

# Unidata's Role in the GEMPAK to AWIPS II Migration

September 2012

## Introduction and Background

AWIPS II is the next generation weather forecasting, display, and analysis package currently being developed by the National Weather Service (NWS), Raytheon, and the National Centers for Environmental Prediction (NCEP). The Unidata Program Center (UPC) has long supported universities in their use of the previous-generation software used by NCEP (NAWIPS/GEMPAK), and is working to create a migration path for these users to a Unidata-supported release of the AWIPS II software.

Currently, the NCEP National Centers and NWS forecast offices use different tools to support their missions. The National Centers use NAWIPS, while the NWS forecast offices use AWIPS, which is fundamentally different from and not compatible with NAWIPS. The new AWIPS II architecture aims to unify these tools, allowing the NWS to expand data access and provide better integration and collaboration between the NWS field offices, River Forecast Centers, and National Centers. Working in close collaboration with NCEP, Unidata is the focal point for the effort to extend the same benefits to the university community.

## Software Architecture

AWIPS II is not designed as a single piece of software, but rather as a collection of interoperable services, each with a well-defined role. This service-oriented architecture allows the AWIPS II system to use many existing open source technologies such as Apache Qpid, PostgreSQL, and PyPIES. As a Java application, AWIPS II is designed to *eventually* run on multiple platforms, although initial support is extended only to Red Hat Enterprise Linux (RHEL) version 5 (and equivalent open-source CentOS systems).

The primary AWIPS II application for data ingest, processing, and storage is the Environmental Data EXchange (EDEX) server. The EDEX server consists of several discrete software components, which in an operational setting are expected to be spread across multiple servers.

The primary AWIPS II application for visualization/data manipulation is the Common AWIPS Visualization Environment (CAVE) client, which is based on the open source Eclipse application framework. The CAVE client contains different viewing modes, called *perspectives*, developed as Eclipse plugins. Each perspective (D2D, National Centers Perspective, GFE, etc.) offers a different way to meet the goals of various forecasting offices and departments. The National Centers Perspective, developed by NCEP, is designed to offer the same functionality found in NAWIPS programs such

as NMAP2, NSHARP, NTRANS, and NWX. The CAVE client is typically installed on a workstation separate from the EDEX components, but the UPC is investigating the possibility that CAVE and EDEX software can run on the same workstation.

## Status and Schedule for the National Weather Service

Raytheon, contracted by the NWS to develop AWIPS II, provides regular releases and updates to the NWS for testing and evaluation. Unidata subsequently receives updates of the source code and the development environment for all major AWIPS II releases through the NWS Silver Spring office and NCEP.

The AWIPS to AWIPS II transition at the NWS began in Fall 2011 and is expected to be completed in early 2013 (to date, WFOs at Omaha, Boulder, Norman and Houston have installed AWIPS II). The NAWIPS to AWIPS II transition at the National Centers will occur on a center-by-center basis, beginning in early 2013, and is expected to be completed early in 2014.

NCEP has stated that they intend to continue supporting GEMPAK code until further notice, and GEMPAK routines are being reworked to ensure that GEMPAK libraries can read from the AWIPS II database, as well as from decoded GEMPAK format files. The CAVE client is currently able to read GEMPAK-formatted grid files, and support for GEMPAK-formatted surface and upper-air files is anticipated in early 2013.

## Unidata's Role

Unidata is collaborating with NCEP and the NWS to prepare AWIPS II for non-operational use by the university community. To provide redundancy when used operationally by NWS forecast offices and NCEP National Centers, AWIPS II components are distributed and clustered on multiple servers, a resource requirement that is less practical for universities and individuals. Of primary interest is performance of the EDEX server when installed on a single server rather than clustered among four. The Java Virtual Machines which comprise EDEX handle data ingest, processing, and read/write access to processed data storage, but long data processing latencies have been difficult to avoid when these JVMs are run in parallel on a single machine and ingesting a full suite of data via the Unidata Internet Data Distribution (IDD) network.

Recent work by Unidata has improved the performance of AWIPS II data flow on single-server EDEX installations. Changes to Raytheon's configuration of the Local Data Manager (LDM) have been made in recent months, allowing Unidata to run current AWIPS II releases on a standalone server. Data ingest latencies, disk read and write times, and system load have been reduced to the point where Unidata considers a single-server AWIPS II system, or a single-server EDEX supporting multiple CAVE

clients, to be real possibilities for academic (non-operational) use.

The UPC is conducting an ongoing beta testing program involving a small number of universities identified as core members of our community. Through the feedback received from these institutions and the continued work in Boulder, the UPC is preparing to offer full support services to the Unidata community throughout the NAWIPS to AWIPS II transition.

In addition to the UPC developers taking part in NWS-directed AWIPS II training, documentation and training materials are being created to assist our users in the installation, configuration, and general understanding of the AWIPS II system, specific to the anticipated needs of the community. The UPC is incorporating an AWIPS II section into the annual NAWIPS/GEMPAK training workshop to provide current NAWIPS users with an introduction to the software before migration begins.

Additionally, the UPC is exploring the feasibility of hosting and managing a code repository for open source AWIPS II software development by community members, separate from the baseline maintained by Raytheon and the NWS.

## Summary

The UPC continues to play an active role in the development and testing of AWIPS II, in cooperation with Raytheon, the NWS, and NCEP. In-house work, along with a growing beta testing program involving the Unidata community, is bringing us closer to the goal of providing a functional, fast, and well-documented software release for community members.

Additional AWIPS II migration information and news, including frequently asked questions, can be found online at <http://www.unidata.ucar.edu/software/awips2/>

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