VIRTUAL ASTRONOMICAL OBSERVATORY

Spectral DataModel V2.0

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Goals

- Primary
  - To extract a generalized model for Spectro-Photometric sequences to serve as a basis for specific case models.
  - To define Spectrum and PhotometryPoint models in terms of this base model.
  - To incorporate photometry filter model components.
  - To clarify and resolve issues from earlier versions.
  - To min. effect on existing interfaces (change utypes)
- Secondary
  - To reconcile and consolidate elements defined by external models (Char, STC, Resource).
  - Organizational changes for readability and ease of use.

The Document

Organization

- Introduction
- Spectral Data Model
  - Objects defined by this model/document.
- Characterization Data Model Elements
  - Essentially duplicating definitions from Char model.
  - Simplifications made by this model prevent full reconciliation.
- STC Data Model Elements
- IVOA Conventions; (Utypes, Units, UCDs, Extensibility)
- Spectrum Data Model
- PhotometryPoint Data Model
- Appendices; (Utypes List, UCD List, Serialization examples)
- References

Content

- Core text is straight from Spectrum v1.2 document
- Removed text describing how other models will use this one
- Improved description of items which confused us in previous versions
    - Relation between elements shared by Char and Data
    - The DataAxis object
    - The distinction between the top level CoordSys and that under CharAxis.
    - Enumerated legal Utypes not previously defined.
- Improved model reuse
    - Moved DataAxis.Quality to DataAxis.Accuracy.QualityStatus

Content (cont.)

- Incorporated UCD comments to Spectrum V1.1
  - Several need another look (eg: stat.error;phot.flux.density;em.*)
- More prominent datatype declaration
- Provide defaults appropriate for the datatype
- Improved consistency between the examples and the text
- Sorted objects from other models
  - moving toward a building block architecture.

Example section

2.10 Curation

Curation is an object which provides information about the entity responsible for the support of the dataset content. The content of this object is assembled from various definitions provided in the IVOA standard document, ”Resource Metadata for the Virtual Observatory Version 1.12”[1] (Resource Metadata). The mappings are noted in the text for each field.

2.10.1 Curation.Publisher:String

The entity making the data available. This field is consistent with the Curation.Publisher field of the Resource Metadata document.

2.10.2 Curation.PublisherID:URI

The identifier for the publisher, provided according to the syntax defined in the ”IVOA Identifiers”[2] document. This field is consistent with the Curation.PublisherID field of the Resource Metadata document.

2.10.3 Curation.PublisherDID:String

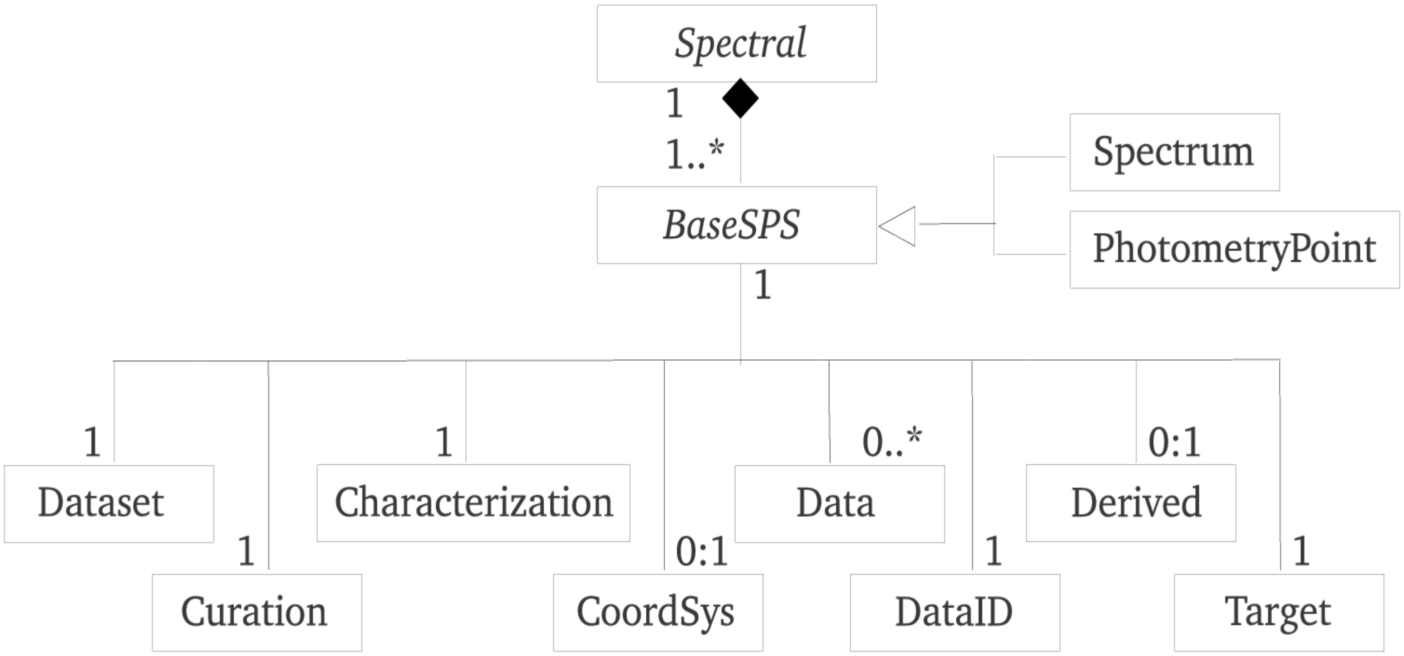
This field is a publisher specified dataset ID and may be an internal ID used by the archive. It is the same as the Resource.Identifier field of the Resource Metadata document.

2.10.4 Curation.Date:String

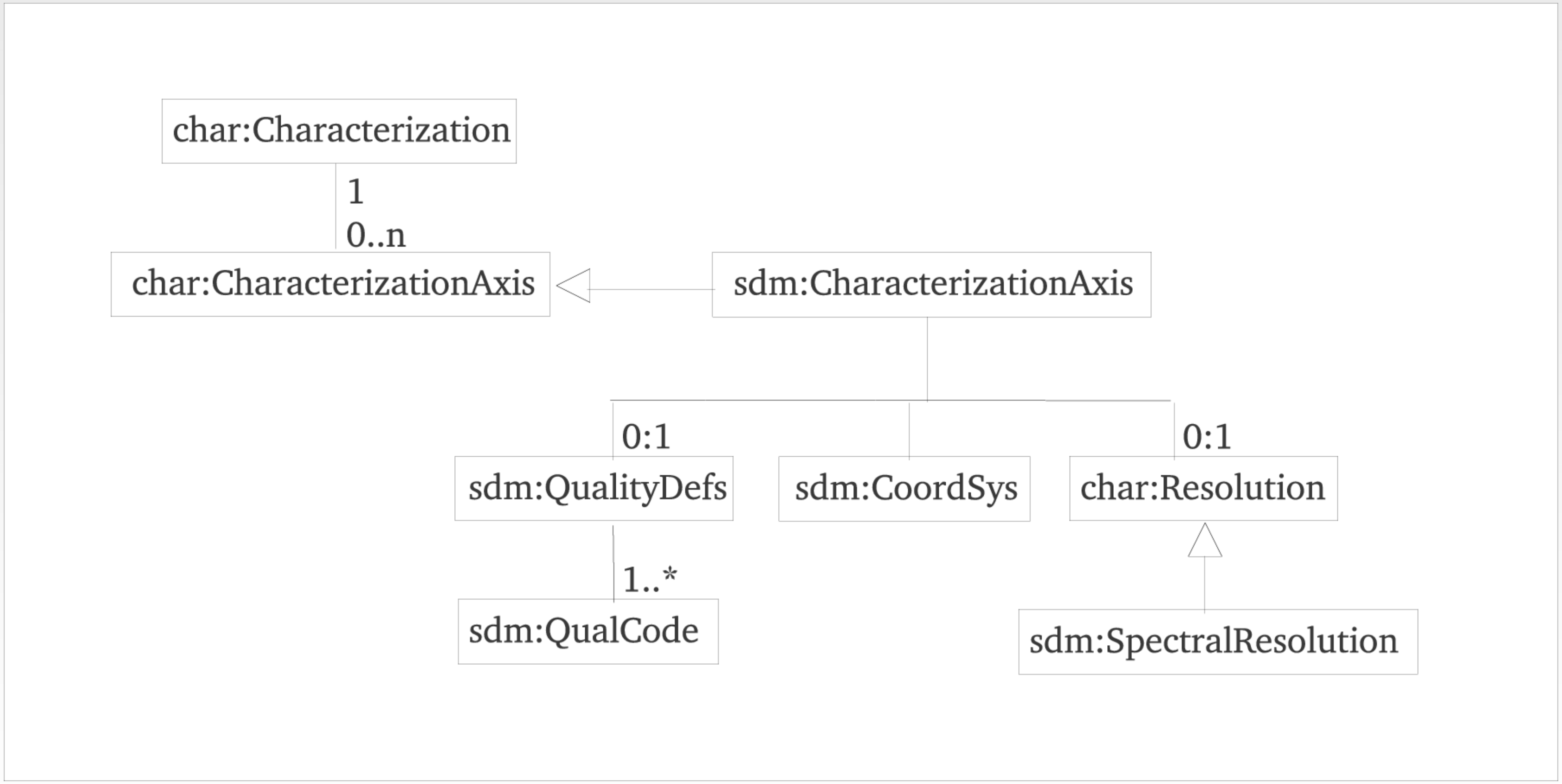
Date the curated dataset was last modified. The preferred format is ISO8601 (YYYY-MM-DD). This field is consistent with the Curation.Date field of the Resource Metadata document.

The Model

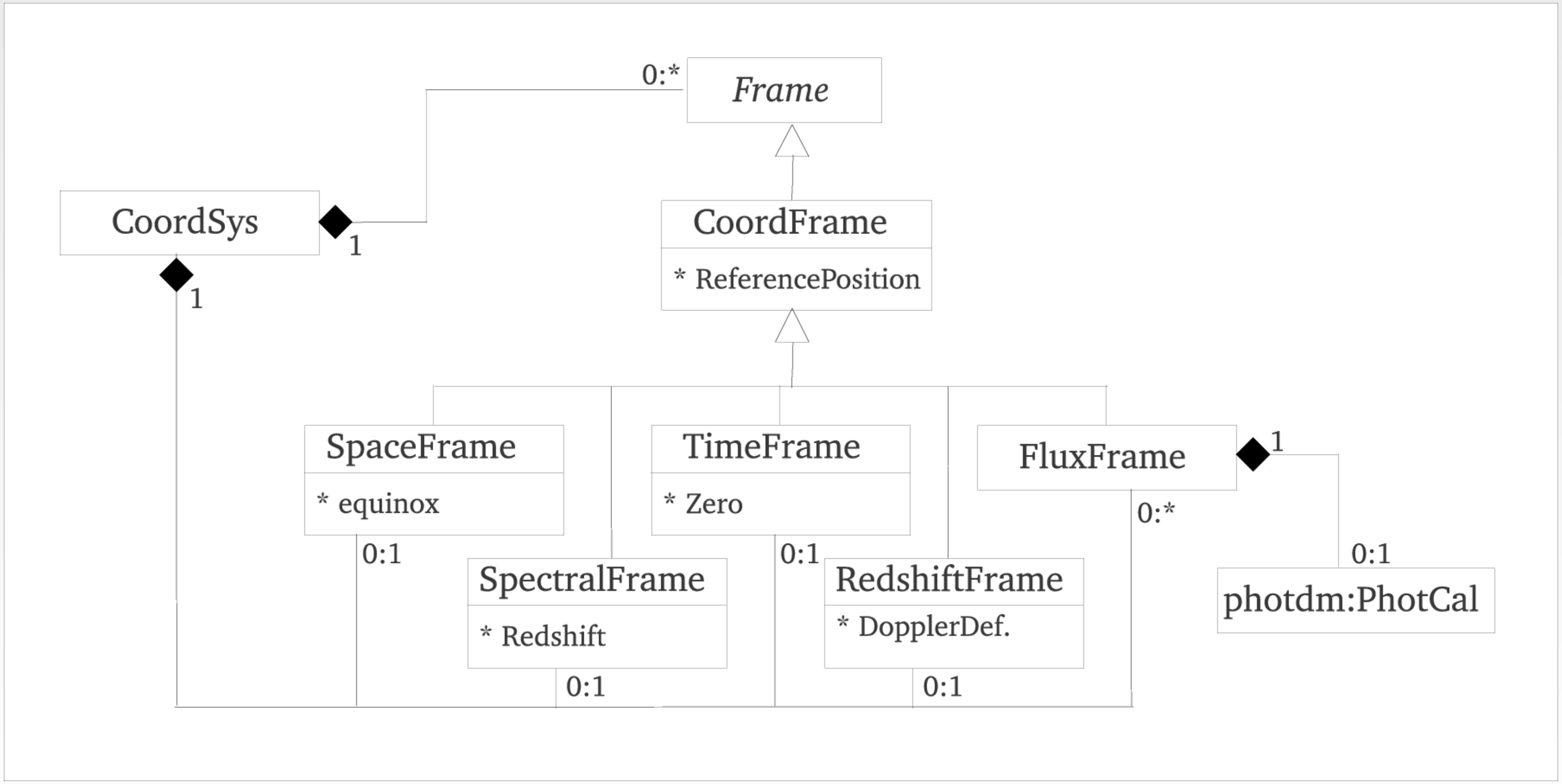
Base Sectro-Photometric Sequence



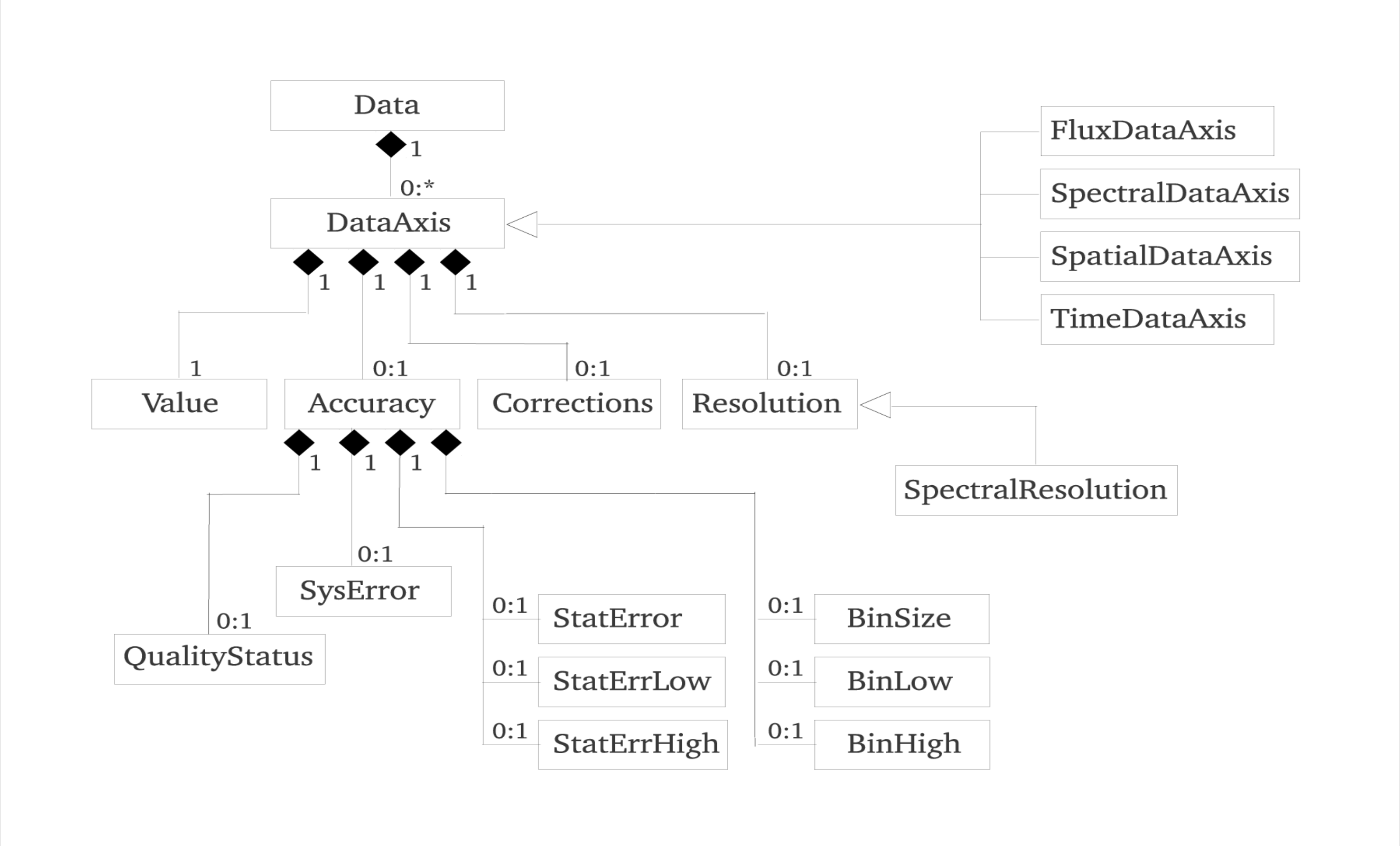
Characterization



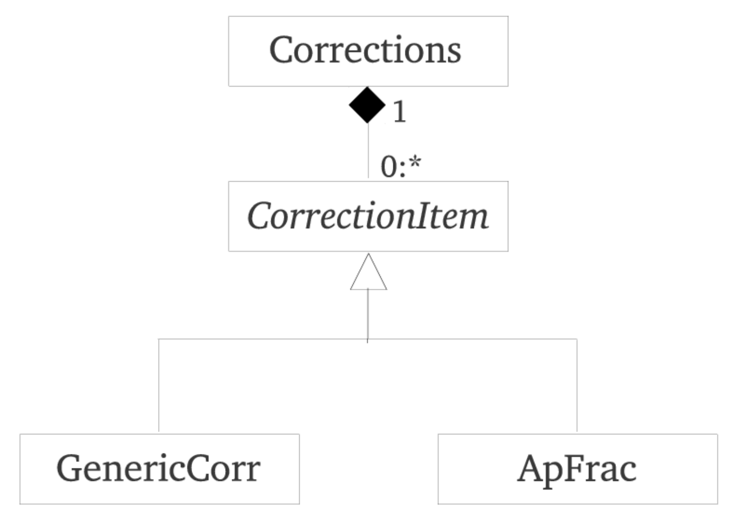
CoordSys


0:*
Frame
CoordSys
1
1
CoordFrame
* ReferencePosition
SpaceFrame
* equinox
TimeFrame
* Zero
FluxFrame
1
0:*
0:1
0:1
SpectralFrame
* Redshift
RedshiftFrame
* DopplerDef.
0:1
photdm:PhotCal
0:1
0:1

Data


Data
1
0:*
DataAxis
FluxDataAxis
SpectralDataAxis
SpatialDataAxis
TimeDataAxis
1
1
1
1
1
0:1
0:1
0:1
Value
Accuracy
Corrections
Resolution
SpectralResolution
1
1
1
0:1
SysError
0:1
QualityStatus
0:1
StatError
0:1
StatErrLow
0:1
StatErrHigh
0:1
BinSize
0:1
BinLow
0:1
BinHigh

Corrections



Defining specific case models

- Defining a specific SpectroPhotometric case becomes a relatively simple process.
  - Define case (Spectrum, PhotometryPoint, etc)
  - Declare namespace
  - Define axis requirements
  - Define field requirement differences from base
  - Define semantic differences in object usage/meaning.
  - Define model extensions specific for that case
- Spectrum and PhotometryPoint are 2 pages each

Open items – should be resolved

- Multiple instances of complex objects.
  - The model now contains several objects that may appear more than once within a container. (CoordFrame, FluxFrame, Correction Items, QualityCode)
  - We need a format independent mechanism defined that allows clients to unambiguously associate object members when deserializing instances.
  - Utypes group are discussing a 'dynamic' utype specification which would accommodate this need. (Wed 11 – 12:30)
  - If not this, then we should define another mechanism.
- Units convention
  - Currently echo previous model recommendation of OGIP.
- UCD list should be reviewed

Open Item – can we fix this?

- FITS serialization
  - The model defines a static mapping of model UTypes to FITS keywords. This is a valid solution, but:
    - It is not generic, must be done for every model that supports FITS.
    - It is not user unfriendly, there is a huge buy-in for data providers to convert their holdings to an arbitrary set of keywords
    - Requires extension and revision as new cases are defined, especially if they create new 'multiple instance' objects
    - Requires maintenance for standards migration.
    - “RADECSYS” vs “RADESYS”
    - Changes invalidate all existing products.
  - IVOA should be providing a mechanism which allows users to map their files to the model.
    - Add Keyword hashmap (VNAM#, VUTY#, VUCD#)
    - Add Table extension

Open Item – maybe a problem

- Axis linkage in more complex cases
  - Associating FluxAxis with corresponding Spectral Axis when there is more than one, especially if the Spectral Axis is not explicitly defined, but to be obtained from the PhotometryFilter. (ex: Photometry Catalog, possibly TimeSeries)