WISE Science Archive System

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Overview

- Long term archiving of WISE science data products, and serves as distribution portal to WISE science team and astronomical community
- Built in collaboration with Infrared Science Archive (IRSA) at IPAC
- Holdings:
  - Internal science working database
  - Public Products: Source Catalogs and Atlas images
  - Database content:
    - (Level 1b) processed single frame images and source lists
    - (Level 3) coadded images and source lists
    - Associated metadata tables
WISE Archive Implementation

- Leverage the existing IRSA infrastructure
  - Inter-operability
  - Extensibility
  - Long term stability
- WISE source catalog archive uses the IRSA existing GATOR, which serves catalogs from 2MASS and Spitzer
- Data will be prepared by WISE team, load and service will be developed by IRSA, WISE QA will validate.
- Develop the WISE archive together with IRSA

Operational Readiness Review – October 7-8, 2009
Operational Loading

Database load timing tests: Currently, it takes about 3 hours to load & index 60 millions rows of data (equivalent to 2 days data)
Newly loaded data will be released to both WSDC members and the WISE science team at the same time, unless problems are identified.
Archive Load Frequency

During Survey Operation:

• We will load new processed data into the WISE archive twice a week.

• Each load will have about 100 million rows of source tables (~ 1KB per row), and 90,000 Images (300GB).
Archive Volume

- Source tables (L1b & L3): 10 billion rows (9 months)
- Images: 20 million images (L1b + L3)
- Level 1b: 80 TB
- Level 3: 14TB
Source Catalog Archive:

CONTENT:

• Sources extracted from all single frames (L1b)
• Sources extracted from daily ops coadded images (L3o)
• Sources extracted from final Atlas images (L3)
Query Capabilities: Search on any database (DB) column or combined columns. Specifically:

- Positional and regional search
- Flux or Color search
- Observational date search
- Search with 2MASS morph. flag, flux or color
- Unique ID search
- As a part of NEOWISE implementation, the archive will also have solar object search by name/ID and orbits.
IRSA/WISE DB Table Query Example

Plot Page

Data Tag for 1

SINGLE OBJECT SEARCH

Object Coordinate

Object Name: 347.371

Examples

Search Method (choose one):

Cone

Radius: 50

Box:

Size: 0:1:0:1

Polygon:

Vertices:

MULTI-OBJECT SEARCH

Upload Table:

Table Output

Selected Objects:

Table Selection

Table Name:

src

src_id

frame_id

scan_id

ra

dec

sigma

Row 1:

Rid src ra dec

1 269 40655.08

2 485 40655.08

3 2945 40655.08

4 4518 40655.08

DataSet Selection

Table

wise_test2_src_data_1b5324181

X Axis: w1mag

Y Axis: w2mag

Symbol Type: BOX

Symbol Color: red

Symbol Size: 1
Content:

- Single exposure images (Level 1b, +noise images)
- Daily ops coadded images (+noise and coverage images)
- Atlas images (+noise+coverage)

Query capabilities:

- Positional & regional search
- Object name search
- Time range search
- Unique ID search
- Rapid and easy visualization
- Inventory search
### WISE Image Search Results


#### WISE Band 1: Image mask variance

<table>
<thead>
<tr>
<th>Metadata</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation date (UTC)</td>
</tr>
<tr>
<td>Band</td>
</tr>
<tr>
<td>Scan Group</td>
</tr>
<tr>
<td>Scan ID</td>
</tr>
<tr>
<td>Frame number (in scan)</td>
</tr>
<tr>
<td>Reference RA (deg)</td>
</tr>
<tr>
<td>Reference Dec (deg)</td>
</tr>
<tr>
<td>Photometric zero point (mag)</td>
</tr>
<tr>
<td>Photometric zero point uncertainty (mag)</td>
</tr>
</tbody>
</table>

#### Visualization Options

- **Stretch mode**: logarithmic
- **Color table**: reverse greyscale
- **Coordinate grid**: ecliptic J2000.0
- **Location marker**: ✔

#### Table

<table>
<thead>
<tr>
<th>Coadd ID</th>
<th>Band</th>
<th>Reference RA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1728m239_z_d180</td>
<td>1</td>
<td>172.860846</td>
</tr>
<tr>
<td>1728m239_z_d180</td>
<td>2</td>
<td>172.860846</td>
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<td>172.860846</td>
</tr>
</tbody>
</table>

Showing 1 to 10 of 14 entries

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Image Archive interface
## Archive development timeline

**Source Catalog Service:**

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct 6, 2009</td>
<td>Archive Content Update</td>
</tr>
<tr>
<td>Feb 10, 2010</td>
<td>Archive v2 delivery (post-IOC updates &amp; revision)</td>
</tr>
<tr>
<td>Sept 10, 2010</td>
<td>Archive v3: solar system interface (NEOWISE)</td>
</tr>
</tbody>
</table>

The source catalog archive is ready for the launch.
## Image Archive Service:

<table>
<thead>
<tr>
<th>Date</th>
<th>Archive v2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov 18, 2009</td>
<td><strong>Archive v2</strong></td>
</tr>
<tr>
<td>July 15, 2010</td>
<td>Archive v3: (1) make mosaic on-fly, (2) DSS &amp; 2mass &amp; WISE image display</td>
</tr>
<tr>
<td>Sept. 10, 2010</td>
<td>Archive v4: solar systems (position &amp; orbit)</td>
</tr>
</tbody>
</table>