DAQ Data XML Marshalling

This document describes a mechanism of converting DAQData protocol messages into an XML document.

XML Namespace

The XML namespace for DAQData protocol is:

```
http://www-bd.fnal.gov/2011/daqdata
```

Representation of Data Samples

Each individual *XXXSample* message of the DAQData protocol (e.g., *BinarySample*, *IntegerArraySample*, *StatusSample*) is represented in the XML document as a **<reply>** element with the following attributes and nested elements:

DAQData protocol	XML Document	Example
sample type name	**type** attribute.	`type="DoubleArraySample"`
time field	If an *iso-time* option is set to *true*, the timestamp is rendered in the **time** attribute as a string formatted according to ISO8601 with a millisecond precision; otherwise, the original long integer value goes to the **time** attribute formatted as a decimal number.	`time="20110815T120517.331Z"` `time="11234567809"`
optional **unit** field	If present, the value goes to the **unit** attribute.	`unit="usec"`
optional **format_hint** field	If present, the value goes to the **format_hint** attribute formatted as a decimal number.	`format_hint="5"`
optional **ref_id** field	If present, the value goes into the **ref_id** attribute formatted as a decimal number. It can also be overwritten during the marshalling operation by a new value of any type.	`ref_id="1705"`
value field	A nested element, as described in the next chapter.	
facilityCode field (*StatusSample* only)	**facilityCode** attribute, formatted as a decimal number.	`facilityCode="72"`
errorNumber field (*StatusSample* only)	**errorNumber** attribute, formatted as a decimal number.	`errorNumber="-155"`
optional **message** field (*StatusSample* only)	If present, goes to a text node under a **<message>** child element	`<message>No Such Device</message>`

The **ref_id** field in data samples and the corresponding **ref_id** XML attribute are used to correlate each reply with a certain request. Different clients may prefer to use different pieces of information for the purpose of correlation. For example, an original (unparsed) DRF2 string can be injected into **<reply>** element by the marshaller, to mark which user request this data is associated with.

Multiple replies can be put together inside **<data-set time="...">** element. The **time** attribute describes when this data set was generated by the service provider. It's created depending on a value of the *iso-time* option, similar to the reply's timestamp.

Representation of Values

Primitive Scalars

A value of a primitive scalar type (e.g., integer) is rendered as **<value type="...">** element, under which the formatted value appears as a text node. The **type** attribute describes the value's type name, exactly as specified in the protocol definition. The following table lists all supported types and associated formatting rules:

Protocol Type	Formatting Rules
bool	`true` or `false`.
int16	As a decimal integer.
int32	As a decimal integer.
int64	As a decimal integer.
double	As a floating-point number with a reasonable precision, in either decimal or exponential notation. A *not-a-number* value is rendered as `NaN`; an infinite value is rendered as `Infinity`.
string	As a string in ISO-8859-1 encoding.
binary	As a BASE64-encoded blob.

Example of a primitive scalar values:

```
<value type="int32">2128506</value>

<value type="string">Lorem ipsum dolor sit amet</value>

<value type="bool">true</value>
```

Arrays

A value of an array type is rendered as **<array type="..." size="...">** element, under which the items are listed according to their types. (All array elements, including those of sub-arrays, should be of the same type). A **type** attribute is not included in immediate children of the **<array>** element.

For example,

```
<array size="2" type="double">
    <value>5.3</value>
    <value>-1.1e-16</value>
</array>

<array size="3" type="string">
    <array size="2">
        <value>Excepteur</value>
        <value>sint</value>
    </array>
    <array size="2">
        <value>occaecat</value>
        <value>cupidatat</value>
    </array>
    <array size="2">
        <value>non</value>
        <value>proident</value>
    </array>
</array>

<array size="0" type="int32"/>
```

Structures

A value of a structured type is rendered as **<struct type="...">** element, which includes a certain number of **<field name="...">** sub-element. The **type** attribute describes the structure's type name. Under each **<field>**, the value of that field is rendered according to its type.

For example,

```
<struct type="BasicStatus">
    <field name="on"><value type="bool">true</value></field>
    <field name="positive"><value type="bool">true</value></field>
    <field name="ready"><value type="bool">true</value></field>
```

```
    <field name="remote"><value type="bool">false</value></field>
    <field name="ramp"><value type="bool">true</value></field>
    <field name="text"><value type="string">+..L.</value></field>
    <field name="colors"><value type="string">GBBRB</value></field>
</struct>

<struct type="EsotericStuff">
    <field name="foo">
        <value type="string">Quo voluptas nulla pariatur?</value>
    </field>
    <field name="bar">
        <array size="2" type="int16">
            <value>48</value>
            <value>35</value>
        </array>
    </field>
    <field name="ozz">
        <struct type="Reprehenderit">
            <field name="value"><value type="double">75.3</value></field>
            <field name="units"><value type="string">DegF</value></field>
        </struct>
    </field>
</struct>
```

If a *quiet* option is set to *true*, the marshaller should inhibit **type** attributes that belong to primitive scalar values and arrays (but not replies!) and all **format_hint** attributes.

Example

This is a syntactically valid example of two data points returned in one data set, with original DRF2 strings injected as reference IDs,

```
<data-set iso-time="20110823T13:00:10.405Z">
    <reply ref_id="m:OutTmp" type="DoubleSample" iso-time="20110823T13:00:09.333Z" unit="DegF">
        <value type="double">65.366754</value>
    </reply>
    <reply ref-id="z:array[5:8] type="IntegerArraySample" iso-time="20110823T13:00:05.000Z">
        <array size="4" type="int32">
            <value>12</value>
            <value>34</value>
            <value>56</value>
            <value>78</value>
        </array>
    </reply>
</data-set>
```

This page was changed 05-Aug-2011 14:59:19 CDT by apetrov