Unidata Community Equipment Awards Cover Sheet

Proposal Title:

Infrastructure enhancements to support educational use of GOES-16

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PI Name: Christopher G. Herbster

Title: Associate Professor

Institution: Applied Aviation Sciences, Embry-Riddle Aeronautical University, Daytona Beach

Telephone: 386 226 6444

Street Address: Applied Aviation Sciences
Embry-Riddle Aeronautical Univ.
600 S. Clyde Morris Blvd.
Daytona Beach, FL 32114-3900

Email: herbstec@erau.edu

[redacted]

Co-PI Name: Robert E. Haley

Title: Meteorology System Administrator

Institution: Applied Aviation Sciences, Embry-Riddle Aeronautical University, Daytona Beach

Name of Institution Official:

Title: Chair
Applied Aviation Sciences

Telephone: 386 226 7125

Email: mcguidcb@erau.edu

[redacted]

Infrastructure enhancements to support educational use of GOES-16

Project Summary

The Meteorology Program in the Applied Aviation Sciences Department at Embry-Riddle Aeronautical University (ERAU) – Daytona Beach is requesting funds to enhance existing hardware that is used to support research and education in our institution. These resources are used in support of our degrees in Meteorology, Air Traffic Management, Aeronautical Science, as well as our Minor in Aviation Weather, which is popular across all the colleges on campus. The requested hardware will increase storage, memory, and networking capacities on one of our existing servers that provides access to weather data on the campus network. Additionally, there are plans to include remote access to the data via Internet protocols like the LDM, ADDE and THREDDS services.

Project Description

The Meteorology degree program at ERAU operates a modest, 2 rack server cluster that provides several weather data processing services, many of which are available to external partners. We currently run fourteen servers on HPE, Dell, Sun, and other hardware platforms, many of which run virtual servers responsible for specific processing tasks. The processing tasks include radar, satellite, model, and text data for use in GEMPAK, AWIPS II, and webpages. Across all systems, we have over fifty terabytes of storage, most for user and case study storage. Networking is provided by a combination of the ERAU network for classroom and external connections, and a private WX network for rapid inter-server data sharing. On campus, students and faculty analyze weather data primarily via two computerized classrooms and an open meteorology lab with about eighty computers that dual-boot Windows and Linux with programs like GEMPAK, AWIPS II, IDV, NCL, GrADS, MATLAB, and Cygwin. The meteorology servers also support undergraduate and graduate work in other colleges at the Daytona Beach campus. There are several computer labs across campus, some open 24/7, that have the dual-boot configuration, and all Linux users have access to the weather data and software packages. In all, several hundred computers can access these resources.

The Information Technology department has initiated a plan to upgrade the networking capabilities of the meteorology server cluster to remove current bottlenecks and include bandwidth growth for the future. Our current network bandwidth within the college is limited to gigabit network speeds, and we have shown a single student running meteorological analysis software like NMAP can use as much as 30% of that bandwidth. IT plans to upgrade the network so the weather processing and home directory servers will have ten-gigabit bandwidth to the weather classrooms and to other colleges on campus. This tenfold bandwidth increase will greatly improve instruction and research, reducing access times and making massive datasets more manageable.

There have been many advancements in the data stream over the past few years that have dramatically increased storage space demands (such as dual-pol NEXRAD and higher resolution forecast models), but the launch of GOES-16 is going to demand even more of our systems than what we have seen to date. The requested hardware will increase our disk storage space,

increase our available memory (which will allow for a much larger LDM product queue) and provide some networking enhancements that will help reduce data transfer bottlenecks.

Hard drives for HP Server:

The ERAU weather data processing server (named Gale) has four terabytes (4 TB) of fast, reliable storage, which provides roughly two weeks of archived data. This two-week period offers ample time for students to complete assignments and researchers to download data from interesting cases. The significant increase of data expected from GOES-R series weather satellites will drastically cut back the archive period available with the existing storage capacity. Gale has fourteen empty disk bays, allowing this server to take on the task of processing and storing higher volumes of weather data without having to build and configure a completely new system. Our request will fill the empty bays with 900 GB drives that will be configured as a new file system, largely dedicated to satellite (and possibly model) data.

Memory for HP server:

Our weather data processing servers use RAM disks instead of hard drive disks for LDM queues. This method significantly improves data delivery, especially when providing data to numerous downstream LDMs. Our goal is to keep at least one hour of data in our LDM queue so downstream servers can backfill if necessary. Again, the significant increase of imagery data expected from the GOES-R series weather satellites will result in a reduced queue time. Increasing the system memory will ensure our LDM queue can consistently provide over an hour of weather data for backfilling without having to build and configure a whole new system.

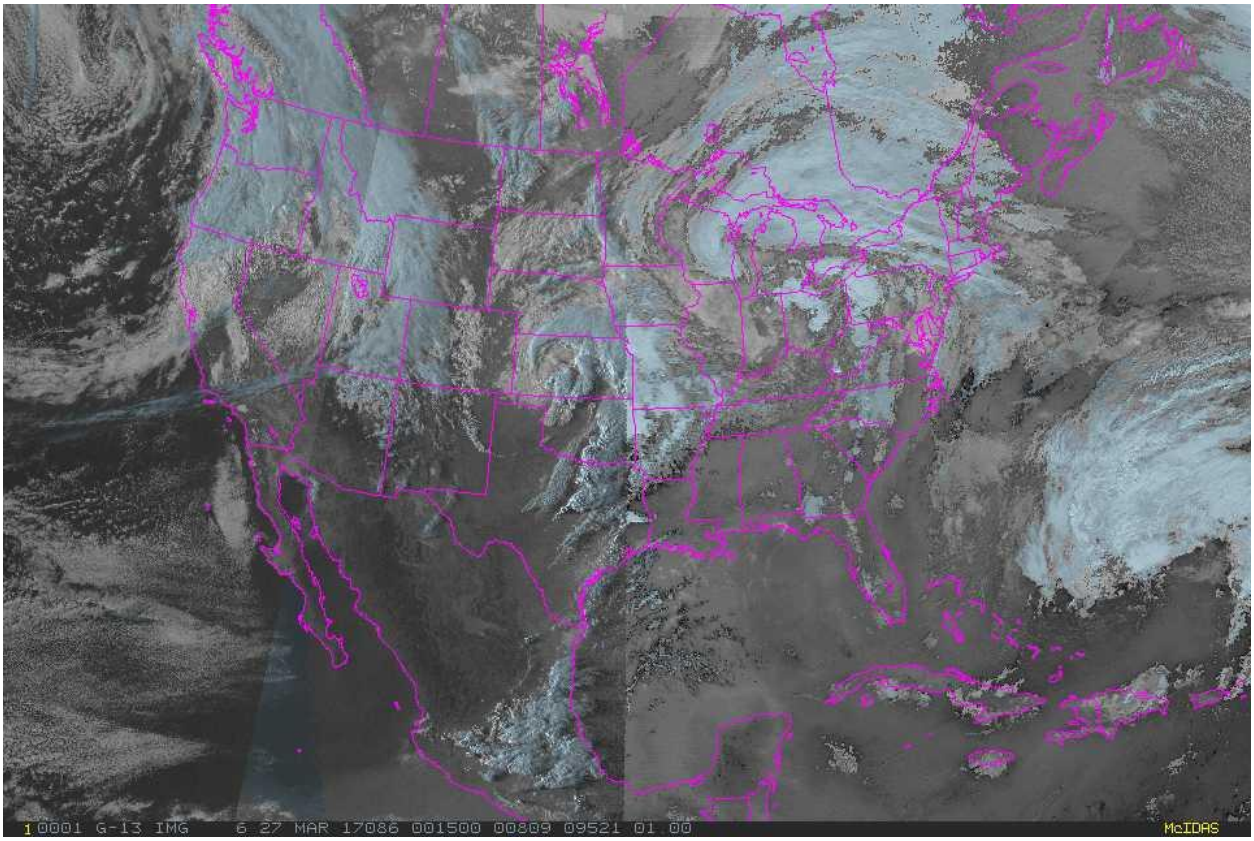
High-speed network adapter for HP server:

Gale has only a single backup network connection for users, both ERAU internal and community external, to access data. This extra connection also provides increased bandwidth. Additional network ports will provide more bandwidth and backup connections for providing data services to external users.

We intend to leverage this hardware, paired with other existing systems, to provide community access to both the raw data and derived products, like those that we now produce using the GOES-13 and GOES-15 data. Web access to these products can be found at: http://wx.erau.edu/erau_sat/

An example of the products we produce can be seen below. In this image, from 0015 UTC on 3/27/2017, we use visible, IR and near IR channels to create a seamless transition from day to night. The right half of the image is IR only, as the sun is below the horizon, while the left side of the image is still using the higher resolution visible channel to depict clouds. Using the IR temperature information, we color cloud tops that are estimated to be 18,000 feet or higher, which would suggest they might affect commercial aviation interests. The seam where the two

GOES satellites are stitched together can be seen along the western US. Slight differences in the calibrations of the satellites make it difficult remove this artifact.



We also provide several other products, such as a volcanic ash detection product, a convective diagnostic and some experimental 3-D visualization products. The URL provided also gives access to several different sectors that are made from one or more geostationary satellite inputs.

We expect to make new multi-channel products from the GOES-R series satellites as the data become available. We are already experimenting with some of the test data that have come across our NOAAPort receivers.

Budget

Funds are requested to fill all the available disk storage bays in our existing system. This will provide for 14 x 900 GB drives, which will greatly increase our available storage space, and should prepare us for the future when there are two GOES-R series satellites on station. (GOES-S is scheduled for launch later in 2017.) The requested memory upgrade will double the available memory in the system, and will allow us to create a much larger product queue than we are currently able to support, while the network adapters will provide greater throughput between the server and the campus networking equipment.

Qty.	Description	Price	Cost
14	HP 900GB 12G SAS 10K 2.5in SC ENT HDD	$554.07	$7,756.98
8	HP 8GB 2Rx8 PC4-2133P-R Kit	$218.27	$1,746.16
1	HP Ethernet 1Gb 4-port 331T Adapter	$262.07	$262.07
1	HPE Flexfbrc 10Gb 4P 536FLR-T Adapter	$656.27	$656.27
		Sub-total	**$10,421.48**
	University Indirect Costs		**$0**
		Total	**$10,421.48**

ERAU Commitment

ERAU will provide the necessary infrastructure to support and maintain these upgrades, as well as the faculty and staff time required to incorporate the requested equipment into our existing systems. The ERAU IT Department will work with our staff to ensure that the server has the best possible connectivity to our classroom and campus network infrastructure.

Project Milestones

If funding is provided, the proposed equipment will be purchased and installed during the summer of 2017. Once installed, these upgrades will immediately be available across the ERAU campus to Linux users. We anticipate having all resources in place before the GOES-16 data becomes operational, which is expected to occur in fall 2017. After the hardware is in place, we will begin the process of adding services, such as the ADDE and THREDDS protocols, to make data available both on and off campus to individuals using packages like the Unidata IDV or McIDAS software.

COMPUTER SYSTEMS SUPPORT, INC.
5000 SW 75th Avenue, Suite 301
Miami, FL 33155
Phone: (305) 666-6804 Fax: (305) 666-6895
Email: sales@cssfla.com

Quotation

Date	Quote #
3/28/2017	CSSQ13600

Customer:
Steven Marino
Embry-Riddle Aeronautical University
Accoutns Payable
600 S. Clyde Morris Blvd.
Daytona Beach, FL 32114-3900
USA

Quotation subject to the Terms and Conditions of Florida NASPO Valuepoint IT Contract 43211500-WSCA-15-ACS

Rep	Terms	FOB	Ship Via
Steve Cavendish Jr.	Net 30	Destination	BW Surface

Ln	Qty	Part Number	Description	List Price	NASPO Price	ERAU Price	Ext. ERAU Price
1	14	785069-B21	HP 900GB 12G SAS 10K 2.5in SC ENT HDD	$759.00	$554.07	$554.07	$7,756.98
2	8	759934-B21	HP 8GB 2Rx8 PC4-2133P-R Kit	$345.00	$218.27	$218.27	$1,746.16
3	1	647594-B21	HP Ethernet 1Gb 4-port 331T Adapter	$359.00	$262.07	$262.07	$262.07
4	1	764302-B21	HPE Flexfbrc 10Gb 4P 536FLR-T Adptr	$899.00	$656.27	$656.27	$656.27
						Total	**$10,421.48**

Computer Systems Support, Inc. (CSS) provides this quote directly to the entity listed above. Please make all purchase orders awarded from this quote out to Computer Systems Support, Inc. (FEIN 65-0103028), 5000 SW 75th Avenue, Suite 301, Miami, FL 33155. To ensure accurate and timely processing of orders, please fax all purchase orders to CSS at (305) 666-6895 and/or email to orders@cssfla.com.

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