McIDAS - XCD

2015 McIDAS Users' Group Meeting

Rewrite Team

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McIDAS XCD

McIDAS X

Conventional Data

Decoder

McIDAS-XCD files, decodes and indexes the NOAAPORT data stream into formats that can be served by McIDAS-X ADDE servers.

Output formats include McIDAS MD files, Text files, McIDAS GRID files, GRIB Version 1 and 2 files, NEXRAD files, and BUFR files.

NOAAPORT Data

- The NOAAPORT broadcast system provides a one-way broadcast communication of NOAA environmental data and information in near-real time to NOAA and external users. This broadcast service is implemented by a commercial provider of satellite communications utilizing C-band.

NOAAPORT Channels

The following NOAAPORT channels supply data to be decoded by McIDAS-XCD:

- **NCEP/NWSTG Channel (NWS Telecommunications Gateway)**
  - model output from the National Centers for Environmental Prediction (NCEP)
  - observations, forecasts, watches and warnings from NWS Forecast Offices
  - WSR-88D radar products
  - most observational data over North America
- **NCEP/NWSTG2 Channel**
  - supplements the NWSTG channel

NOAAPORT Data flow into SSEC

Users generally get NOAAPORT data in two ways:

1. Directly from DOMSAT (101° W)
2. Over the Internet via LDM

Why replace -XCD?

- Installation is difficult
- Upgrades are difficult
- System is overly complex, large learning curve for operators, and very large learning curve for new programmer
- System was written for a mainframe then ported to UNIX
- A powerful system is needed to run -XCD, otherwise data can be lost
- A data format change can mean bad data, and a fix can be difficult to implement, and is only effective for future data

Goals

- Replace 4 parts of -XCD filing and decoding:
  - GRIB (in testing) ✔
  - NEXRAD (in testing) ✔
  - Text (in testing) ✔
  - POINT/MD serving (in testing) ✔
- Utilize LDM direct filing ✔
- Reduce or eliminate compiled code ✔
- Remove legacy mainframe complexity ✔
- Utilize simple open-source database, SQLite ✔
- Create simple interface to pqact.conf and ldmd.conf to select and edit data to be filed (prototype)
- Match or exceed current filing and serving performance on existing hardware (close)

GRIB Data

- LDM files GRIB messages to a temporary directory
- A GRIB daemon written in Python watches for data, extracts information and files metadata into a SQLite database
- SQLite databases are separated by model and date

NEXRAD Data

- LDM files NEXRAD files into a directory structure similar to the existing -XCD Decoder
- Data served by NEXRAD server

Text Data

- LDM files data directly to disk
- A bash script running as a daemon watches for new data and files data into a daily *.XCD file as data comes in
  - New -XCD:
    - A concatenation of the text from the LDM stream with no stripping out of start of text, carriage return, line feed, end of text characters
  - Current -XCD:
    - Starts with the date of the file (in binary) and a total 80-byte header
    - Padding (spaces) in the file - to make 80 character lines
    - Start of text character 0x01 and end of text character 0x03 are included, and also 80-character padded. Carriage returns/line feeds stripped out
- The bash script extracts metadata for insertion into a daily SQLite database
- Text server queries SQLite databases to find data and return information to client

Point Data

- No MD files are created, but structure created on the fly when serving via ADDE
- PTLIST, PTDISP and PTCOPY get metadata from the SQLite database, then extract data from the *.XCD file created by the text filer
- Daily Station Database table (equivalent to STNDB.CORE) is created upon creation of the same SQLite database file that contains the daily text metadata table
- Station Database is retained for archived data

BUFR Data (Binary Universal FoRmat)

- Filed directly using LDM
- No operational McIDAS-X server exists, only a prototype server
- Individual files can be loaded into McIDAS-V if they follow the standard BUFR tables
- Options are under discussion for upcoming increase in BUFR data volume

Local Data

- A couple -XCD sites have local (non-NOAAport) feeds of data
- We have contacted those sites in the past
  - So far, no core -XCD decoder dependencies are known i.e. sites have written their own decoders
- If there is local data that do depend on -XCD libraries, sites will be able to continue to use -XCD libraries, or may link to McIDAS-X libraries as needed. Contact Jerry Robaidek or Becky Schaffer if you have concerns.

Hardware Specs

- Requires more resources than hoped.
- Development hardware (~$4K in 2013)
  - 2- AMD Opteron 4180 CPUs - 6 core each
  - 32 GB ram
  - 7.2k rpm SAS disks
- Briefly tested GRIB on a sub $1K desktop
  - Intel i5-3570 3.4 GHz (quad core)
  - 16 GB memory
  - 7.2k rpm SATA drives (6 Gb/s)

Serving performance (Text)

- TEXT lists
  - WXTLIST (no parameters)
    - Current -XCD: fastest=.081 s slowest=.177 s
    - New -XCD : fastest=.019 s slowest=.043 s
  - WXTLIST WMO=SA
    - Current -XCD : fastest=.023 s slowest=.054 s
    - New -XCD : fastest= .987 s slowest= 1.092 s

Serving performance (SFCRPT)

- SFCRPT
  - SFCRPT KGRB 9 (Current –XCD)
    - Fastest : ~.030 s
    - Slowest : ~.255 s
  - SFCRPT KGRB 9 (New –XCD)
    - Fastest : ~.020 s
    - Slowest : ~.037 s

Serving performance (PTLIST)

- PTLIST
  - PTLIST RTPTSRC/SFCHOURLY SEL="DAY 2015155; TIME 12; ID KMSN"
    - Current –XCD: fastest=.027 s slowest=.040 s
    - New –XCD: fastest=.025 s slowest=.051 s
  - Remove ID: PTLIST RTPTSRC/SFCHOURLY SEL="DAY 2015155; TIME 12"
    - New –XCD slows to : ~0.584 s
  - Remove ID and Time: PTLIST RTPTSRC/SFCHOURLY SEL="DAY 2015155"
    - New –XCD slows to : ~2.39 s

Server performance (GRID)

- GRID lists (GRDLIST)
  - RTGRIDS/GFS-USLC DAY=2015155 TIME=6:00 PAR=U NUM=10
    - Current -XCD : ~.85 s
    - New -XCD : ~.084 s
- GRID display (GRDDISP)
  - RTGRIDS/GFS-USLC DAY=2015155 TIME=6:00 PAR=U FHOUR=12 LEV=500
    - Current -XCD: ~.181 s
    - New -XCD : ~.165 s
- GRID copy (GRDCOPY)
  - RTGRIDS/NAM-USPS G/G.5700 DAY=2015155 TIME=0:00 PAR=T FHOUR=9 LEV=500
    - Current -XCD: ~.264 s
    - New -XCD: ~.160 s

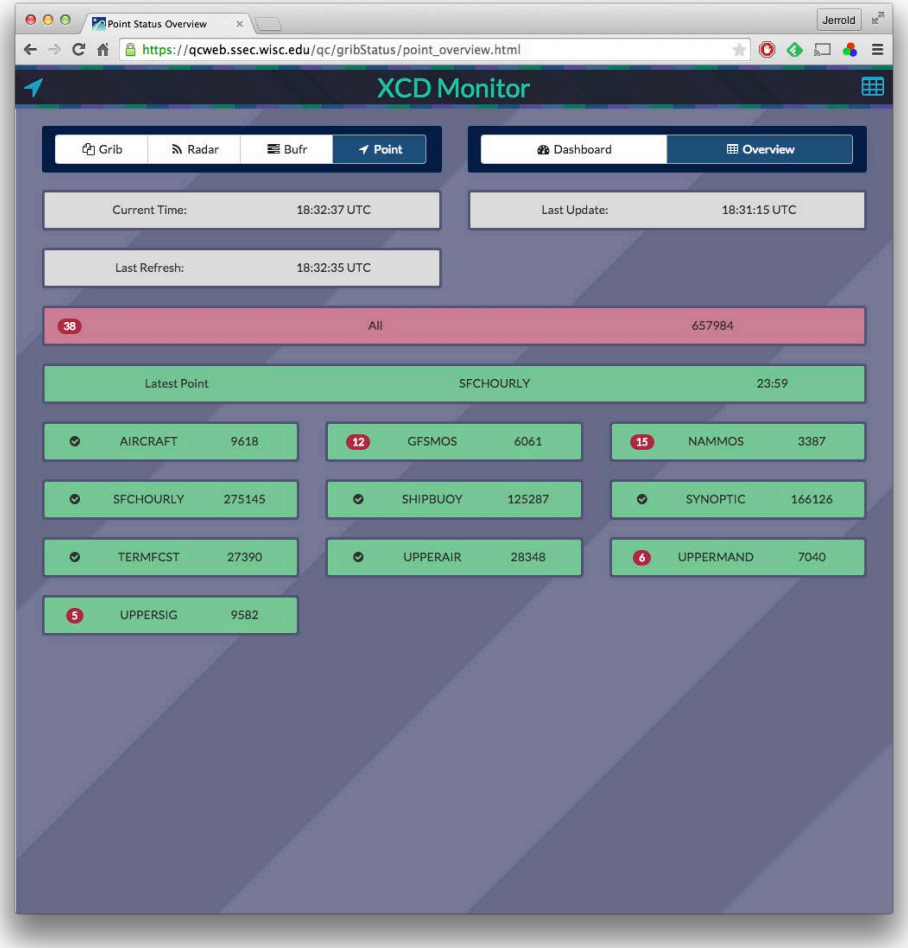
Monitoring

- Command line
  - ldmadmin watch
  - gribadmin
- Graphical
  - HTML based
  - Does not require apache to be installed

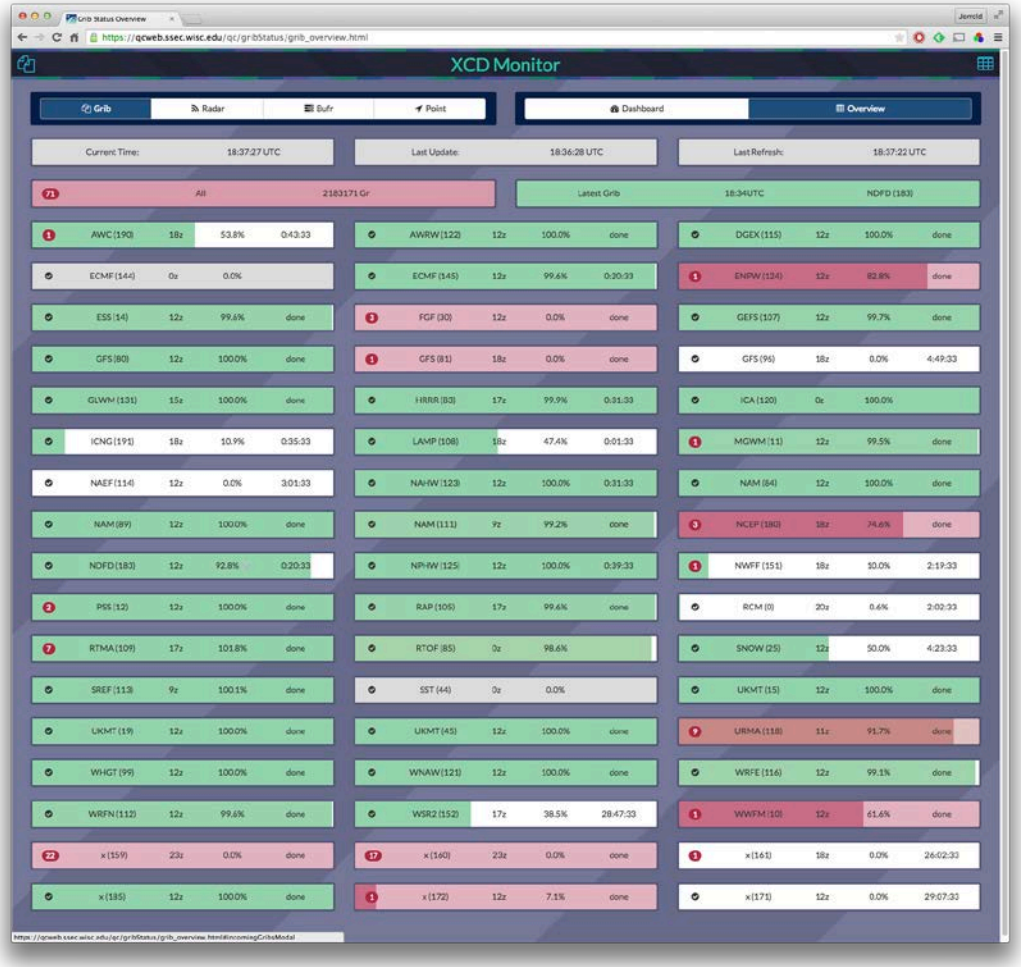
Monitoring


XCD Monitor – SSEC
Jerrold
https://qcweb.ssec.wisc.edu/xcd_monitor/
XCD Monitor
4
GRIB
RADAR
BUFR
POINT
2.2M
38

Point Monitoring



GRIB Monitoring



Radar Monitoring

Packaging and installation

- -XCD replacement beta will be packaged with McIDAS-XCD 2015.1
  - User will have the choice to install either or both -XCD packages.
- Version 1.0 of the -XCD replacement will again be packaged with McIDAS-XCD 2016.1
  - Announcements of -XCD sunset dates will be announced at that time

Schedule

- All ingest and serving components are In testing
- Monitoring (nearly complete)
- Operations testing just beginning now
- Beta release summer 2015