

Introduction to APAN APRP WG and Korea Research Platform Activities

KISTI/KREONET
Jeonghoon Moon
16th Sep. 2024



1. APAN APRP WG

- APAN 57th Meeting at Bangkok(31st Jan. 2024)
- APAN 58th Meeting at Islamabad(28th Aug. 2024)

2. Asi@Connect Project/TEIN*CC

- Current Status
- Result of the project
- Expanding to Asia Region

3. A3 Foresight Program Project

- Consortium of A3 countries
- Data Sharing Infrastructure across Northeast-Asia Supercomputing Centers for Open Science
- Strategies and Key technologies

4. Korea Research Platform

- Smart Agriculture
- Smart Decision making system
- Yonsei Medical University

5. Conclusion

APAN & APRP WG

- [1] APAN 57th Bangkok Meeting
- [2] APAN 58th Islamabad Meeting



- **Since 2018 APRP WG initiated at APAN 45th 2018 in Singapore**
APRP – Asia Pacific Research Platform Working Group
APAN meeting held 2 times in a year
- **Objectives**
APRP WG develops technologies to provide data-intensive science (AI, Bio, Climate/Weather, Agriculture) environments and various computing resources by linking distributed HPC systems and establishing a stable big data highway system based on NREN in the big data era, and promotes related research collaboration in the Asian region.
 - Promote **Distributed & Shared HPC ecosystem in the Asia-Pacific.**
 - Engage **APAN members and ASEAN countries**
 - Towards the setting up an **Asia Pacific Research Platform (APRP)** and **become a part of a Global Research Platform**
- **Executive member**
Chair : Jeonghoon Moon, KISTI, Korea
Co-Chair : Andrew Howard, NCI, Australia
Secretary : Asif Khan, Qatar Univ. Qatar
- **Asi@Connect 5th Call project by TEIN*CC**
Title : A High bandwidth distributed HPC (1st April 2022 – 31st July 2023)
- **A3 Foresight Program Project by A3 Countries NRF**
Title : Data Sharing Infrastructure across Northeast-Asia Supercomputing Centers for Open Science (1st Aug. 2024 – 31st Jul. 2029, 5 Years)



- **APAN 57th APRP Meeting**

- Held at Bangkok in Thailand(Jan. 2024)

- **Session Information**

- Session 1: Infrastructure and Technical Part, Chair: Jeonghoon Moon, 1330-1500
- Session 2: Application and Technical Part, Chair: Jeonghoon Moon, 1530-1700
10 Presentations from 6 countries
- Infrastructure: Country update and status of platform(KR, AU, MY, PK etc)
- Technology: Exa-Scale data challenges(FermiLab), Quantum Safe Network(KR), Wireless Communication(KR)
- Application: AI-Science, Bio-Science, Climate change disaster related Forest(AFaCo), Avian infection diseases



Session 1

Session1: Infra & Technical Part, Chair: Jeonghoon Moon

1	Asif Raza(PK)	Exascale Data Challenges and Networking R&D Efforts for the HL-LHC era
2	Asif Khan(MY)	Bioinformatics & HPC
3	Yves Poppe(SG)	The road toward a Global Research Platform
4	Nor Asilah(MY)	Distributed HPC and Malaysia future works
5	Jeonghoon Moon(KR)	Korea Research Platform and future works

Session 2

Session2: App & Technical Part, Chair: Jeonghoon Moon

1	Andrew Howard(AU)	Australia update and future works
2	Woojin Seok(KR)	Researches of Quantum Safe Network at KREONET
3	Veerachai Tanpipat (TH)/Soozin Ryang (KR)	Capacity Building for Forest, Hydrology and Climate Change Disaster Related
4	Kiwook Kim(KR)	Update of wireless communication and scientific data
5	Nurulfiza Mat Isa(MY)	Update of data driven in the fight against avian infectious diseases

Current KRP Platform Status

- Korea Research Platform**
 - Several prototype KRPs
 - GPU intensive, CPU intensive, Storage intensive type
- Applications**
 - Analysis of Urban flooding by LSTM
 - Analysis of Solar Visual data by High intensive GPU(Astronomy)
 - Several distributed computing task based on AI & GPU

Platform Architecture

KRP Login

Web UI

Open Source

Service Software for AI

Platform & Manage Software

- Korea Research Platform update and current status(Jeonghoon Moon/KREONET)

- Malaysia Research Platform Update(Nor Asilah)

Fermilab **U.S. DEPARTMENT OF ENERGY** **Office of Science**

Exa-scale Data Challenges and Networking R&D Efforts for the HL-LHC at Fermilab

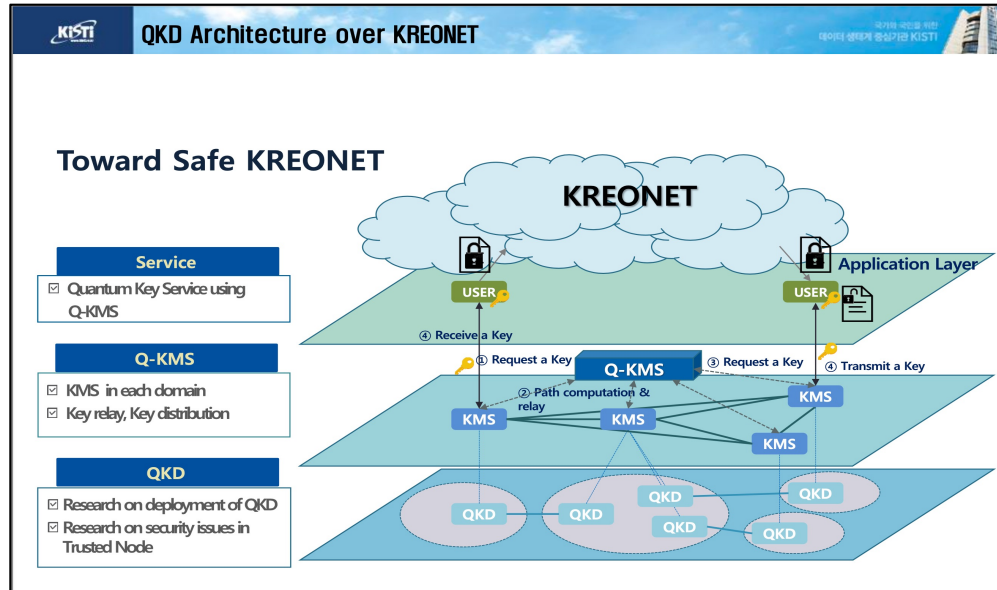
Presented by: Asif Raza
(Network and Software R&D for USCMS)
December 31st, 2024

57th Asia Pacific Advanced Network (APAN 57th)

Asia Pacific Research Platform Workgroup(APRP)

Assoc. Prof. Dr. Nor Asilah Wati Abdul Hamid,
Faculty of Computer Science and Information Technology,
Institute for Mathematical Research (INSPEM),
Universiti Putra Malaysia

- Exa-Scale data challenges and networking R&D efforts for the HL-LHC at FermiLab (Asif Raza/FermiLab)



- Wireless Communication and Scientific data(Kiwook Kim/KREONET)

Asia Pacific Research Platform (APRP)-APAN57, BKK, Thailand, 29th Jan-2nd 2024

Capacity Building for Forest, Hydrology and Climate Change Disaster Related

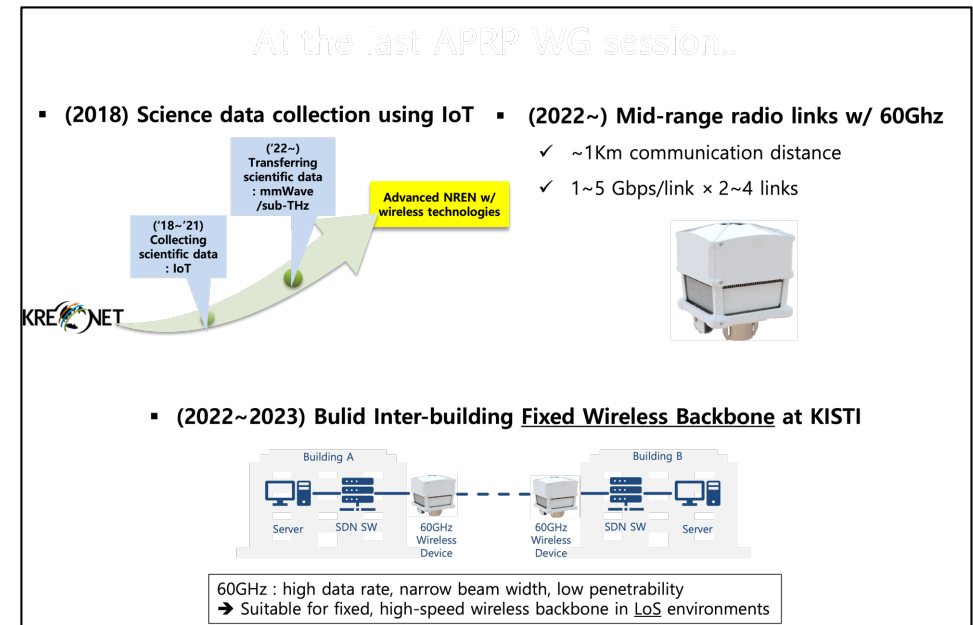
Veerachai Tanpipat (WFSRU & HII) & Soozin Ryang (AFoCO)

veerachai@hii.or.th - fforvrc@ku.ac.th & soozin.ryang@afocosec.org

Background Source: <https://newsghana.com.gh/design-child-focused-climate-change-adaptation-plans-govt-told/>



- Research of Quantum Safe network at KREONET (Woojin Seok/KREONET)

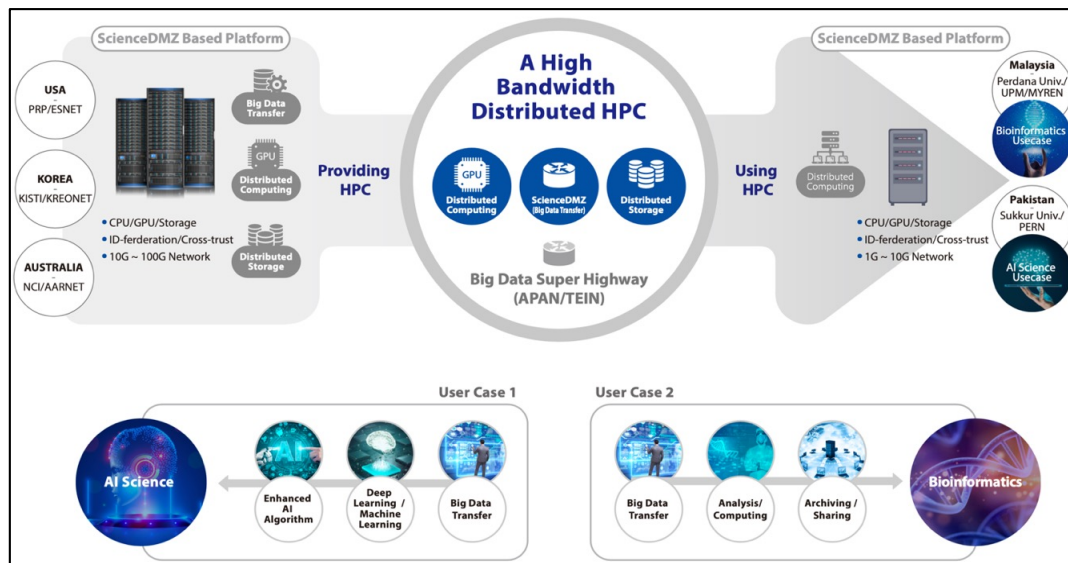


- Capacity Building for Forest, Hydrology and Climate Change Disaster Related(Veerachai Tanpipat(TH) & Soozin Ryang(KR))

- Asia-Pacific Research Platform setup complete at UPM of Malaysia(Feb. 2024)
- Test running for various Applications (refer. Table)
 - APRP platform is being tested and used by Jupyter/Python users.
 - There are about 5 categories of the application areas

No.	SW	Time (days / hours) (Laptop with 1 processor)	Time (days/hours) (Max core available are 48 cores)	Reduce to
1.	Gromacs	3 months (90days)	With 48 cores	9 days
2.	Pythons	15 hours	With 24 cores	2 hours

- Open plan to APRP WG members (Pakistan, Nepal, Sri-Lanka and Thailand)
- Share the computing resources with KR, AU, JP, SG etc



Architecture of APRP

Building a High Bandwidth Distributed HPC

1 April 2022 – July 2023

- Master Node Server (1)
- Three (3) Worker Node Server -DTN-R7524
- 2 AMD EPYC 7352 2.3GHz, 24C/48T per node. X 3 node = 144 cores
- 2 NVIDIA A40 per node 48GB GDDR6 PCIe = 6 GPUs

APRP setup@UPM



• APAN 58th APRP Meeting

- Held at Islamabad in Pakistan(26th Aug. to 30th Aug. 2024)

• Session Information

- Session 1: Keynote Speech and Technical Part, Chair: Jeonghoon Moon, 0900 – 1030

- Session 2: Application and Country Update Part, Chair: Andrew Howard, 1100 - 1230

10 Presentations from 6 countries

- Keynote Speech: Quantum Network by Dr. Raj Kettimuthu (ALN/US)

- Presenters: 10 presentations, 6 countries

- Keywords: Big data, A3 Foresight Program, New Project, DMC/Cloud of NCI, Inter Data Center, Apply for Agriculture, Bio-Science, AI-Science, PERN, etc

Session 1

Session1, 0900-1030 GMT +5(PK time), 28th Aug. Chair: Jeonghoon Moon(KISTI/KR)

1	0900-0903	Introduction of APRP WG and sessions (Jeonghoon Moon/KISTI/KR)
2	0900-0918	FNAL's High-Speed Networking R&D Efforts for the HL-LHC (Asif Raza/Fermilab/US)
3	0918-1010 (Keynote)	INTERQNET: A systems approach to realize a scalable quantum network (Raj Kettimuthu/ANL/US)
4	1010-1025	NDeX Project: Inter data centers big data transfer (Kiwook Kim/KISTI/KR)
5	1025-1035	Data Sharing Infrastructure across Northeast-Asia Supercomputing Centers for Open Science (Jeonghoon Moon/KISTI/KR)

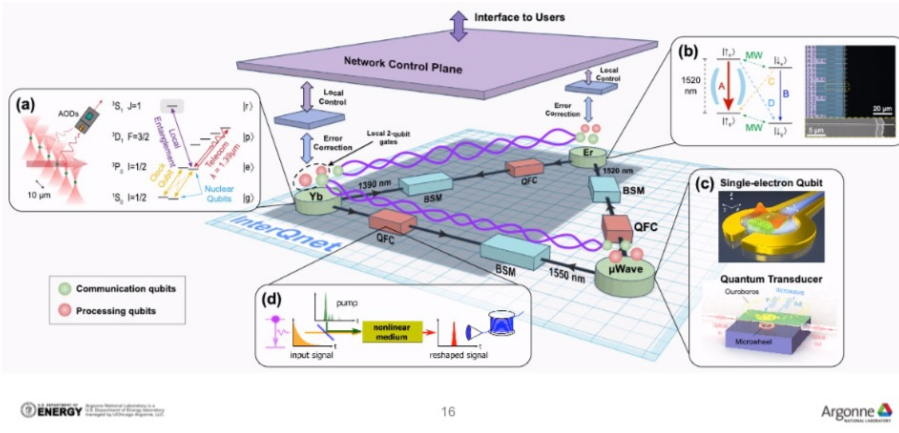
Session 2

Session2, 1100 - 1230, GMT +5(PK time), 28th Aug. Chair: Andrew Howard(NCI/AU)

1	1100-1115	Australia Country Update and NCI future works (Andrew Howard/NCI/AU)
2	1115-1130	Introduction of PERN and activities(Ahmed Naeem/PERN/PK)
3	1130-1145	AI research activities of Sukkur-IBA Univ. in PK (Ghulam Mujtaba/Sukkur-IBA Univ.PK)
4	1145-1200	EBC-K project in MY(Nor Asilah/UPM/MY)
5	1200-1215	HPC & Bioinformatics activities(Asif Khan/Perdana Univ./MY)
6	1215-1230	Research Platform and apply for Agriculture fields (Kihyeon Kim/KISTI/KR)

InterQnet Achieve

Integrating heterogeneous qubit platforms developed at Argonne



Keynote Speech: Overview of Quantum Networking Technologies and Ongoing Quantum Networking Research at Argonne(Rai Kettimuthu/ANL/US)



FNAL's High-Speed Networking R&D Efforts for the HL-LHC era (Asif Raza/FermiLab/US)



Overview of CMS / US CMS

• CMS Worldwide Collaboration:

- High Energy Physics (HEP) general-purpose experiment designed to precision study of proton-proton collisions at CERN's LHC.
- Over 200 Institutes from 57 countries
- More than 3300 physicists
- Worldwide 7 Tier-1 sites and more than 50 Tier-2 sites
- CMS compute needs are mainly covered by WLCG resources, a global collaboration of about 170 computing centers, aggregating 1M CPU cores and 1 EB of storage (disk and tape)

• U.S. CMS

- Fermilab the largest Tier-1 site along with 7 Tier-2 sites
 - Enable U.S. physicists to take on a leadership role in CMS physics
- Current LHC era, Future HL-LHC (High-Luminosity LHC) era (2029~)
- On going R&D efforts for U.S. CMS to enable HL-LHC era



Extra Budgetary Contribution from Korea (EBC-K 2024)

58th Asia Pacific Advanced Network Asia Pacific Research Platform Workgroup (APRP)

Nor Asilah Wati Abdul Hamid
Universiti Putra Malaysia

#WeLoveUPM



Extra Budgetary contribution from Korea (EBC-K 2024) Project(Nor Asilah/UPM/MY)



Available Computational Resources for Training and Testing AI Models



NTNU High Performance Computing

IDUN S3 Documentation Get access Shareholders

Idun



The Idun cluster is a project between NTNU's faculties and the IT division that aims at providing a high-availability and professionally administrated compute platform for NTNU. It is an effort to combine the compute resources of individual shareholders to create a cluster for rapid testing and prototyping of HPC software. While the IT division provides the backbone of the cluster, such as switches for high-speed interconnection, storage, and provisioning servers, the individual faculties/departments provide the compute resources. Any faculty or department can become a shareholder in the cluster by financing compute capacity, leveraging their share of compute time as well as the compute time of other idling resources. Accounting guarantees each partner's share of compute time and ensures fairness between the users on the system. More:

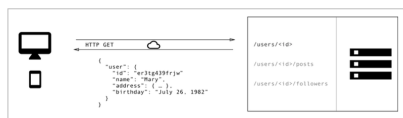
Introduction to NDeX (Kiwook Kim/KISTI/KR)

4. Agricultural Big Data Research Platform Linkage Plan

Platform Composition Plan (Draft)

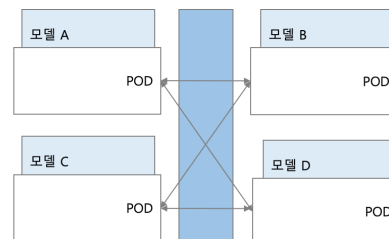
- Platform and SW Configuration for Container and API Networking Processing
- Container Control/Management -> Kubernetes Open Source SW
- Model Management -> Harbor
- Data Management -> Ceph
- (Option 1) API Networking -> Self-made API Protocol
- (Option 2) DevOps/MLOps -> Dizest, Argo, Mlflow

API Networking Protocol Development



Rest API-based Protocol
Pipelining/Ensemble Linkage between Models

(Option 1) API Networking Protocol Creation



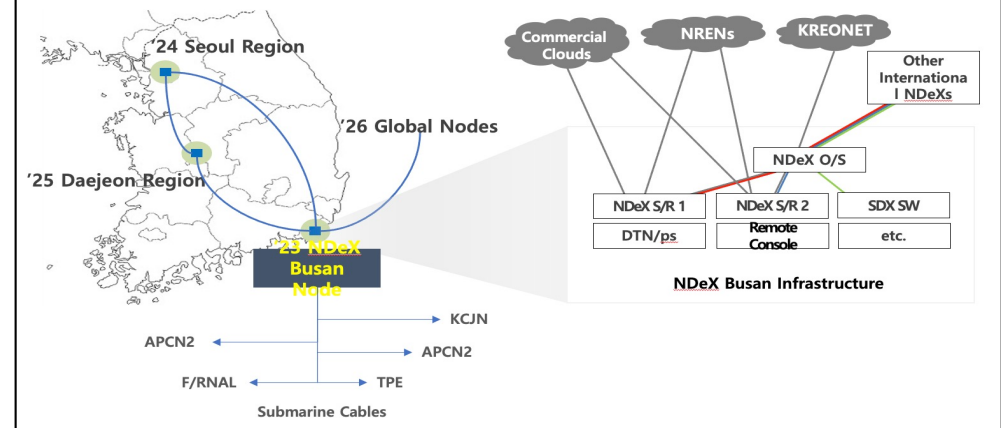
AI Research Activities@Sukkur-IBA University (Ghulam Mjtaba/Sukkur-IBA Univ/PK)



Building Distributed NDeX Infrastructures

NDeX Regional Node Establishment Plan

- '23 : Completed pilot node in the Busan metropolitan area.
- '24 : New node to be built in the Seoul metropolitan area.
- '25 : Additional node planned for the central region of Korea.



Big Data Research Platform of Agriculture (Kihyeon Kim/KISTI/KR)

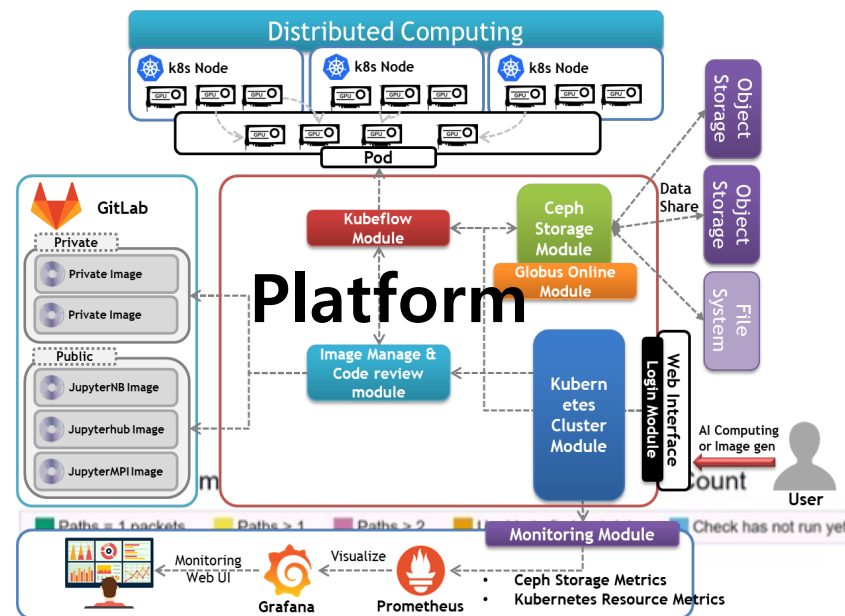
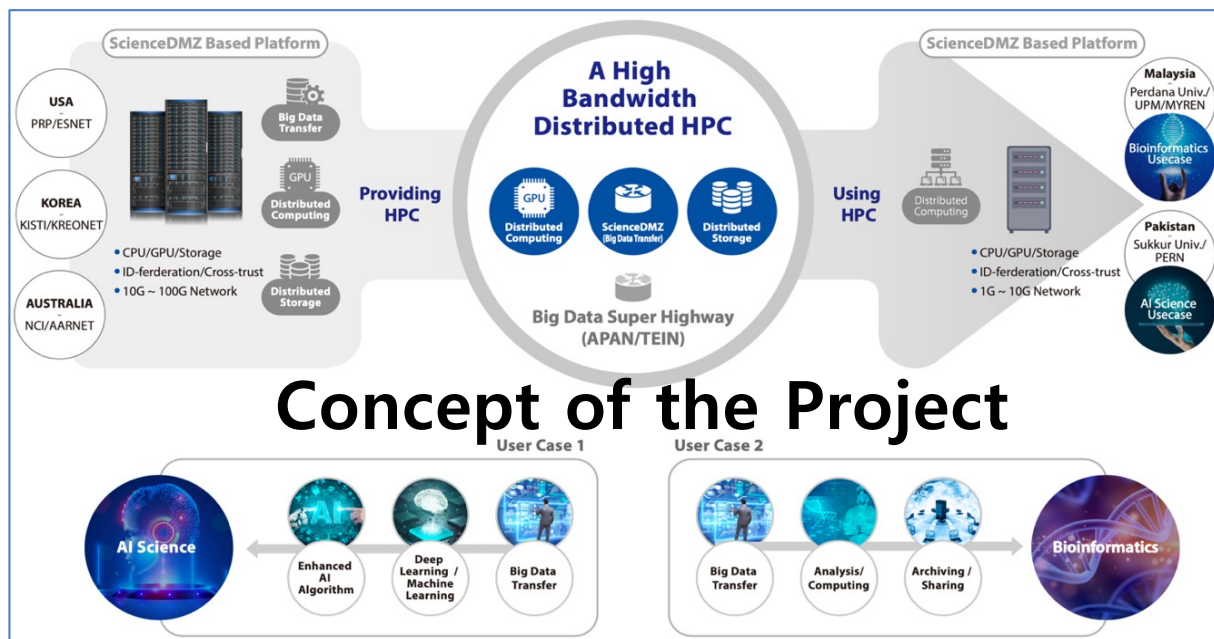


Asi@Connect Project

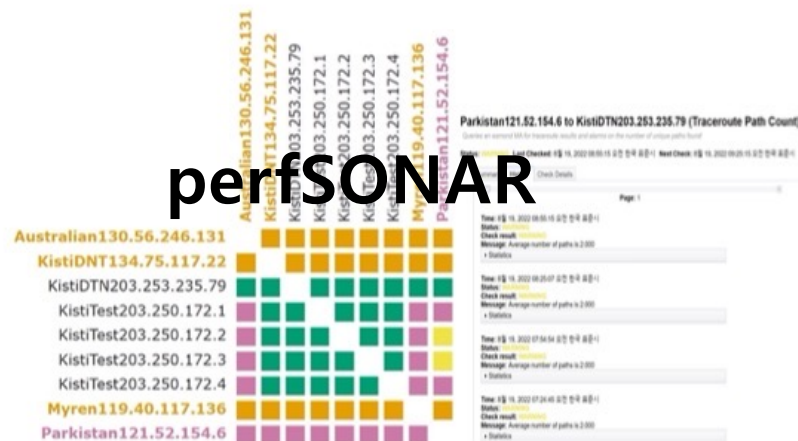
- [1] Activities of the application areas
- [2] Expanding to the Asia region

Asi@Connect Project summary

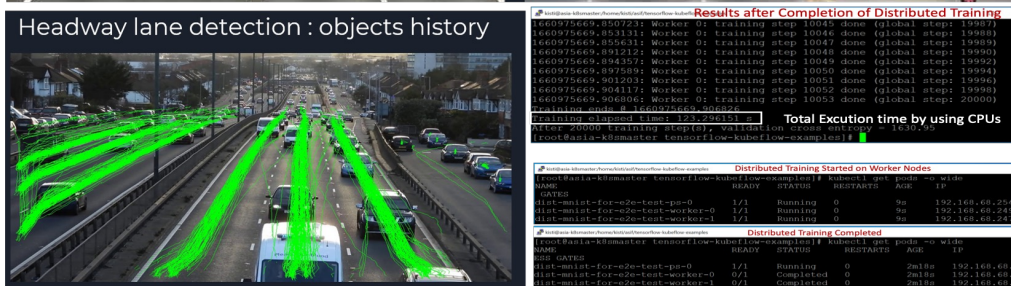
- Increasing big data → Required high throughput/capacity network → Big data super highway
- Lack of IT infrastructure → Need of Computing resources → Distributed/Shared HPC
- Linked ScienceDMZs → Research Platform + Kubernetes = High bandwidth distributed HPC



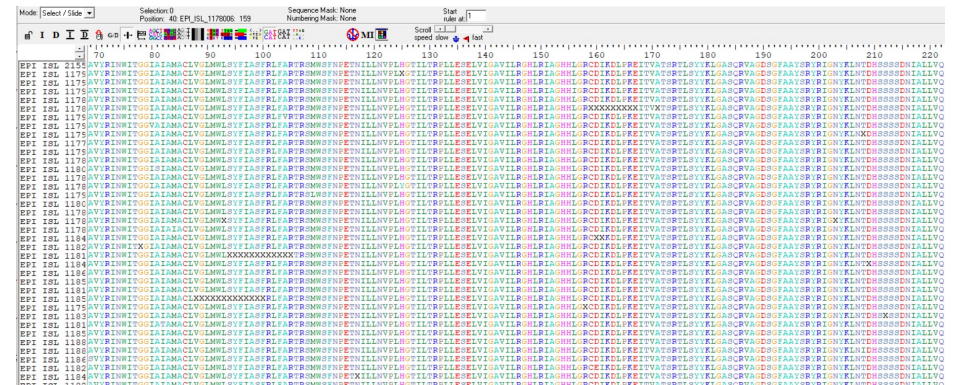
SW Stack					
Service Software for AI	jupyter	R	PyTorch	python	
Platform & Manage Software	kubernetes	docker	ceph	Image Register	Monitoring Manage
HW Stack					
Server Role	GPU	CPU	Mem ory	Storage	Network
Master Node	No GPU	Intel(R) Xeon(R) Gold 622 6R CPU @ 2.90GHz 32-Core Processor	DDR4 2 51GB	HDD 480GB	1GB
Pakistan Node	NVIDIA A40 1G PU	AMD EPYC 7502 32-Core Processor	DDR4 188GB	SSD 960GB	1GB
Malaysia Node	NVIDIA A40 1G PU	AMD EPYC 7502 32-Core Processor	DDR4 188GB	SSD 960GB	1GB
Storage Node	No GPU	AMD EPYC 7402 24-Core Processor	DDR4 188GB	HDD 58TB	100GB



- Analysis and Turkey)
- of sequences on HPC
- Molecular Simulation
-
- Heatmap showing sequence characteristics for 47-PHE, 19-ILE, 98-ARG, 140-PHE, 23-ILE, and 22-VAL. The heatmap displays a color scale from 0.0 to 1.0, with red indicating high values and blue indicating low values. The heatmap is divided into two main sections, 1 and 2, with a color bar on the left indicating the sequence position (1 to 1000). The heatmap shows a high concentration of red in the first section (1) and a lower concentration in the second section (2).
- Molecular Simulation: Binding Residues & Characteristics for 47-PHE, 19-ILE, 98-ARG, 140-PHE, 23-ILE, 22-VAL



Multiple Object Tracking for Aerial View Images



1M sequences, with 1.5 TB RAM, 100 CPUs 1 hour by RefAligner

Plan and direction for the advancement of APRP

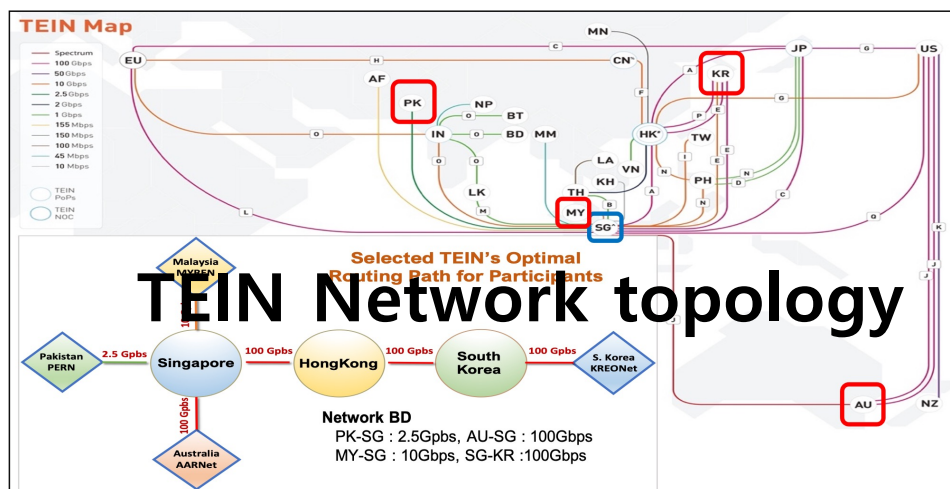
- Expansion of participating countries and institutions through APAN/TEIN
- Securing new funding sources for upgrading the current APRP system and expanding its applications
 - Propose to EBC-K 2024 project of Korea
- Technical support for system maintenance and collaboration with APRP-utilizing institutions

Education & Tutorial

Home prices in Sukkur Township

area	price
2500	430000
2900	565000
3300	620000
3700	650000
4000	725000
4300	680000
4500	750000
4800	800000
5000	850000
5300	790000

Given these home prices find out the prices of homes whose area is, 400 square feet



MoU

MEMORANDUM OF UNDERSTANDING

BETWEEN

UNIVERSITI PUTRA MALAYSIA

AND

KOREA INSTITUTE OF SCIENCE AND TECHNOLOGY INFORMATION (KISTI)

INTERNATIONAL CONFERENCE FOR HIGH BANDWIDTH DISTRIBUTED HPC

JOINTLY ORGANISED BY:
 INSTITUTE FOR MATHEMATICAL RESEARCH (INSPEM),
 UNIVERSITI PUTRA MALAYSIA (UPM) &
 KOREA INSTITUTE OF SCIENCE AND TECHNOLOGY INFORMATION (KISTI)

SPONSORED BY:
 ASI@CONNECT PROJECT / TEIN+CC

DATE:
 21 - 22 JUNE 2023

VENUE:
 AL - FARABI SEMINAR ROOM,
 INSTITUTE FOR MATHEMATICAL RESEARCH,
 UNIVERSITI PUTRA MALAYSIA

Tel : +603-9769 6806 / 6878 (Mrs. Zurita Ismail)
 Email : inspem_labfb@upm.edu.my

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SPONSORED BY:
 ASI@CONNECT PROJECT / TEIN+CC

TENTATIVE PROGRAM

21 JUNE 2023 (WEDNESDAY)

09:30 - 09:50	Registration and Breakfast
09:50 - 10:00	Welcome Speech by Chairperson
10:00 - 11:00	Introduction Session: • Assoc. Prof. Dr. Nor Auliah Wati Abdul Hamid - Introduction to the project (UPM) • Dr. Jeonghoon Moon - Project Details (KISTI) • Mr. Nicholas Kim - Research Platform (KISTI)
11:00 - 12:30	Panel Discussion (Future works and collaboration issues)
12:30 - 13:00	Lunch
13:00 - 14:00	Project members close discussion
14:00 - 14:30	Tea Break and End

22 JUNE 2023 (THURSDAY)

09:30 - 09:50	Registration and Breakfast
09:50 - 10:00	Welcome Speech by Chairperson
09:50 - 10:00	Tutorial 2 for engineers (for Network Administration only)
10:00 - 10:30	How to setup and operation platform (Mr. Nicholas Kim (KISTI))
10:30 - 11:00	Networking Break
11:00 - 12:30	Tutorial 2 for engineers (for Network Administration only)
12:30 - 13:00	How to setup and operation platform (Mr. Nicholas Kim (KISTI))
13:00 - 14:00	Lunch
14:00 - 14:30	Project members close discussion
14:30 - 15:00	Tea Break and End

International Workshop

A3 Foresight Program Project

- [1] Consortium of A3 countries
- [2] Data Sharing Infrastructure across Northeast-Asia Supercomputing Centers for Open Science
- [3] Strategies and Key technologies



Overview of A3 Foresight Program Project

– Main Title

- Data Sharing Infrastructure across Northeast-Asia Supercomputing Centers for Open Science

– Sub Title(Korea Part)

- Research on building a high-bandwidth distributed HPC based on high-compression metadata of AI technology

– Participants : Korea, Japan, China

– Duration : Aug. 2024 – Jul. 2029 (5 Years)

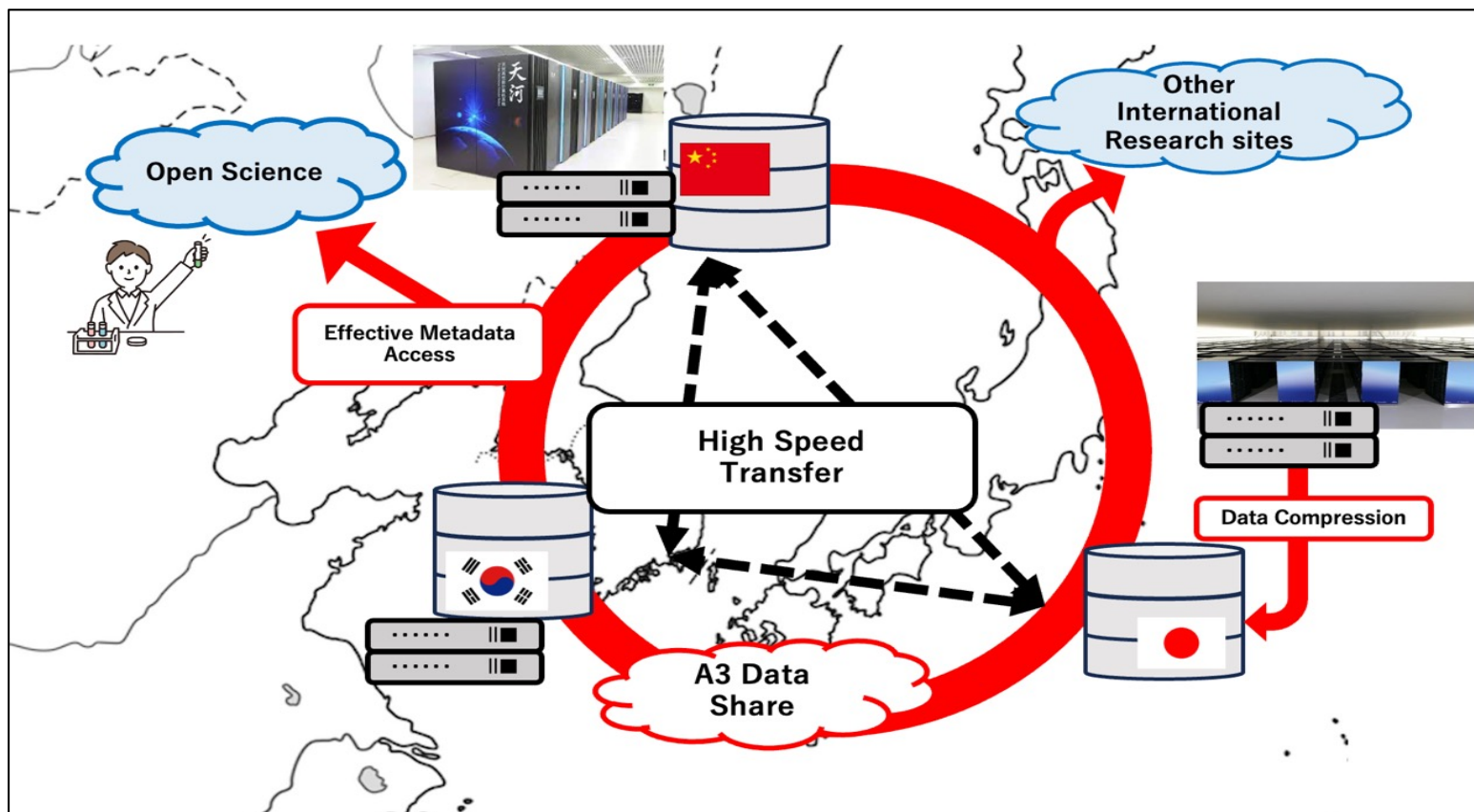
– Budget : Korea(264,000\$), Japan(347,000\$), China(562,000\$) = 1,173,000\$

– PI and Co-PI

- Hidetomo Kaneyama: RIKEN/Japan
- Yutong Lu: NSCC-GZ(Sun Yat-sen Univ.)/China
- Jeonghoon Moon: KISTI/Korea

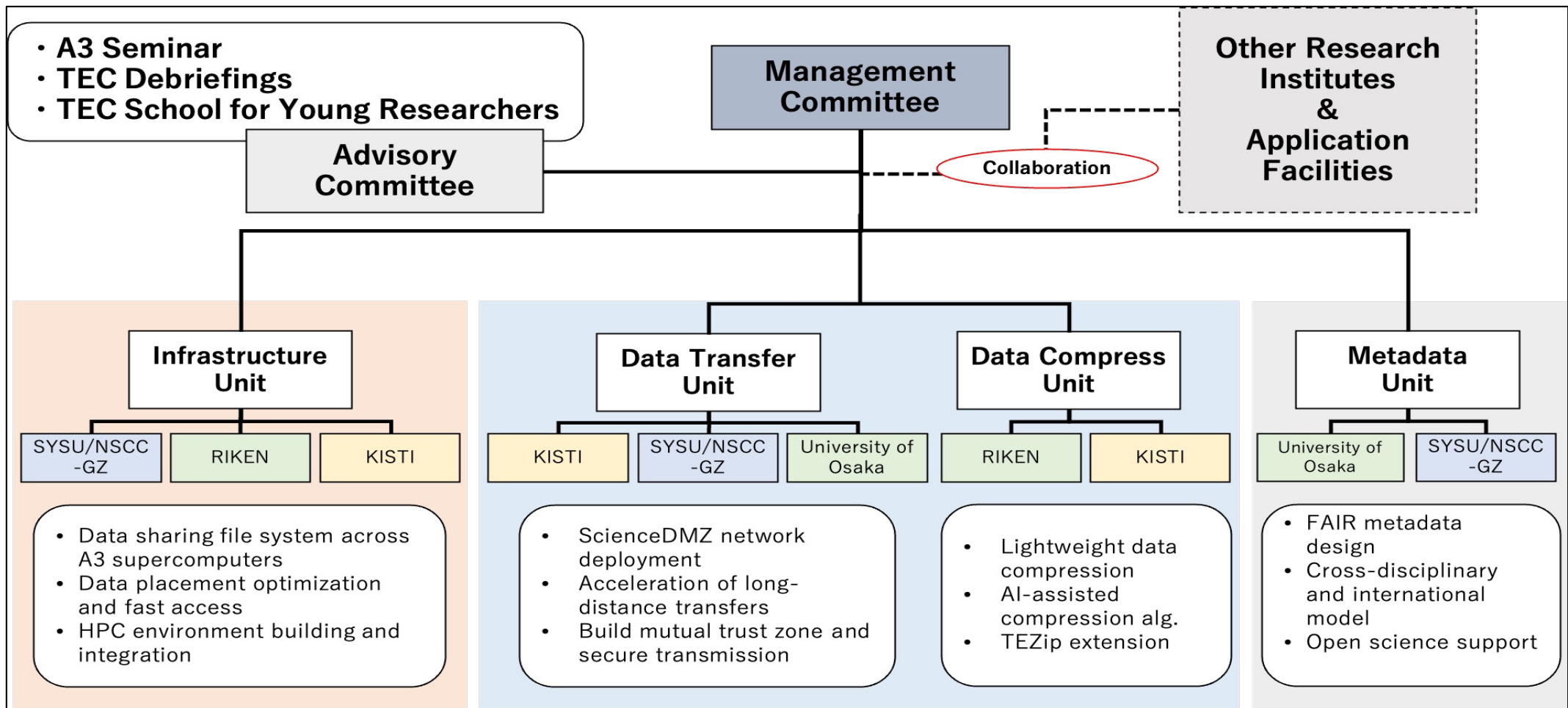
Objective:

According to the Boundless advancement of science and technology through LLM (Large-Scale Language Model) and Advancement of science and technology without boundaries through open science, **this project aims to lead the development of an advanced research environment (system and element technology) for the utilization and sharing of research data and to establish an infrastructure for sharing advanced research data between Korea, China, and Japan.**



- **Strategies (Divide into 4 Units)**

- Unit 1: Infrastructure Unit (Leading by China: NSCC-GZ , KISTI, RIKEN)
- Unit 2: Data Transfer Unit (Leading by Korea: KISTI, NSCC-GZ, Osaka Univ)
- Unit 3: Data Compress Unit (Leading by Japan: RIKEN, KISTI)
- Unit 4: Metadata Unit (Leading by Japan: Osaka Univ., NSCC-GZ)





- **Strategies (Divide into 4 Units)**
 - **Unit 1: Infrastructure Unit(Leading by China - NSCC-GZ , KISTI, RIKEN)**
 - Data sharing file system across A3 supercomputers
 - Data placement optimization and fast access
 - HPC environment building and integration
 - **Unit 2: Data Transfer Unit(Leading by Korea - KISTI, NSCC-GZ, Osaka Univ)**
 - ScienceDMZ network deployment
 - Acceleration of long-distance transfers
 - Build mutual trust zone and secure transmission



- **Unit 3: Data Compress Unit(Leading by Japan - RIKEN, KISTI)**
 - Lightweight data compression
 - AI-based compression algorithm
 - TEZip extension
- **Unit 4: Metadata Unit(Leading by Japan – Osaka Univ., NSCC-GZ)**
 - FAIR metadata design
 - Cross-diciplinary and international model
 - Open Science support



- **Part of the KISTI**
 - Title: Research on building a high-bandwidth distributed HPC based on high-compression metadata of AI technology
- **Strategy of the High speed data transfer among the participants**
 - Main goal: Inter-connect HPC, Experimental equipment and Storage through the high-capacity network
 - 3 Steps to establishment
 - i) Step1:
 - ✓ Building a big data super-highway for participant's countries.
 - ii) Step2:
 - ✓ Installing and optimizing data accelerating environment at each participant's institutes
 - iii) Step3:
 - ✓ Measuring and maintaining network performance among participants' institute for high-performance transfer

Korea Research Platform Status

- [1] Overview and status
- [2] Smart Agriculture
- [3] Smart decision making system
- [4] Yonsei Univ. College of Medicine



- Since 2015, Global partner of PRP project
- Since 2018, Leading of APAN APRP WG
- Since 2021, Expanding to 7 Korea National Research Institute
- Since 2022, Asi@Connect Project/TENI*CC for international
- Since 2024, A3 ForeSight Program Project by A3 NRF

“Establish a high-reliability & high-speed transfer system without boundaries between participants”

- Korea Research Platform expanding to 25 National Research Institutes -
- HPC(Supercomputer, Cloud, Storage) over HPN and global federation -

National Scale

Establish a high-reliability & high-speed transfer system without boundaries between participants

For 25 Korea National Research Institutes & 4 University of Advanced Science & Technology

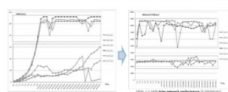


Key elements

- Borderless single domain transfer performance level
↳ Esnet ScienceDMZ level
- A Unified authentication system without boundaries

Example of Nuclear Fusion Research

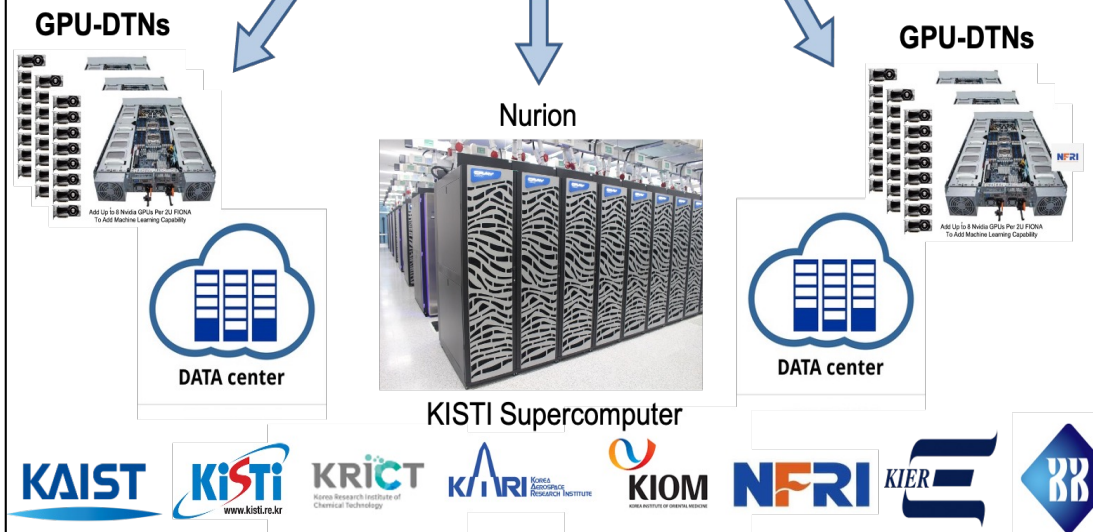
Improve transfer performance about 75 times after ScienceDMZ deploy
↳ To expand the national scale



HPC over HPN: A High bandwidth distributed HPC

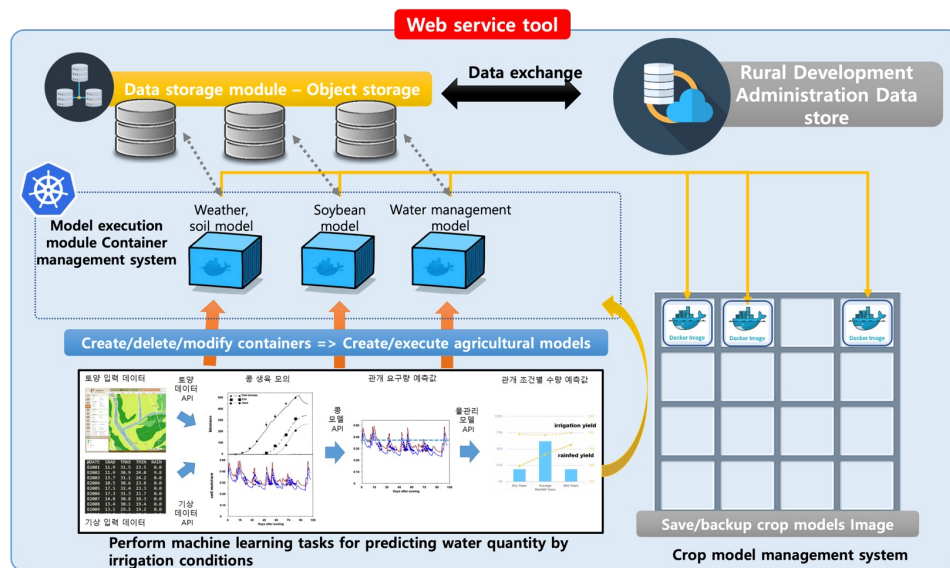
Korea Research Platform (1G ~ 100Gb/s)

Faster workflow with big data

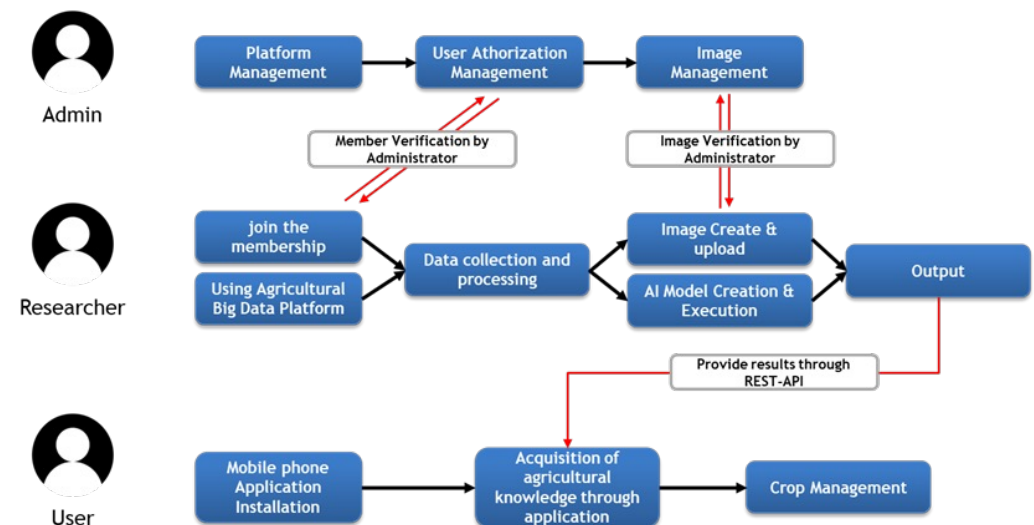


1. Korea Rural Development Administration project (2022~2024)

- Title: Development of integrated linkage system for agricultural big data and utilization model
- Main Goal
 - Establishment of CAMP Environment based on KRP
 - CAMP, as a **Community Agricultural Model Platform** for multi-model ensemble simulations of crop growth and development, consists of subsystems supporting crop model ensembles using containers
- Research Contents (KISTI/KREONET part)
 - Agriculture big data transfer
 - Running Crop model on the Research Platform (Using CPU & GPU)
 - Establishment Research Platform for end-user(Farmer) & developer(Agriculture Researcher)



Overview of CAMP Platform

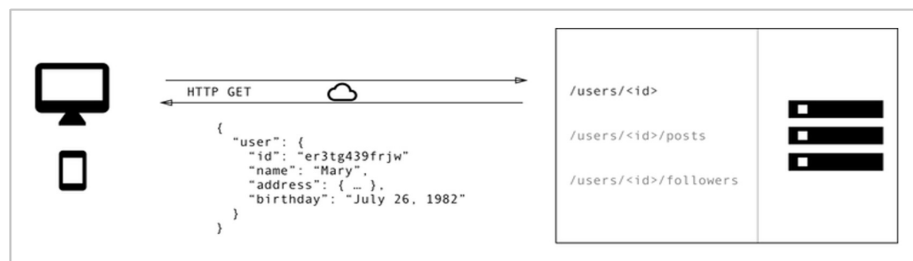


Use Case Scenarios for CAMP

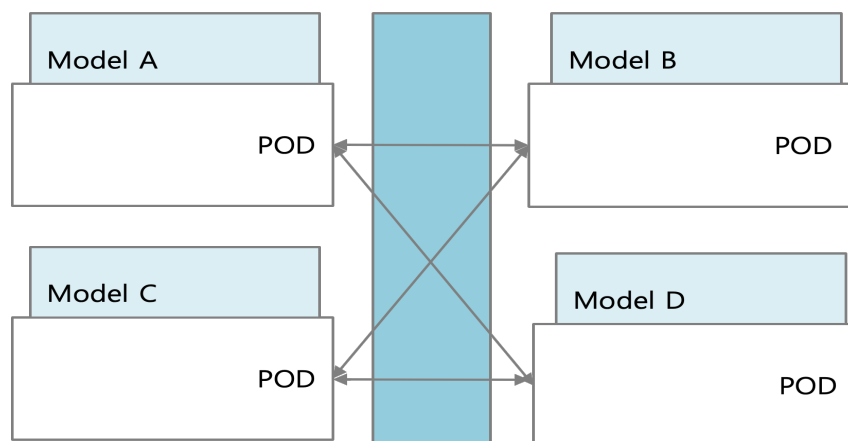
2. Korea Environment Institute Project (2022-2029)

- Title : Establish an integrated impact assessment platform and build an ensemble of multi-climate scenarios based on the new climate regime (AR6)
- Main goal
 - Building a **Container based Research Platform** & Ceph storage
 - Construction **API networking** (Communication inter Models)

API Networking Protocol Development



Rest API-based Protocol (Pipelining/Ensemble linkage between models)



API Networking Protocol Creation

_id	action_id	model_code	input_json	input_file	output_file	status	starting_date	finished_date	worker
655223d3c80ca395c6e91f0c	b2305b97-a8c9-403a-81a1-44acb6ac33ef	finedust-001	ModelA		output_b2305b97-a8c9-403a-81a1-44acb6ac33ef	finish	2023-11-01 05:00:00	2023-11-01 05:00:01	10.10.10.10:8080 ModelA
655223d3c80ca395c6e91f0d	5695974b-9fcb-4355-afee-2b9f966c4712	disease-001	ModelB		output_b2305b97-a8c9-403a-81a1-44acb6ac33ef	finish	2023-11-01 05:30:00	2023-11-01 05:30:02	10.10.10.20:8080 ModelB
655223d3c80ca395c6e91f0e	dde98ab1-c518-4823-9994-411d981ebd50	finedust-001			output_dde98ab1-c518-4823-9994-411d981ebd50	finish	2023-11-02 05:00:00	2023-11-02 05:00:01	10.10.10.10:8080
655223d3c80ca395c6e91f0f	cc14f36-a43b-4c2a-90c3-3abb47370677	disease-001			output_dde98ab1-c518-4823-9994-411d981ebd50	finish	2023-11-02 05:30:00	2023-11-02 05:30:02	10.10.10.20:8080
65522434c80ca395c6e91f1d	87017e34-bab5-4c70-8ffa-23c873203f67	finedust-001	ModelA		output_87017e34-bab5-4c70-8ffa-23c873203f67	finish	2023-11-03 05:00:00	2023-11-03 05:00:01	10.10.10.10:8080
65522434c80ca395c6e91f1e	57d87993-10c5-4928-94b1-d94f926c292f	disease-001			output_87017e34-bab5-4c70-8ffa-23c873203f67	finish	2023-11-03 05:30:00	2023-11-03 05:30:02	10.10.10.20:8080

Model-to-model automated operation scenario based on API network



3. Building a NRP node for gene scissors research

- **Yonsei University College of Medicine & KREONET**
 - Built a **NRP node for gene scissors research** with KREONET(17th Aug. 2024)
 - Python, MATLAB, Julia, Deep Learning, GPU, CPU and several IT resources
 - Expand to Physics(CMS), Bio, Genome areas



연세대학교 의과대학
YONSEI UNIVERSITY
COLLEGE OF MEDICINE



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Science and Technology Information

Conclusion



- **APAN APRP WG & Asi@Connect Project**
 - Expansion of participating countries and institutions
 - New funding sources for upgrading the current APRP system
 - Technical support for system maintenance and collaboration
- **A3 Foresight Program Project**
 - Building a prototype for international distributed HPC
 - Collaboration with KR, JP, CH
 - Expand computing resource utilization
- **HPC over HPN**
 - Expansion and joint establishment of applied research through collaboration with the National Research Institute
 - GPU sharing for artificial intelligence areas
 - Expanding International collaboration research through the big data transfer
- **Extension for 3rd party research areas**
 - Climate & Weather change research areas
 - Utilize Smart Agriculture/Environmental Research
 - Cloud computing & Wireless communication

