



# DataSeeker



## A Web Interface to Chandra MTA Data

by

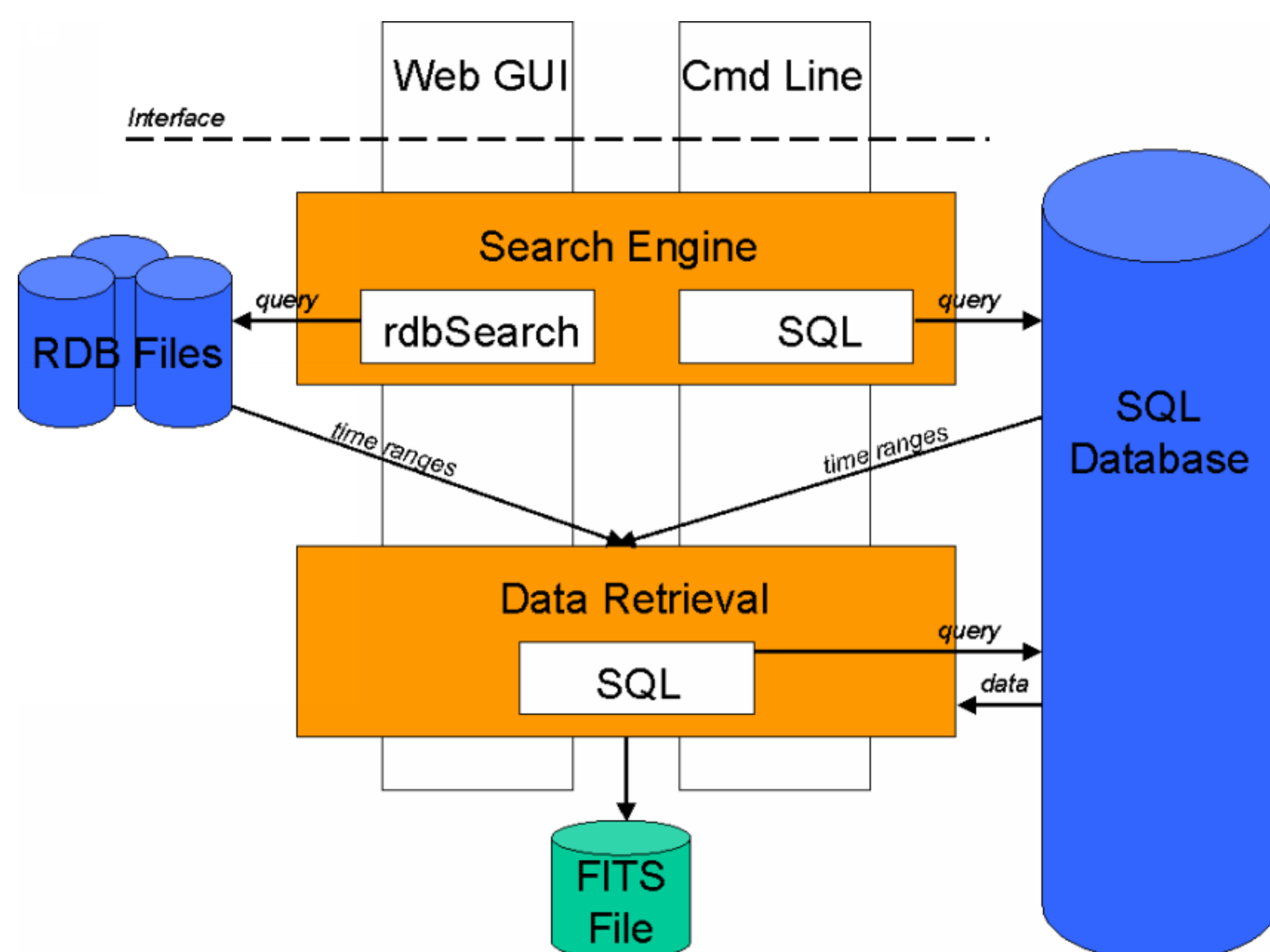
Ryan S. Overbeck, Scott J. Wolk, Mark Cresitello-Dittmar,  
Brad Spitzbart, and James G. Petreshock  
(Harvard-Smithsonian Center for Astrophysics)

Chandra's Monitoring and Trends Analysis (MTA) team utilizes a series of database tables to store binned information about spacecraft configuration and condition over the life of the mission. The Science Operation Team members need to be able to sift through this information and extract data for evaluation. The DataSeeker was developed as an efficient means to specify a particular set of data and have it conveniently downloaded in a usable format.

The DataSeeker has a modular design, each module being written in the language that best optimizes performance for that module. Its web interface provides the user with a 3-tier selection procedure where the user defines which data he/she is interested in. All selections are retained between tiers allowing for progressive refinement of the selection process. Once complete, DataSeeker can search SQL databases and/or Relational DataBase (RDB) files to first restrict the time ranges of interest then retrieve the specified data and provide it as a FITS binary table. A command line tool presents an alternative, one-step DataSeeker, for inclusion in scripts and pipelines.

In Chandra's brief life of a little over two years in orbit, there is already well over 10 GB of data stored in approximately 50 relational database tables for the Science Operation Team to sift through. DataSeeker has made it possible to discriminate pull out small subsets of this data in a matter of minutes.

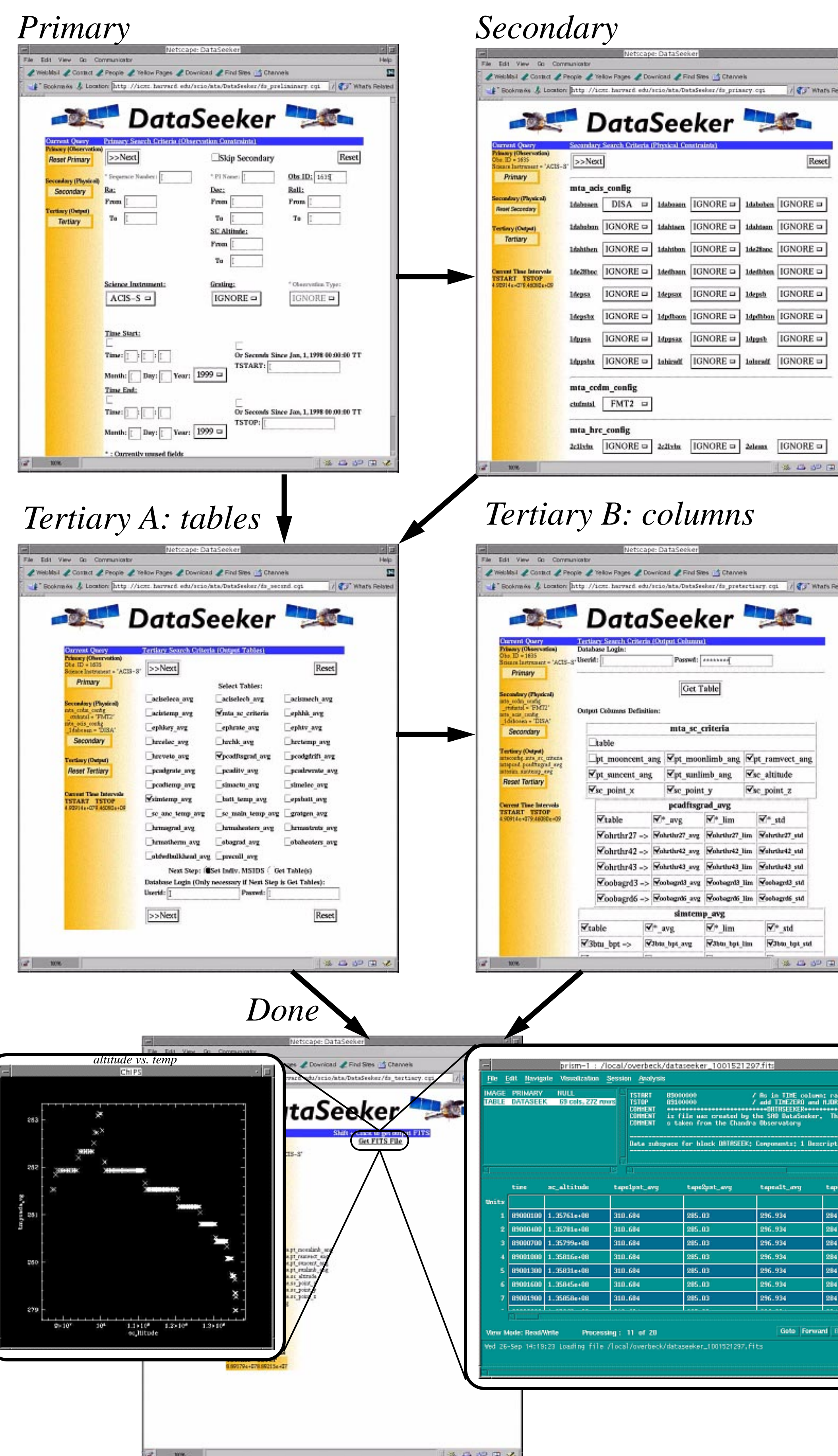
## Architecture



## Interface

### Web Interface

- Build DataSeeker queries progressively using physically meaningful values
- 3-tier query construction: primary->secondary->tertiary
- The interface maintains all criteria between tiers to allow query editing
- Use left-side nav. bar to move back to previous tiers and to keep track of current query



## Procedure

- User supplies search criteria using either Web GUI or CMD Line.
- **Search Engine:** DataSeeker queries databases and files to find matching time ranges.
  - SQL Queries constructed based upon input values and executed.
  - Command line for RDB querying tool (rdbSearch) constructed and executed.
- Matching time ranges retrieved and merged.
- **Data Retrieval:** Data are retrieved from database.
  - SQL queries constructed to retrieve all requested data within the matching time intervals.
  - Final data are merged and placed in a FITS binary table as rows are retrieved.
  - Final table size only limited by disk-space and the user's needs.

## Data Resources

- **SQL Database**
  - The Monitoring and Trends Databases (see Poster P-72) contained in the Chandra Data Archive (Rots 2000).
  - All tables contain sampled or binned data with a record every ~ 300 seconds. However, sampling/binning resolution is allowed to vary.
  - MTA databases contain proprietary data, therefore username and password are needed to log into the database server.
  - Currently: 7 tables used for search and 35 used for retrieval.
  - Planned: 7 tables for search and 49 for retrieval.
- **RDB Files**
  - RDB is an ASCII table file format.  
(<http://hea-www.harvard.edu/MST/simul/software/docs/rdb.html>)
  - Mimick the database tables.
  - Use C tool rdbSearch for fast search times.
  - Useful for rapid implementation and prototyping of new data tables.
  - Only used when mnemonics aren't available in the data archive.
  - Currently: 2 tables used for search.
  - Planned: 0 tables.

### Command Line Interface

- One-step execution.
- Specify criteria via command line argument and/or text file.
- Ideal for longer queries.
- Useful for inclusion into scripts and other tools.
  - one such tool MTA\_DB\_GET:
  - ([http://asc.harvard.edu/mta\\_days/mta\\_db/IDL/](http://asc.harvard.edu/mta_days/mta_db/IDL/))

### Primary Criteria

Criteria dealing with main spacecraft information.

- Spacecraft pointing vector
- Spacecraft altitude
- Science Instrument
- Time Start/Time Stop
- Observation ID
- ...

### Secondary Criteria

Criteria dealing with particular spacecraft hardware.

- Power Supplies ON/OFF
- Radiation Flags
- Calibration modes
- ...

### Tertiary Criteria

Output table definition and username/password database login. Select full tables and/or individual columns from any of the MTA Databases.

- Electronics Statistics
- Thermal Statistics
- Spacecraft position
- Pointing vector
- ...

A FITS Binary Table is returned, readily manipulable by other CXC tools.

### Related CXC Presentations

Name	Title	Year
Wolk	The Monitoring and Trends Data-bases for the Chandra X-Ray Observatory	2001
Rots	The Chandra X-Ray Data Archive	2000
Petreshock	Data Inspector: Data Visualization for Chandra Monitoring System	2000
Wolk	The Chandra Monitoring System	2000