



Pacific Research Platform

A High-Speed Data Freeway for Collaboration

Pacific Research Platform: The Future of Big Data Collaboration

From biomedical data to particle physics, today nearly all research and data analysis involves remote collaboration. In order to work effectively and efficiently on multi-institutional projects, researchers depend heavily on high-speed access to large datasets and computing resources.

To meet the needs of researchers in California and beyond, the National Science Foundation (NSF) has awarded a five-year, \$5 million grant to fund the Pacific Research Platform (PRP). The PRP integrates Science DMZs, an architecture developed by the U.S. Department of Energy's Energy Sciences Network (ESnet), into a high-capacity regional "freeway system." This system makes it possible for large amounts of scientific data to be moved between scientists' labs and their collaborators' sites, supercomputer centers or data repositories, even in the cloud.



Built by Scientists and Researchers for Scientists and Researchers

The PRP, led by researchers at UC San Diego and UC Berkeley, will enable fast and secure data transfers between participating institutions, which include all 10 UC campuses, as well as select universities and research facilities across the region and beyond. The project utilizes Pacific Wave and CENIC's California Research and Education Network (CalREN) to create one large, seamless research platform that will encourage statewide, regional -- even worldwide -- collaboration.

The PRP will support a broad range of data-intensive research projects that will have wide-reaching impacts on science and technology worldwide. Cancer genomics, galaxy evolution research, climate modeling, and the creation of virtual reality gaming systems are just a few of the projects that will benefit from the use of the PRP.

Pacific Research Platform Highlights :

- The PRP transforms ESnet's Science DMZ model into a regional freeway system for scientific data.
- A dedicated environment for sharing science data, built by researchers for researchers.
- The PRP creates a partnership of more than 20 institutions, including all 10 UC campuses, four national supercomputer centers, and the NSF Chameleon cloud testbed.

*During a demonstration of its capabilities at the 2015 CENIC Conference, researchers showed that **the PRP moved data up to 500 times faster** than speeds currently available.*

Pacific Research Platform : Big News for Big Data

The PRP's data-sharing architecture, with end-to-end 10-100 Gbps connections, enables region-wide virtual co-location of data with computing resources. The PRP establishes a science-driven high-capacity data-centric network, enabling researchers to move data between labs and collaborators' sites, supercomputer centers or data repositories without performance degradation. **Today, dozens of top universities and research centers are doing work across six major research areas, positioning the PRP to be one of the most impactful big data projects in recent history.**



PRP Partners include:

- Univ. of Hawaii System
- Montana State University
- Northwestern University
- NCAR
- University of Amsterdam (UvA)
- MREN
- StarLight
- UIC
- Chameleon
- AARNet (Australia)
- KISTI/KREONET (Korea)
- Univ. of Tokyo

Particle Physics Data Analysis

- UC San Diego: A.Yagil, F. Wuerthwein (team leader);
- UC Irvine: A. Lankford, A. Taffard, D. Whiteson;
- UC Santa Cruz: A. Seiden, J. Nielsen, B. Schumm;
- Caltech: H. Newman;
- UC Davis: M. Chertok, J. Conway, R. Erbacher, M. Mulhearn, M. Tripathi;
- UC Santa Barbara: C. Campagnari;
- UC Riverside: R. Clare, O. Long, S. Wimpenny

Astronomy and Astrophysics Data Analysis

- Telescope Surveys:** LBNL: Peter Nugent; UC Davis: Tony Tyson; Caltech/IPAC/JPL, UC Berkeley, Stanford/ SLAC, UC Irvine, UC Santa Cruz, Univ. Washington.
- Galaxy Evolution:** UC Irvine: CGE, director James Bullock; UC Santa Cruz: AGORA, directors Joel Primack & Piero Madau.

Gravitational Wave Astronomy:

- Caltech: David Reitze, Executive Director, LIGO Laboratory;
- UC San Diego: Frank Wuerthwein.

Biomedical Data Analysis

Cancer Genomics Hub/Browser:

- UC Santa Cruz: David Haussler, Brad Smith

Microbiome and Integrative 'Omics:

- UC San Diego: Rob Knight, Larry Smarr;
- UC Davis: David Mills, Carlito Labrilla;
- Caltech: Sarkis Mazmanian;
- UC San Francisco: Sergio Baranzini.
- Integrative Structural Biology:
- UC San Francisco: Andrej Sali

Earth Sciences Data Analysis

Data Analysis and Simulation for Earthquakes and Natural Disasters:

- UC Berkeley: Steve Mahin, with UC San Diego, UC Davis, UCLA, UC Irvine, USC, Stanford, OSU, and UW.
- Pacific Earthquake Engineering Research Center (PEER)

Climate Modeling:

- NCAR/UCAR: Anke Kamrath, Marla Meehl.
- California/Nevada Regional Climate:
- UC San Diego/SIO: Dan Cayan

CO₂ Subsurface Modeling:

- San Diego State Univ.: Christopher Paolini and Jose Castillo

Scalable Visualization, Virtual Reality, and Ultra-Resolution Video

- UC San Diego: Tom DeFanti, Falko Kuester, Tom Levy, Jurgen Schulze;
- UI Chicago: Maxine Brown; UHM, Jason Leigh;
- UC Davis: Louise Kellogg;
- UC Irvine: Magda El Zarki, Walt Scacchi;

PRP Participants:

- UC Davis
- UC Berkeley
- Stanford
- UC Santa Cruz
- Caltech
- USC
- UC Irvine
- UC San Diego /SDSC
- San Diego State Univ.
- UC Riverside
- Univ. Washington/PNWGP
- UC San Francisco
- NASA Ames/NREN
- UC Santa Barbara
- UCLA
- UC Merced
- LBNL, NERSC, ESnet

● Denotes CENIC Hub Sites