

ASAM ASAM ODS V6-1-0

Release Presentation

Hans Beckers

National Instruments

13.03.2020

<Location>



Agenda

- 1 Introduction**
- 2 Motivation for New Release**
- 3 New Features**
- 4 Backward-Compatibility**
- 5 Relation to Other Standards**
- 6 Deliverables**

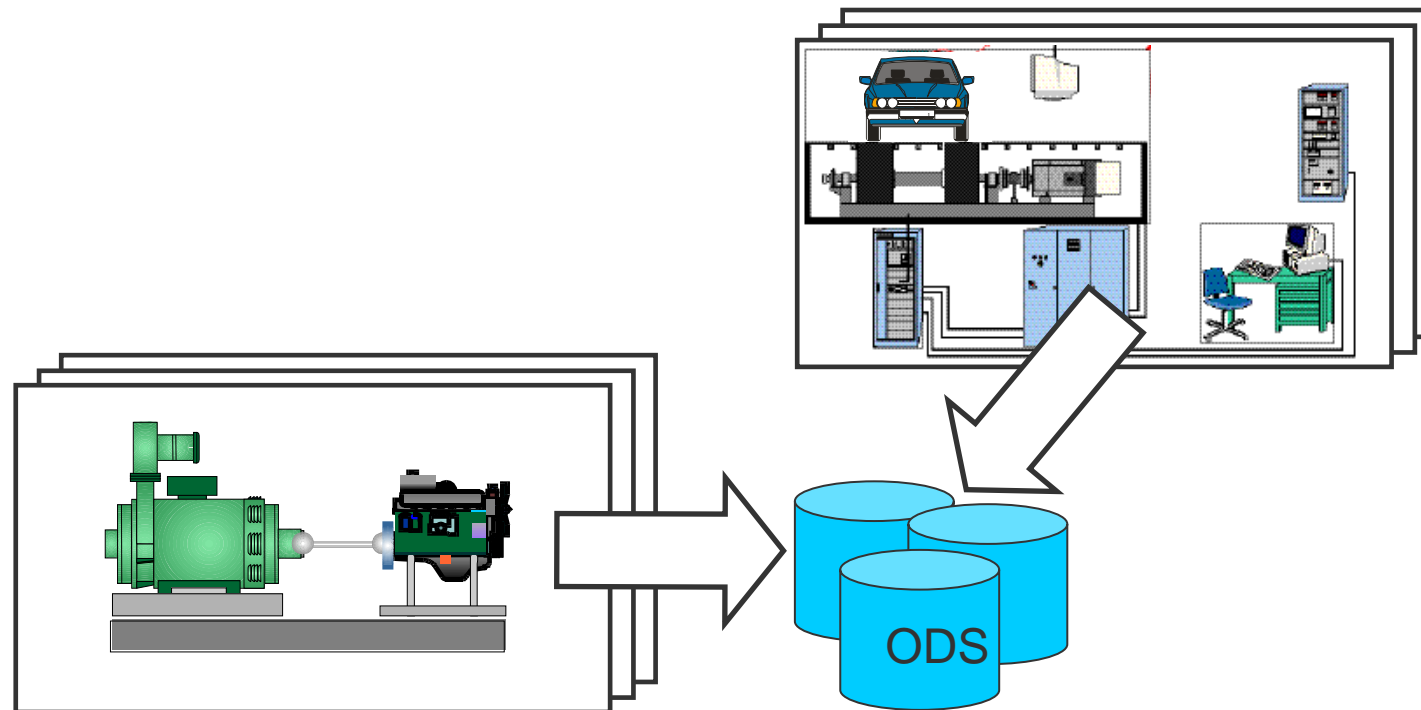
Introduction

The main part of this new ODS release is an Associated Standard which describes the export of ASAM-ODS data to big data environments. A Proof of Standard implementation should test the usability of the resulting files on an example HADOOP system.

In Addition several change requests to the Standard have been fixed.

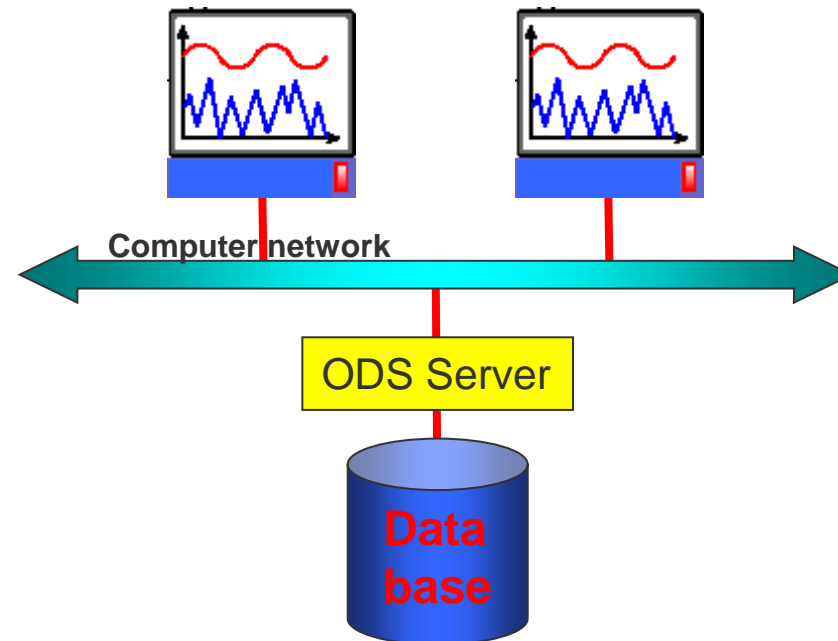
Here is a short description, what the ODS Standard is.

- ASAM ODS is a standard for archiving test data persistently.



Introduction

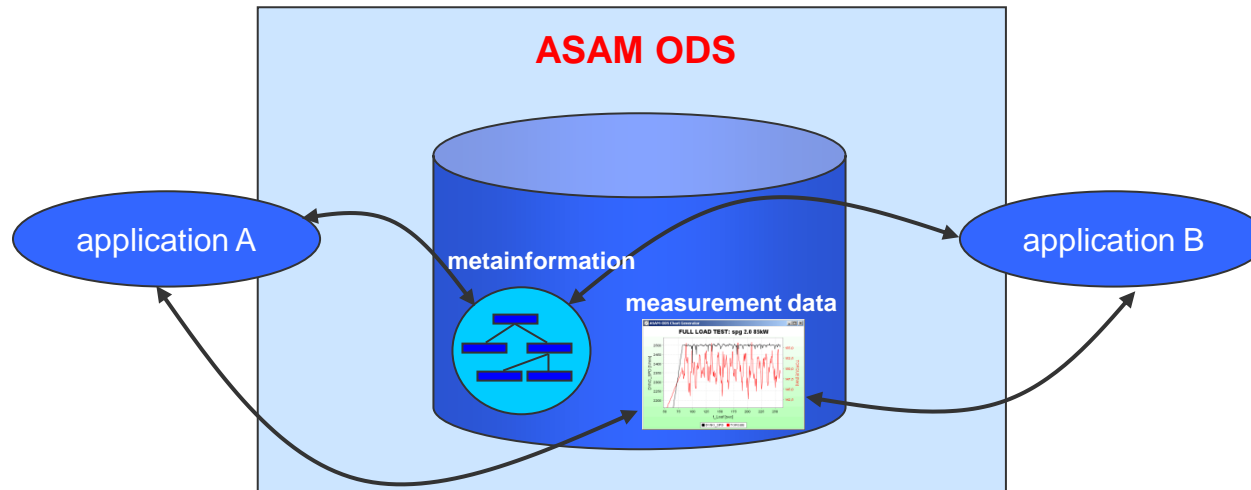
- ASAM ODS defines Application Programming Interfaces for a server. The server is a front end to a traditional database.
- The server is accessible via a TCP/IP computer network.



Introduction

ASAM ODS defines

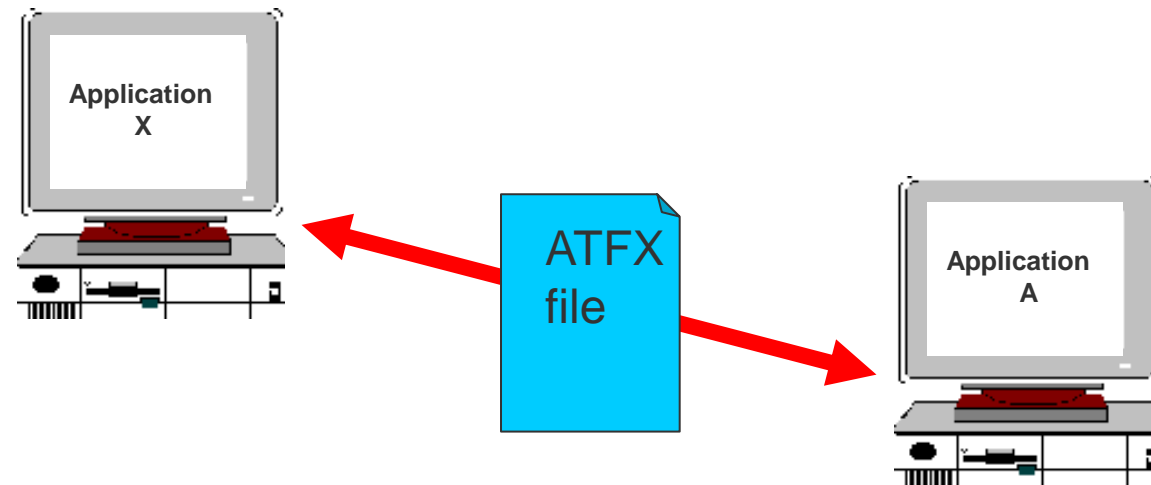
- a Basic Data Model which can be mapped to customer specific applications (engine test, brake test, engine calibration, ... etc.)
- a Meta Data Model enabling a client application to navigate through domain specific or application specific data structures



Introduction

ASAM ODS defines

- a file format for the exchange of test result data



Introduction

ASAM ODS

- defines data models for dedicated applications like
 - NVH data
 - Test stand calibration data
 - VSIM (crash test data model, provided by ISO)
 - Workflows
 - Geometry data
 - Bus data
 - Big Data (new)
- supports gateways to foreign data formats
- defines export of ODS Data into Avro, JSON and Parquet

Motivation

Many users of measurement data have plans to use big data environments like HADOOP or are already using them. The question, how ODS data can be used in such environments came up and ASAM had done a project to evaluate, which possibilities and use cases are given which such big data environments (P2015-08_CAT_ODS_Big-Data-Technologies_CONCEPT).

Based on the results of this project that standard specifies, how ODS data can be exported to big data environments.

New Features

Big Data Connector

Associate Standard for exporting ODS-Data to Big-Data-Environments

Export of Instance Data

- Export Definition File
 - Defines, what kind of data shall be exported. XML based format.
- Export to Avro and JSON
 - The export to JSON will be done by using the Avro build in mechanism.

Export of Mass Data

- Parquet in two Modes
 - Point Scheme
 - All values of a local column are stored in a Parquet column.
 - If a set of flags is given for them, these will be stored in a separate Parquet column
 - This Scheme will be used, if the number of MeasurementQuantities is not so big.
If a ParquetFile has to many columns, it will be splitted over several calculation nodes on a Hadoop cluster.
This leads to performance issues.
 - Packed Scheme
 - A set of Parquet columns will be used to store the mass data.
If one measurement has many MeasurementQuantities, this scheme should be used. Because one row of the file has all values of a MeasurementQuantity.
 - A basic set of Parquet columns is required; their names are "name", "data", "length", "flagsname", "indepname", "ordnum", "idref", "datatype", and "compression".
 - A set of further Parquet columns is defined by ASAM ODS and may optionally be used.
 - Users may add further Parquet columns; however, their names must not start with "ao" as ASAM ODS has reserved this prefix for potential extensions in the future
- Avro in Packed Mode

New Features

Big Data Connector

Associate Standard for exporting ODS-Data to Big-Data-Environments

Export of Mass Data

- Big Data Application Model
 - AoMeasurement
 - Analytic_path
 - AoMeasurementQuantity
 - phys_name
 - raw_name
 - flags_name
 - phys_imag_name
 - raw_imag_name
 - AoQuantity
 - def_phys_name
 - def_raw_name
 - def_flags_name
 - def_phys_imag_name
 - def_raw_imag_name

New Features

Example Export Definition File

```
<ExportRules name="ExampleExport" exportStructure="hierarchical">
  <!--These are the rules for producing Environment objects -->
  <ExportRule applicationElementName="Environment" exportType="include" name="EnvironmentExport">
    <AttributeExport name="Id" exportType="include" exportKey="EnvId"/>
    <AttributeExport name="Name" exportType="include"/>
    <RelationExport name="Tests" exportType="ignore"/>
  </ExportRule>
  <!--These are the rules for producing Localcolumn objects -->
  <ExportRule applicationElementName="Localcolumn" exportType="include" name="LocalcolumnExport">
    <AttributeExport name="Id" exportType="include" exportKey="LocColId"/>
    <AttributeExport name="Name" exportType="include"/>
    <AttributeExport name="GlobalFlag" exportType="ignore"/>
    <AttributeExport name="Flags" exportType="include"/>
    <AttributeExport name="Independent" exportType="include"/>
    <AttributeExport name="SequenceRepresentation" exportType="include"/>
    <AttributeExport name="Values" exportType="ignore"/>
    <RelationExport name="MeasurementQuantity" exportType="embed"
refExportRuleName="MeasurementquantityExport"/>
    <RelationExport name="Submatrix" exportType="ignore"/>
  </ExportRule>
  <!--These are the rules for producing Measurement objects -->
  <ExportRule applicationElementName="Measurement" exportType="include" name="MeasurementInstanceExport">
    <AttributeExport name="Id" exportType="include" exportKey="MeaId"/>
    <AttributeExport name="Name" exportType="include"/>
    <AttributeExport name="StartTime" exportType="include" exportFormat="UTC"/>
    <RelationExport name="Subtest" exportType="embed" refExportRuleName="SubtestExport"/>
    <RelationExport name="MeasurementQuantities" exportType="ignore"/>
    <RelationExport name="Submatrices" exportType="embed"
refExportRuleName="SubmatrixExport"/>
    <RelationExport name="Responsible" exportType="embed" refExportRuleName="UserExport"/>
    <RelationExport name="Process" exportType="embed" refExportRuleName="ProcessExport"/>
  </ExportRule>
</ExportRules>
```

New Features

Example Export Definition File II

```
<ExportRule applicationElementName="Measurement" exportType="include" name="MeasurementExport">
  <AttributeExport name="Id" exportType="include" exportKey="MeaId"/>
  <AttributeExport name="Name" exportType="include" docInfo="the name"/>
  <AttributeExport name="StartTime" exportType="include" exportFormat="UTC"/>
  <RelationExport name="Subtest" exportType="embed" refExportRuleName="SubtestExport"/>
  <RelationExport name="MeasurementQuantities" exportType="embed" refExportRuleName="MeaQ1Export"/>
  <RelationExport name="Submatrices" exportType="ignore"/>
  <RelationExport name="Responsible" exportType="embed" refExportRuleName="UserOnlyExport"/>
  <RelationExport name="Process" exportType="embed" refExportRuleName="ProcessExport"/>
</ExportRule>
<!--These are the rules for producing Measurementquantity objects -->
<ExportRule applicationElementName="Measurementquantity" exportType="include"
name="MeasurementquantityExport">
  <AttributeExport name="Id" exportType="include" exportKey="MeaQuaId"/>
  <AttributeExport name="Name" exportType="include"/>
  <AttributeExport name="Datatype" exportType="include"/>
  <RelationExport name="Measurement" exportType="ignore"/>
  <RelationExport name="LocalColumns" exportType="ignore"/>
  <RelationExport name="Quantity" exportType="embed" refExportRuleName="QuantityExport"/>
  <RelationExport name="Unit" exportType="embed" refExportRuleName="UnitExport"/>
</ExportRule>
<ExportRule applicationElementName="Measurementquantity" exportType="include" name="MeaQ1Export">
  <AttributeExport name="Id" exportType="include" exportKey="MeaQuaId"/>
  <AttributeExport name="Name" exportType="include"/>
  <AttributeExport name="Datatype" exportType="include"/>
  <RelationExport name="Measurement" exportType="ignore"/>
  <RelationExport name="LocalColumns" exportType="ignore"/>
  <RelationExport name="Quantity" exportType="ignore"/>
  <RelationExport name="Unit" exportType="ignore"/>
</ExportRule>
```

New Features

Example JSON File

```
{
  "name": "MeasurementExample01",
  "type": "array", Instance Data Export to Avro and JSON ASAM ODS Big Data Connector Connector Version 1.0.0 25
  "items": {
    "name": "Measurement",
    "type": "record",
    "fields": [
      {
        "name": "ao_element",
        "type": "string"
      },
      {
        "name": "ao_source",
        "type": "string"
      },
      {
        "name": "ao_id",
        "type": "string"
      },
      {
        "name": "ao_iid",
        "type": "string"
      },
      {
        "name": "MeaId",
        "type": [ "null", "long" ]
      },
      {
        "name": "Name",
        "type": [ "null", "string" ]
      }
    ]
  }
}
```

New Features

Example JSON File II

```
{
  "name": "StartTime",
  "type": [ "null", "long" ],
  "logicalType": "timestamp-millis"
},
{
  "name": "Subtest",
  "type": {
    "name": "Subtest",
    "type": "record",
    "fields": [
      {
        "name": "ao_element",
        "type": "string"
      },
      {
        "name": "ao_source",
        "type": "string"
      },
      {
        "name": "ao_id",
        "type": "string"
      },
      {
        "name": "ao_iid",
        "type": "string"
      },
      {
        "name": "SubtestId",
        "type": [ "null", "long" ]
      }
    ]
  }
},
```

...

Backward Compatibility

ASAM ODS 6.1.0 is fully compatible with the previous ODS 6.0.0 standard

Relation to Other Standards

ASAM MDF

- ASAM MDF4 Files can be used as External Reference to be managed by an ODS Mixed Mode Server or by an ATFX File.

Deliverables

Overview

- Specification incl. API description
- Appendix including related documents
- IDL description of API interface
- Definition of the structures for the GOOGLE Protocol Buffers
- Basic data model as step express file
- XML schema files
- Example ATF/ATFX files
- Example Query Code for CORBA Extended Query
- Example Code for HTTP
- Example Export Definition File
- Example Code for BigData Mass Data Export

Deliverables

Base Standard Documentation

- ASAM_ODS_BS-01-15_Introduction_V6-1-0.pdf
- ASAM_ODS_BS-02-15_RelToOthers_V6-1-0.pdf
- ASAM_ODS_BS-03-15_Architecture_V6-1-0.pdf
- ASAM_ODS_BS-04-15_Base_Model_V6-1-0.pdf
- ASAM_ODS_BS-05-15_OO_API_V6-1-0.pdf
- ASAM_ODS_BS-06-15_RPC_API_V6-1-0.pdf
- ASAM_ODS_BS-07-15_ATF_XML_V6-1-0.pdf
- ASAM_ODS_BS-08-15_ATF_CLA_V6-1-0.pdf
- ASAM_ODS_BS-09-15_Physical_Storage_V6-1-0.pdf
- ASAM_ODS_BS-10-15_Mime_Types_V6-1-0.pdf
- ASAM_ODS_BS-11-15_HTTP-API_V6-1-0.pdf
- ASAM_ODS_BS-12-15_TermsDefinitions_V6-1-0.pdf
- ASAM_ODS_BS-13-15_SymbolsAbbrev_V6-1-0.pdf
- ASAM_ODS_BS-14-15_Bibliography_V6-1-0.pdf
- ASAM_ODS_BS-15-15_Appendices_V6-1-0.pdf

Deliverables

Base Standard Model and Interface Definitions

- Model
 - asam35.exp (Step-Express)
 - ODSBaseModel_asam35.xml
- CORBA OO API Interface Definition
 - ods531.idl
- RPC Interface Definition
 - aods.x
- Google Protocol Buffer Definitions
 - ods.proto
 - ods_notification.proto
 - ods_security.proto
 - ODSBaseModel_asam35.protobuf.json
- XML Schema Files
 - ASAM_HDTypes.xsd
 - HelperSchema.xsd
 - ODSBaseModelSpecSchema.xsd
 - Schema.xsd

Deliverables

Associated Standards Documentation

- Noise Vibration Harshness
 - ASAM_ODS_AS_NVH-Model_V1-5-3.pdf
- Calibration
 - ASAM_ODS_AS_Calibration_V1-1-2.pdf
- Geometry
 - ASAM_ODS_AS_Geometry_V1-0-1.pdf
- Workflow
 - ASAM_ODS_AS_Workflow_V1-0-1.pdf
- Bus Data
 - ASAM_ODS_AS_BusData_V1-0-2.pdf
- **Big Data**
 - ASAM_ODS_AS_BigData_V1-0-0.pdf

Deliverables

Example Files

Example ATF Classic File

- Example_ATF_CLA.atf

Example ATFX Files

- Example_AllTypes.atfx
- Example_Geometry.atfx
- Example_Bus.atfx
- Example_BusWithIndex.atfx
- Example_Simple.atfx
- Example_Workflow.atfx
- **Example_CastTypespecs.atfx**
- **Example_CommonTypespecs.atfx**
- **Example_NonNumbers.atfx**

Deliverables

Example Files

Example Code Extended Query CORBA OO API

- ExampleQueryCode.zip

Example Code HTTP API

- ExampleCode_HTTP.zip

Example Export Definition File

- **Example_ExportDefinition_Simple.xml**

Example Code BigData MassDataExport

- **ExampleCode_BigData_MassDataExport.zip**