Spitzer Heritage Archive

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One of the NASA’s four great observatories
  - *Hubble, Compton, Chandra, Spitzer*

Launched August 25, 2003
  - *Three instruments: IRAC, IRS, MIPS*
  - *Wavelength range from 3.6um and 160um*

Cryogen depleted on May 15, 2009

Warm mission started September 2009
◆ IRSA
  – IRSA: InfraRed Science Archive
    ◆ IRAS, 2MASS, …
  – Final home for Spitzer Heritage Archive

◆ This talk
  – Spitzer Data Products
  – Design principles
  – Major features
  – System architecture and reusability
Spitzer Data Products

- Pipeline data
- Enhanced data
- Legacy data
- Warm mission data
- ~25 TB data products
Design Principles

- Easy to learn and use
- Feel fast
- Well integrated
- Consistent look
- Strong OO design
- Easy to maintain
- Extensibility and Reusability
- Reuse existing software
Major Features of
Spitzer Heritage Archive
Search Capabilities

- Radius search with instrument and wavelength constraints
  - one position or a list of positions
- Observer (PI)
- Program ID
- Observation Request (AOR) ID
- NAIF ID (for moving target)
- Campaign ID
- Observation date
- Free form text search (Google like)
  - Any text in proposal abstract, proposal title, and category
Data Presentation (1)

- **Different levels of data**
  - Observation Request
  - Level1(BCD)
  - Level2(PBCD)
  - Level3(Enhanced products or source list)
Data Presentation (2)

- Dual panels display
  - Meta data table panel
  - More information panel
  - Interaction between the two panels
Data Exploration - table manipulation

- Paging
- Sorting on columns
- Filtering on columns
- Customizing displayed columns
- Saving meta data
Data Exploration - image

- Position and flux value read-out
- Pre-defined color table and stretch
- Grid overlay
- Zoom in/out
- Image cut-out
- North up arrow
- Image rotation
- Magnifier and thumb-nail
Data Exploration - spectrum

- Flux and wavelength value read-out
- Zoom in
Data Download

- Download anytime
- Select individual or all the data to download
- Package in background
- Monitor packaging status
User Registration

◆ Optional
◆ Benefits
  – Remember email for download notification
  – Remember the search history
  – Remember user preference
Two Ways to Access

- **Web interface**
  - *Search*
  - *Explore interactively*
  - *Download*

- **Program interface**
  - *Search*
  - *Download*
System Architecture and Reusability
Major Technologies

- Multi-tiered architecture
- AJAX
  - GWT - Google Web Toolkit
- Java application server
  - Tomcat
  - Three layered design
    - Uniform access to external data in files, DBMS, etc. (Persistence)
    - Generic data manipulation (Logic)
    - Receive user requests and generate results (Presentation)
Server Design Diagram

DAO: Data Access Object

Spitzer Heritage Archive

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Performance Enhancements

- Maximum use of client computation power
  - Input validation
  - Name resolution through NED or Simbad
  - Coordinate conversion
  - FITS image position read-out
- Image search using R-tree index
- Cache
- Partial return of large data result
Existing Software Reuse

- Catalog search using spatial index
- Image search using R-tree index
- Name resolution through NED or Simbad
- Coordinate conversion
- FITS image display
- Getting images and catalogs from other archive
Future Software Reuse

- **Firefly - common web frame work**
  - **Infrastructure**
  - **Data display and table manipulation**
  - **FITS image display**
  - **Spectrum plot**
  - **Data download management**
  - **Input fields**
  - **Data validation**
  - **Coordinate conversion**
Schedule

- Beta public release, February 2010
  - As much data as possible
- First Public release, July 2010
  - All final reprocessed cryogen data
- Second public release, January 2011