INTERNATIONAL VIRTUAL OBSERVATORY ALLIANCE
US National Virtual Observatory

IVOA Data Access Layer
SIAP V2.0 Concepts and Interface

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Simple Image Access V2.0

- Context
  - Motivations and use-case have been covered
  - Now we look at the proposed solution as it currently stands
- Scope
  - 2D images remain a primary focus
  - Support is added for image cube data (hypercubes)
  - Precision data access capabilities added (AccessData)
  - Grid support: scalability, async capabilities
- Core Author/Design Team
  - F.Bonnarel, D.Durand, A.Micol, A.Richards, J.Salgado, D.Tody
  - Much progress since Strasbourg interop:
    - http://www.ivoa.net/cgi-bin/twiki/bin/view/IVOA/SiaInterface

Interface Overview

- Based upon existing standards
  - Standard service profile (DAL2 + GWS)
    - most elements are common to all service types
  - Common core data model (GDS/ObsDM)
    - most metadata DM-based, common to all DAL interfaces
  - Grid capabilities (UWS for async, VOSI)
    - implementation mostly common to all service types
- Provides
  - Uniformity, robustness, completeness, code sharing

Service Operations

- QueryData
  - Data discovery and access; metadata query
  - Simple generation of optimized virtual data
- AccessData (New in SIAV2)
  - Precision client-directed access to a specific dataset
  - Higher performance for pure data access use cases
  - Useful for other services in the future, e.g., SSA
- StageData (New in SIAV2)
  - Scalability; generate many images simultaneously
  - Uses SIA query information to create a job under UWS
- GetCapabilities
  - Query service capabilities (VOSI and DAL2 interface)

QueryData

- Concept
  - Backwards compatible with SIAV1
    - but updated to modern standards (interface, model)
  - Provides
    - Discovery, basic access, metadata access, virtual data, access planning AccessData)
    - Access reference for simple access to data
  - Simple approach to virtual data generation
    - Sufficient for one-step access in most common use cases
    - Service tries its best to generate “ideal image” specified by client

- Parameters
  - Basic: POS,SIZE, BAND, TIME, POL
    - ROI or "ideal image" maintained; REGION added
  - Other discovery parameters
    - dataID, curation, resolution, calibration quality, etc.
  - FORMAT, COMPRESS

AccessData

- Concept
  - Not a query (no votable); advance knowledge required
  - Tell the service what image to generate – one step access
  - How to generate the image is up to the service
- Logical Model
  - Defines the transformations which AccessData provides
    - these can be combined, but often only one will be used
    - provide general transform, dim reduction, axis reduction, fcn
- Transformations
  - Filter — POS,SIZE, BAND, TIME, POL (e.g., BAND=V)
  - Geom+WCS — Image geometry (dim,size) plus WCS
  - Image Section — As in cfitsio,IRAF: `"[*,5,-*]"`, `"[*,10/30,//*]"`, etc.
  - Function — Spectral index, vel disp, rotation measure, etc.

ported.

UTYPE	*Description*	*Req*	*Default*
Image Matrix Transform			
Mapping.NAxes	Number of image axes		
Mapping.NAxis[]	Length of each axis in pixels		
Mapping.CoordRefPixel[]	Reference pixel		
Mapping.CoordRefValue[]	WCS value at reference pixel		
Mapping.CDMatrix[]	Coord definition matrix		
Mapping.PCMatrix[]	Coord definition matrix		
Mapping.CDelt[]	World coord delta per pixel		
Mapping.AxisMap[]	Image-to-WCS axis mapping		
Mapping.WCSAxes	Number of WCS axes		
World Coord Transform			
Mapping.SpatialAxis.CoordType	Coordinate type as in FITS		
Mapping.SpatialAxis.Projection	Celestial projection		
Mapping.SpatialAxis.CoordFrame	Spatial coordinate frame		
Mapping.SpatialAxis.CoordEquinox	Coordinate equinox (if used)		
Mapping.SpatialAxis.CoordUnit	Unit for coordinate value		
Mapping.SpatialAxis.CoordName	Axis name (optional)		
Mapping.SpectralAxis.CoordType	Coordinate type as in FITS		
Mapping.SpectralAxis.Algorithm	Algorithm type as in FITS		
Mapping.SpectralAxis.RestFreq	Rest frequency of spectral line		
Mapping.SpectralAxis.RestWave	Rest wavelength of spectral line		
Mapping.SpectralAxis.CoordUnit	Unit for spectral coordinate value		
Mapping.SpectralAxis.CoordName	Axis name (optional)		
Mapping.SpectralAxis.CoordValue[]	Spectral value/band at pixel index		
Mapping.TimeAxis.CoordType	Time scale (UTC, TT, TAI, ...)		
Mapping.TimeAxis.CoordUnit	Time unit		
Mapping.TimeAxis.CoordName	Time axis name (optional)		
Mapping.TimeAxis.CoordValue[]	Time value at pixel index		
Mapping.TimeAxis.RefPosition	TOPOCENT, BARYCENT, ...		
Mapping.PolAxis.CoordType	Polarization system (Stokes etc.)		
Mapping.PolAxis.CoordName	Polarization axis name (optional)		
Mapping.PolAxis.CoordValue[]	Polarization type at pixel index		

In the above table, UTYPEs which have "[]" appended are vector-valued (the value is a string consisting of a sequence of numbers or string tokens delimited by

StageData

- Concept
  - QueryData is used to "plan" the job (define images to be generated)
  - StageData creates a job to create 1-N images in one go
  - Once the job is created, UWS is used to manage the job
  - Images may be delivered to a VOSpace during execution
  - Client can use a normal acref-GET to retrieve individual images
- Async execution
  - An individual accessData request can execute asynchronously
  - StageData can be used to create many images at once
- Scalability
  - Multi-position query, stageData

GetCapabilities

- Provides
  - Ability for client to query service capabilities, interface
  - Simple service operation query (GET) returns XML
  - Could possibly be data-specific
- Interface
  - Available both via VOSI and as a service operation