

MDF to ODS

Known problems

Karst Schaap
Manager Server Development

Overview

1. Unique channel name
 2. Conversions
 3. Previews
 4. Compressed/Transposed datablock
 5. Invalid values
 6. Textblocks
 7. Channel datatypes.
 8. Datablock structure
 1. Usage of list
 2. Split value at different blocks
 9. Block or Channel oriented storage
 10. Structures and n-dimensional Arrays
 11. Variable length data
 12. Write to MDF files
 13. Static header information
 14. Unit catalog
 15. Constants of MDBLOCK
 16. Attachments
 17. Events
 18. Default X axis
 19. Channel meta information
 20. Not supported blocks.
- I am sure that this list is not complete.**

Unique channel name

ODS

Name of AoMeasurementQuantity must be unique for each AoMeasurement

From asam32.exp line 900

```
UR2: SELF\asam_base_entity.name, measurement;
```

MDF

Signalname is not unique, Table 8 shows the uniqueness. Naming of channels not unique or identical over different MDF files.

Path-separator of the DGBLOCK for each datagroup not for the MDF file.

The signal name of MDF can not be used as name of the AoMeasurementQuantity, no place for path separator in ODS.

Conversions

ODS

The conversion type is given in the base attribute **sequence_representation** of the base element **AoLocalColumn**.

The **sequence_representation** is of the **seq_rep_enum** type and can have these values:

explicit (0)	implicit_constant (1)	implicit_linear (2)
implicit_saw (3)	raw_linear (4)	raw_polynomial (5)
formula, deprecated because of missing formula language.(6)		
external_component (7)	raw_linear_external (8)	raw_polynomial_external (9)
raw_linear_calibrated (10)	raw_linear_calibrated_external (11)	

Conversions

MDF

The following conversion are defined in ASAM ODS MDF 4.1:

- 1:1 conversion (0)
- linear conversion (1)
- rational conversion (2)
- algebraic conversion, MCD-2 MC text formula (3)
- value to value tabular look-up with interpolation (4)
- value to value tabular look-up without interpolation (5)
- value range to value tabular look-up (6)
- value to text/scale conversion
- tabular look-up (7)
- value range to text/scale conversion tabular look-up (8)
- text to value tabular look-up (9)
- text to text tabular look-up, translation (10)

Multi-level conversions are not supported by ODS.

Conversions

1:1 conversion (0)

This conversion type is identical with the ODS explicit or external_component.

No problems for mapping this conversion.

Conversions

linear conversion (1)

This conversion type is identical with the ODS `raw_linear` or `raw_linear_external`.

Remarks:

MDF conversion values `cc_val` must be copied to the `generation_parameters` in ODS.

The `raw_datatype` can be mapped from the `cn_data_type` and `cn_bit_count` from MDF.

Datatype of the channel is not given in MDF, ODS needs a constant datatype (E.g. `DT_DOUBLE`)

Conversions

rational conversion (2)

There is no matching conversion in ODS 5.3.1.

ODS 6.0 will extend the `sequence_representation` with rational conversion. Already accepted by ODS FVD.

Conversions

algebraic conversion, MCD-2 MC text formula (3)

This conversion can be covered by sequence_representation formula, which is deprecation because of the missing formula language and storage location for the formula in ODS.

Current not relevant, because this conversion is not used in MDF.

Conversions

Value Look-up tables

value to value tabular look-up with interpolation (4), value to value tabular look-up without interpolation (5), value range to value tabular look-up (6), value to text/scale conversion tabular look-up (7), value range to text/scale conversion tabular look-up (8)

There is no conversion in ODS 5.3.1. ODS has define mime_type definitions for this conversion so the client can decide to calculate with the values or show the user the text values.

The mime-type definitions will be available on ODS 6.0. The proposal are already accepted by ODS FVD.

Double conversion is not supported by ODS. Keys values are direct accessible, Text values cannot be addressed with ODS AoExternalComponents.

🔗 Chapter 5.17.8 of MDF specifies a slightly different behavior depending on whether 'Int' is an integer or a floating point number. Is there a well-founded reason for that? See Bugzilla

Conversions

Text to Value/Text look-up

text to value tabular look-up (9), text to text tabular look-up, translation (10)

There is no conversion in ODS 5.3.1.

A mime-type is proposed, ODS FVD dis not accept this proposal and ask MDF for the usecases and relevance of these conversions.

Current answer, no use case and not relevant.

No support of these conversions in ODS

Previews

There is no preview definition in ODS 5.3.1.

A preview can be handled as another measurement. There is no difference between a „measured“ measurement or a „calculated“ measurement. ODS have already defined mime-types for other kind of calculated measurements (E.g. NVH mime-types)

A proposal of the mime-type for the preview is made.

ODS FVD has accepted the mime-type, open the final acceptance of the specification.

Current there is no support of the previews, will be available in ODS 6.0

Compressed datablock

There is no support for compressed datablocks in ODS 5.3.1.

There is a proposal to extend the basemodel for this functionality in ODS 6.0.

This proposal is not accepted by ODS FVD because it solves again only one topic of the problems in ODS with MDF files.

ODS FVD likes to create a solution for all problems. In this solution the proposed extension of the basemodel can be added.

Invalid values

ODS

Use flags, each flag is 2 bytes, following bits are defined:

AO_VF_VALID (0x01) – the value is valid

AO_VF_VISIBLE (0x02) – the value has to be visualized

AO_VF_UNMODIFIED (0x04) – the value has not been modified

AO_VF_DEFINED (0x08) – the value is defined

MDF

Use invalidation bits, each bit is 1 bit and 8 bits of 8 different channels can be stored in a byte.

Invalidation bit = not(AO_VF_VALID)

ODS is not able to address a bit channel for the flags, new definition of `AoExternalComponent` is required.

ODS specifies 4 bits but almost never seen the usage of the different bits.

Textblocks

ODS

Text values with NUL-Character separated in a block, store the total length of all text values.
Character set ISO 8859-1 and UTF-8 are supported.

MDF

Text values with NUL-Character for channel data, One Text value in a block for conversions.
MDF supports UTF-8, UTF-16 leo and UTF-16 beo.

Current ODS for each MDF Text value one instance of AoExternalComponent, this is an unacceptable overhead.

Current no proposal how to solve, except MDF Specification is modified and the files are reorganized.

No proposal to support UTF-16.

Channel datatypes.

ODS

Important is the typespec_enum from the basemodel. The datatypes of the integer are always signed datatypes, unsigned datatype are mapped to the next bigger signed datatype.

MDF

Unsigned and signed interger, IEEE–float, Strung and complex datatypes.
Combined with cn_bit_count.

This does not work with 64–Bit unsigned integers.

Byte array (10 possible support by DT_BYTESTR, MIME sample (11) and MIME stream (12)
unclear mapping to ODS.

DT_DATE what is defined in MDF. CANopen Date (13) and CANopen Time (14) are not available in ODS.

Datablock structure

Usage of list

ODS

AoExternalComponent has a start_offset for the datablock.

MDF

Either a datablock or a list of datablocks.

For each datablock ODS needs an instance of AoExternalComponent. With the small datablocks in MDF and many channels per datablock the number of instances of AoExternalComponent increase.

These number of instances of AoExternalComponent is unacceptable.

Datablock structure

Split value at different blocks

ODS

The complete value must be stored in a block.

MDF

When there are bytes left in a block, these bytes are filled with the first bytes of the next value and the remaining bytes of the value are in the next block.

ODS is unable to handle with values split over different blocks. MDF loose maximum 7 bytes in a block.

Block or Channel oriented storage

ODS

Support block and channel oriented storage of the values, analysis is done channel oriented.

MDF

Uses block oriented storage.

Reading a channel from a block need to transfer the complete block from disc to memory, which reduce the performance.

The user is waiting for his channel data, an ODS server have to handle requests of different users parallel and most time the files are not located on the same computer so many I/O performance is needed. Reading the same data once stored in MDF and ODS

- 🕒 a channel (N-MOT) with 9120000 values
- 🕒 read from MDF 7,7 sec (7 sec without CORBA-Transfer).
- 🕒 read from ODS 1,7 sec (1 sec without CORBA-Transfer).

The user is not willing to wait that long.

Structures and N-Dimensional arrays.

Structures are split up into their sub-components, which are addressed as measurement quantities. The channel representing the complete structure has to be ignored.

n-dimensional Arrays which are stored en-block (CN-Template), can be mapped to measurement quantities using rank and dimension attribute.

What kind of data is stored in SDBLOCK, the variable length data.

Unknown the relevance of structures in MDF. Which possible can be solved with mime_type definitions. Which mime_types definition already exist in ODS.

Variable length data

ODS:

T_BYTESTR with 4-byte length and byte-array

MDF:

SDBLOCK?

Unknown the relevance in MDF and if it match with ODS Bytestream.

Write to MDF Files

ODS:

No implementation to keep the MDF File structure.

Transaction control, new or modified data comes in new file.

MDF:

Write to imported MDF file change the offsets in the file, so reimport in ODS is required.

MDF files read only, none can write to MDF files after import.

Static header information

Timezone

ODS:

Baseattribute at AoEnvironment, all dates in the same time zone.

MDF:

Fields in HDBLOCK, dates and time can differ for each file.

Conversion of the Date/Time is required, even for channel data to the time zone of the environment.

Static header information

Angle or distance offset

ODS:

No global offsets available, `sequence_reprepesenation` and `generation_parameter` can be used to add an offset

MDF:

Fields in HDBLOCK, offsets must be added to channel data.

Unclear how to recognize which channel is a angle or distance.

Conversion of the channel data or `sequence_representaion` wit `generation_parameters` is required.

Unit catalog

ODS:

Baseelements AoUnit and AoPhysicalDimension.

MDF:

Unit catalog in md_hd_comment, for each file another unit catalog can be given.

Check of the unit catalog with AoUnit and AoPhysicalDimension, in case of differences representing or mapping to another unit.

Constants in hd_md_comment

ODS:

Depends on the mapping to any element / attribute in the model.

MDF:

List of constants can differ for each MDF file..

The importer need rules to decide what to do with the constants.

Attachments

ODS:

Each element has a base attribute `external_references`, with `description`, `mimetype` and `location`.
Base element `AoFile` for managed files, where extra attributes can be added.
Always referencing the complete file.

MDF:

`ATBLOCK`, either external file or embedded in MDF file.

External files can be addressed, embedded attachments can not be addressed by ODS.

Events

ODS:

Base element AoLog is available or creating a submatrix / measurement with the events.

MDF:

EVBLOCK.

Mapping is undefined.

Default X Axis

ODS:

Baseattribute independent is normally used as default x-axis, one channel for each submatrix

MDF:

In CNBLOCK a link to the default X-axis, so each channel can have a different X-axis.

No reference in ODS for the default X-axis per channel.

Channel meta data

ODS:

Baseattribute maximum, minimum, average, standard_deviation at AoMeasurementQuantity.

MDF:

In CNBLOCK value_range_*, precision, limit_range_* and limit_range_ext_*.

Channel comment like axis, raster ..

No base attribute for value_range_* and precision, limit_range_* can be mapped to maximum and minimum when there is no conversion otherwise limit_range_ext_* must be mapped to these base attributes. Average and standard_deviation are missing in MDF. No equivalent for the channel comment.

Not supported blocks

FHBLOCK, no representation in ODS

CHBLOCK, structure not clear how to map to ODS.

SDBLOCK, only for unsorted MDF files or support by DT_BYTESTR?