THE UNIVERSITY of WISCONSIN MADISON

OFFICE OF RESEARCH AND SPONSORED PROGRAMS

UW Reference # MSN163642

University Corporation for Atmospheric Research

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An AWIPS-II testbed and UNIDATA community THREDDS/RAMADDA server at UW-Madison

This proposal has been administratively approved on behalf of the Board of Regents of the University of Wisconsin System and is submitted for your consideration. Please keep our office advised as developments occur with regard to this application.

The appropriate programmatic and administrative personnel of each institution involved in this grant application are aware of the sponsor's grant policy and are prepared to establish the necessary inter-institutional agreement(s) consistent with that policy.

All costs cited conform to established institutional policies and procedures. Our DHHS Negotiated Rate Agreement can be found at http://www.rsp.wisc.edu/rates/rates.pdf. Website: http://www.rsp.wisc.edu/

A final agreement is contingent upon the successful negotiation of terms and conditions acceptable to the University of Wisconsin-Madison.

We ask that you use the University's above-referenced proposal number in any future correspondence.

Questions regarding administrative matters should be directed to:

PreAward Services by email: preaward@rsp.wisc.edu or by phone: (608) 262-3822.

Questions regarding the technical nature of this application should be directed to:

The Principal Investigator.

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Unidata Community Equipment Awards
Cover Sheet

An AWIPS-II testbed and UNIDATA community THREDDS/RAMADDA server at UW-Madison

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Project Summary

The Department of Atmospheric and Oceanic Sciences at the University of Wisconsin-Madison (UW-AOS) has an excellent undergraduate program that graduates between 15 and 30 B.S students each year, and a graduate program that graduates approximately 15 M.S. and Ph.D. students each year. The education and training of these students involves extensive use of earth science observational data and numerical model output, along with analysis and visualization software to interrogate this data.

The UW-AOS department has for many years maintained a computer classroom dedicated to the use of state-of-the-art data analysis and visualization tools in earth sciences courses and research. Software provided by Unidata, as well as other data analysis and visualization tools are regularly used in UW-AOS courses and research. As a result, students graduating from the UW-AOS department have a strong working knowledge of software commonly used in earth science, and can share this knowledge with the broader earth sciences community as they pursue their graduate work or career.

As the state-of-the-art software advances, we desire to include this new software in our curricula and research training. With the transition from N-AWIPS and GEMPAK to AWIPS-II rapidly approaching, we need the ability to learn ourselves, and educate our students in the set-up and use of this new technology. We therefore propose to acquire a server on which to set up an EDEX back-end server for AWIPS-II. We plan to test the CAVE client in our computer classroom, and the CAVE thin client on other workstations in various research groups throughout our department.

Our existing computer classroom is regularly used by several groups affiliated with the Space Science and Engineering Center (UW-SSEC), and by groups affiliated with the National Weather Service and the American Meteorological Society's DataStreme Atmosphere program. These programs provide education and experience to K-12 teachers and students, and others. In these programs, teachers and high school students come to the UW for several days in the summer to learn about the earth system and the tools and technologies used the field of atmospheric and oceanic science.

Since the introduction of the Unidata Internet Data Distribution project (IDD) UW-Madison has been a top-level node for data distribution, and has maintained a local data server used in-house with GEMPAK and the Unidata IDV. Data saved at UW-Madison has frequently been offered to other participating UNIDATA sites to fill in data gaps or help with research or case study data needs.

Over the past several years, earth science data sets have grown in size and complexity to the point where it is neither feasible nor desirable to send all of the data from all sources via the internet to all downstream sites. Instead, new approaches such as THREDDS and RAMADDA have been developed to allow for large data sets to be housed on large, remote servers, cataloged and accessed on demand when needed by software such as the Unidata IDV. We intend to continue our involvement in making these large data resources available to all interested, and propose to set up a RAMADDA/THREDDS

server as a resource to the Unidata community. This server would house all data available on the existing Unidata IDD data feeds, as well as additional data sets that will be available in the future.

We would eventually envision hosting and contributing to a collection of case study data sets of interest to the community. We have acquired a sizeable collection of case study data sets that have been used in our senior level undergraduate courses. Some of the older case studies include data not generally available at existing archive sites (e.g. NCAR's CISL Research Data Archive, or the NCDC NOMADS archive site) that may be of interest to the Unidata community at large.

Generally these case study data sets include surface and upper air observations and numerical model data for the duration of the events, and many also include satellite and radar data, mostly sourced from the various Unidata IDD data feeds. The data are currently in GEMPAK format, and accessed locally using GEMPAK/GARP over our internal network using NFS. We would like to begin to update these data sets and make them available to the Unidata community via the proposed RAMADDA/THREDDS server.

Project Description

A. Details of equipment requested

We propose two separate servers for the scope of this project. These would be Dual Opteron 3.1 GHz 8-core systems with 64 GB of RAM and a sizeable RAID disk subsystem for each. Each system is expected to cost approximately $6,000.

The first system would be used as an EDEX server to provide data service and processing to the CAVE clients in our prototype AWIPS-II environment.

The second system would run the LDM software and ingest the full suite of Unidata/IDD data streams, convert to the appropriate formats (GEMPAK, netCDF, etc.) and make these data available to the UW-AOS department and to the Unidata community at large via a THREDDS/RAMADDA server.

B. Goals of the project

The primary goals of this project are twofold. First, we desire to set up an AWIPS-II prototype environment in order to evaluate and improve the experience in the as yet untested educational and research settings. Second, we desire to replace our existing in-house data storage server with a modern THREDDS/RAMADDA server capable of ingesting, storing and serving all current and future data products available over the IDD. We anticipate that this server would eventually also host a collection of case study data sets that would be of interest to the community.

Many of our undergraduate courses, including our senior level synoptic laboratory courses AOS 452 and 453, make extensive use of our computer classroom for display of Unidata data and model output for use in daily weather discussions and daily lectures. AOS 452/453 students also make extensive use of GEMPAK and the Unidata IDV to interrogate historical case study data as part of their coursework. Other AOS courses, including our introductory AOS 100 class, and AOS 441 (Radiation in the Atmosphere) also make use of the software and data available via Unidata and the IDD.

Other groups from UW-SSEC, the National Weather Service and the American Meteorological Society utilize the classroom would also have the option of working with AWIPS-II as a part of their programs. In their programs, teachers and high school students spend several days during the summer learning about earth science topics and the tools and methods used in our field. The teachers then take this knowledge and some of the tools back to their science classrooms to enhance their curriculum. The students can enter college with a better idea of the methods and software tools used in the earth sciences.

C. Benefits to research/education

The primary benefit to research and education will be an environment where large real-time and historical data sets are readily available alongside state-of-the-art tools that can be utilized to analyze and visualize this data.

The prototype AWIPS-II installation will give both users and data administrators experience with this new software, and give the opportunity to test, evaluate and improve the AWIPS-II experience in both research and education environments.

The new RAMADDA/THREDDS server will enhance the availability of current and historical data sets to students for classes and research. Additionally, as new, larger datasets become available, the server will have the computational and storage capacity to accommodate the increased demands of processing and storing these data sets.

D. Added value to Unidata community at large

The prototype AWIPS-II environment will allow students and staff at UW-Madison to test and evaluate the AWIPS-II software in a research/education environment, provide feedback to the developers, and suggest improvements that will enhance the AWIPS-II experience when it ultimately replaces N-AWIPS and GEMPAK as a primary data plotting and analysis tool.

The RAMADDA/THREDDS server would benefit the entire Unidata community by providing additional data set availability. Additionally, as case study data sets are

acquired and configured, these historical data sets would be readily available to the Unidata community as well.

Outreach programs conducted by UW-SSEC, the National Weather Service, and the American Meteorological Society and their attendees will also benefit from enhanced data availability and the AWIPS-II prototype environment. The K-12 teachers that take advantage of these programs will have a better opportunity to become familiar with Unidata analysis and visualization tools, and incorporate these tools into their curricula. Similarly, students taking part in these programs will enter college having already been exposed to Unidata software and available data.

E. Relationship to existing computing facilities and resources, and departmental plan

We currently maintain a Unidata IDD ingest/relay machine that ingests the entire suite of IDD data feeds, and relays data internally and to many downstream sites.

Our existing real-time and internal archive data server was originally purchased in 2005 and is rapidly approaching obsolescence. The new RAMADDA/THREDDS server would act as a new departmental data server as well as a resource for the Unidata community.

The AWIPS-II EDEX server would provide data and products to either the CAVE client or the CAVE thin-client running on the 15 student workstations in our existing computer classroom.

Budget

The two servers requested are $5699.88 each. Detailed quotes are attached.

The total cost of these purchases is $11399.76.

UW-AOS will provide the labor and personnel required to configure and install the AWIPS-II EDEX server, the THREDDS/RAMADDA server and related and decoding software.

Project Milestones

The proposed equipment will be ordered as soon as possible prior to the summer of 2013. The servers will be installed and configured in early summer 2013 and should be ready for use by UW-AOS courses and the greater Unidata community by the fall semester, 2013.