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McIDAS-XCD Replacement

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, GRID files, grib1 and grib2 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

- **GOES Channel**
  - GOES-East visible, infrared, and water vapor for the Eastern Conterminous United States (CONUS), Puerto Rico, supernational composites, and Northern Hemisphere (NH) composites
  - GOES-West. visible, infrared, water vapor for CONUS, Alaska, and Hawaii; supernational composites, and NH composites
- ***NCEP/NWSTG Channel (NWS Telecommunications Gateway)**
  - model output from the National Centers for Environmental Prediction (NCEP)
  - observations, forecasts, watches and warnings produced by NWS Forecast Offices
  - WSR-88D radar products
  - most observational data over North America
- ***NCEP/NWSTG2 Channel**
  - supplements the NWSTG channel
- **Non-GOES Imagery/DCP Data Channel**
  - GOES DCP data
  - GMS/GOES-West/GOES-East/METEOSAT-7/METOSAT-9 composites for visible, IR, and water vapor products (every 3 hours)
  - OCONUS grids

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

Survey Highlights

- Survey was sent out during the last Quarter of 2010
- 26 responses *(not all current users of XCD)*
- Feed types decoded:
  - 33% used for CONDUIT feed
  - 100% used for NOAAPORT
  - Local data?
- All used XCD with LDM
- Built in monitoring not used?

Goals

- Replace 4 parts of XCD filing and decoding:
  - GRIB (prototype done)
  - NEXRAD (prototype done)
  - Text (in process)
  - MD serving (in process)
- Utilize LDM direct filing
- Create simple interface to pqact.conf and ldmd.conf to select and edit data to be filed
- Reduce or eliminate compiled code
- Remove legacy mainframe complexity
- Utilize simple open-source database, SQLite
- No more GRIDXXXX files created by XCD
- Match or exceed current filing and serving performance on existing hardware

GRIB details

- LDM files GRIB files to a temporary directory
- A GRIB daemon watches for directories, and moves it to a temporary directory name
- Another daemon watches for temporary directories and extracts information and files metadata in to an SQLite DB; One SQLite DB per model per day

GRIB processing

GRIB messages arrive on LDM

!grib/ncep/NAM_84/#215/20120425180o/F003/VGRD/90-60 mb above gnd/
!grib/ncep/NAM_84/#212/20120425180o/F009/RH/925 mb/
!grib2/ncep/NAM_84/#218/20120425180oF009/UREL/525 hPa PRES
!grib2/ncep/NAM_84/#218/20120425180oF009/AVOR/250 hPa PRES
!grib2/ncep/NAM_84/#218/20120425180oF009/RELH/500 hPa PRES

LDM directly files GRIB message to disk

```
…
FILE    -close  /data/xcd/incoming_grib.tmp/\2-\3.\4\5\6_\7_\8.grib1
…
FILE    -close  /data/xcd/incoming_grib.tmp/\2-\3.\4\5\6_\7_\8.grib2
```

/data/xcd/incoming_grib.tmp/
NAM_84-#215.20120425_18_003.grib1
NAM_84-#212.20120425_18_009.grib1
NAM_84-#218.20120425_18_009.grib2

Daemon xcdgribdir.sh moves temporary directory to processing directory

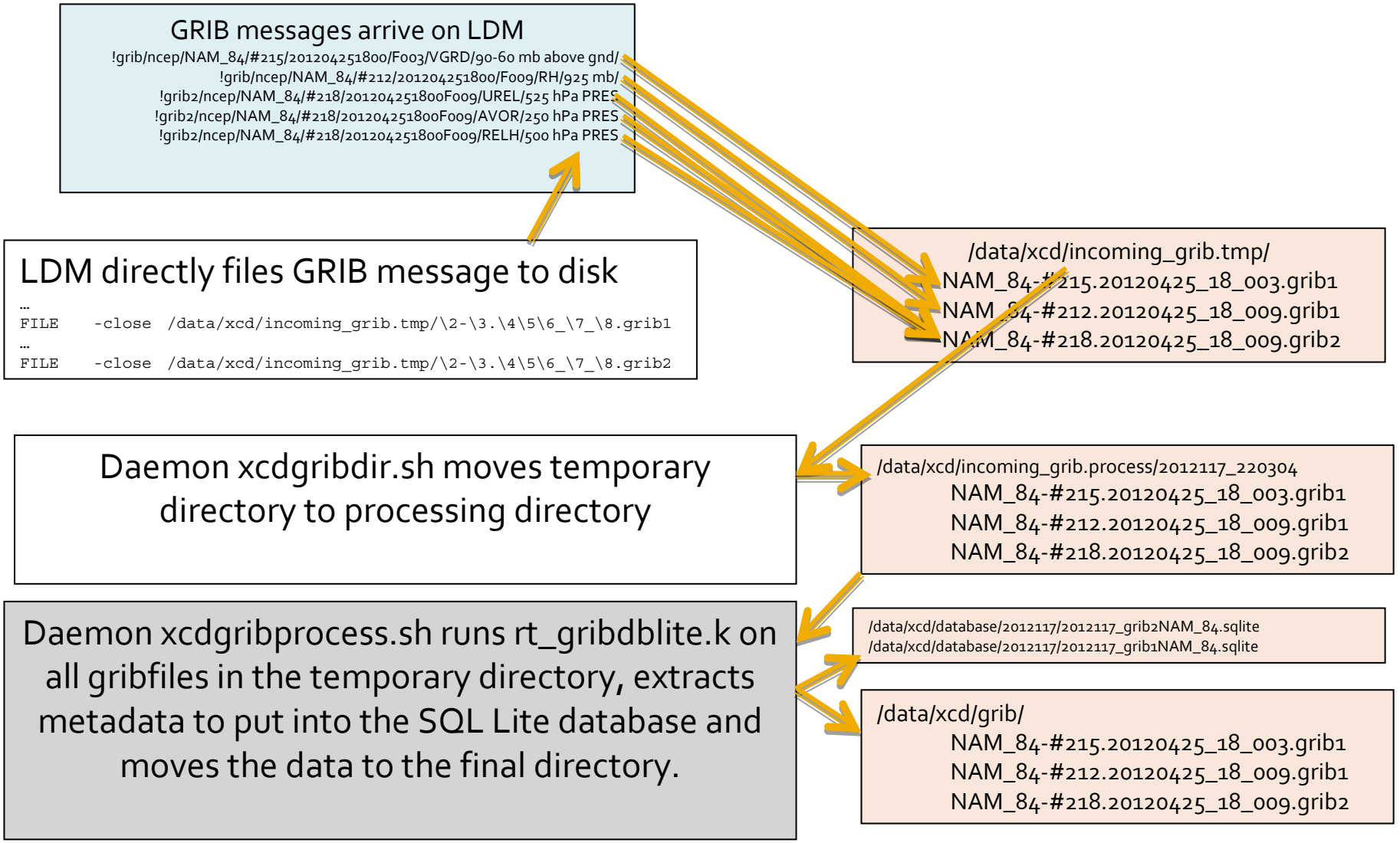
/data/xcd/incoming_grib.process/2012117_220304
NAM_84-#215.20120425_18_003.grib1
NAM_84-#212.20120425_18_009.grib1
NAM_84-#218.20120425_18_009.grib2

Daemon xcdgribprocess.sh runs rt_gribdblite.k on all gribfiles in the temporary directory, extracts metadata to put into the SQL Lite database and moves the data to the final directory.

/data/xcd/database/2012117/2012117_grib2NAM_84.sqlite
/data/xcd/database/2012117/2012117_grib1NAM_84.sqlite

/data/xcd/grib/
NAM_84-#215.20120425_18_003.grib1
NAM_84-#212.20120425_18_009.grib1
NAM_84-#218.20120425_18_009.grib2

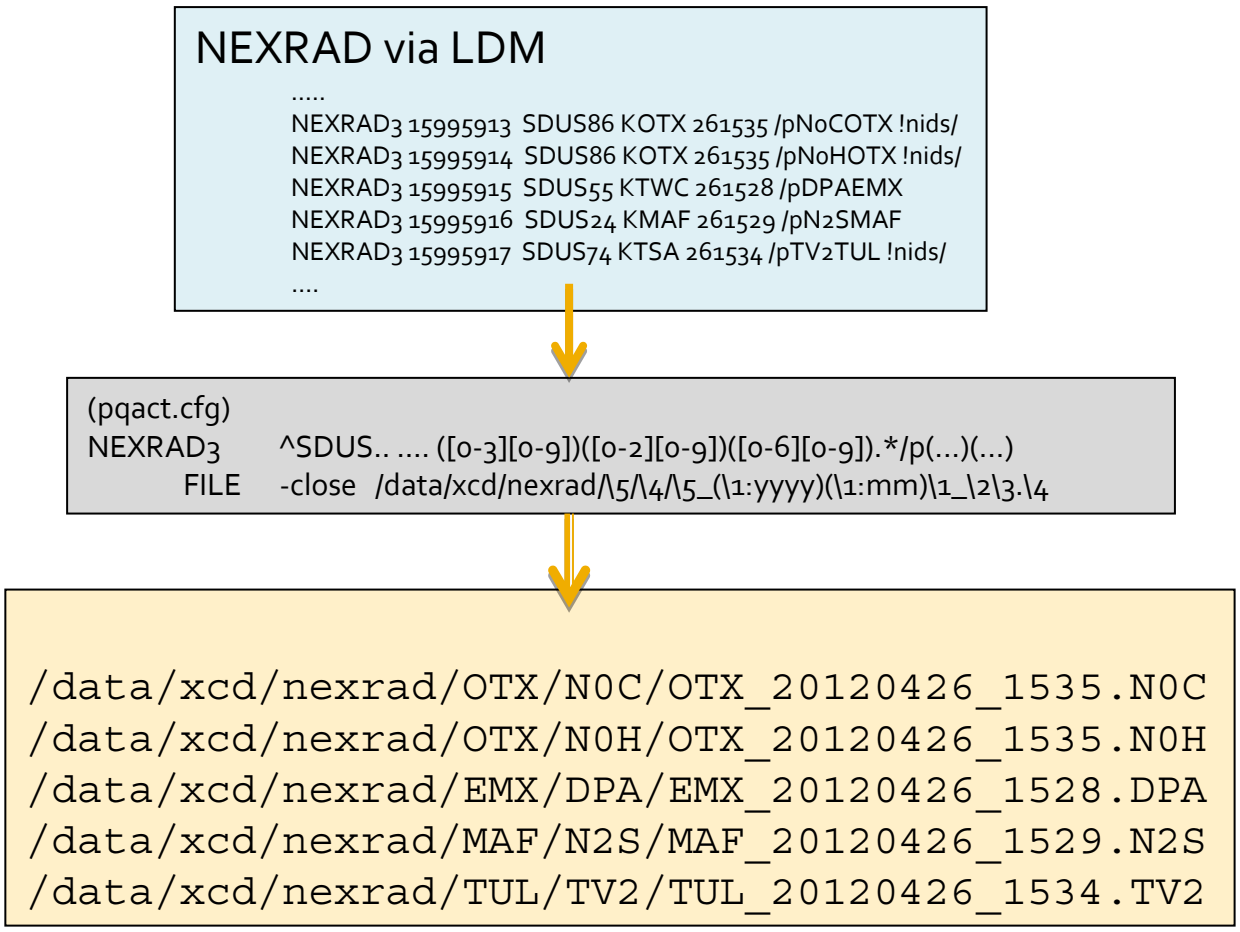
GRIB processing



NEXRAD Details

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

NEXRAD to Disk



Text

- LDM files data directly to disk
- A 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
    - No stripping out of start of text, carriage returns, line feeds, end of text
  - 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 - carriage returns and line feeds have been stripped out
    - Start of text character 0x01 and end of text character 0x03 are included, and also are 80-character padded
- Script extracts metadata to put into SQLite DB
- Text server accesses SQLite DB to find data and return information to server

Text processing

text messages

IDS|DDPLUS 16144267 FLUS42 KFFC 261659 /pHWOFFC
IDS|DDPLUS 16144301 SIAA01 KARS 261600 RRB
IDS|DDPLUS 16144298 SRBZ40 KWAL 261659
IDS|DDPLUS 16144426 SRUS55 KTWC 261659 /pRR2TWC

LDM directly files text message to disk

```
…
PPS|DDS|IDS     (^......) ([A-Z][A-Z][A-Z][A-Z]) (......)( |)(...|)(
/|)(p......|)
        FILE    -close  /data/xcd/incoming_text/\1-\2.\3\7.txt
```

/data/xcd/incoming_text/
FLUS42-KFFC.261659pHWOFFC.txt
SIAA01-KARS.261600.txt
SRBZ40-KWAL.261659.txt
SRUS55-KTWC.261659pRR2TWC.txt

Daemon xcdtextdir.sh moves temporary directory to processing directory

/data/xcd/incoming_text.process/2012117_180304
FLUS42-KFFC.261659pHWOFFC.txt
SIAA01-KARS.261600.txt
SRBZ40-KWAL.261659.txt
SRUS55-KTWC.261659pRR2TWC.txt

Daemon xcdtextprocess.sh runs on all files in the temporary directory, extracts meta data to put in the SQL Lite database and moves the data to the final directory.

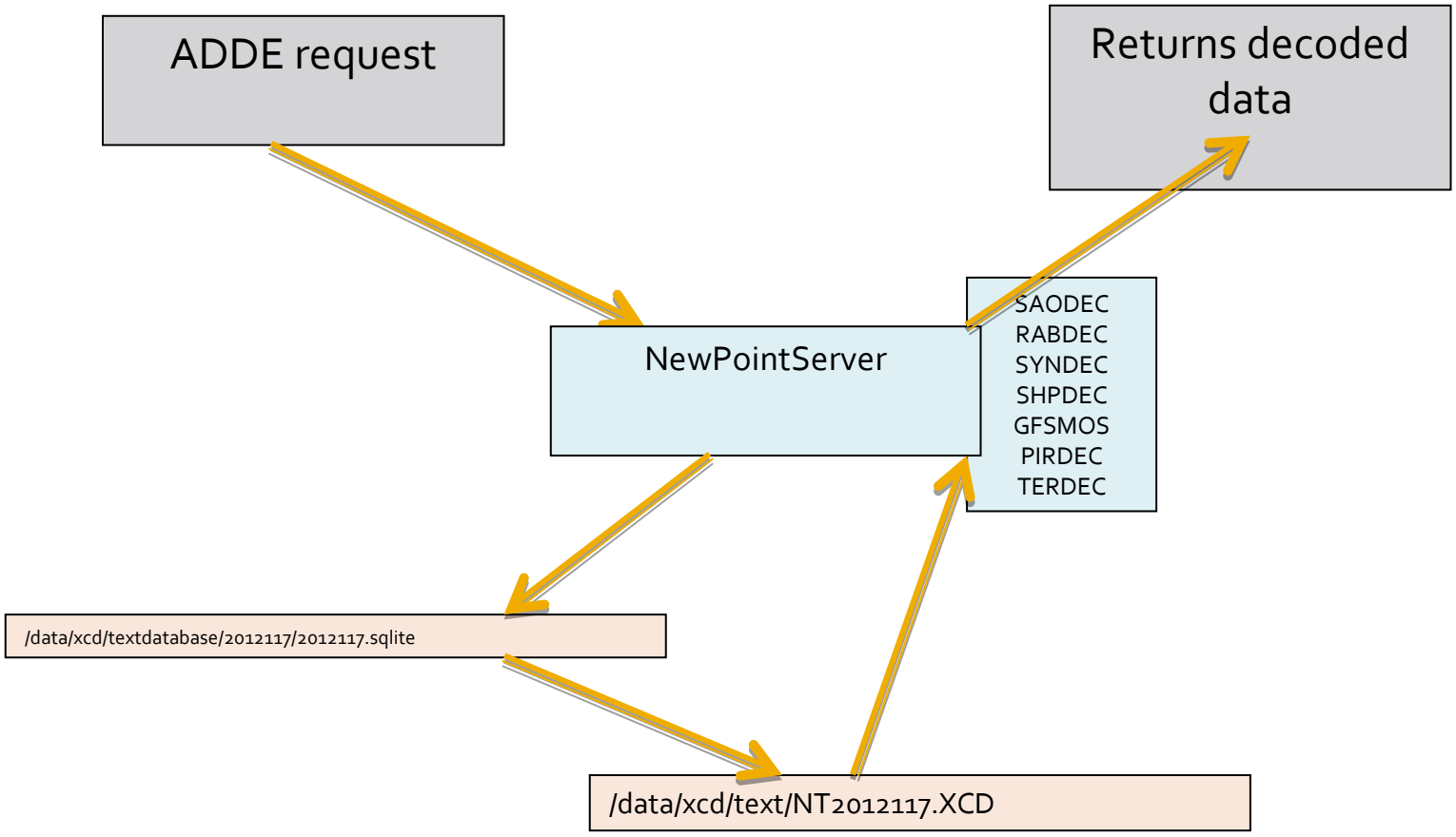
/data/xcd/textdatabase/2012117/2012117.sqlite

/data/xcd/text/NT2012117.XCD

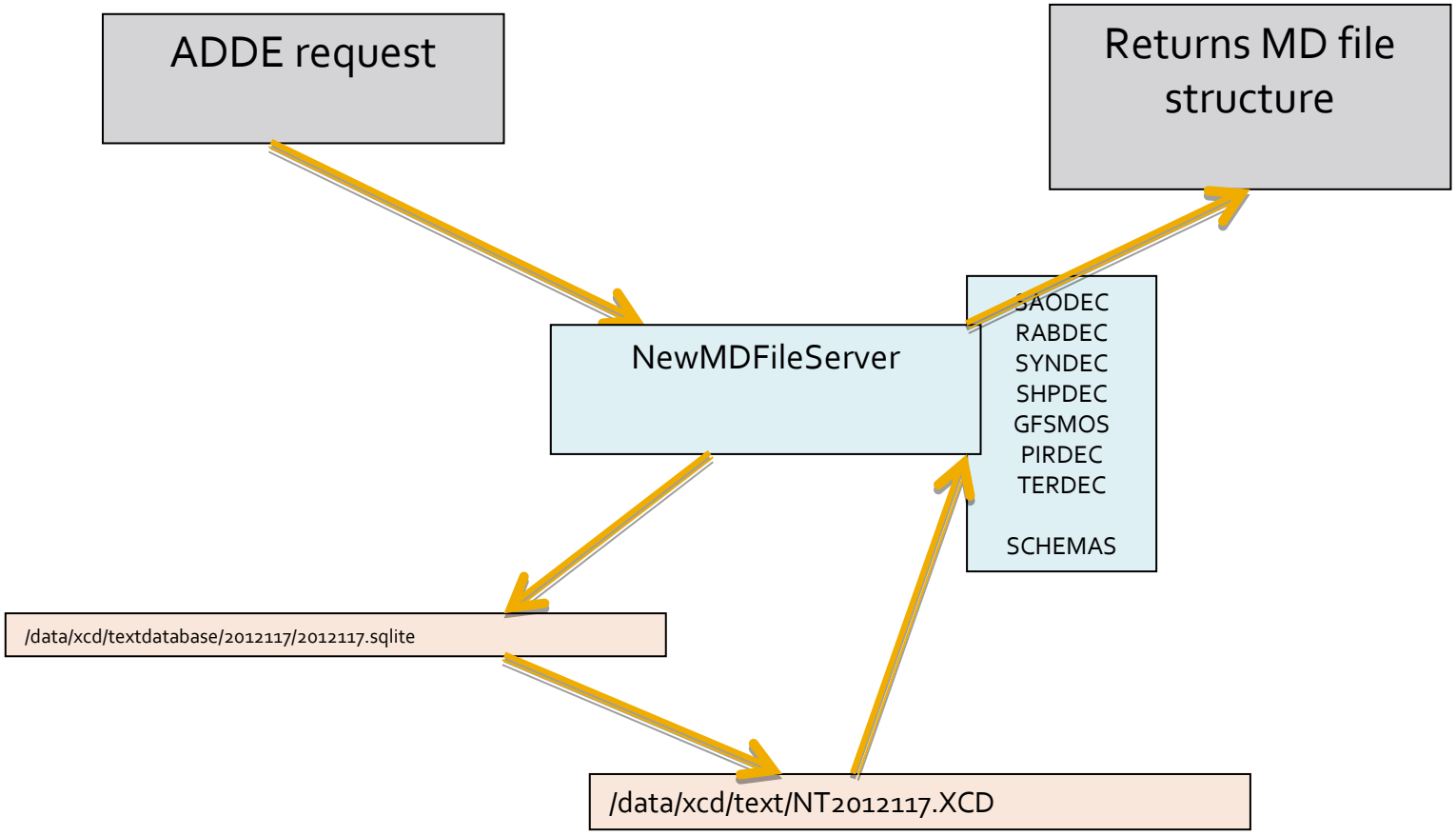
MD

- Uses the *.XCD file created by the text filer
- No MD files created (current plan)
- PTLIST and PTDISP serves from *.XCD file
- PTCOPY serves from *.XCD file
- Daily Station Database
- Station Database is retained for archived data

MD data
ADDE serving (PTLIST & PTDISP)



MD data
ADDE serving (PTCOPY)



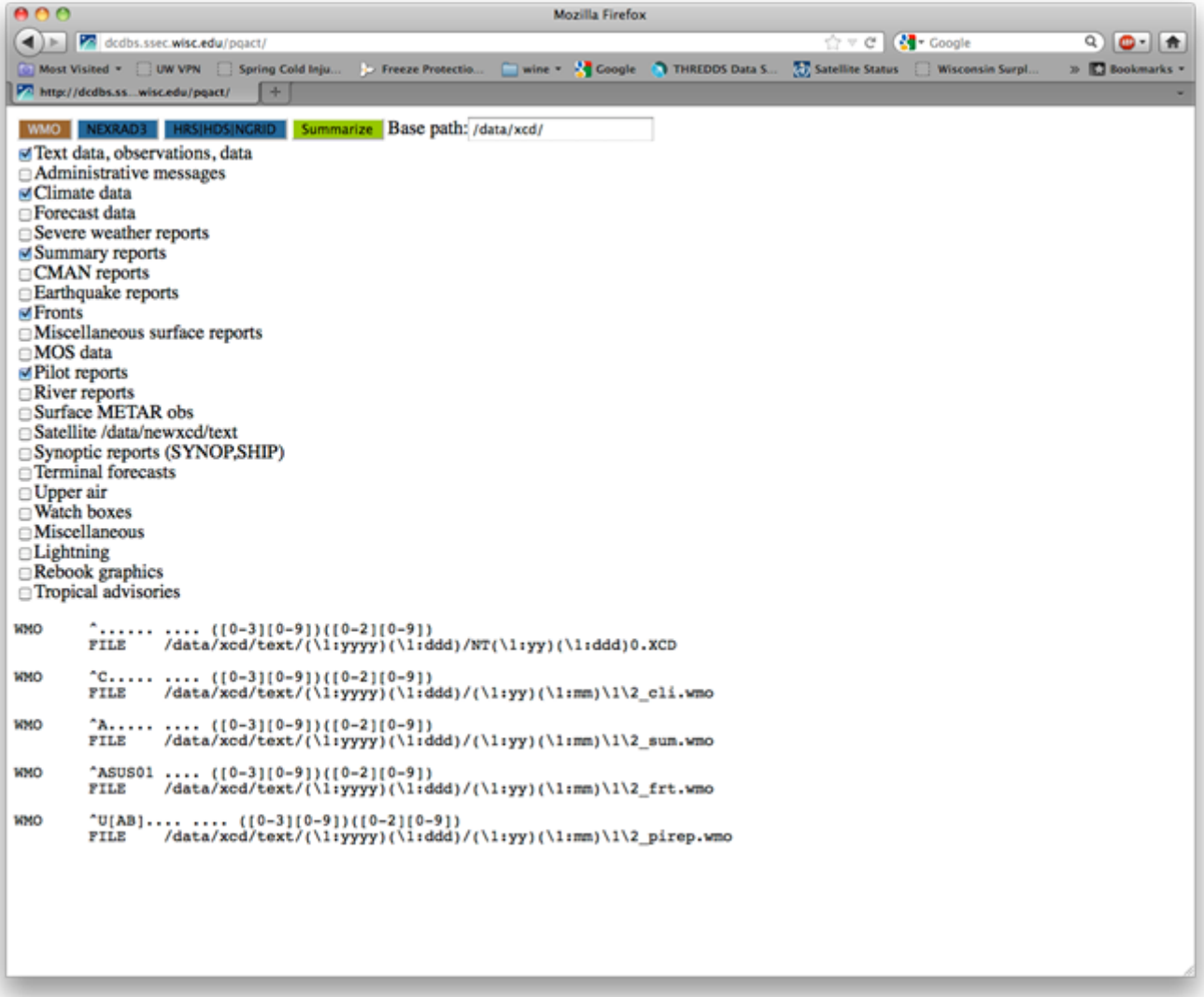
BUFR
(Binary Universal FoRmat)

- Filed directly using LDM
- No operational server exists, only a prototype server

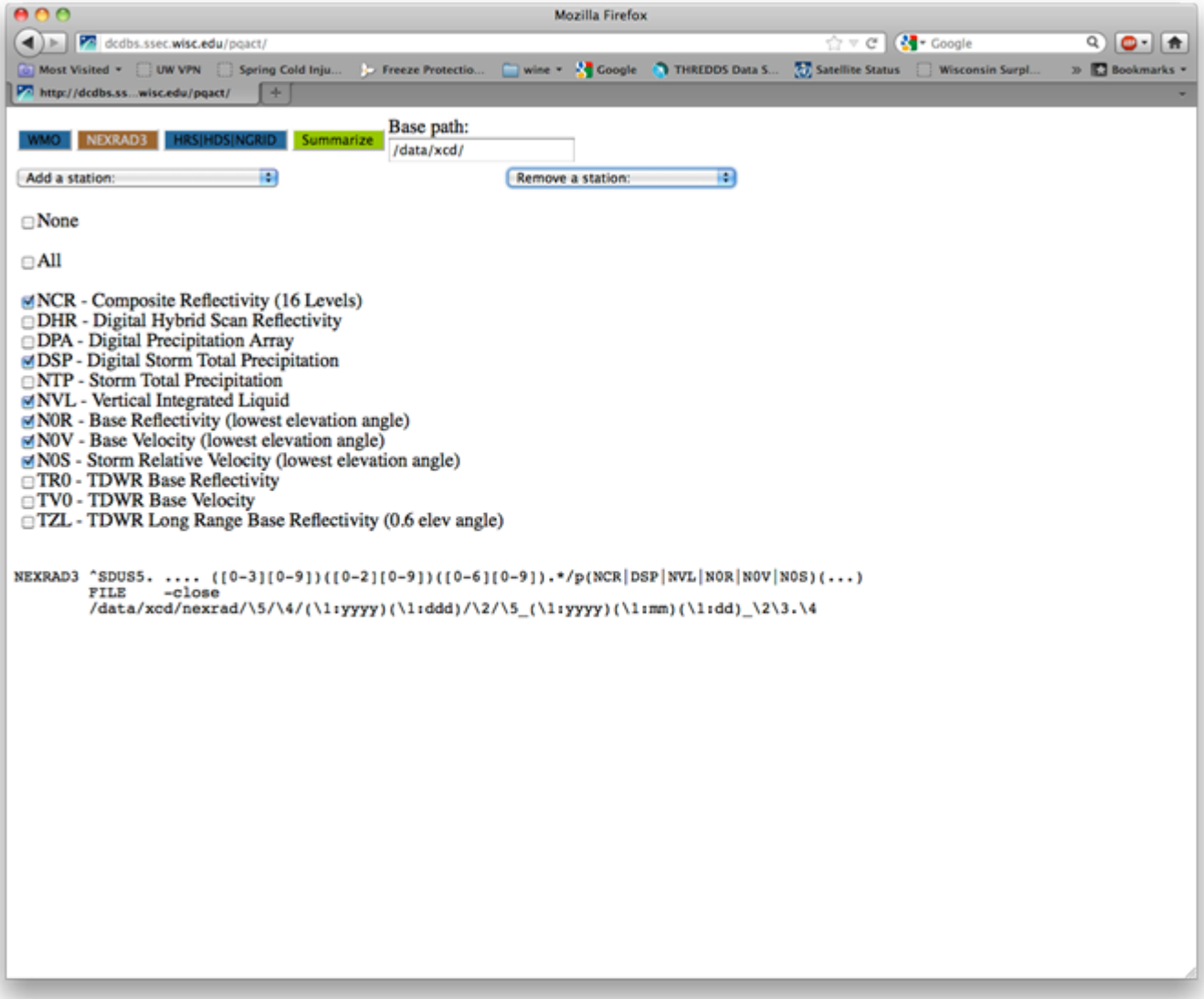
LDM pqact.cfg configuration assistant

- Allows user to select Models, stations, parameters, etc
- Web interface
- Cut and paste to pqact.cfg

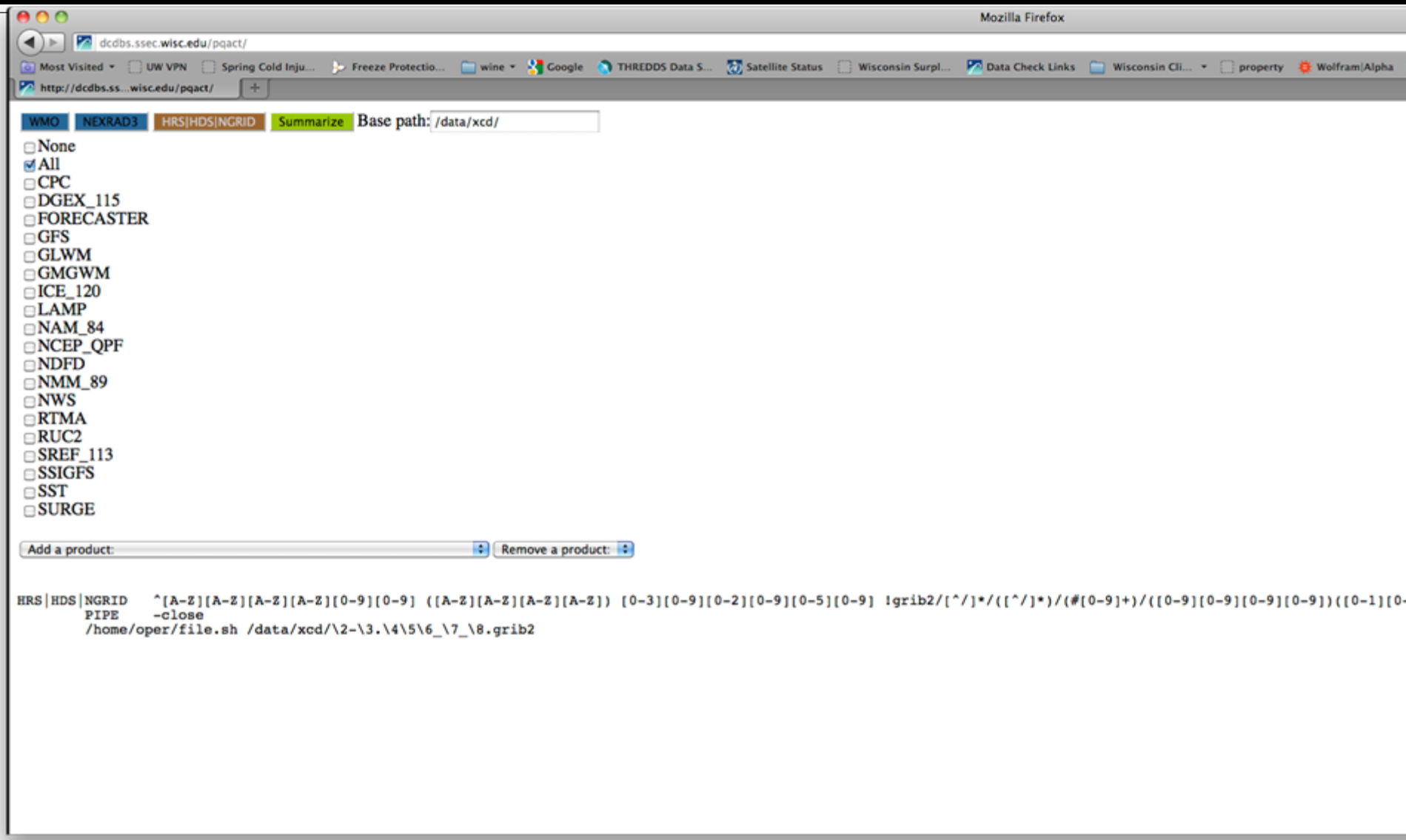
pqact assistant



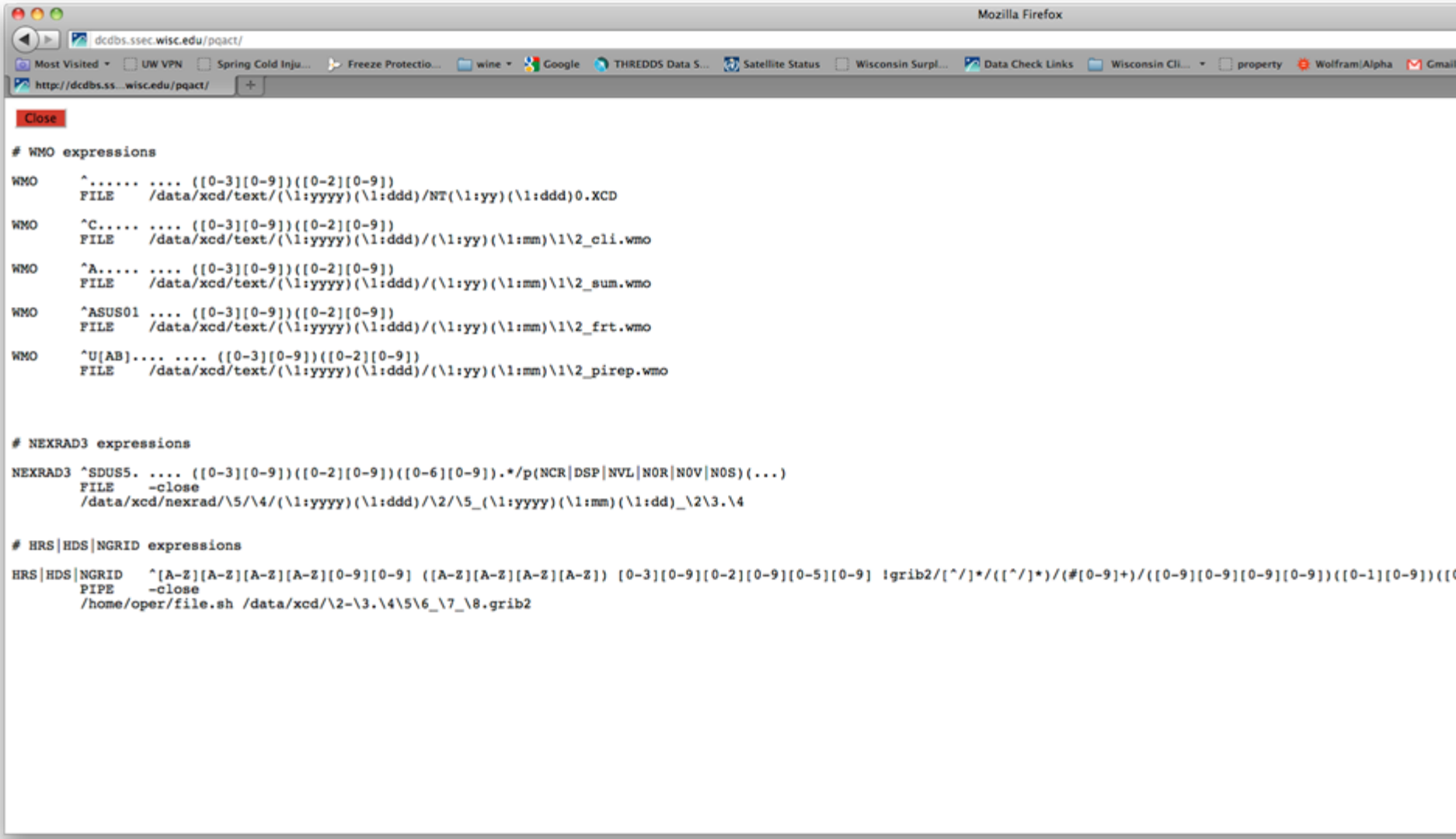
pqact assistant



pqact assistant



pqact assistant



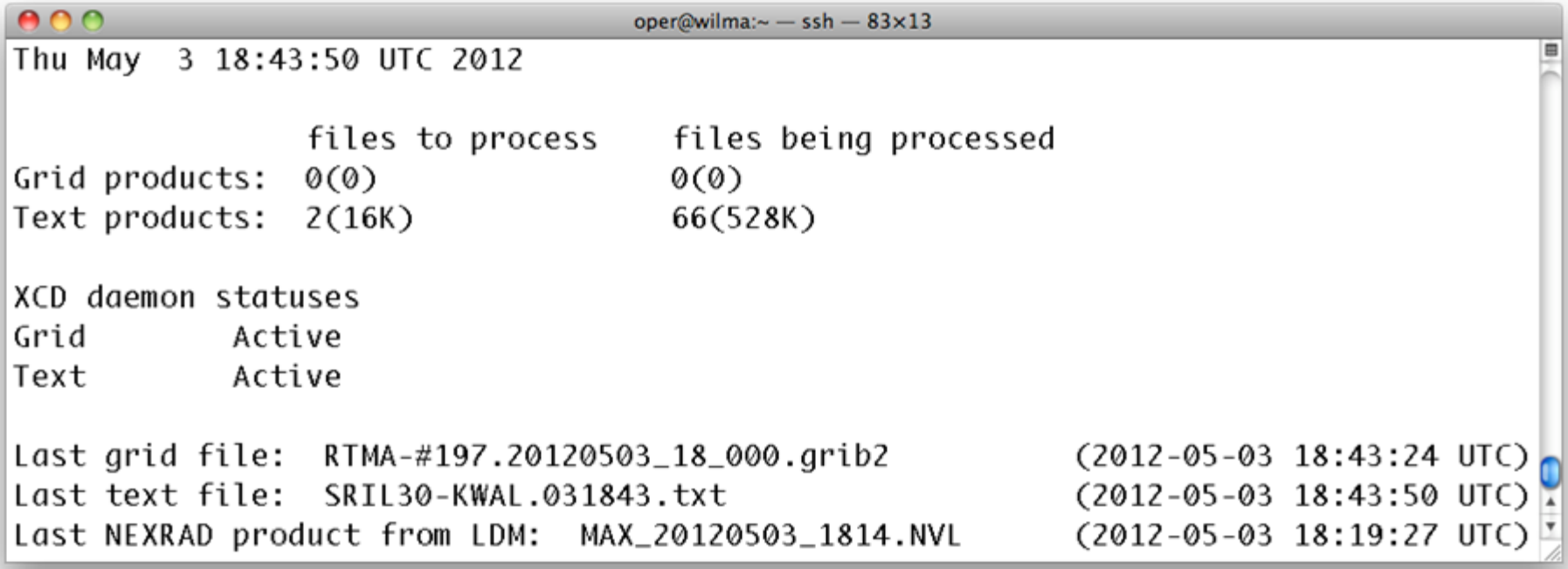
Local feeds

- Several sites have local feeds
- We will be contacting those sites in the future for test data

Reprocessing Data

- Script with a filename argument
- Script automatically determines data type (e.g. text, GRIB)
- Files data appropriately and updates SQLite DB

Monitoring


oper@wilma:~ — ssh — 83×13
Thu May 3 18:43:50 UTC 2012
files to process files being processed
Grid products: 0(0) 0(0)
Text products: 2(16K) 66(528K)
XCD daemon statuses
Grid Active
Text Active
Last grid file: RTMA-#197.20120503_18_000.grib2 (2012-05-03 18:43:24 UTC)
Last text file: SRIL30-KWAL.031843.txt (2012-05-03 18:43:50 UTC)
Last NEXRAD product from LDM: MAX_20120503_1814.NVL (2012-05-03 18:19:27 UTC)

Performance (TEXT)

- TEXT lists (no parameters)
  - WXTLIST
    - Current XCD: fastest=.158 s slowest=1.584 s
    - New XCD : fastest=1.544 s slowest=2.453 s
- TEXT lists
  - WXTLIST WMO=SA
    - Current XCD : fastest=.024 s slowest=.556 s
    - New XCD : fastest=.026 s slowest=.612 s

Performance (SFCRPT)

- SFCRPT
  - `SFCRPT  KGRB 9`
    - Current XCD : ~.040s
    - New XCD : ~.640 s

Performance (GRID)

- GRID lists
  - RTGRIB2/GFS-USLC2 DAY=2012124 TIME=6:00 PAR=U NUM=10
    - Current XCD : .064 s
    - New XCD : .052 s
- GRID display
  - RTGRIB2/GFS-USLC2 DAY=2012124 TIME=6:00 PAR=U FHOUR=12 LEV=500
    - Current XCD: .868 s
    - New XCD : .414 s
- GRID copy
  - RTGRIDS/NAM-USLC2 G/G.5700 DAY=2012124 TIME=0:00 PAR=T FHOUR=9 LEV=500
    - Current XCD: .451 s
    - New XCD: .205 s

Schedule

- Prototype this summer
- Released 2013

End