

**Building a Real-Time Running Archive EDEX Server for Meteorology Instruction
2020 Unidata Equipment Award
Final Report**

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In March 2020, the Texas A&M Department of Atmospheric Sciences requested a Unidata Equipment Award to build its own EDEX server to support educational use of Unidata AWIPS-2. Our primary goal was to build a server that mirrors the existing Unidata EDEX cloud server, but could support 50 local CAVE clients simultaneously with the added capability of archiving weather data for a 10-day period on a rolling basis. Through past experience, we have learned that weather forecasting laboratory instruction at the undergraduate level is best facilitated by maintaining availability of observational and model datasets for an extended period of time. This is essential so students have several days to work through their assignments with the ability to go back to previous days' model runs or observations without worry that they will disappear before they can finish their work.

Three machines were purchased as part of this project. The main server, which was funded by the Unidata award, is a Dell PowerEdge R740xd server with 44 cores across two 3.00 GHz Intel Xeon Gold 22 core processors and 128 GB of RAM. This server also holds 16 4-TB HDDs formatted to 36 TB with two 1.9-TB SSDs and an additional 960 GB SSD. Two ancillary machines purchased with department funds support radar and model data. Both 12-core Intel Xeon Silver 2.20 GHz CPUs (one on the radar machine and two on the model data machine), 23 GB RAM, and two 960-GB SSDs. The three servers are housed at Texas A&M's West Campus Data Center, which is a dedicated secure facility with modern power, cooling, and networking capabilities. The servers are connected to each other and the outside world via a 10-GB network connection with plans to update to 20 GB lines.

Over several months in late 2020 and early 2021, Co-I Gyarmati worked closely with Unidata staff to configure the server to successfully host our 10-day archive of weather data and serve this data to our CAVE clients. Approximately fifty department CAVE clients operate on CentOS 7 machines across two department computer labs in the Oceanography & Meteorology building on the Texas A&M campus in College Station, TX. After testing and troubleshooting, our EDEX server was ready for use in Spring 2021 classes.

Co-I Conlee used our local EDEX server in his spring 2021 "ATMO 456: Practical Forecasting" class. Conlee was able to successfully use classroom teaching examples from recent archived cases using the new EDEX. After demonstrating this capability to students, Conlee attests that students used CAVE/AWIPS-2 for their forecasts and COMET module forecasting papers far more than in prior semesters. For the first time, students had the capability to do forecast verifications from COMET modules and from weekly classroom forecasting using CAVE with archived model runs, satellite images, observational data, and radar.

AWIPS was also used as one of the main forecasting, observational, and radar analysis tools in two classes taught by Instructional Assistant Professor Erik Nielsen: "ATMO 352: Severe Weather and

Mesoscale Forecasting,” and “ATMO 251: Weather Observation and Analysis.” Students used the real-time stream of products to examine or find examples of synoptic and mesoscale phenomena that were currently occurring or forecasted to occur. This allowed the students to gain added conceptual knowledge by building three dimensional pictures of real-world weather events. Additionally, the 10-day running archive allowed for students to verify their and model forecasts using observational data within the same program. It also allowed a vast repository to develop case studies for future labs and class once an event occurred. The availability of the MRMS product suite was also quite advantageous to the class. It allowed for an in-depth look, at nowcasting timescales, of severe weather and flash flooding threats, using operational products that are not as available on standard web pages.

Though our implementation of the EDEX server was largely successful, we have identified a few areas for continued development. First, a full load of students using the EDEX server simultaneously for demanding tasks can still crash the local server (as it can the Unidata cloud server). Moreover, we have not yet been able to provide access to users at other Universities until we can troubleshoot these stability issues. Thus, continued use in future classes (particularly in future semesters when more students are working in the computer labs in person again), will be required to continue to identify problems and troubleshoot with Unidata staff. However, we are pleased with our initial efforts and look forward to continuing and expanding the use of our new server in future classes including Radar and Satellite Meteorology, in addition to its demonstrated use in our forecasting classes.



Figure 1 - One of the two computer labs maintained in the Department of Atmospheric Sciences at Texas A&M configured to run AWIPS-2 from our local EDEX server.

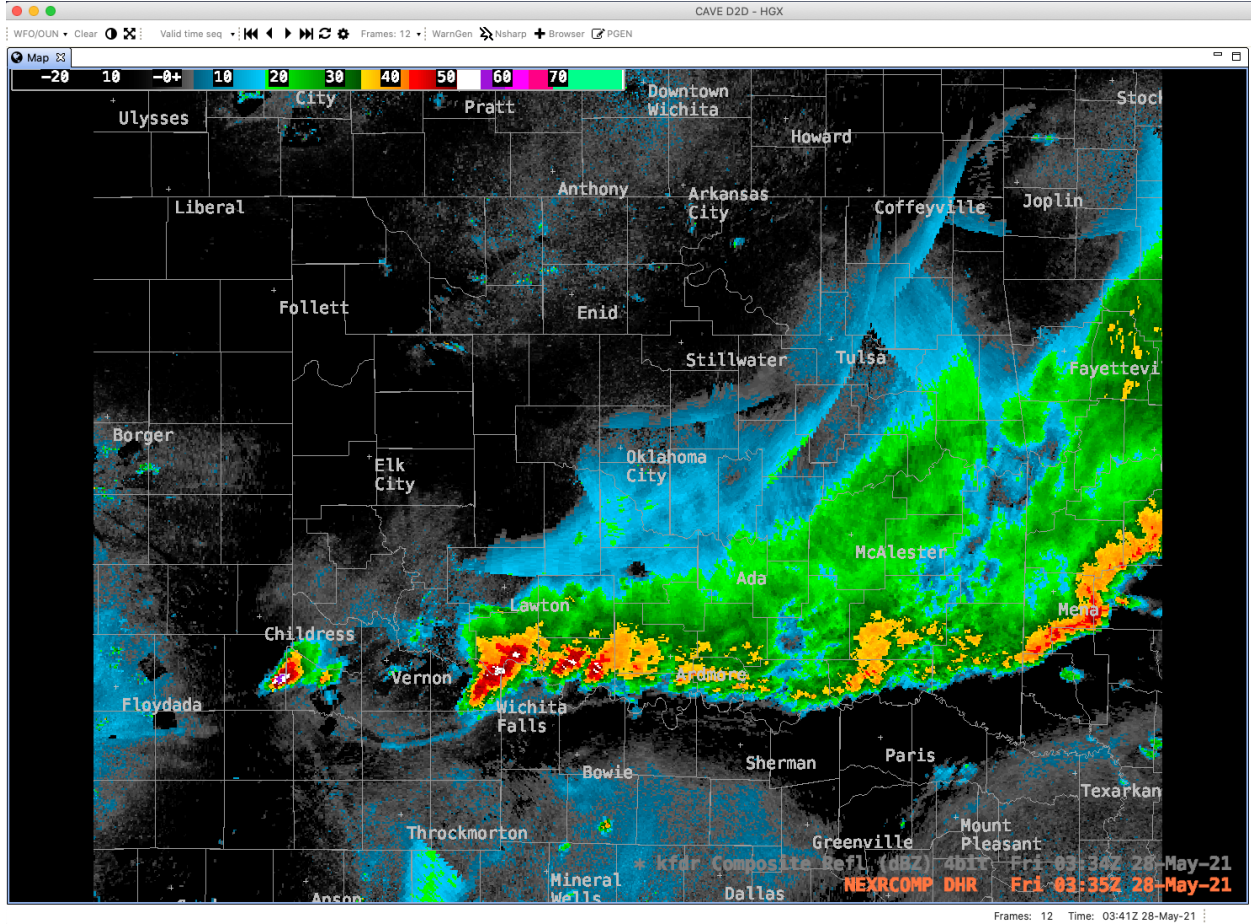


Figure 2 – Screen shot of AWIPS-2 radar display