Introduction of ASGC Computing & Storage Services

10 April, 2025

Jingya You (jingya.you@twgrid.org)

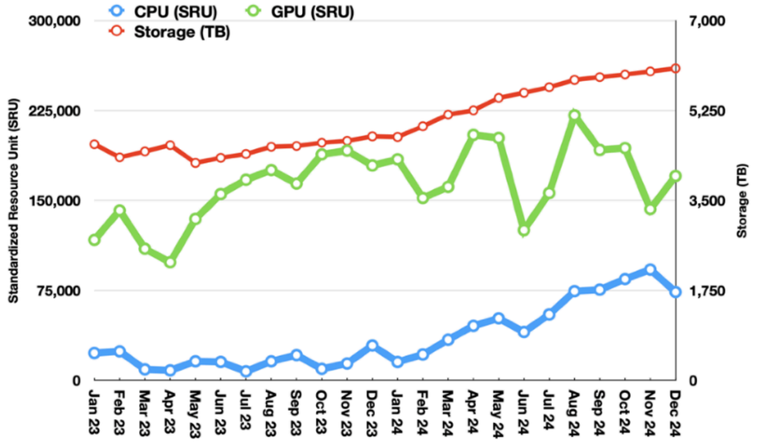
Introduction of ASGC Computing Services

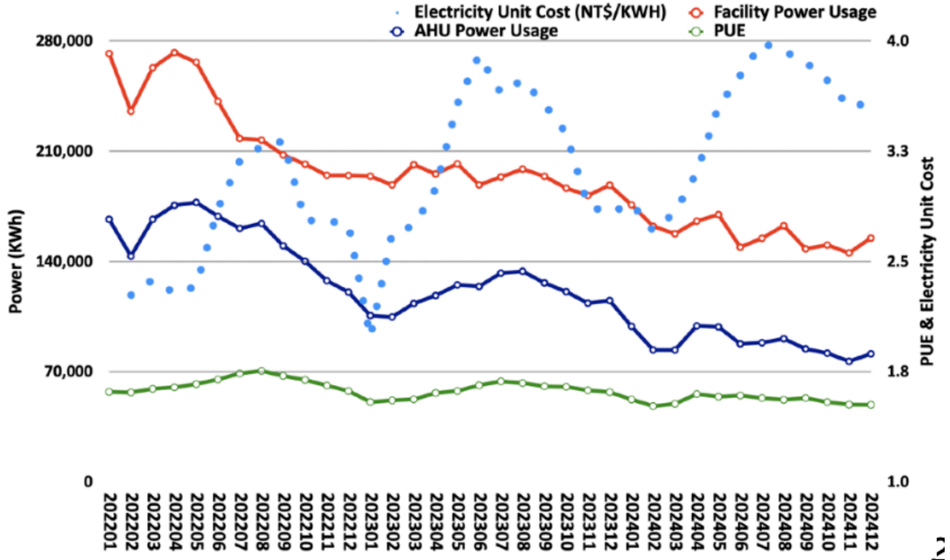
- *Funding from both Academia Sinica & NSTC(國科會)*
- Our Mission is To serve all Taiwan Scientific communities:
- Collaborate with research teams to
  - Assist in the customization of big data analysis processes
  - Improve the performance of big data analysis and scientific computing
  - Develop new analytical tools and methods
- Maintain a stable research and analysis environment
- Provide a convenient high-performance application environment
- Research team does not have to go through the work to setup their own system and maintain it
  - Allow to focus on scientific issues

NSTC Core is currently servicing about 600 users from 25 institutes

Introduction of ASGC Computing Services

- Sustained Growth of Users, Utilization, Reliability and Satisfaction in 2024
  - 174 PI Groups, 595 Users from 25 Institutes in Taiwan
  - Finished 4.94M CPU jobs, and 52.8K GPU jobs, with 99+ reliability
  - 26+ supported research publications
  - Demands of advanced GPU keeps growing in 2024 - 20% utilization growth in high usage situation
- Efficiency & Performance Improvements by Power Saving
  - Onboarding new hardware and retiring legacy ones
  - Expected to have >7,000 CPUCores and new GPUs, 15PB disk and new tape backup/archive in 2025





Introduction of ASGC Computing Services

- ASGC Portals of Core Facility Services
  - ASGC website
    - https://www.twgrid.org
  - 中研院大數據分析與科學計算核心設施
    - https://scale.grid.sinica.edu.tw
  - 國科會高效能科學計算服務
    - https://nstccore.twgrid.org
- DiCOS Computing Service Portal
  - https://dicos.grid.sinica.edu.tw
- Training Materials
  - https://indico4.twgrid.org/category/3/

Today's Sessions

- 13:30~13:50 Introduction
- 13:50~14:00 User Management: Accounts & 2FA
- 14:00~14:30 Computing service: SLURM
- 14:30~14:45 Computing service: SaSS Cloud Computing - DiCOSApp
- 14:45~15:00 Storage service & data transfer

Introduction of NSTCCore Computing Service

- Computing Service
  - SLURM
  - DiCOSApp
- Storage Service
- Technical Support
- User Management

	2024.04 ~	2024.09~2025.08	2025.08~2026.06	
CPU	1920 Cores *AMD Genoa + 768 Cores AMD Rome + 528 Cores *Intel FDR5	1920 Cores *New (2024. 12) + 1920 Cores AMD Genoa + 768 Cores AMD Rome + 256 Cores Intel-G4	1920 Cores *New + 3840 Cores AMD Genoa + 768 Cores *AMD Rome + 256 Cores *Intel-G4	*後續算量計核狀決定 計能依畫定況
GPU	V100 - 32 boards A100 - 8 boards *Current Resources	V100 - 32 boards A100 - 8 boards + 16 boards *Current Resources	V100 - 32 boards A100 - 8 boards *Current Resources	
Storage (PB)	3 *Buy-in every year	6 *Buy-in 3TB every year	9	
Tape (PB)	4 *Buy-in every year	8 *Buy-in 4TB every year	12	

表、計算資源購置規劃表 2025.1

Storage Service

- Ceph Filesystem
  - An open source distributed filesystem
  - High-Throughput

User Home Space

- /dicos_ui_home/{user_account}
- 100GB Free space

Working Space

- /ceph/work/{group_account}
- Every Group has 3TB free space, PI has full permissions for data in this space. Buy more space according to your computing needs, 1TB/days as a purchase unit.

Tape as Backup Service is now in testing phase

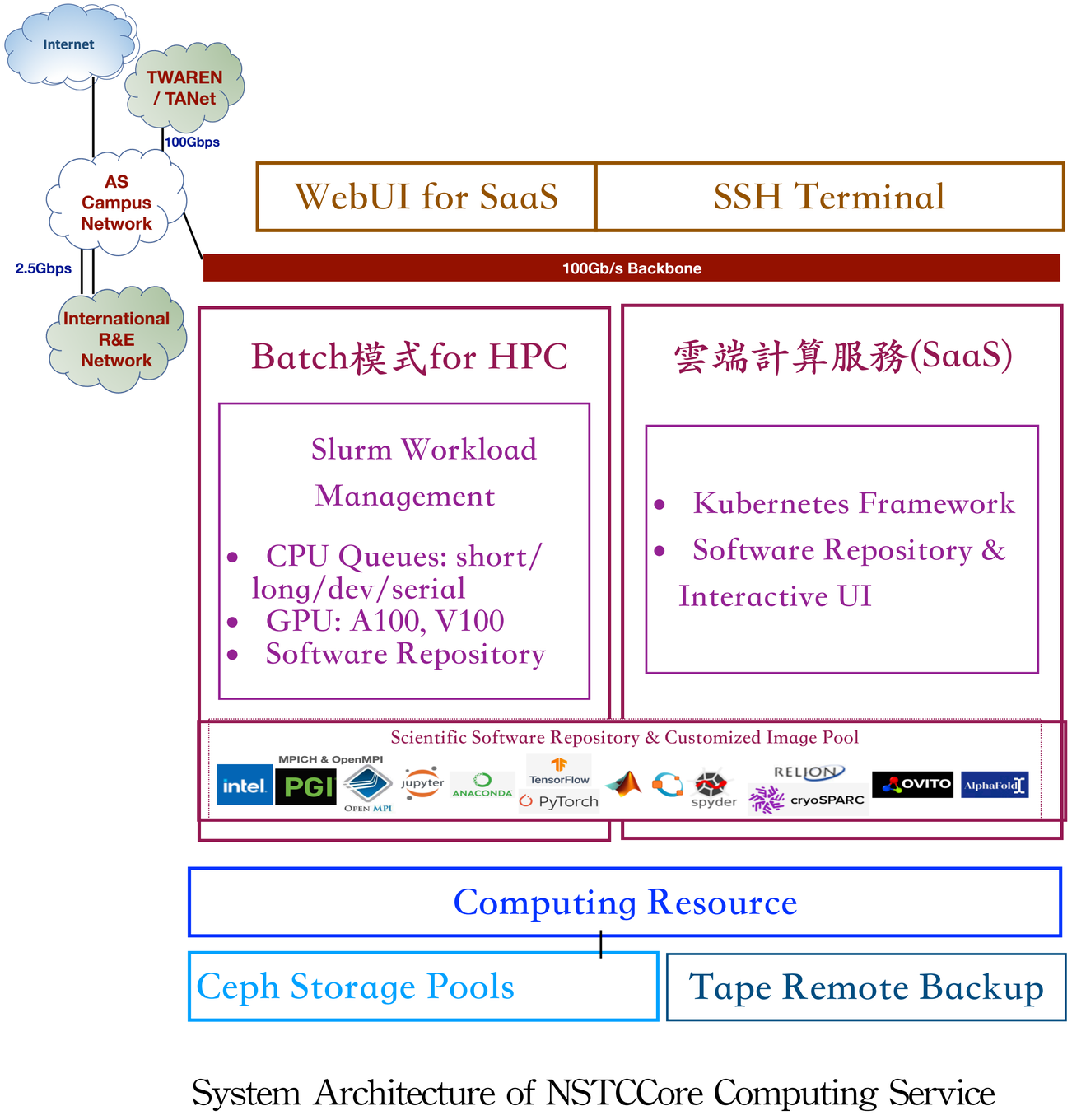
- /ceph/project/{group_account}
- Backup and long-term preserved space. Buy as needed. 1TB/years as a purchase unit.

Data Transfer

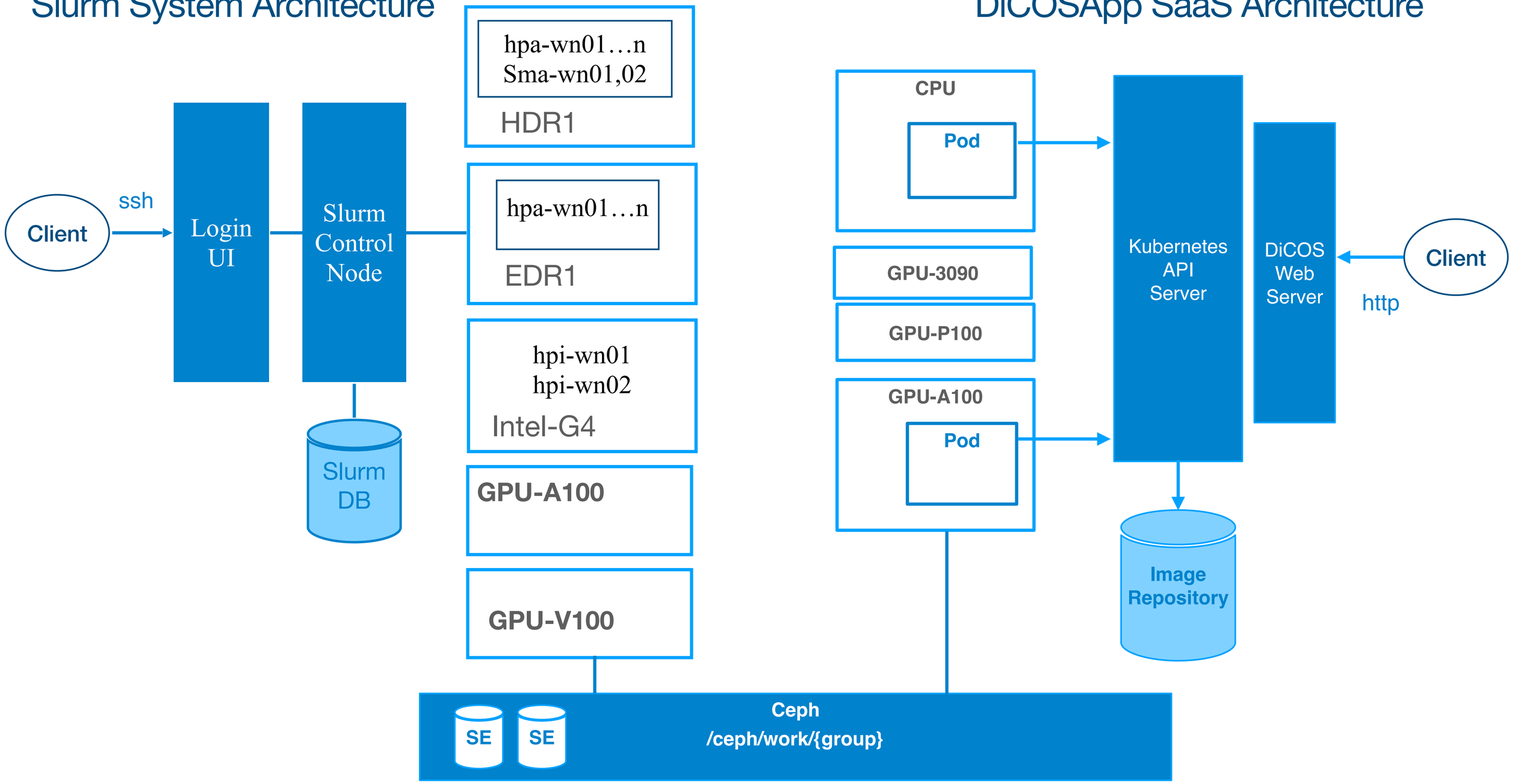
- Transfer by SFTP via dicos-sftp.twgrid.org

Scientific & HPC Computing Service

- Batch Jobs Computing Service
  - Slurm Work Management System
- Interactive Jobs Computing Service
  - Scalable & Virtualized Service-as-Service (SaaS) Service Model
  - Software on-demand Web-based UI
  - Customized Application Deployment



System Architecture of NSTCCore Computing Service


Slurm System Architecture
DiCOSApp SaaS Architecture
hpa-wn01…n
Sma-wn01,02
HDR1
hpa-wn01…n
EDR1
hpi-wn01
hpi-wn02
Intel-G4
GPU-A100
GPU-V100
Client
ssh
Login UI
Slurm Control Node
Slurm DB
CPU
Pod
GPU-3090
GPU-P100
GPU-A100
Pod
Kubernetes API Server
DiCOS Web Server
Client
http
Image Repository
SE
SE
Ceph
/ceph/work/{group}

Batch Jobs Computing Service

- Slurm System Architecture
  - Scalable Cluster Management and Job Scheduling System
- Computing Nodes
  - CPU - EDR1、HDR1、Intel-G4
  - GPU - A100、V100

- Jobs Working Space:
  - Ceph Cloud Filesystem
  - Intermediate Space: Local Disk in Worker Nodes

Cluster	CPU	Nodes	Cores-Per-Node	Cores	RAM(GB)	Inter-connection	Local Disk (SSD)
Intel-G4	Intel® Xeon® CPU E5-2650 v4@2.20GHz	22	24	528	128	IB:FDR, Eth:10Gbps	2TB
HDR1	AMD Rome 7662 @2.0GHz	6	128	768	1536	IB:HDR, Eth:100Gbps	1TB
EDR1	AMD Genoa 9654@2.4GHz	20	192	3840	1536	Eth: 100Gbps	2TB

Interactive Jobs - SaaS Computing Service

- Kubernetes and Openstack
  - High extensible and reliable virtual environment
- Customized Application Deployment
- Images Repository
  - JupyterLab and various scientific applications
  - Built by user’s requirements
- Software-on-demand Web UI
  - No installation and easy to adopt
- Working Space (* Customized User Data Pool)
  - Ceph Filesystem

SaaS for Virtualized Computing Service

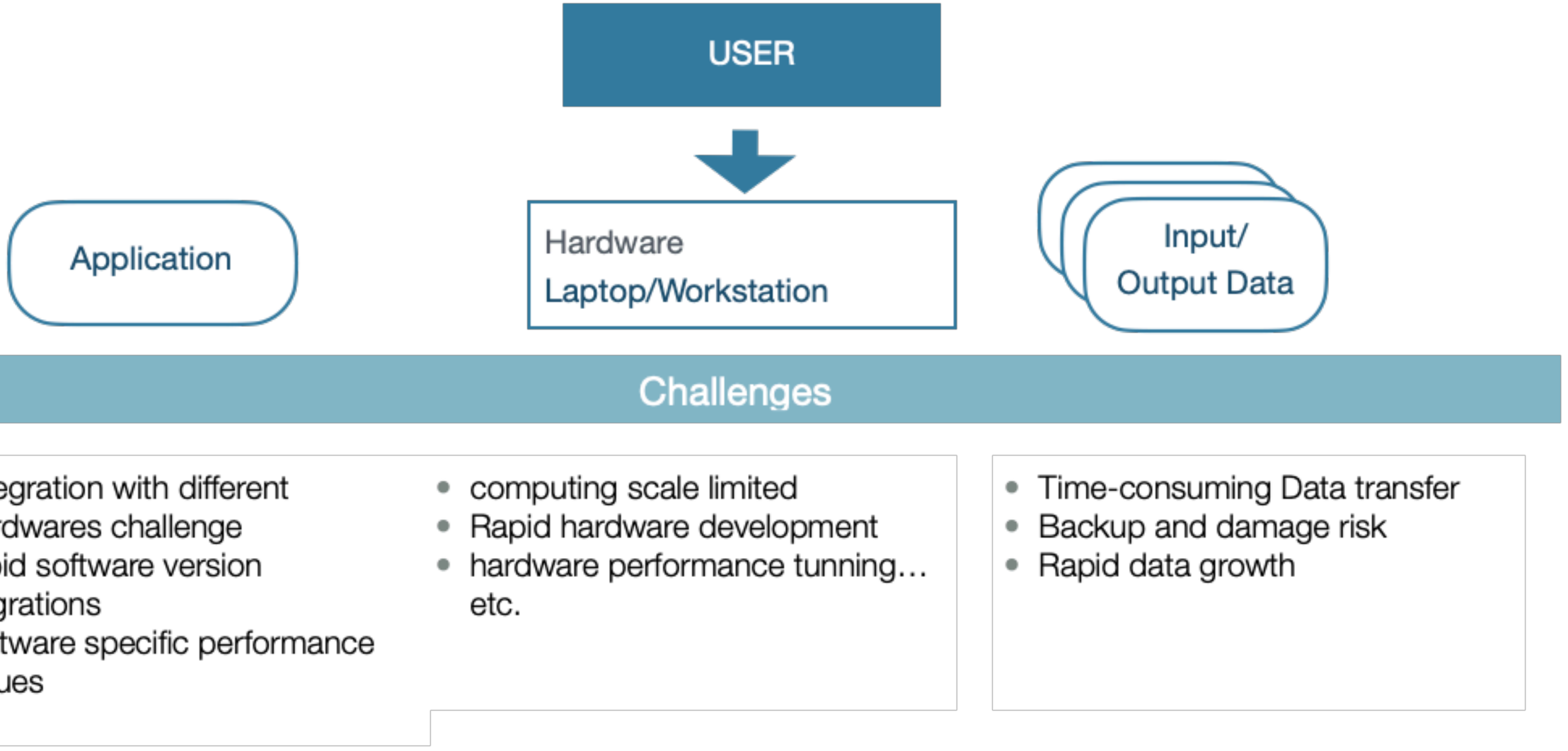
Scientific Software Repository

- Interactive：Ovito(Molecular Dynamics)、cisTEM、RELION(Medical Image Reconstruction)
- BioMedical：Cryosparc (* License required from users）
- Anaconda Python packages for ML：JupyterLab、TensorFlow、PyTorch、PyRoot、DeepMD(Molecular Dynamics)…etc.

When your job needs

- Interactive UI
- Specific OS or Application required
- Dedicate node for rapid development for multi-core or GPU to develop and testing your task

Users' Challenges



Workflow of User Support

User Support & Customization

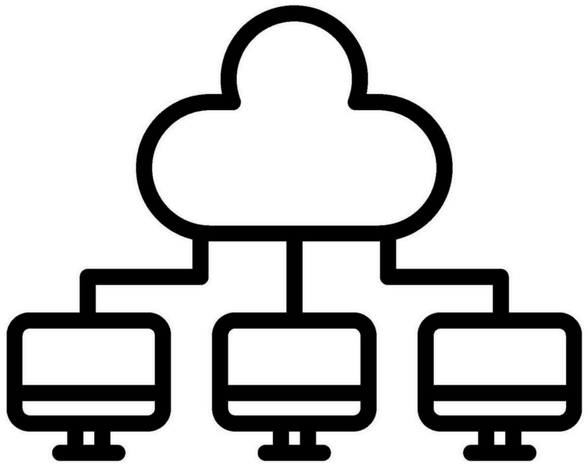
Application on various hardware platforms

Scalable computing resources according to your requirements

Transparent data space & easy data sharing in your research group

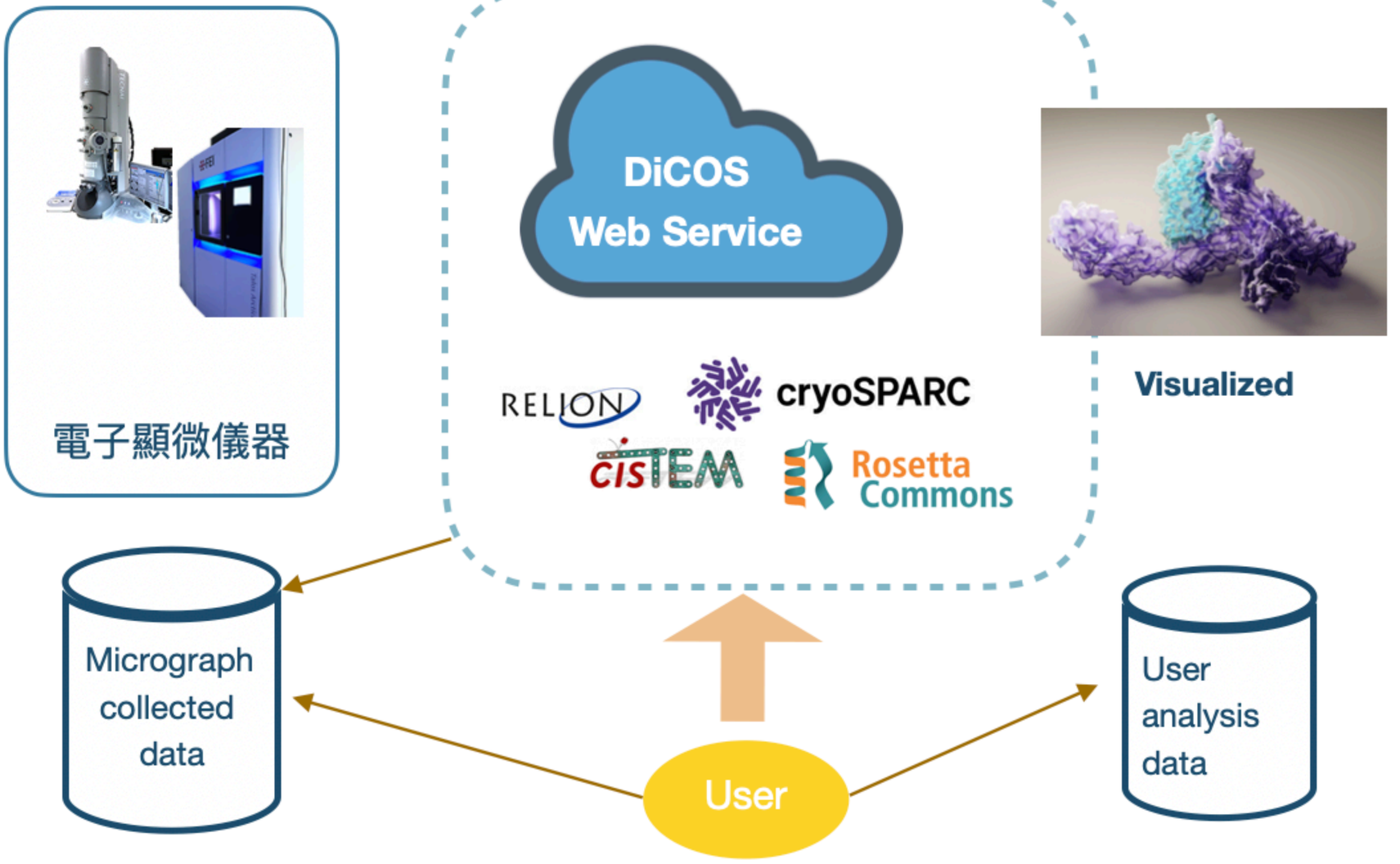
User Training & Consulting Service for Technical Issues

SLURM Service



DiCOS-Apps (Cloud SaaS)

以中研院冷凍電顯中心為例：



Pricing for Computing Service

More details in
https://dicos.grid.sinica.edu.tw/resources
https://nstccore.twgrid.org/access.php#pricing

CPU計算服務				
機器名稱	機器規格	計費單位(Per Core/Board-Day) 價格(NTD)	國內非學術單位使用者	國外學術單位使用者
intel-g4	Intel(R) Xeon(R) Gold 6448H	1.4	加計 50%	加計 50%
EDR1	AMD Genoa 9654 @2.4GHz	1.2		
HDR1	AMD Rome 7662 @2.0GHz	1		
GPU計算服務				
A100	NVIDIA A100	120	加計 50%	加計 50%
RTX4090	NVIDIA RTX-4090	60		
RTX3090	NVIDIA RTX-3090	40		
RTX3090 (Dedicated for ASCEM user)	NVIDIA RTX-3090	40		
V100	NVIDIA V100	35		
P100	NVIDIA P100	8		
1080Ti	NVIDIA GTX-1080Ti	1		
儲存與擷取服務				
--	$1000 NTD/TB-Year		加計 20%	加計 50%
--	$3 NTD/TB-Day			
資料傳輸				
--	目前未納入計費			
進階服務				
--	依據所需人時計算。額外需開發之軟體、系統或使用介面等，將另按工時計費(每 168 man-hr 為 NT$ 120,000)			

Technical Support

- Help Desk & Service Notification
  - Rocketchat online chat - https://rocketchat.twgrid.org/channel/general 
  - Email - dicos-support@twgrid.org
  - Portal - https://nstccore.twgrid.org
    - Release up-to-date services status, group usage, pricing and technical relevant information