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A Data Display System for Weather Modification Research and Operations

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1.0 INTRODUCTION

NOAA has a mission to improve the response to society's needs for weather and water information. Fulfilling the needs of forecasters who are deployed to field locations during hazardous events such as fires and the aftermath of hurricanes, requires a highly capable, low-bandwidth system solution. The FX-Net system was developed to provide such a solution. It is a thin-client, data 'pull' system that delivers data from multiple sources, including NOAAPort and Local Data Management (LDM) data feeds.

FX-Net: A Highly Leveraged System:
The FX-Net servers are based on the Natinal Weather Service (NWS) Advanced Weather Interactive Processing System (AWIPS) data and application server software. They have been modified to allow the FX-Net Java client to access the same data sets available in the AWIPS system. Access to the data is via 'Pull' commands from the client. Since this is a thin-client, users can retrieve the full set of meteorological data over low-bandwidth communication connections. To enhance the thin-client's low-bandwidth capability, specialized Wavelet Compression algorithms (Wang et al. 2002) were developed to allow high-resolution imagery and vector graphics to be quickly transmitted from the server to the client. The architecture of the system provides the unique capability of hosting more than 50 real-time client users simultaneously.

The FX-Net system has been in operational use by NWS Incident Meteorologists (IMETS) since early 2003. Between 2003 and September 2007 an average of 150 IMETS were dispatched each year.

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The large majority of those dispatches were to wildfires. Other of the IMETS were dispatched to several oil spills, the hazardous clean-up command center in Louisiana in the aftermath of Katrina, and to national events such as political party conventions. NOAA and University researchers use the system during field experiments to forecast research asset placement.

2.0 SYSTEM DESCRIPTION

System Components (Figure 1):
1) NOAAPort CP (satellite broadcast)
   LDM data feed (specialized products)
2) Modified AWIPS Data and File servers.
3) Load Balancers
4) Java Client

***The Servers*:** The data server ingests imagery, observations, and model data from the NOAAPort SBN (Satellite Broadcast Network). It ingests local data, including all Meteorological Assimilation Data Ingest System (MADIS) data and specialized data sets via the LDM. The file server answers the clients' http requests for products and data. The load balancers ensure that clients will not have to wait for a request response.

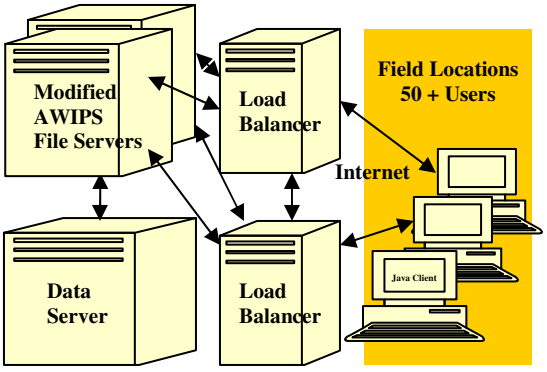

Figure 1. FX-Net System

The Remote Client: The Java client software executes on a desktop PC , Pentium IV, 2.8 Ghz processor, 2 GB RAM, 80 GB hard drive, running Windows XP, or Mac OS, or Red Hat Enterprise Linux. Once an http request is received by the file server, data are compressed using a Wavelet Compression algorithm and made available over the Internet to the client. All data requests come from the client, there is no data 'push' in this system.

The speed of the client's response to user requests is dependant on the speed of the communications link. The client is designed to function at a reasonable level using a 56kbps link. Additional bandwidth provides faster response time.

3.0 DATA SETS AND TOOLS FOR THE WEATHER MODIFICATION COMMUNITY

Added Data Sets: The FX-Net architecture allows for the addition of observing data, specialized products, and map backgrounds, (shape files). The added data sets are automatically time matched to all other data sets available through the file server.

Procedures: The Procedures Tool gives users the ability to design and save specialized products that can be rebuilt without having to reload each part of the product individually.

Product Annotation, Printing, and Export: Users can create products and charts for export to briefing tools or to a printer.

4.0 PLANS

During the summer of 2008, the ESRL/GSD has agreed to provide FX-Net clients to State of Colorado Water Conservation Board researchers and forecasters for their use during Weather Modification field operations and assessment activities. Additional data sets of interest to the weather modification community will be added to the system for this project.

5.0 REFERENCES

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