SC26 Network Research Exhibition: Demonstration Final Abstract

Global Research Platform (GRP)

Joe Mambretti, Jim Chen, Fei Yeh,
International Center for Advanced Internet Research - Northwestern University
j-mambretti, jim-chen, fyeh@northwestern.edu

Abstract

The Global Research Platform (GRP) is an international scientific collaboration that is creating innovative advanced ubiquitous services that integrate resources around the globe at speeds of multi-gigabits and terabits per second, especially for data-intensive science research. GRP focuses on design, implementation, and operation strategies for next-generation distributed services and infrastructure to facilitate high-performance data gathering, analytics, transport, computing, and storage among multiple science sites at 100 Gbps or higher (e.g., 400 and 800 Gbps WAN streams as well at Tbps). GRP community partners are located in North America, Asia, Europe, and South America and work together to customize international fabrics and distributed cyberinfrastructure to support optimal data-intensive scientific workflows. Essentially, the GRP is a worldwide Science DMZ, a distributed environment for data-intensive research. The GRP leverages optical circuits and open exchange facilities provided by its collaborators. The GRP consortium focuses on extremely high-capacity data intensive science. Some facilities used are dedicated to specific science projects, some are shared under restrictive policies with other science communities, others are more widely shared with research communities. The GRP assists in coordinating among those activities.

The GRP focuses on recent and emerging advances in architecture, services, technologies, and infrastructure, specifically recent innovations that can directly support global large-scale data-intensive science research via: (a) Large Scale Global Science; (b) Next-Generation Research Platforms; (c) Orchestration Among Multiple Domains; (d) Large-Scale Data WAN Transport; (e) High-Fidelity Data Flow Monitoring, Visualization, Analytics, Diagnostics, Event Correlation, AI/ML/DL; (f) Data-Intensive Science, Programmable Networking, and Automation; and, (g) International Testbeds for Data-Intensive Science.

Each year, the Global Research Platform community organizes an annual workshop to present their innovations to wider communities. This workshop is co-located with the IEEE International Conference on eScience. The 2024 GRP/eScience event took place in September in Osaka, Japan. The 2025 workshop took place in September in Chicago, Illinois. The 2026 GRP workshop will be held in Naples, Italy. In addition, GRP workshops have been held co-located with the Supercomputing Asia Conference in Singapore and the National Research Platform workshop.

Goals

1 In part the GRP interconnects multiple continental and national research platforms, including the US National Research Platform, the Asia Pacific Research Platform and the Korea Research Platform. GRP is supported by research and education network professionals, NREN network engineers, computer scientists, and computational scientists who are developing new computing paradigms and cyberinfrastructure, based on programmable network services and resources, to enable international multidisciplinary teams to collaborate and communicate optimally.

2 Techniques will be demonstrated that dynamically create powerful, distributed, integrated systems of computers, data storage, visualization displays and instruments at collaborating sites around the globe, making it easier for researchers to share resources, innovations, information, and knowledge.

3 iCAIR has developed and is experimenting with a prototype model for an integrated SDN/SDX/DTN. Enhancements include AI dynamic real-time processes and additional capabilities for slicing resources across the exchange to segment different science communities while using a common infrastructure.

4 This initiative is also developing capabilities for interoperability among other SDXs, including those based on national and international AutoGOLE/SENSE resources.

Impacts

1) This series of research projects is directed at developing resources to meet the demands of increasingly large capacity WAN transport for large scale data intensive science. This NRE is focused on demonstrating highly distributed environments (globally, e.g., world-wide science DMZs) for large scale research projects engaged in by multiple science communities.
2) SCinet supports capabilities that enable innovative techniques being developed to support data intensive science to be demonstrated at a global scale.
3) Multiple next steps include extending capabilities to additional international sites, integrating new protocols and developing additional orchestration, optimization, monitoring and analytics using AI techniques.

Resources

Required resources from SCinet WAN are 1.2 Tbps E2E WAN services from the StarLight International/National Communications Exchange Facility in Chicago to the SC26 venue, between StarLight and the JBDT Facility in McLean, between the JBDT Facility and the SC26 venue and among all sites. Another required resource is NA REX. In addition, the NA REX infrastructure will be used, along with AutoGOAL/SENSE infrastructure. Ref NRI 103

Involved Parties

- Joe Mambretti, iCAIR, j-mambretti@northwestern.edu
- Jim Chen, iCAIR, jim-chen@northwestern.edu
- Fei Yeh, iCAIR,fyeh@northwestern.edu
- Tom DeFanti, UCSD, tdefanti@ucsd.edu
- John Graham, UCSD, jjgraham@ucsd.edu
- Maxine Brown, UIC, maxine@uic.edu
- Metropolitan Research and Education Network
- StarLight International/National Communication Exchange Facility and Consortium
- SC25 SCinet
- The Global Research Platform Consortium REF: https://www.theglobalresearchplatform.net