

JADE – A Web-based development and testing environment for remotely-developed QPE applications

FY 2005 Proposal to the NOAA HPCC Program

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Principal Investigator: **Steve Vasiloff**

Line Organization: NSSL

Routing Code: OAR

Address:

National Severe Storms Laboratory
1313 Halley Circle

Norman, OK 73069

Phone: (405) 366-0499

Fax: (405) 366-0513

E-mail Address: steven.vasiloff@noaa.gov

Dongjun Seo
National Weather Service

Dongjun.seo@noaa.gov

Sandra Yuter
University of Washington

Syuter@wash.edu

Jian Zhang
University of Oklahoma

Jian.Zhang@noaa.gov

Proposal Theme: **Disaster Planning, Mitigation, Response and Recovery**

Funding Summary:

_____	_____	<i>Signature 3 (optional)</i>
Steven Vasiloff	Dr. James Kimpel	Authorizing Official 2
Research Meteorologist	Director	Title
NSSL	NSSL	Organization

JADE – A Web-based development and testing environment for remotely-developed QPE applications

Proposal for FY 2005 HPCC Funding

Prepared by: Steven Vasiloff

Executive Summary:

This project is a multi-NOAA line office and joint institute collaboration designed to facilitate quantitative precipitation estimation (QPE) applications over the internet. This effort is an extension of scientific collaboration between the National Severe Storms Laboratory and the NWS Office of Hydrologic Development/Hydrology Laboratory. The NWS/OHD is responsible for providing and enhancing NWS operational precipitation products for flood warnings and hydrologic modeling. The NSSL performs research on improving precipitation estimates from multiple sensors. A Joint Applications Development Environment (JADE) is proposed to facilitate collaboration and scientific exchange between NSSL, OHD, and joint institutes for improving operational precipitation products. JADE leverages the previously funded HPCC project CRAFT by making data from all 121 WSR-88Ds operated by the NWS available on a common platform for applications testing. This proposal will utilize the Abilene Internet2 distribution system set up by NWS and UNIDATA to distribute the high-resolution radar data. Other data stream that will be available include NOAA GOES and state-of-the-art multi-spectral satellite data, numerical model data, surface observations. A web-based visualization and verification tool will be enhanced to accommodate new QPE applications. This will allow a coordinated, centralized QPE product viewing environment in real-time for convenient assessment of all QPE applications by researchers in remote locations. A graphical user interface will be developed to allow easy installation and running of applications. Traditionally, researchers must establish their own data ingest, run-time, and testing environment. To the extent possible, ncBrowse will be used.

Problem Statement:

Many NOAA line offices, joint institutes and universities have or are developing local applications that may increase the accuracy of quantitative precipitation estimation (QPE) for flash flood warnings and other fresh water resources management. However, there is no cohesive manner for collaboration and application testing of QPE products. The result is longer time for applications development and testing, lack of coordination among researchers, and unnecessary costs to funding organizations.

This proposal will foster research collaboration among disparate groups providing convenient access to the vast amounts of NOAA data streams and a web-based development and testing environment.

Proposed Solution:

High-resolution WSR-88D radar data are available through the newly created National Weather Service (NWS) Abilene Internet2 distribution system in real time. The infrastructure exists to run 3-D radar mosaic and NSSL's QPE algorithms (e.g., QPE-SUMS) across the entire continental U.S. We propose to make available software code segments for outside users to interface with the run-time environment via the web on our National Mosaic QPE (NMQ) computing system. A staging area will be set up for initial code testing to ascertain its functionality. CPU and disk usage performance metrics will be made available. Scripts and associated software will be used to display the application output on the web verification pages. The verification pages will provide real-time performance statistics for multiple application-ground truth verification combinations. The framework for this environment is called JADE (Joint Application and Development Environment). Products will be output in netCDF format and will be interfaced with the HPCC funded ncBrowse capability.

Analysis:

The purpose of JADE is to provide a straightforward, efficient method of rapidly assessing state-of-the-art QPE and QPF (quantitative precipitation forecast) applications.

We considered using the Warning Decision Support System Integrated Information (WDSS-II), a previously funded HPCC project that ingests multiple data sets. However, WDSS-II lacks simplicity and has no user interface for real-time web-based verification and straightforward applications installation. Furthermore, WDSS-II does not ingest and produce products for all WSR-88D radars.

Another alternative is to for individual researchers/institutions to continue to move subsets of radar, satellite, NWP, and surface data across the network for local applications development. These efforts result in unnecessary increases in internet traffic (especially for the high bandwidth requirements for WSR-88D level-2 data) and expenditures related to developing new software to move and view data and applications products. Furthermore, organizations often do not choose to develop applications on real-time data sets and instead test new applications using case studies. This results in limited evaluation whereas as realtime CONUS data sets will provide enormous evaluation opportunities.

The benefits of the proposed solution begin with simplicity. Often, testing new applications involves setting up a local applications development and testing environment. These "overhead" efforts take time and money. If JADE were available, overhead costs for grants and other funding would be reduced. Another benefit is reduced time from application prototype inception to validation. A readily available evaluation platform would greatly facilitate testing of new applications. Perhaps most importantly, JADE would allow all involved to evaluate applications using common statistical methods, thus enhancing the scientific integrity of the applications. An associated web forum would allow discussion and feedback among contributors.

Performance Measures:

Milestones

April 2005 – Initial design of JADE structure including, code I/O specifications, directory structures, staging area, software function monitors, scripting to move application output to verification area.

June 2005 – Begin applications testing

October 2005 – Completion of application analyses and final report

Deliverables

- Deliverable 1 - A system configuration including software installation and run scripts for the generation of products and verification.
- Deliverable 2 - Documentation on applications development and testing
- Deliverable 3 - Prototype development and testing environment that will be used by NSSL, OHD and joint institutes to evaluate candidate applications for potential inclusion into operations.