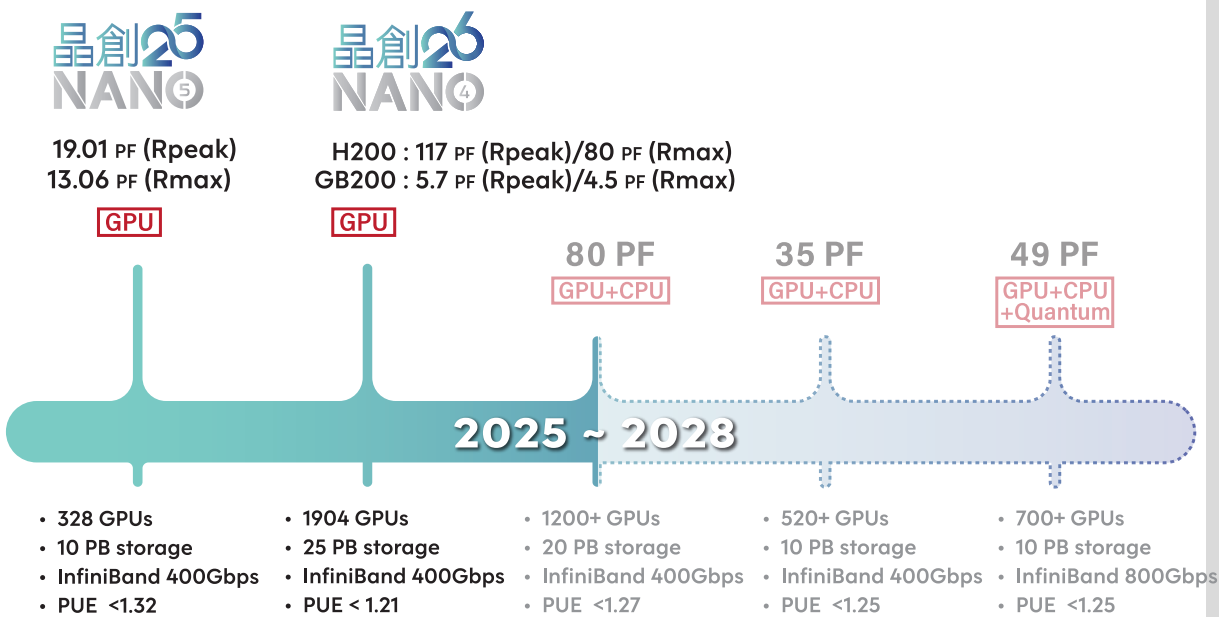
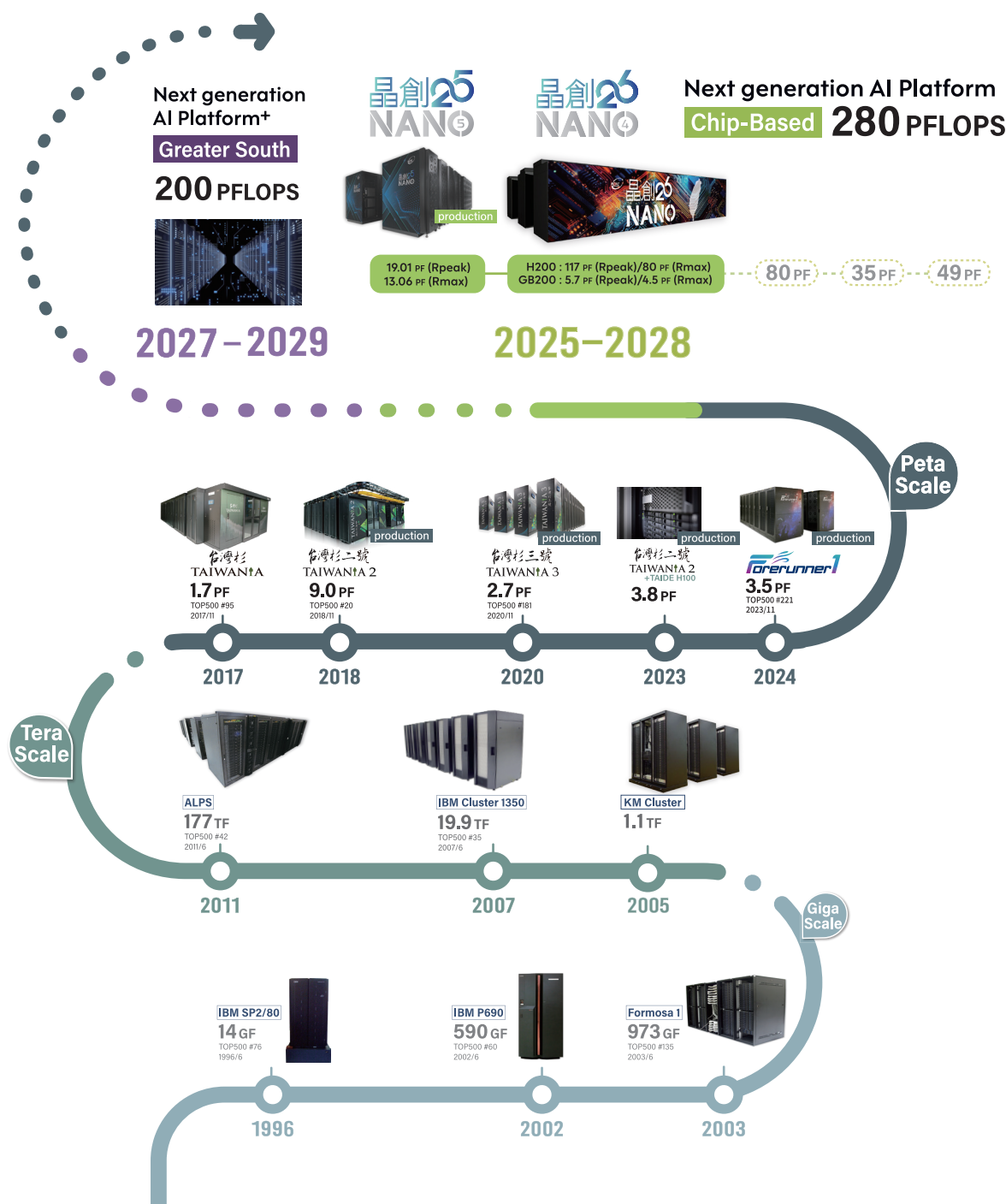
1) NVIDIA H200
CPU: Intel Xeon Platinum 8480+ x2
GPU: NVIDIA HGX H200 x8
Memory: DDR5 2TB

2) NVIDIA GB200 NVL72
CPU: NVIDIA Grace x36
GPU: Blackwell GPU x72
Memory: HBM3e 13.4TB



NCHC
HPC MILESTONES

Taiwan **Chip-based**
Industrial Innovation Program



To support the advancement of the Taiwan Chip-based Industrial Innovation Program, NCHC is building a shared heterogeneous supercomputing environment to provide various services such as general purpose AI computation (GPU), large scale scientific computation (CPU), and future quantum computation. We will also develop a high-quality and convenient cloud service platform to enhance user experience and improve application efficiency. In 2024-2025, the program focus on the research and development of generative AI technology, especially for building Traditional Chinese foundation models, and help Taiwan's industries and government to implement GAI applications.

2027 ~ 2029
Greater South Smart-Tech Industrial
Ecosystem Project

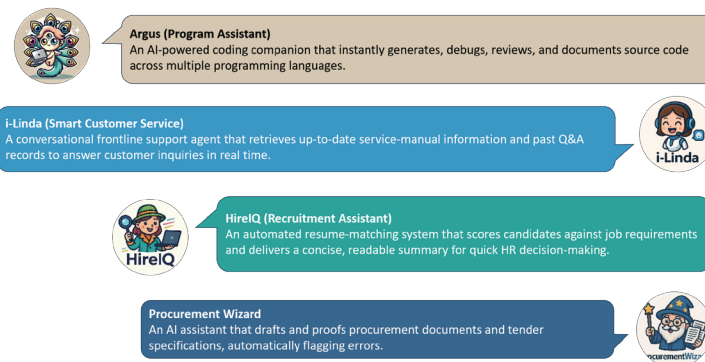
The National Science and Technology Council launched a national program in August 2024. The program is to invest in the development of Taiwan's own artificial intelligence platform over the next five years, thus to promote the smart technology industry ecosystem in southern Taiwan. The plan aims to build 200 PF of computing power which will bring the overall computing power of the country to 480 PF.

TAIWAN Resilient and high-performance AI Platform (RAP)

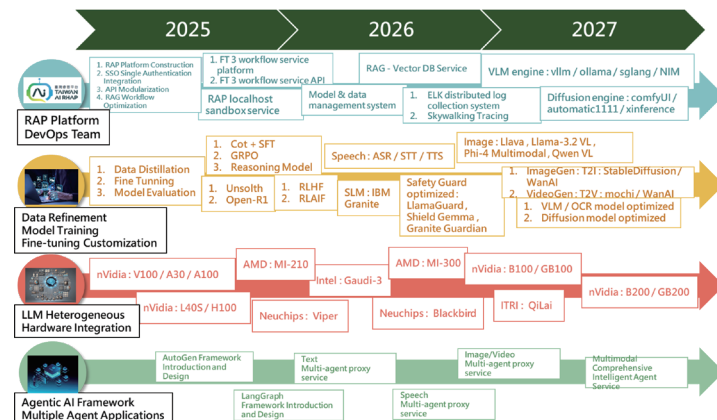
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Taiwan AI RAP operates along four coordinated tracks while being presented to the public as a single, coherent service layer. Track 1 (RAP Platform & Public Services) delivers three offerings people can use today: (1) a GPT-style frontend and customized workflow design, (2) various open-source model API services, and (3) model fine-tuning and evaluation. These offerings give users a simple way to try models, compose workflows, access stable APIs, and tune and evaluate models with transparent results—without needing to touch the underlying infrastructure.

Under the hood, Track 2 (Data & Model Quality) curates datasets, runs continual pre-training, and fine-tunes targeted models with reproducible benchmarks; Track 3 (Heterogeneous Hardware Integration) unifies diverse accelerators and tunes scheduling and cache to keep throughput high and time-to-first-token predictable across clusters; and Track 4 (Agentic AI Framework & Multi-Agent Apps) enables coordinated agents for text, speech, and multimodal tasks with policy guardrails and full observability. Together, these tracks form a single, open, reproducible AI stack that the public can build on and that researchers can fairly benchmark and extend.



Production solution

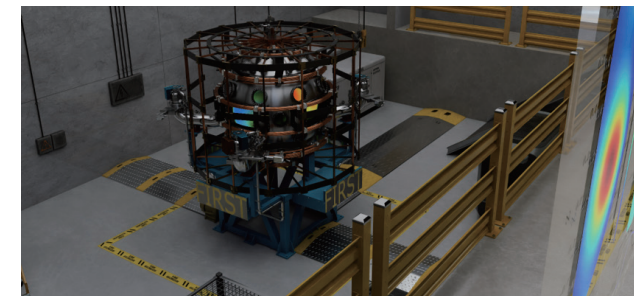
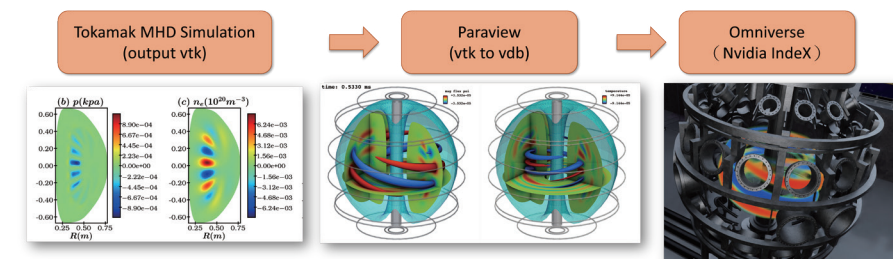


LLM taskforce roadmap

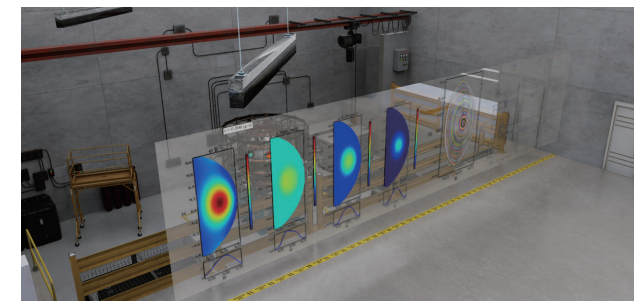
Digital Twin of Taiwan's First Spherical Tokamak (FIRST):

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We present a high-performance computing (HPC)-enabled digital twin of Taiwan's first spherical tokamak, FIRST, designed to integrate advanced plasma simulations with immersive visualization for fusion research and experiment planning. Numerical modeling is performed using the JOEKE magnetohydrodynamic (MHD) code on the NCHC F1 and T3 supercomputers, generating time-series plasma fields in VTK format. These outputs are transformed into volumetric representations by converting VTK timesteps into OpenVDB datasets via ParaView. The resulting volumes are imported into NVIDIA Omniverse, where they are rendered using NVIDIA IndeX for high-fidelity volumetric visualization. To provide contextual understanding, the plasma data are co-registered with USD-based models of the FIRST tokamak chamber and surrounding laboratory environment, creating a unified scene that combines scientific data with experimental infrastructure. This framework establishes an interactive digital twin that bridges simulation and facility context, enabling detailed analysis, experimental planning, and effective communication of fusion physics. This platform provides researchers and with a powerful tool to explore plasma dynamics and support the development of fusion energy in Taiwan.



Fusion plasma data from JOEKE simulations visualized inside the USD-based model of the FIRST spherical tokamak and its experimental hall.



An interactive scene combining JOEKE MHD simulation data with the 3D model of the FIRST facility in Omniverse, providing context-aware plasma visualization.

Acknowledgements:

The 3D models of FIRST tokamak chamber and laboratory layout are provided by National Atomic Research Institute and by Pulsed-Plasma Laboratory, Institute of Space and Plasma Sciences, National Cheng Kung University in Taiwan.

Sustainable Big Data in Health Platform

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Department of Life Sciences of National Science and Technology Council(NSTC) and the National Center for High-performance Computing(NCHC) are co-executing units. The project involves 8 medical centers collecting complete electronic medical records, gene sequencing data, medical images, and digital pathology images from patients with eight different diseases, compiling them into a high-quality biomedical data set. NCHC will be responsible for storing and collecting related information.

Promote Disease-oriented Biomedical Data Infrastructure Optimization and Technology Application Projects

1. Continue to optimize the integrity of case data and collect information about patients after treatment.
2. Add new major diseases that threaten the health of Taiwanese people. Further improve the support functions of the biomedical big data platform.
3. Strengthen the application value of clinical data in the industry.

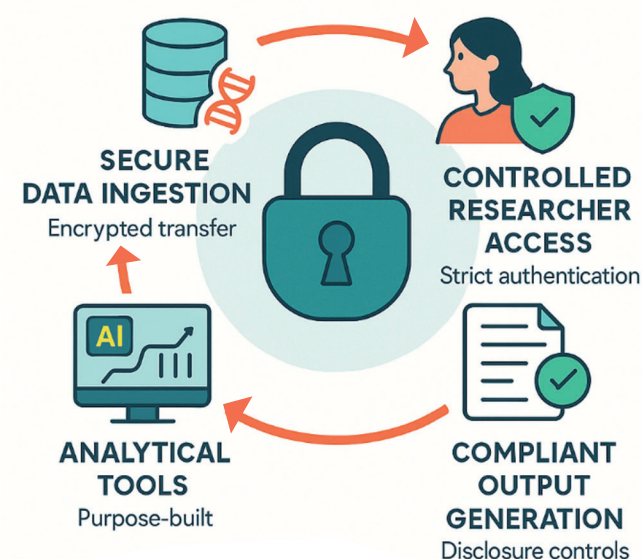


The project to promote disease-oriented biomedical data infrastructure optimization and technology application is an extension of the Sustainable Big Data in Health Platform Project, aiming to establish secondary data sets that can be used for biomedical research.

Trusted Research Environment

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The integration of artificial intelligence into biomedical big data offers the potential for precision medicine. Since 2017, the National Science and Technology Council has been gradually compiling genomic sequences and digital clinical records, including those for rare diseases. Furthermore, starting in 2021, eight medical centers will collect genomic sequences, pathology slides, electronic clinical records, and 3D images for 10 types of cancer, as well as stroke and dementia. This will integrate multiple data sets from the onset of illness and post-treatment in a patient-centric manner. By combining data from healthy individuals in the Taiwan Human Biobank and leveraging the computing power of the National Center for High-performance Computing, the Council hopes to develop precise models capable of predicting the progression of related diseases and ultimately preventing their occurrence.



Trusted Research Environment



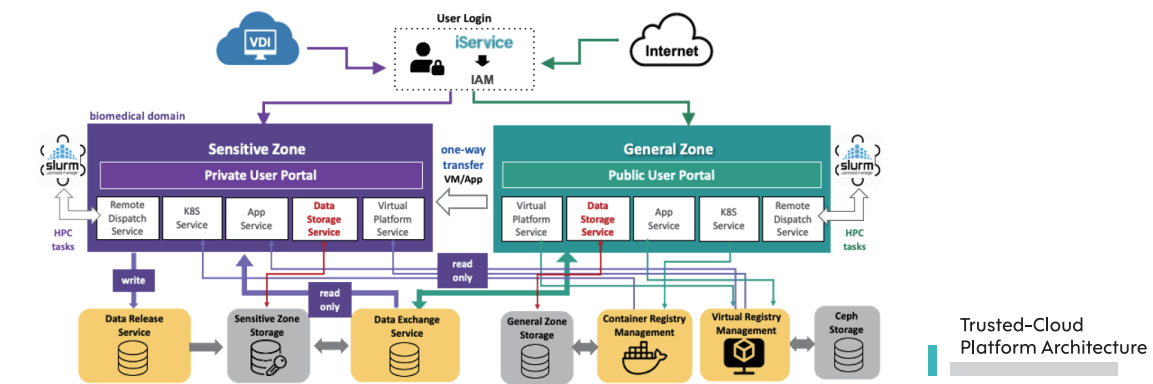
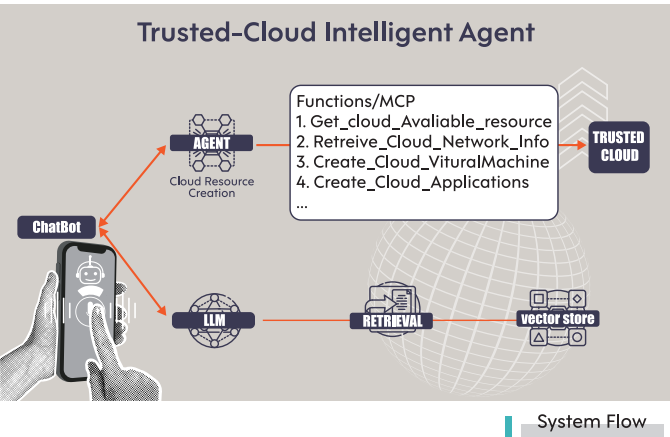
The trusted cloud platform adheres to five safes framework: safe people, safe data, safe settings, safe projects, and safe output.

Trusted-cloud Intelligent Execution Assistant

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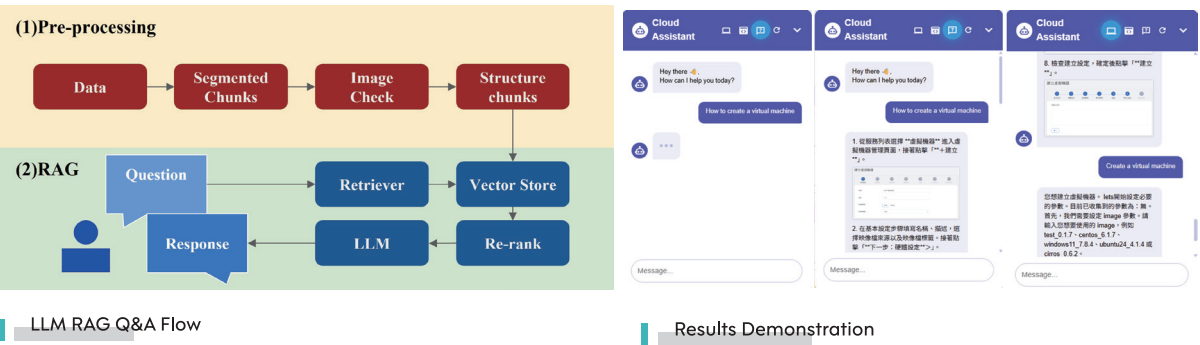
Trusted-cloud Platform

The National Center for High-Performance Computing (NCHC) provides the Trusted-Cloud Platform, a secure, reliable cloud that built on advanced security and encrypted storage for strong data protection and compliance. It provides both virtual-machine and Kubernetes-based container services to suit varied workloads, To improve the user experience on our Trusted-Cloud Platform we add the Trusted-Cloud Intelligent Execution Assistant a value-added tool that streamlines cloud operations and boosts user productivity.



Trusted-cloud Intelligent Assistant

NCHC's Trusted-Cloud AI-Agent integrates LLM to assist users in managing cloud resources. It offers three main functions: RAG Q&A for image-text based answers to resolve cloud-related questions. VM creation help user create customized network, storage, and compute resources. Application deployment supports via uploaded images or Python services. By automating these tasks, the AI-Agent Assist user on cloud service , create and management resource smarter, faster, and easier.



Taiwan Climate Change Projection Information and Adaptation Knowledge Platform (TCCIP)

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Taiwan Climate Change Projection Information and Adaptation Knowledge Platform (TCCIP) is currently in the fourth phase of research since its beginning in 2009. In this new phase, TCCIP aims to strengthen cross-level and cross-sector adaptation applications through climate-related research to support Sustainable Development Goals (SDGs) in Taiwan. Simultaneously, TCCIP strives to achieve the mid-term goal of the National Science and Technology Council (NSTC) in proactively responding to the climate emergency and enhancing the systemic resilience of Taiwan.





Accelerating Research Connectivity: TWAREN's Leap to 400G

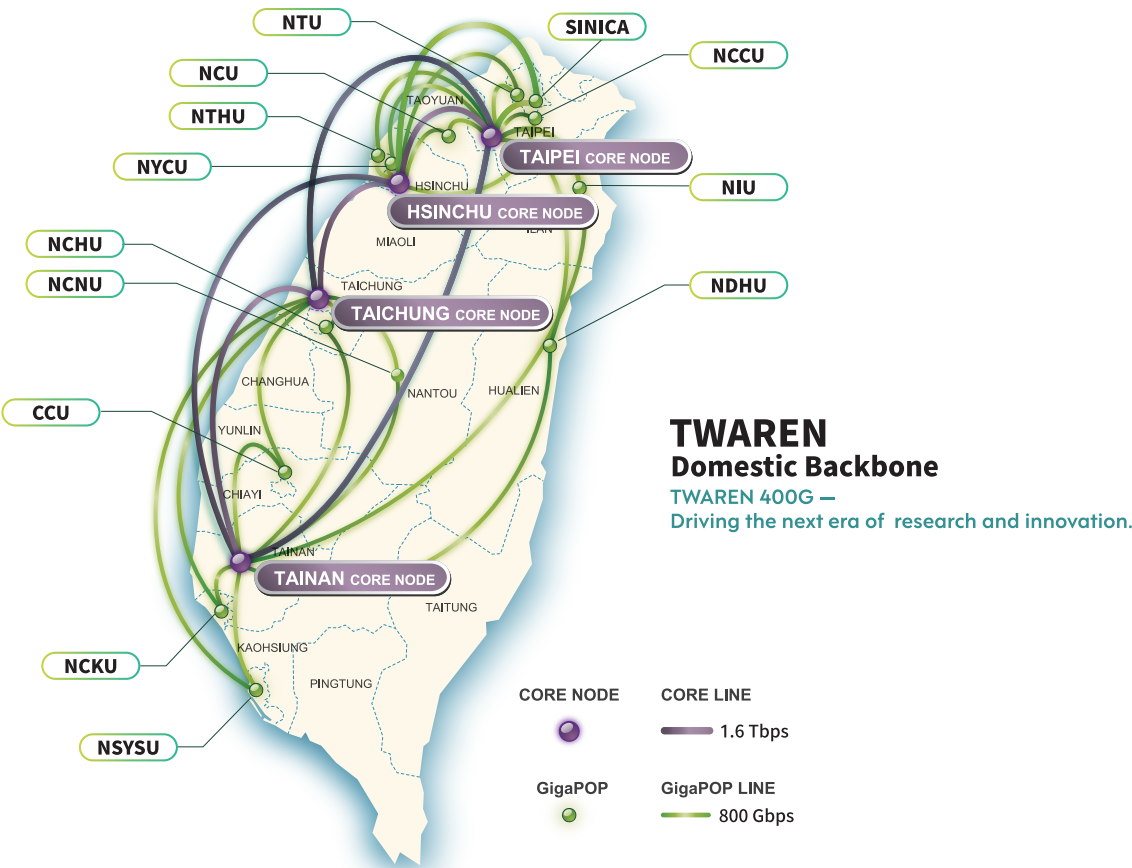


Contact information | Boyi Lee | boyi@nlar.org.tw

TWAREN takes a bold step forward with its next-generation **400G backbone upgrade**, empowering research and innovation with unprecedented speed and resilience. The new architecture is enhanced with a **3D Digital Twin Dashboard**, delivering full-visualized, real-time monitoring for smarter network management.

At the global scale, TWAREN's **international circuits** have been upgraded to **100G**, strengthening seamless connectivity to the U.S. and beyond.

Across Taiwan, the **nationwide fiber backbone** now interlinks north to south via robust terrestrial and submarine cables, ensuring a more reliable and resilient research infrastructure. With advanced visualization and real-time oversight, TWAREN is redefining network reliability for the future.



NCHC

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