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Archive - Potential NGI Applications

Real Time Environmental Data via the NGI:
Sponsored by NSF

Categories

Environment, Collaboration

Description

Universities across the nation are transforming their teaching and research efforts through increased use of a rapidly expanding menu of environmental data. The Unidata Program, funded by the National Science Foundation, is playing a central role in this transformation by enabling universities to employ innovative computing and networking technologies to acquire such data sets in real-time and use them routinely in their classrooms and research labs. The Unidata community of more than 140 institutions has developed an Internet Data Distribution (IDD) system that delivers, in real time via the commodity Internet, an aggregate of over 20 Gigabytes of data per day to computers at the scientists' home institutions. This includes data from environmental satellites, NEXRAD radars, supercomputer forecast models, wind profiler and lightning networks, as well as traditional reports from weather stations.

Next generation data-gathering facilities are becoming operational, including the Earth Observing System (EOS), a modernized National Weather Service with its GOES satellites, new forecast models of ever-increasing resolution from the National Centers for Environmental Prediction, various levels of data from the new NEXRAD radars, and other observations to be made available on the NOAAPort system. Faculty want access to these data sets for both classroom and research purposes. For example, some academic researchers run regional atmospheric and hydrological models on computers at their own institutions; using the higher resolution data to set the initial conditions for these models is an important element in increasing the accuracy with which local storms, tornadoes, and floods can be predicted. Educators use the latest data to train future meteorologists, oceanographers and earth scientists.

Today, the Unidata community is struggling to establish priorities on distributing various data sets because of limitations of the current commodity Internet. Access to the NGI would enable the Unidata community to:

- Deliver more and better data to sites connected to the NGI so they could begin the process of incorporating the new data into their research and education programs.
- Develop a hybrid scientific data system incorporating the best of the Unidata IDD "push" technology with innovative "pull" systems such as that being developed by the Distributed Ocean Data Systems (DODS) group. With the power of the NGI, the DODS system would make remotely stored datasets appear as though they were on local disks.
- Extend the use of the IDD beyond the atmospheric, oceanographic, and hydrological disciplines who are now the primary users. IDD experiments are already underway with researchers in the seismic studies and global positioning systems communities.

Requirements

The current system is delivering about 30-35 GBytes of data per day in the aggregate to institutions via the commodity Internet at a sustained rate of several products per second. Network latencies of more than half an hour are problematic at present. If reliable network bandwidth were available, the community would be able to make use of an order of magnitude more data immediately by simply doubling the resolution of satellite images and supercomputer model output in space and time. Moreover, most sites would welcome additional radar data if it were available affordably and could be delivered. Over the next five years, the amount of data delivered to these scientists could increase by several orders of magnitude if adequate network bandwidth were available. This would ultimately amount to roughly 150 MBits/s data rate on a sustained basis.

Partners and Potential Partners

The current Unidata community:

- 140+ research and education institutions that comprise the Unidata Community.
- Representatives of industry (e.g., WSI, Alden, the Weather Underground, Inc.).
- NOAA organizations (NWS, NCEP, Forecast Systems Laboratories).
- Several NASA sites and Department of Energy labs.
- The Air Force Institute of Technology and Naval Postgraduate School

Potential partners for the future:

- The seismic studies community
- The Global Positioning System community
- The Geographic Information Systems community
- Space Environment Center (SEC) for Solar and Geophysical Events (Space Weather)

URLs

http://www.unidata.ucar.edu/staff/ben/projects/ngidd2.htm

http://www.unidata.ucar.edu