COL/CE/19

A Web-based Display of WDSS-II Products

FY 2004 Proposal to the NOAA HPCC Program

August 10, 2003

| Title Page | Proposed Project | Budget Page |

Principal Investigator:	**Kurt Hondl**
Line Organization:	NOAA/OAR/NSSL
Routing Code:	R/E/NS
Address:	National Severe Storms Laboratory 1313 Halley Circle Norman, OK 73069
Phone:	(405) 366 0433
Fax:	(405) 366-0472
E-mail Address:	kurt.hondl@noaa.gov

Other Collaborators:

Valliappa Lakshmanan OU/CIMMS lakshman@ou.edu	Gregory J. Stumpf OU/CIMMS gstumpf@ou.edu	Rusty Pfost Miami, FL NWSFO Rusty.Pfost@noaa.gov

Proposal Theme: **Technologies for Collaboration, Visualization, or Analysis**

Kurt Hondl Meteorologist NOAA/OAR/NSSL	Dr. James F. Kimpel Director NOAA/OAR/NSSL	Jon Domstead Administrative Officer NOAA/OAR/NSSL

A Web-based Display of WDSS-II Products

Proposal for FY 2004 HPCC Funding

Prepared by: Kurt Hondl

Executive Summary:

The National Severe Storms Laboratory (NSSL) in association with the University of Oklahoma Cooperative Institute for Mesoscale Meteorological Studies (CIMMS) has developed sophisticated meteorological severe weather detection and analysis algorithm as part of the Warning Decision Support System – Integrated Information (WDSS-II). Algorithms developed within WDSS-II are new and experimental and need to be evaluated by research and operational meteorologists.

Several WDSS-II servers have been installed at NSSL and routinely ingest and process large amounts of observational weather data and generate experimental products. Selected research and operational meteorologists in the local community have dedicated Linux workstations capable of displaying WDSS-II algorithms and products. The cost to provide workstations to all the meteorologists on staff and maintaining the software on these systems would be prohibitive.

We propose to develop a Java Network Launch Protocol (JNLP) application capable of displaying WDSS-II products on various workstation platforms. This would allow a much more diverse set of meteorologists to participate in the evaluation of WDSS-II algorithm products generated at NSSL and displayable on the client's workstation via the Internet.

Problem Statement:

The Warning Decision Support System – Integrated Information (WDSS-II) has been developed collaboratively between the NSSL and CIMMS. The objective of the WDSS-II project is to integrate data from multiple observational sensors and computer model analyses (WSR-88D radars, satellite, surface observations, numerical models, lightning, etc) and to use sophisticated techniques to identify severe weather signatures and provide guidance to forecasters. The ultimate goal of WDSS-II is to provide a means of research and development to improve the accuracy and efficiency of the process to issue warnings of severe and hazardous weather.

The WDSS-II software applications can ingest and process the observational data to create various algorithm products. Several WDSS-II servers have been installed at NSSL to ingest and process data from the CRAFT radar network (an HPCC-funded project) and other data available through the LDM NOAAPORT data stream. Through the use of expert systems, artificial intelligence, and shear determination, these data sets are blended and analyzed to produce new and experimental products. A large amount of data is routinely ingested, processed, and displayed on desktop workstations at NSSL. However, these WDSS-II products need to be evaluated by a large and diverse set of research and operational meteorologists at other locations.

A software application has also been developed to display the meteorological data and output from various WDSS-II algorithms using OpenGL libraries. The current display software is only capable of running on Linux workstations. The cost of workstations, security concerns, and

support for software maintenance precludes us from providing Linux workstations for all the meteorologists who we would like to participate in the evaluation of products.

To address the technological need for a remote display application for WDSS-II products, we have investigated various options for remote display and experimented with them. We have produced images from WDSS-II products and published them in real-time on a web page. This provided access to a limited number of products, but only provided limited capability to evaluate the products, as there was no interactive capability (e.g. zoom, data readout, overlays, etc.).

Proposed Solution:

In order to reach a wider audience for evaluation of WDSS-II products, we propose to develop and distribute a Java Network Launch Protocol (JNLP) application to enable remote viewing of the WDSS-II products over the Internet. We choose this technology because it can be distributed freely, is platform-independent, and requires limited support. Meteorologists participating in the evaluation may download a copy of the viewer to their desktop. As newer versions of the display code become available, it may be automatically downloaded to the client's desktop.

There is a large and diverse set of products being routinely produced on the WDSS-II servers at NSSL. Not all evaluation meteorologists will be interested in every product that is generated. The JNLP viewer will need to be able to identify the user's products of interest so that the server can "push" the products to the user's desktop.

We intend to use XML-formatted information as the means of passing the client's interest information back and forth between the WDSS-II server and the remote client workstation. The client's session characteristics will be stored on a server-side database, thus allowing quick retrieval, formatting, and pushing of data to the client workstation, in order to keep bandwidth requirements manageable. The WDSS-II server has to be smart about skipping intermediate frames and sending the most current data in the event of network latencies or processing limitations on the client workstation.

The JNLP viewer will be developed for a different user-base than the current OpenGL display application. The OpenGL application will still be required for detailed, scientific, off-line analysis and higher-end display functions in real-time for a limited set of users. The JNLP viewer will be used for remote, widespread evaluation of WDSS-II products by a diverse set of meteorologists.

Analysis:

The National Oceanic and Atmospheric Administration (NOAA) has invested large sums of money to distribute observational weather data in real-time. In addition, the NSSL has invested considerable sums of money and effort to develop WDSS-II algorithms capable of ingesting these data sets in real-time. The proposed project will build upon NSSL's existing experience in developing tools and techniques that improve the short-term forecasts and warnings of severe weather.

The WDSS-II algorithms developed at NSSL are some of the most advanced techniques to integrate all these various observational data and use the multi-sensor information for automated severe weather analysis, detection, and prediction. The WDSS-II algorithms and products are

routinely generated for various geographical regions and are being evaluated by NSSL meteorologists. Additional WDSS-II algorithm servers are being added to run the algorithms on additional geographic areas as funding permits.

The development of the JNLP viewer for WDSS-II products would make these advanced and experimental products available to a wider, more diverse audience for evaluation and operational testing. The feedback and evaluation by operational forecasters is instrumental to improving the algorithm products for operational use.

This proposal would continue and enhance other development activities funded through other sources. The development of WDSS-II algorithms and display software is being funded through NSSL funds, various government MOUs, and National Science Foundation grants (through the OU/CIMMS collaborators).

Performance Measures:

Milestones

Month 3: Complete design of software architecture for JNLP viewer and begin development.

Month 6: Develop XML protocols for viewer-server collaboration.

Month 9: Deploy prototype JNLP viewer.

Month 12: Deploy final version of JNLP viewer along with the data.

Deliverables

The proposed project would provide a JNLP application that is capable of viewing WDSS-II products in real-time via the Internet. The website with real-time meteorological observation data and WDSS-II products will be open to all NOAA users.