



CASDA's Implementation of SODA for Multi-Dimensional Data

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Outline

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2. Current SODA Implementation
3. Future Plans
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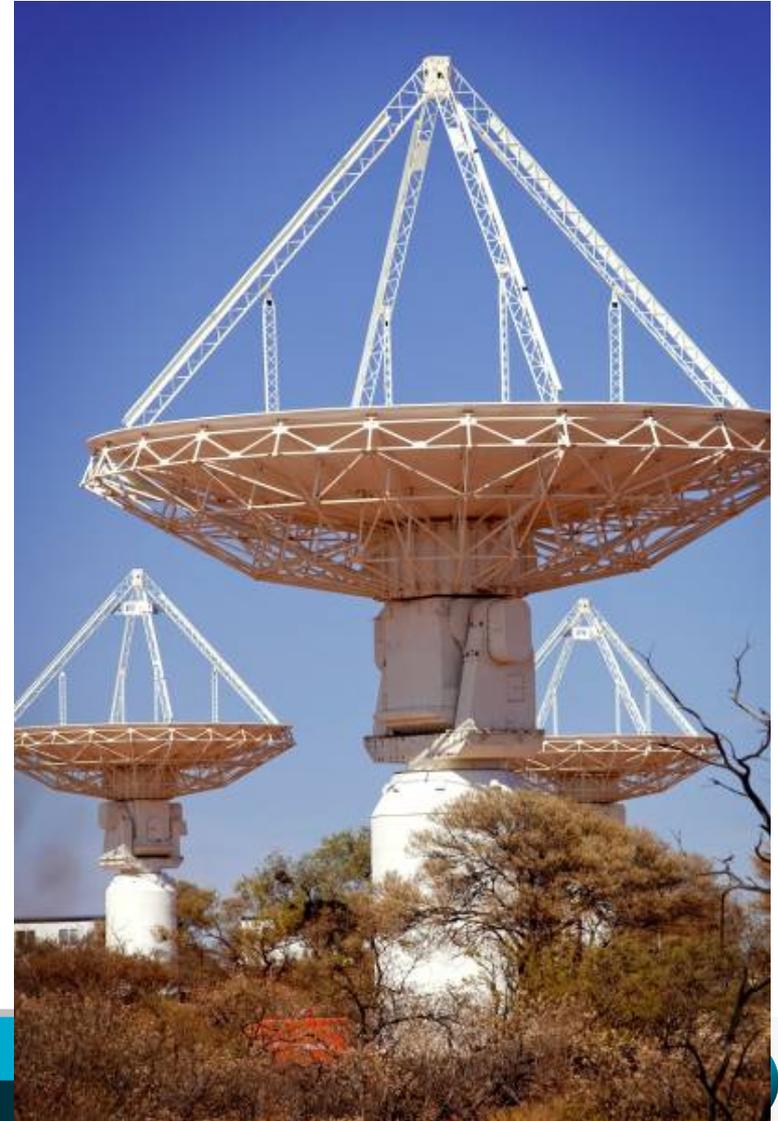
1/4 CASDA Background

Australian SKA Pathfinder (ASKAP)



- 36 x 12 m dishes
- Max baseline = 6 km
- Phased array feeds – 188 elements
- 30 deg² FOV

- 700 – 1800 MHz
- 300 MHz Bandwidth
- 16,384 channels



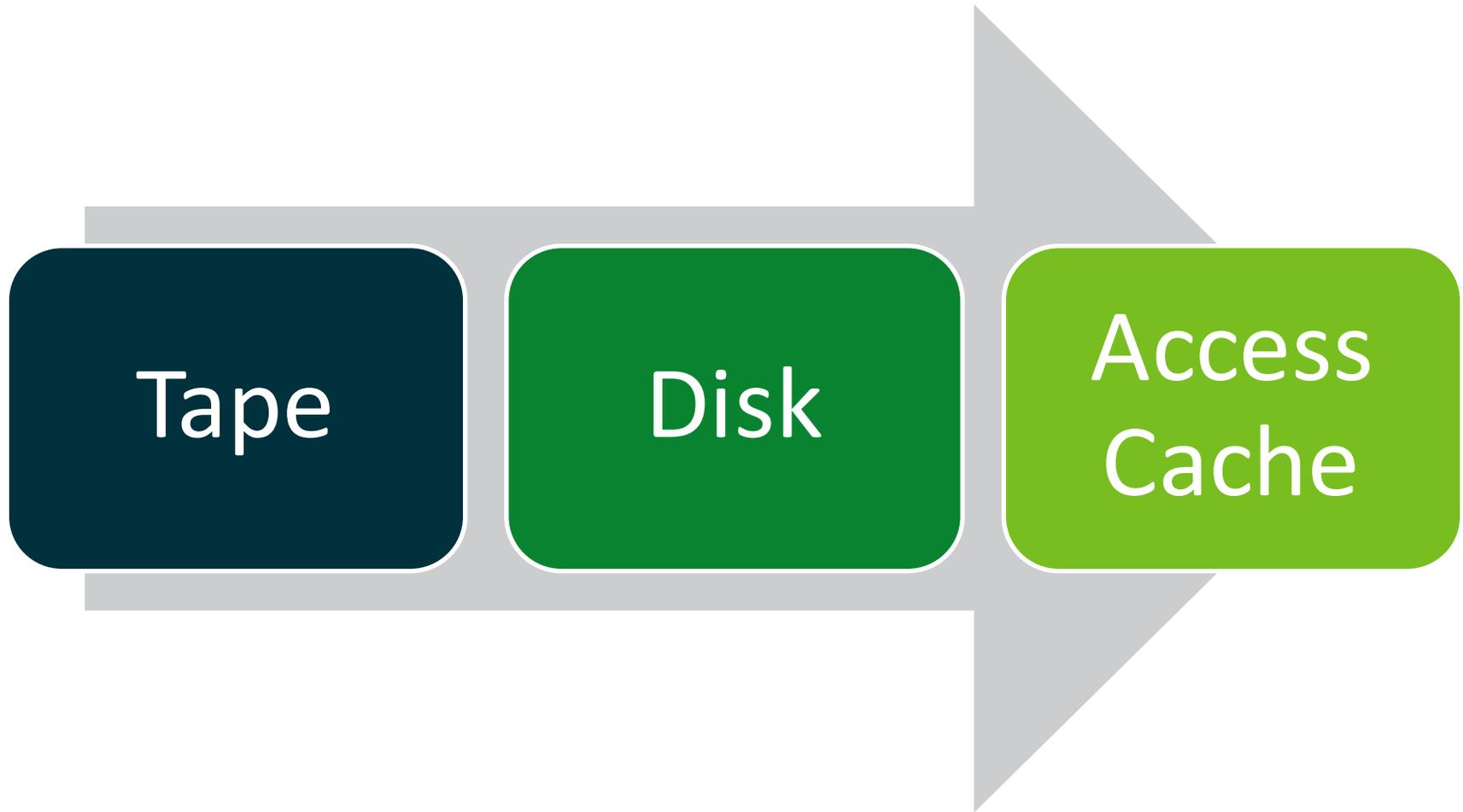
ASKAP Data Products

- Calibrated visibility data files (CASA)
- Image cubes (FITS)
- Single plane images (FITS)
- Catalogues

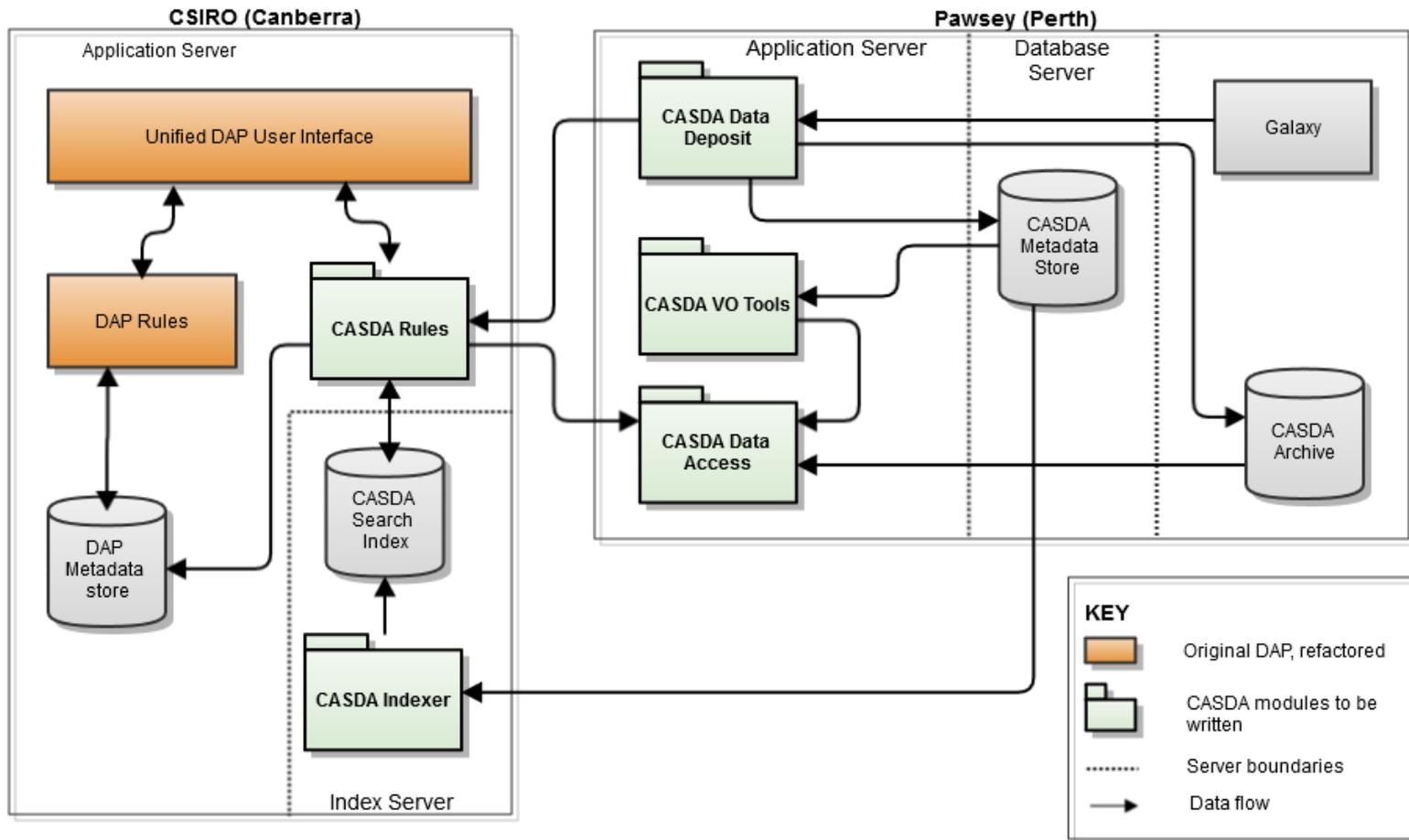
ASKAP Data Products – Images/Cubes

- 2D images
 - Continuum
 - Moment maps
- 3D image cubes
 - Continuum – polarisation, broad frequency bands
 - Spectral line – high resolution frequency or velocity
 - Transients – time series
- 4D image cubes
 - Combinations of above e.g. polarisation plus frequency

Data Storage



Application Architecture



2/4 Current SODA Implementation

SODA – Server Operations for Data Access

- Full file downloads (no filter params)
- Spatial and plane cut-outs
- Only implemented async currently
 - Data on tape
 - Large data files

SODA Async Pattern

1. Create job
2. Add parameters
 - Validate isolated params
3. Phase – Run
 - Validate params as a whole
 - Calculate cut-outs (spatial and plane overlaps of images/cubes)
 - Retrieve data
 - Create cut-outs (Montage)

Supported Parameters

- ID – Allow multiple

Filters

- POS
- BAND
- POL
- COORD (which is no longer in the standard)

Future Parameters

- Time
- Velocity – galactic, extragalactic
- Rotation measure

Challenges

- Data access is different to data discovery
- Removal of COORD
 - Need to consider new axis types
- Multiple axis calculations
- Naming (multiple) cut-outs

Current Status

Capability	Status
SIA2 Queries: POS and BAND	Ready
SIA2 Queries: Other	Ready
DataLink: Web access and direct download	Ready
DataLink: Services	Ready
SODA: Sync - Online FITS data by ID	Retired
SODA: Async - Offline and online FITS data by ID	Ready
SODA: Filtering (i.e. cutouts)	Ready

3/4 Future Plans

Upcoming Web UI

CASDA Cutout Service

INSTRUCTIONS

CASDA provides two methods to generate a spatial cutout from the image cube selected.

1. by providing the J2000 range of values in the RA or Dec fields, and the Frequency values for Spectral Line images, to define the spatial cutout, or

2. By providing the centre point of the cutout by entering a single value in J2000 format into each of the RA and Dec fields, and providing the radius in decimal degrees. You can only provide a centre point which is within the boundary of the selected image cube.

Selected Image Details

Project ID: AS007	Right Ascension Range: 343.67961730343 - 350.76860269657 decimal degrees
Project Name: POSSUM: Polarization Sky Survey of the Universe's Magnetism	Declination Range: -61.163164198599 - -57.750086939332 decimal degrees
Scheduling Block IDs: 3333305	Wavelength Range: 787.0 - 939.0 MHz
Image Type: Unknown	Polarisation Range: // IQUV
File Size: 8.233 Mb	

Enter Cutout Parameters

J2000 22 43 10.505 -57 00 51.61



FoV: 7.08°

	Ra	Dec	
Right Top Corner	<input type="text"/>	<input type="text"/>	decimal degrees ?
Bottom left Corner	<input type="text"/>	<input type="text"/>	decimal degrees ?
Wavelength	<input type="text"/>	Megahertz (MHz) ▼	?
Polarisation	<input type="text"/>	IQUV	?

SUBMIT

Parameter Ranges

- Informing the client what the valid ranges are for each parameter
- Metadata not easily available in data link (our TAP module)
- Would be straight forward in SODA (our Data Access module)

Future Work

- Immediate access via sync
- Other image/cube types
- Cache cut-outs, or access pregenerated cut-outs
- Parameter ranges
- Future services e.g. image stacking

Needs for the future

- New 'SODA triples'
- Parameter range endpoints
- Stability

4/4 Summary

Summary

- Open Source
 - https://github.com/csiro-rds/casda_data_access
- Operational and being expanded

Thank you

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