ASDM

The ALMA Science Data Model (ASDM) defines the collection of information recorded during an observation that is needed for scientific analysis. The raw data from the ALMA facility will have:

1) Correlator/backend: observing data
    - e.g., raw visibilities, total power readings, etc (the bulk of the data)
2) Metadata: data needed to describe the observing process
    - e.g., source information, spectral setup
3) Auxiliary: monitoring data taken during the observation and needed for reduction
    - e.g., weather, pointing information

During the observing process, the content of these three broad components are obtained from various hardware/software elements, each sampling at different rates and with limited views of the observing system. The DataCapture process (next section) takes these pieces and associates all of the information at every time during the observation; the ASDM is all of the metadata and auxiliary data along with links (archive addresses for the correlator/backend data).

The ASDM is composed of a core of 16 tables which are used in all observing modes; an additional 23 tables are available depending on the observing context. The Telescope Calibration subsystem defines additional tables (one per calibration type) which provide calibration information during an observing session (or isolated within a calibration session).

The organization of the ASDM content into tables is based on a number of considerations:

1) efficiency of the writing process during observing
2) minimization of data volume
3) logical separation of components

In practice, this means that discrete hardware elements (e.g., antennas, feeds, etc) will each have their own table associated and that any content that is sampled at a very different rate will be split into its own table to avoid gross duplication of values.

Main	Main Table Columns	Links to…	Links to…	Links to…
	configDescriptionId			
		antennaId	stationId	
		dataDescriptionId	polOrHoloId	
			spectralWindowId	dopplerId
		feedId	receiverId	
			beamId	

		processorId	almaCorrelatorModeId
		switchCycleId	freqOffsetArray
	fieldId	ephemerisId	
		sourceId	sourceParameterId
	time	FlagCmd	
		Focus	focusModelId
		GainTracking	
		History	
		Pointing	pointingModel
		Seeing	
		TotalPower	
		WVMCal	
		Weather	
	execBlockId		
	stateId		
	scanNumber		
	subscanNumber		
	dataOid		

Figure 1 Table representing the referencing hierarchy within the ASDM. The Main table (containing the links to the visibility/backend data) is the center of the organization with all references extending from it. The Main Table Column represents a (partial) row of the Main table – those parts that complete the referencing to all other data aspects within the ASDM.

Within a table, the content is grouped into three broad categories:

1) key – used to reference/associate between tables
2) required – content that is always obtained
3) optional – content that may be present in some contexts.

Required Tables	**Rows are added at:**	**Optional Tables**	**Rows are added at:**
*Main**	Integration	AlmaRadiometer	Integration
AlmaCorrelatorMode	Subscan	Beam	ExecBlock
Antenna	ExecBlock	Cal*	Scan
*ConfigDescription**	Subscan	Doppler	Scan
DataDescription	Subscan	Ephemeris	ExecBlock
ExecBlock	ExecBlock	FlagCmd	Integration
Feed	ExecBlock	Focus	Subscan
Field	Subscan	FocusModel	ExecBlock

Polarization	Scan	FreqOffset	Integration
Processor	Subscan	GainTracking	Subscan
SBSummary	ExecBlock	History	Subscan
Scan	Scan	Holography	Subscan
Source	Scan	Observation	ExecBlock
SpectralWindow	Subscan	Pointing	Integration
State	Integration	PointingModel	ExecBlock
SubScan	Subscan	Receiver	ExecBlock
		Seeing	Subscan
		SourceParameter	Scan
* Table is not required for non-correlator modes		SquareLawDetector	Integration
		Station	ExecBlock
		SwitchCycle	Integration
		TotalPowerData	Integration
		WVMCal	Scan
		Weather	SubScan

The ASDM implementation entails classes to represent and manipulate the data structures which compose the ASDM.

Project Scope

The original document outlining the ASDM (formerly called the ALMA Export Data Format) is:

ALMA-70.00.00.00-004-A-SPE – The ALMA Export Data Format (Viallefond & Lucas).