



*International
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Implementations of the Data Model for Astronomical DataSet Characterisation Version 1.0

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1 Introduction

This note presents three implementations of the Characterisation Data Model, that uses many concepts defined in the model and handled either via applications written in Object oriented languages like java or C++, or via Utypes. The Utype list is available in another document [2].

2 An SQL oriented implementation :ASPID-SR

2.1 Service description

ASPID-SR stands for "Archive of Spectral, Photometric, and Interferometric Data - Science Ready". It contains about 600 data sets obtained with the Russian 6-m telescope of SAO RAS, comprising integral-field-unit (IFU), longslit and scanning Fabry-Perot Interferometric (IFP) data. [3][4]

The service is available at <http://alcor.sao.ru/php/aspid-sr>.

2.2 Metadata supported

Characterisation metadata is provided up-to level two (Location, Bounds) for all properties (Coverage, Resolution, SamplingPrecision) of SpatialAxis and SpectralAxis, and only for Coverage along FluxAxis. Statistical errors are provided in selected cases for FluxAxis. For SpectralAxis and SpatialAxis, errors correspond to some average values for wavelength calibration uncertainties for a given instrument/configuration and telescope pointing errors, and therefore do not reflect real values for a given observation.

Characterisation metadata is computed for every dataset using a piece of dedicated software that makes actual analysis of the data to determine Level 1 and 2 (RefVal and Bounds) for Observable axis (FluxAxis.Coverage). FITS header metadata manipulations are also carried out for computing values of characterisation metadata for Spatial and Spectral axes. Some of these, such as SpectralAxis.Resolution.RefVal and Bounds are extracted from the manuals of corresponding instruments, therefore they reflect only nominal values for a given set of observations.

TimeAxis of Characterisation is normally not calibrated, because only starting time of the observations is preserved by the data processing pipeline (to be changed in the future).

2.3 Database binding

Characterisation metadata are stored in the PostgreSQL database with native XML support, and are fully queryable through the WEB-interface of the archive. Queries use utypes, that are directly translated into XPath expressions used as "SQL WHERE" clauses to constraint the data selection.

3 Implementation within Aladin Image Server functionalities

3.1 Service description

The Aladin Image server is an image retrieval facility mainly used by the Aladin service as a default provider for survey "reference images" (available from the Aladin client [1] panel under the Load button). The server provides image query response (the metadata) as well as image retrieval (the data) methods. The query response can be delivered in several "modes":

- standard "atlas mode" SIA 1.0 query response for 2MASS, WENSS, IRAS-IRIS and some Schmidt plates
- CSV qualifiers for compatibility with previous tools
- IDHA VOTABLE image descriptions, still used by the Aladin service

An upgrade of the Aladin server has been set up that incorporates retrieval of Characterization metadata for each single observation.

There are two output formats supported: VOTABLE or XML. The VOTable format makes use of the Characterisation Utypes and the XML output document is compliant to the Characterisation XML Schema. This service relies directly on the SIA 1.0 protocol and provides a valid textual (xml or whatever) description of an observation tagged with with the proper MIME type in the SIA query response. Accessing it with *Datascope* is thus very easy and is achieved in two steps: a) ask and get a query response b) retrieve the characterisation of items selected either in VOTABLE or XML format, as well as image itself in FITS.

Direct access to the SIA server is available via an HTTP GET request of the form:

```
http://aladin.u-strasbg.fr/cgi-bin/nph-HTTP.cgi?  
FORMAT=image/fits&  
mode=siap_atlas&  
out=qualifier&  
POS=...,...& SIZE= ...
```

In the query response, one can then extract the URL with the appropriate text/xml MIME type.

3.2 Metadata supported

The Characterisation metadata are restricted as mentioned here:

- The Characterisation spatial axis is CALIBRATED, and regularly sampled
- The Accuracy.Error fields are not given.
- Location, Bounds and Support are given, the latter as a polygon.
- No resolution is given (it will require to know the seeing for all the observations which is unfortunately not the case, but the sampling Precision Period and Extent equals the Pixel size.
- The time axis is restricted to an observation date given as "Location"
- The spectral axis is not sampled, Location (central wavelength) and Bounds (spectral range) are given.

4 CAMEA, an editing tool for Characterisation Metadata

4.1 Tool description

CAMEA stands for **C**haracterisation of **A**stronomical **M**etadata **E**ditng **A**pplication. It provides a user-friendly web interface to XML metadata description of Observations following the Characterisation Data Model. It is a Java application, that allows to define, read and validate an XML description of an Observation, compliant to the Characterisation Data Model. From the XML elements tree it builds up corresponding objects in the Java program and offers a handy visual interface to check the metadata values and possibly change them. This interface can be used to describe one observation from an existing compliant XML document describing a specific data set: 1D spectrum, IFU data , 2D image , 3D velocity cube , etc... or to define a full XML description from scratch as it contains the full frames combinations to fill in the metadata required.

The application follows the framework of the Characterisation DM, as implemented via the Characterisation XML Schema. Axes and their properties (Coverage, Resolution, Sampling) are described following increasing levels of detail, with names, values, and documentation.

See the tool description at:

(<http://wiki.eurovotech.org/twiki/bin/view/VOTech/CharacEditorTool>).

The XML validator incorporated in the application is able to check for mandatory fields and validation towards the Characterisation XML schema

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(<http://ivoa.net/xml/Characterisation/Characterisation-v1.1.xsd>).

4.2 Whom is this tool for?

CAMEA can be helpful for a data provider as well as for a scientist willing to publish his data to the VO community. It helps to get familiar to the metadata description of small sets of observation data. For data providers it can also help to come up with a customized template for the XML description of their data towards the VO. Other tools are designed for the ingestion of FITS keywords into VO aware services such MeX

(<http://wiki.eurovotech.org/twiki/bin/view/VOTech/DpSubmitKWmappingDoc>)

or VOSpecDALIngestor

(<http://http://www.ivoa.net/internal/IVOA/InteropSept2006DAL/DALToolKit.ppt>)

Combining CAMEA with such an extraction approach would help to build up appropriate extraction tools for the VO metadata publishing.

4.3 Metadata supported

All metadata from Level 1 to 3 are supported. Support is restricted to a set of intervals in the current version.

4.4 Extensibility

The next version of this tool will be more dynamic as it is planned to allow classes to be generated automatically from a valid XML schema. Updating the application to a new version of Characterisation, and using other data models could then be envisaged with minimised added effort.

References

- [1] <http://aladin.u-strasbg.fr/aladin.gml>.
- [2] <http://alinda.u-strasbg.fr/model/characterisation/characterisationwd2007may/utypeslist/v1.1.pdf>.
- [3] Chilingarian et al., ADASS-XVI proceedings, 2007, submitted.
- [4] Zolotukhin et al., ADASS-XVI proceedings, 2007, submitted.