

# Reference Manual

## 2.1.1

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# Chapter 1

## The Tango C Language Binding

The Tango C language binding is a reduced C interface which wraps the Tango C++ API. The actual binding only contains the basic query functionality and the basic synchronous reading and writing of commands and attributes.

The API is structured in proxy related functions, command related functions and attribute related functions.

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# Chapter 4

## Module Documentation

### 4.1 Tango C Binding Enumerations

#### 4.1.1 Detailed Description

All enumerations used in the Tango C binding.

#### Enumerations

- enum **TangoDataType** {  
DEV\_VOID = 0, DEV\_BOOLEAN, DEV\_SHORT, DEV\_LONG,  
DEV\_FLOAT, DEV\_DOUBLE, DEV\_USHORT, DEV\_ULONG,  
DEV\_STRING, DEVVAR\_CHARARRAY, DEVVAR\_SHORTARRAY,  
DEVVAR\_LONGARRAY,  
DEVVAR\_FLOATARRAY, DEVVAR\_DOUBLEARRAY, DEVVAR\_-  
USHORTARRAY, DEVVAR\_ULONGARRAY,  
DEVVAR\_STRINGARRAY, DEVVAR\_LONGSTRINGARRAY, DEVVAR\_-  
DOUBLESTRINGARRAY, DEV\_STATE,  
CONST\_DEV\_STRING, DEVVAR\_BOOLEANARRAY, DEV\_UCHAR,  
DEV\_LONG64,  
DEV\_ULONG64, DEVVAR\_LONG64ARRAY, DEVVAR\_-  
ULONG64ARRAY, DEV\_INT,  
DEV\_ENCODED }  
• enum **TangoDevState** {  
ON, OFF, CLOSE, OPEN,  
INSERT, EXTRACT, MOVING, STANDBY,  
FAULT, INIT, RUNNING, ALARM,  
DISABLE, UNKNOWN }  
• enum **AttrQuality** {  
ATTR\_VALID, ATTR\_INVALID, ATTR\_ALARM, ATTR\_CHANGING,  
ATTR\_WARNING }

- enum **AttrWriteType** { **READ**, **READ\_WITH\_WRITE**, **WRITE**, **READ\_WRITE** }
- enum **AttrDataFormat** { **SCALAR**, **SPECTRUM**, **IMAGE** }
- enum **DispLevel** { **OPERATOR**, **EXPERT** }
- enum **ErrSeverity** { **WARN**, **ERR**, **PANIC** }
- enum **DevSource** { **DEV**, **CACHE**, **CACHE\_DEV** }

## 4.1.2 Enumeration Type Documentation

### 4.1.2.1 enum TangoDataType

All available Tango data types.

The list of all available Tango data types. Scalar types and array types.

**Enumerator:**

```

DEV_VOID void
DEV_BOOLEAN bool
DEV_SHORT short
DEV_LONG int (32bits)
DEV_FLOAT float
DEV_DOUBLE double
DEV_USHORT unsigned short
DEV_ULONG unsigned long
DEV_STRING char *
DEVVAR_CHARARRAY array of unsigned char
DEVVAR_SHORTARRAY array of short
DEVVAR_LONGARRAY array of int (32bits)
DEVVAR_FLOATARRAY array of float
DEVVAR_DOUBLEARRAY array of double
DEVVAR_USHORTARRAY array of unsigned short
DEVVAR_ULONGARRAY array of unsigned int (32bits)
DEVVAR_STRINGARRAY array of char *
DEVVAR_LONGSTRINGARRAY array of unsigned int (32bits) followed by an array
    of char *
DEVVAR_DOUBLESTRINGARRAY array of double followed by an array of char *
DEV_STATE TangoDevState enumeration.
CONST_DEV_STRING const char *
DEVVAR_BOOLEANARRAY array of bool
DEV_UCHAR unsigned char
DEV_LONG64 long or long long (64bits)
DEV_ULONG64 unsigned long or unsigned long long (64bits)
DEVVAR_LONG64ARRAY array of long or long long (64bits)
DEVVAR_ULONG64ARRAY array of unsigned long or unsigned long long (64bits)
DEV_INT int (32bits)

```

#### 4.1.2.2 enum TangoDevState

The Tango Device States.

The list of all possible states for Tango devices. Every state is represented with a fixed color on the application level.

**Enumerator:**

- ON** The device is switched ON (green).
- OFF** The device is switched OFF (white).
- CLOSE** The device is CLOSED (white).
- OPEN** The device is OPEN (green).
- INSERT** The device is INSERTED to the beam (white).
- EXTRACT** The device is EXTRACTED from the beam (green).
- MOVING** The device is MOVING or in a state transition (blue).
- STANDBY** The device is STANDBY (yellow).
- FAULT** The device has detected a FAULT (red).
- INIT** The device is INITIALising (beige).
- RUNNING** The device is RUNNING and doing some work (blue).
- ALARM** The device indicates an ALARM (orange).
- DISABLE** The device is DISABLED by an interlock (magenta).
- UNKNOWN** The device lost its connection, the state is UNKNOWN (gray).

#### 4.1.2.3 enum AttrQuality

The attribute quality factor.

The list of all possible attribute data quality factors. Every read attribute data has an assigned quality value to indicate the data validity.

**Enumerator:**

- ATTR\_VALID** The attribute data is VALID.
- ATTR\_INVALID** The attribute data is INVALID.
- ATTR\_ALARM** The attribute indicates an ALARM on the data.
- ATTR\_CHANGING** The attribute value is CHANGING and not stable.
- ATTR\_WARNING** The attribute indicates an WARNING on the data.

#### 4.1.2.4 enum AttrWriteType

The attribute write type.

The list of all possible attribute types. An attribute can be read only, write only or read/write.

**Enumerator:**

- READ** The attribute is read only.
- READ\_WITH\_WRITE** The attribute is of type read with a second write attribute associated.
- WRITE** The attribute is write only.
- READ\_WRITE** The attribute is of type read/write.

#### 4.1.2.5 enum AttrDataFormat

The attribute data format.

The data format of an attribute can be a scalar attribute, a spectrum (1D array) attribute or an image (2D array) attribute.

**Enumerator:**

***SCALAR*** The attribute handles scalar values.

***SPECTRUM*** The attribute handles a spectrum (1D array).

***IMAGE*** The attribute handles an image (2D array).

#### 4.1.2.6 enum DispLevel

The attribute display level.

The attribute might be displayed for expert users only.

**Enumerator:**

***OPERATOR*** Attribute display all users.

***EXPERT*** Attribute display only for expert users.

#### 4.1.2.7 enum ErrSeverity

The error severity level.

A Tango error can indicate three different severity levels.

**Enumerator:**

***WARN*** Warning level.

***ERR*** Error level.

***PANIC*** Real severe Panic level.

#### 4.1.2.8 enum DevSource

The Tango data source.

Data can be read directly from the device or from the polling cache. In the case of `CACHE_DEV`, the data is read from the cache when it is available, otherwise from the device. This is the default setting.

**Enumerator:**

***DEV*** Direct device reading.

***CACHE*** Reading only from polling cache.

***CACHE\_DEV*** Reading from chache or device.

## 4.2 Tango Data Type Related Definitions

### 4.2.1 Detailed Description

Tango data type definitions for the encoded data type, array data types and for long data types. The long data types should be used to avoid the 32/64 bit problem.

#### Data Structures

- struct **TangoDevEncoded**  
*A structure containing a data description string and a pointer to the data buffer.*
- struct **VarBoolArray**  
*A structure containing a pointer to a sequence of boolean values and the number of elements in the sequence.*
- struct **VarCharArray**  
*A structure containing a pointer to a sequence of char values and the number of elements in the sequence.*
- struct **VarShortArray**  
*A structure containing a pointer to a sequence of short values and the number of elements in the sequence.*
- struct **VarUShortArray**  
*A structure containing a pointer to a sequence of unsigned short values and the number of elements in the sequence.*
- struct **VarLongArray**  
*A structure containing a pointer to a sequence of 32 bit long values and the number of elements in the sequence.*
- struct **VarULongArray**  
*A structure containing a pointer to a sequence of 32 bit unsigned long values and the number of elements in the sequence.*
- struct **VarLong64Array**  
*A structure containing a pointer to a sequence of 64 bit long values and the number of elements in the sequence.*
- struct **VarULong64Array**  
*A structure containing a pointer to a sequence of 64 bit unsigned long values and the number of elements in the sequence.*
- struct **VarFloatArray**  
*A structure containing a pointer to a sequence of float values and the number of elements in the sequence.*
- struct **VarDoubleArray**  
*A structure containing a pointer to a sequence of double values and the number of elements in the sequence.*

- struct **VarStringArray**

*A structure containing a pointer to a sequence of strings and the number of elements in the sequence.*

- struct **VarStateArray**

*A structure containing a pointer to a sequence of `TangoDevState` values and the number of elements in the sequence.*

- struct **VarEncodedArray**

*A structure containing a pointer to a sequence of **`TangoDevEncoded`** (p. 51) values and the number of elements in the sequence.*

- struct **VarLongStringArray**

*A structure containing a pointer to a sequence of long and the number of elements in the sequence as well as a pointer to a sequence of strings and the number of elements in the sequence.*

- struct **VarDoubleStringArray**

*A structure containing a pointer to a sequence of double and the number of elements in the sequence as well as a pointer to a sequence of strings and the number of elements in the sequence.*

- struct **TangoDevEncoded**

*A structure containing a data description string and a pointer to the data buffer.*

- struct **VarBoolArray**

*A structure containing a pointer to a sequence of boolean values and the number of elements in the sequence.*

- struct **VarCharArray**

*A structure containing a pointer to a sequence of char values and the number of elements in the sequence.*

- struct **VarShortArray**

*A structure containing a pointer to a sequence of short values and the number of elements in the sequence.*

- struct **VarUShortArray**

*A structure containing a pointer to a sequence of unsigned short values and the number of elements in the sequence.*

- struct **VarLongArray**

*A structure containing a pointer to a sequence of 32 bit long values and the number of elements in the sequence.*

- struct **VarULongArray**

*A structure containing a pointer to a sequence of 32 bit unsigned long values and the number of elements in the sequence.*

- struct **VarLong64Array**

*A structure containing a pointer to a sequence of 64 bit long values and the number of elements in the sequence.*



- struct **VarULong64Array**

*A structure containing a pointer to a sequence of 64 bit unsigned long values and the number of elements in the sequence.*

- struct **VarFloatArray**

*A structure containing a pointer to a sequence of float values and the number of elements in the sequence.*

- struct **VarDoubleArray**

*A structure containing a pointer to a sequence of double values and the number of elements in the sequence.*

- struct **VarStringArray**

*A structure containing a pointer to a sequence of strings and the number of elements in the sequence.*

- struct **VarStateArray**

*A structure containing a pointer to a sequence of *TangoDevState* values and the number of elements in the sequence.*

- struct **VarEncodedArray**

*A structure containing a pointer to a sequence of *TangoDevEncoded* (p. 51) values and the number of elements in the sequence.*

- struct **VarLongStringArray**

*A structure containing a pointer to a sequence of long and the number of elements in the sequence as well as a pointer to a sequence of strings and the number of elements in the sequence.*

- struct **VarDoubleStringArray**

*A structure containing a pointer to a sequence of double and the number of elements in the sequence as well as a pointer to a sequence of strings and the number of elements in the sequence.*

## Typedefs

- typedef int **TangoDevLong**

*A 32 bit long value.*

- typedef unsigned int **TangoDevULong**

*A 32 bit unsigned long value.*

- typedef long long **TangoDevLong64**

*A 64 bit long value.*

- typedef unsigned long long **TangoDevULong64**

*A 64 bit unsigned long value.*

- typedef struct **TangoDevEncoded TangoDevEncoded**

- typedef struct **VarBoolArray VarBoolArray**

- typedef struct **VarCharArray VarCharArray**

- typedef struct **VarShortArray VarShortArray**

- typedef struct **VarUShortArray** VarUShortArray
- typedef struct **VarLongArray** VarLongArray
- typedef struct **VarULongArray** VarULongArray
- typedef struct **VarLong64Array** VarLong64Array
- typedef struct **VarULong64Array** VarULong64Array
- typedef struct **VarFloatArray** VarFloatArray
- typedef struct **VarDoubleArray** VarDoubleArray
- typedef struct **VarStringArray** VarStringArray
- typedef struct **VarStateArray** VarStateArray
- typedef struct **VarEncodedArray** VarEncodedArray
- typedef struct **VarLongStringArray** VarLongStringArray
- typedef struct **VarDoubleStringArray** VarDoubleStringArray

## 4.3 Tango C Binding Data Structures

### 4.3.1 Detailed Description

Data structures used in the Tango C binding.

#### Data Structures

- union **TangoAttributeData**  
*An union of all Tango array data types used for attribute reading and writing.*
- union **TangoCommandData**  
*An union of all Tango scalar and array data types used for command data reading and writing.*
- union **TangoPropertyData**  
*An union of all Tango scalar and array data types used for property reading and writing.*
- struct **CommandData**  
*A structure containing the Tango data type and the command data union to transfer command data to and from a server.*
- struct **AttributeData**  
*A structure containing the scalar Tango data type and the attribute data union to transfer attribute data to and from a server.*
- struct **AttributeDataList**  
*A structure containing a pointer to a sequence of attribute data structures and the number of elements in the sequence.*
- struct **DevFailed**  
*A structure that maps all fields of the `Tango::DevFailed` exception.*
- struct **ErrorStack**  
*A structure containing a pointer to a sequence of error structures and the number of elements in the sequence.*
- struct **CommandInfo**  
*The command info structure contains descriptive command properties.*
- struct **CommandInfoList**  
*A structure containing a pointer to a sequence of command info structures and the number of elements in the sequence.*
- struct **AttributeInfo**  
*The attribute info structure contains descriptive attribute properties.*
- struct **AttributeInfoList**  
*A structure containing a pointer to a sequence of attribute info structures and the number of elements in the sequence.*

- struct **DbDatum**  
*A container structure for the Tango database access.*
- struct **DbData**  
*A structure containing a pointer to a sequence of **DbDatum** (p. 46) structures and the number of elements in the sequence.*
- union **TangoAttributeData**  
*An union of all Tango array data types used for attribute reading and writing.*
- union **TangoCommandData**  
*An union of all Tango scalar and array data types used for command data reading and writing.*
- union **TangoPropertyData**  
*An union of all Tango scalar and array data types used for property reading and writing.*
- struct **CommandData**  
*A structure containing the Tango data type and the command data union to transfer command data to and from a server.*
- struct **AttributeData**  
*A structure containing the scalar Tango data type and the attribute data union to transfer attribute data to and from a server.*
- struct **AttributeDataList**  
*A structure containing a pointer to a sequence of attribute data structures and the number of elements in the sequence.*
- struct **DevFailed**  
*A structure that maps all fields of the `Tango::DevFailed` exception.*
- struct **ErrorStack**  
*A structure containing a pointer to a sequence of error structures and the number of elements in the sequence.*
- struct **CommandInfo**  
*The command info structure contains descriptive command properties.*
- struct **CommandInfoList**  
*A structure containing a pointer to a sequence of command info structures and the number of elements in the sequence.*
- struct **AttributeInfo**  
*The attribute info structure contains descriptive attribute properties.*
- struct **AttributeInfoList**  
*A structure containing a pointer to a sequence of attribute info structures and the number of elements in the sequence.*
- struct **DbDatum**  
*A container structure for the Tango database access.*

- struct **DbData**

*A structure containing a pointer to a sequence of **DbDatum** (p. 46) structures and the number of elements in the sequence.*

## Typedefs

- typedef union **TangoAttributeData** **TangoAttributeData**
- typedef union **TangoCommandData** **TangoCommandData**
- typedef union **TangoPropertyData** **TangoPropertyData**
- typedef struct **CommandData** **CommandData**
- typedef struct **AttributeData** **AttributeData**
- typedef struct **AttributeDataList** **AttributeDataList**
- typedef struct **DevFailed** **DevFailed**
- typedef struct **ErrorStack** **ErrorStack**
- typedef struct **CommandInfo** **CommandInfo**
- typedef struct **CommandInfoList** **CommandInfoList**
- typedef struct **AttributeInfo** **AttributeInfo**
- typedef struct **AttributeInfoList** **AttributeInfoList**
- typedef struct **DbDatum** **DbDatum**
- typedef struct **DbData** **DbData**

## 4.4 Tango Proxy Related Functions

### 4.4.1 Detailed Description

Functions to manipulate a device connection.

#### Functions

- **bool tango\_create\_device\_proxy** (char \*dev\_name, void \*\*proxy, **ErrorStack** \*error)  
*Create the access to a Tango device.*
- **bool tango\_delete\_device\_proxy** (void \*\*proxy, **ErrorStack** \*error)  
*Delete the access to a Tango device.*
- **bool tango\_set\_timeout\_millis** (void \*proxy, int millis, **ErrorStack** \*error)  
*Set the timeout of a device connection.*
- **bool tango\_get\_timeout\_millis** (void \*proxy, int \*millis, **ErrorStack** \*error)  
*Get the timeout of a device connection.*
- **bool tango\_set\_source** (void \*proxy, **DevSource** source, **ErrorStack** \*error)  
*Set the source for data reading.*
- **bool tango\_get\_source** (void \*proxy, **DevSource** \*source, **ErrorStack** \*error)  
*Get the actual source for data reading.*
- **bool tango\_lock** (void \*proxy, **ErrorStack** \*error)  
*Lock a device.*
- **bool tango\_unlock** (void \*proxy, **ErrorStack** \*error)  
*Unlock a device.*
- **bool tango\_is\_locked** (void \*proxy, bool \*is\_locked, **ErrorStack** \*error)  
*Checks the device lock.*
- **bool tango\_is\_locked\_by\_me** (void \*proxy, bool \*is\_locked\_by\_me, **ErrorStack** \*error)  
*Checks whether the device lock is already taken by the caller.*
- **bool tango\_locking\_status** (void \*proxy, char \*\*lock\_status, **ErrorStack** \*error)  
*Get a locking status string.*

### 4.4.2 Function Documentation

#### 4.4.2.1 **bool tango\_create\_device\_proxy** (char \* dev\_name, void \*\* proxy, **ErrorStack** \* error)

Create the access to a Tango device.

**Parameters:**

- ← *dev\_name* The name of the device to connect to.
- *proxy* The pointer to the device handle.
- *error* The error stack of a Tango exception in case of failure.

**Returns:**

false when an failure was detected otherwise true.

**4.4.2.2 bool tango\_delete\_device\_proxy (void \*\* *proxy*, ErrorStack \* *error*)**

Delete the access to a Tango device.

**Parameters:**

- ← *proxy* The pointer to the device handle.
- *error* The error stack of a Tango exception in case of failure.

**Returns:**

false when an failure was detected otherwise true.

**4.4.2.3 bool tango\_set\_timeout\_millis (void \* *proxy*, int *millis*, ErrorStack \* *error*)**

Set the timeout of a device connection.

The timeout value is given in milliseconds.

**Parameters:**

- ← *proxy* The pointer to the device handle.
- ← *millis* The timeout value.
- *error* The error stack of a Tango exception in case of failure.

**Returns:**

false when an failure was detected otherwise true.

**4.4.2.4 bool tango\_get\_timeout\_millis (void \* *proxy*, int \* *millis*, ErrorStack \* *error*)**

Get the timeout of a device connection.

The timeout value is given in milliseconds.

**Parameters:**

- ← *proxy* The pointer to the device handle.
- *millis* The timeout value.
- *error* The error stack of a Tango exception in case of failure.

**Returns:**

false when an failure was detected otherwise true.

#### 4.4.2.5 **bool tango\_set\_source (void \* *proxy*, DevSource *source*, ErrorStack \* *error*)**

Set the source for data reading.

Data can be read from the device or from the polling cache.

##### **Parameters:**

- ← ***proxy*** The pointer to the device handle.
- ← ***source*** The data source to use.
- ***error*** The error stack of a Tango exception in case of failure.

##### **Returns:**

false when an failure was detected otherwise true.

#### 4.4.2.6 **bool tango\_get\_source (void \* *proxy*, DevSource \* *source*, ErrorStack \* *error*)**

Get the actual source for data reading.

Data can be read from the device or from the polling cache.

##### **Parameters:**

- ← ***proxy*** The pointer to the device handle.
- ***source*** The actual data source.
- ***error*** The error stack of a Tango exception in case of failure.

##### **Returns:**

false when an failure was detected otherwise true.

#### 4.4.2.7 **bool tango\_lock (void \* *proxy*, ErrorStack \* *error*)**

Lock a device.

A locked device is protected against the following calls when executed by another client: Command\_inout call, except for device state and status requested via command and for the set of commands defined as allowed following the definition of allowed command in the Tango control access schema, write\_attribute call, write\_read\_attribute call and set\_attribute\_config call

##### **Parameters:**

- ← ***proxy*** The pointer to the device handle.
- ***error*** The error stack of a Tango exception in case of failure.

##### **Returns:**

false when an failure was detected otherwise true.



**4.4.2.8 bool tango\_unlock (void \* *proxy*, ErrorStack \* *error*)**

Unlock a device.

**Parameters:**

- ← *proxy* The pointer to the device handle.
- *error* The error stack of a Tango exception in case of failure.

**Returns:**

false when an failure was detected otherwise true.

**4.4.2.9 bool tango\_is\_locked (void \* *proxy*, bool \* *is\_locked*, ErrorStack \* *error*)**

Checks the device lock.

**Parameters:**

- ← *proxy* The pointer to the device handle.
- *is\_locked* True when locked, otherwise false.
- *error* The error stack of a Tango exception in case of failure.

**Returns:**

false when an failure was detected otherwise true.

**4.4.2.10 bool tango\_is\_locked\_by\_me (void \* *proxy*, bool \* *is\_locked\_by\_me*, ErrorStack \* *error*)**

Checks whether the device lock is already taken by the caller.

**Parameters:**

- ← *proxy* The pointer to the device handle.
- *is\_locked\_by\_me* True when locked by the caller, otherwise false.
- *error* The error stack of a Tango exception in case of failure.

**Returns:**

false when an failure was detected otherwise true.

**4.4.2.11 bool tango\_locking\_status (void \* *proxy*, char \*\* *lock\_status*, ErrorStack \* *error*)**

Get a locking status string.

The status contains detailed information on the process which has taken the lock. Memory for the status string will be allocated and need to be freed.

**Parameters:**

- ← *proxy* The pointer to the device handle.

- *lock\_status* Lock status string.
- *error* The error stack of a Tango exception in case of failure.

**Returns:**

false when an failure was detected otherwise true.

## 4.5 Tango Command Related Functions

### 4.5.1 Detailed Description

Functions to query and execute Tango commands.

#### Functions

- bool **tango\_command\_query** (void \*proxy, char \*cmd\_name, **CommandInfo** \*cmd\_info, **ErrorStack** \*error)  
*Query the descriptive command properties for a given command.*
- bool **tango\_command\_list\_query** (void \*proxy, **CommandInfoList** \*cmd\_info\_list, **ErrorStack** \*error)  
*Query the descriptive command properties for all commands of a device.*
- bool **tango\_command\_inout** (void \*proxy, char \*cmd\_name, **CommandData** \*argin, **CommandData** \*argout, **ErrorStack** \*error)  
*Execute Tango commands with input and output parameters.*
- void **tango\_free\_CommandData** (**CommandData** \*command\_data)  
*Free the allocated command output data.*
- void **tango\_free\_CommandInfo** (**CommandInfo** \*command\_info)  
*Free allocated command information.*
- void **tango\_free\_CommandInfoList** (**CommandInfoList** \*command\_info\_list)  
*Free the list of all allocated command information structures.*

### 4.5.2 Function Documentation

#### 4.5.2.1 bool tango\_command\_query (void \* proxy, char \* cmd\_name, CommandInfo \* cmd\_info, ErrorStack \* error)

Query the descriptive command properties for a given command.

##### Parameters:

- ← **proxy** The pointer to the device handle.
- ← **cmd\_name** The name of the command.
- **cmd\_info** Structure for descriptive command properties.
- **error** The error stack of a Tango exception in case of failure.

##### Returns:

false when an failure was detected otherwise true.

#### 4.5.2.2 `bool tango_command_list_query (void * proxy, CommandInfoList * cmd_info_list, ErrorStack * error)`

Query the descriptive command properties for all commands of a device.

##### Parameters:

- ← *proxy* The pointer to the device handle.
- *cmd\_info\_list* A sequence of structures for descriptive command properties.
- *error* The error stack of a Tango exception in case of failure.

##### Returns:

false when an failure was detected otherwise true.

#### 4.5.2.3 `bool tango_command_inout (void * proxy, char * cmd_name, CommandData * argin, CommandData * argout, ErrorStack * error)`

Ececute Tango commands with input and output parameters.

##### Parameters:

- ← *proxy* The pointer to the device handle.
- ← *cmd\_name* The name of the command.
- ← *argin* The input parameters.
- *argout* The output parameters.
- *error* The error stack of a Tango exception in case of failure.

##### Returns:

false when an failure was detected otherwise true.

#### 4.5.2.4 `void tango_free_CommandData (CommandData * command_data)`

Free the allocated command output data.

##### Parameters:

- ← *command\_data* The command data structure with allocated fields.

#### 4.5.2.5 `void tango_free_CommandInfo (CommandInfo * command_info)`

Free allocated command information.

##### Parameters:

- ← *command\_info* The command info structure with allocated fields.

**4.5.2.6** `void tango_free_CommandInfoList (CommandInfoList *  
command_info_list)`

Free the list of all allocated command information structures.

**Parameters:**

← *command\_info\_list* The sequence of command info structures with allocated fields.

## 4.6 Tango Attribute Related Functions

### 4.6.1 Detailed Description

Functions to query, read and write Tango attributes.

Reading of attribute properties is also possible.

#### Functions

- **bool tango\_get\_attribute\_list** (void \*proxy, **VarStringArray** \*attr\_names, **ErrorStack** \*error)  
*Get the names off all attributes of a device.*
- **bool tango\_get\_attribute\_config** (void \*proxy, **VarStringArray** \*attr\_names, **AttributeInfoList** \*attr\_info\_list, **ErrorStack** \*error)  
*Query the descriptive attribute properties for a list of attributes.*
- **bool tango\_attribute\_list\_query** (void \*proxy, **AttributeInfoList** \*attr\_info\_list, **ErrorStack** \*error)  
*Query the descriptive attribute properties for all attributes of a device.*
- **bool tango\_read\_attribute** (void \*proxy, char \*attr\_name, **AttributeData** \*argout, **ErrorStack** \*error)  
*Read data from one attribute of a device.*
- **bool tango\_write\_attribute** (void \*proxy, **AttributeData** \*argin, **ErrorStack** \*error)  
*Write data to one attribute of a device.*
- **bool tango\_read\_attributes** (void \*proxy, **VarStringArray** \*attr\_names, **AttributeDataList** \*argout, **ErrorStack** \*error)  
*Read data from a list of attributes of a device.*
- **bool tango\_write\_attributes** (void \*proxy, **AttributeDataList** \*argin, **ErrorStack** \*error)  
*Write data to a list of attributes of a device.*
- **void tango\_free\_AttributeData** (**AttributeData** \*attribute\_data)  
*Free the allocated attribute output data.*
- **void tango\_free\_AttributeDataList** (**AttributeDataList** \*attribute\_data\_list)  
*Free the list of allocated attribute data structures.*
- **void tango\_free\_VarStringArray** (**VarStringArray** \*string\_arr)  
*Free the an allocated string array.*
- **void tango\_free\_AttributeInfoList** (**AttributeInfoList** \*attribute\_info\_list)  
*Free the list of all allocated attribute information structures.*

## 4.6.2 Function Documentation

### 4.6.2.1 `bool tango_get_attribute_list (void * proxy, VarStringArray * attr_names, ErrorStack * error)`

Get the names off all attributes of a device.

**Parameters:**

- ← *proxy* The pointer to the device handle.
- *attr\_names* A string array with the attribute names.
- *error* The error stack of a Tango exception in case of failure.

**Returns:**

false when an failure was detected otherwise true.

### 4.6.2.2 `bool tango_get_attribute_config (void * proxy, VarStringArray * attr_names, AttributeInfoList * attr_info_list, ErrorStack * error)`

Query the descriptive attribute properties for a list of attributes.

**Parameters:**

- ← *proxy* The pointer to the device handle.
- ← *attr\_names* The string array with the attribute names.
- *attr\_info\_list* A sequence of structures for descriptive attribute properties.
- *error* The error stack of a Tango exception in case of failure.

**Returns:**

false when an failure was detected otherwise true.

### 4.6.2.3 `bool tango_attribute_list_query (void * proxy, AttributeInfoList * attr_info_list, ErrorStack * error)`

Query the descriptive attribute properties for all attributes of a device.

**Parameters:**

- ← *proxy* The pointer to the device handle.
- *attr\_info\_list* A sequence of structures for descriptive attribute properties.
- *error* The error stack of a Tango exception in case of failure.

**Returns:**

false when an failure was detected otherwise true.

#### 4.6.2.4 `bool tango_read_attribute (void * proxy, char * attr_name, AttributeData * argout, ErrorStack * error)`

Read data from one attribute of a device.

##### Parameters:

- ← *proxy* The pointer to the device handle.
- ← *attr\_name* The attribute name.
- *argout* The read attribute data.
- *error* The error stack of a Tango exception in case of failure.

##### Returns:

false when an failure was detected otherwise true.

#### 4.6.2.5 `bool tango_write_attribute (void * proxy, AttributeData * argin, ErrorStack * error)`

Write data to one attribute of a device.

##### Parameters:

- ← *proxy* The pointer to the device handle.
- ← *argin* The attribute data to be written.
- *error* The error stack of a Tango exception in case of failure.

##### Returns:

false when an failure was detected otherwise true.

#### 4.6.2.6 `bool tango_read_attributes (void * proxy, VarStringArray * attr_names, AttributeDataList * argout, ErrorStack * error)`

Read data from a list of attributes of a device.

##### Parameters:

- ← *proxy* The pointer to the device handle.
- ← *attr\_names* The string array with the attribute names.
- *argout* A sequence of attribute data structures.
- *error* The error stack of a Tango exception in case of failure.

##### Returns:

false when an failure was detected otherwise true.



#### 4.6.2.7 `bool tango_write_attributes (void * proxy, AttributeDataList * argin, ErrorStack * error)`

Write data to a list of attributes of a device.

##### Parameters:

- ← *proxy* The pointer to the device handle.
- ← *argin* A sequence of attribute data structures to be written.
- *error* The error stack of a Tango exception in case of failure.

##### Returns:

false when an failure was detected otherwise true.

#### 4.6.2.8 `void tango_free_AttributeData (AttributeData * attribute_data)`

Free the allocated attribute output data.

##### Parameters:

- ← *attribute\_data* The attribute data structure with allocated fields.

#### 4.6.2.9 `void tango_free_AttributeDataList (AttributeDataList * attribute_data_list)`

Free the list of allocated attribute data structures.

##### Parameters:

- ← *attribute\_data\_list* The sequence of attribute data structures with allocated fields.

#### 4.6.2.10 `void tango_free_VarStringArray (VarStringArray * string_arr)`

Free the an allocated string array.

##### Parameters:

- ← *string\_arr* The allocated string array.

#### 4.6.2.11 `void tango_free_AttributeInfoList (AttributeInfoList * attribute_info_list)`

Free the list of all allocated attribute information structures.

##### Parameters:

- ← *attribute\_info\_list* The sequence of attribute info structures with allocated fields.

## 4.7 Error Handling Related Functions

### 4.7.1 Detailed Description

Functions to print and free a Tango error stack.

#### Functions

- void **tango\_print\_ErrorStack** (**ErrorStack** \*error\_stack)  
*Print an error stack to stdout.*
- void **tango\_free\_ErrorStack** (**ErrorStack** \*error\_stack)  
*Free the data allocated for an error stack in case of a failure.*

### 4.7.2 Function Documentation

#### 4.7.2.1 void tango\_print\_ErrorStack (**ErrorStack** \* error\_stack)

Print an error stack to stdout.

##### Parameters:

← **error\_stack** The error stack of a Tango exception in case of failure.

#### 4.7.2.2 void tango\_free\_ErrorStack (**ErrorStack** \* error\_stack)

Free the data allocated for an error stack in case of a failure.

##### Parameters:

← **error\_stack** The error stack of a Tango exception in case of failure.

## 4.8 Tango Property and Database Related Functions

### 4.8.1 Detailed Description

Functions to query, read and write Tango attributes.

Reading of attribute properties is also possible.

#### Functions

- **bool tango\_create\_database\_proxy** (void \*\*db\_proxy, **ErrorStack** \*error)  
*Create the access to the Tango database.*
- **bool tango\_delete\_database\_proxy** (void \*\*db\_proxy, **ErrorStack** \*error)  
*Delete the access to the Tango database.*
- **bool tango\_get\_device\_exported** (void \*db\_proxy, char \*name\_filter, **DbDatum** \*dev\_list, **ErrorStack** \*error)  
*Get a list of exported devices using a name filter.*
- **bool tango\_get\_device\_exported\_for\_class** (void \*db\_proxy, char \*class\_name, **DbDatum** \*dev\_list, **ErrorStack** \*error)  
*Get a list of exported devices for a given Tango class.*
- **bool tango\_get\_object\_list** (void \*db\_proxy, char \*name\_filter, **DbDatum** \*obj\_list, **ErrorStack** \*error)  
*Get a list of free property objects from the Tango database using a name filter.*
- **bool tango\_get\_object\_property\_list** (void \*db\_proxy, char \*obj\_name, char \*name\_filter, **DbDatum** \*prop\_list, **ErrorStack** \*error)  
*Get a list of property names for a given free property object, using a name filter.*
- **bool tango\_get\_property** (void \*db\_proxy, char \*obj\_name, **DbData** \*prop\_list, **ErrorStack** \*error)  
*Get a list of properties for a given free property object.*
- **bool tango\_put\_property** (void \*db\_proxy, char \*obj\_name, **DbData** \*prop\_list, **ErrorStack** \*error)  
*Put a list of properties for a given free property object.*
- **bool tango\_delete\_property** (void \*db\_proxy, char \*obj\_name, **DbData** \*prop\_list, **ErrorStack** \*error)  
*Delete a list of properties for a given free property object.*
- **bool tango\_get\_device\_property** (void \*dev\_proxy, **DbData** \*prop\_list, **ErrorStack** \*error)  
*Get a list of device properties.*
- **bool tango\_put\_device\_property** (void \*dev\_proxy, **DbData** \*prop\_list, **ErrorStack** \*error)  
*Put a list of device properties.*

- **bool tango\_delete\_device\_property** (void \*dev\_proxy, **DbData** \*prop\_list, **ErrorStack** \*error)  
*Delete a list of device properties.*
- **void tango\_free\_DbDatum** (**DbDatum** \*db\_datum)  
*Free the allocated database data structure.*
- **void tango\_free\_DbData** (**DbData** \*db\_data)  
*Free the list of all allocated database data structures.*

## 4.8.2 Function Documentation

### 4.8.2.1 **bool tango\_create\_database\_proxy** (void \*\* db\_proxy, **ErrorStack** \* error)

Create the access to the Tango database.

The function uses the environment variable “TANGO\_HOST” to determine which instance of the TANGO database to connect to.

#### Parameters:

- **db\_proxy** The pointer to the database handle.
- **error** The error stack of a Tango exception in case of failure.

#### Returns:

false when an failure was detected otherwise true.

### 4.8.2.2 **bool tango\_delete\_database\_proxy** (void \*\* db\_proxy, **ErrorStack** \* error)

Delete the access to the Tango database.

#### Parameters:

- ← **db\_proxy** The pointer to the database handle.
- **error** The error stack of a Tango exception in case of failure.

#### Returns:

false when an failure was detected otherwise true.

### 4.8.2.3 **bool tango\_get\_device\_exported** (void \* db\_proxy, char \* name\_filter, **DbDatum** \* dev\_list, **ErrorStack** \* error)

Get a list of exported devices using a name filter.

The name filter can contain one or more wilcards (\*). Example: sr/\*-pen/\*

#### Parameters:

- ← **db\_proxy** The pointer to the database handle.

- ← *name\_filter* The filter string
- *dev\_list* **DbDatum** (p. 46) structure containing a string array with the list of exported devices.
- *error* The error stack of a Tango exception in case of failure.

**Returns:**

false when an failure was detected otherwise true.

**4.8.2.4** `bool tango_get_device_exported_for_class (void * db_proxy, char * class_name, DbDatum * dev_list, ErrorStack * error)`

Get a list of exported devices for a given Tango class.

**Parameters:**

- ← *db\_proxy* The pointer to the database handle.
- ← *class\_name* The name of the Tango class.
- *dev\_list* **DbDatum** (p. 46) structure containing a string array with the list of exported devices.
- *error* The error stack of a Tango exception in case of failure.

**Returns:**

false when an failure was detected otherwise true.

**4.8.2.5** `bool tango_get_object_list (void * db_proxy, char * name_filter, DbDatum * obj_list, ErrorStack * error)`

Get a list of free property objects from the Tango database using a name filter.

The name filter can contain one or more wilcards (\*). Example: my\*prop/\*

**Parameters:**

- ← *db\_proxy* The pointer to the database handle.
- ← *name\_filter* The filter string
- *obj\_list* **DbDatum** (p. 46) structure containing a string array with the list of free property objects.
- *error* The error stack of a Tango exception in case of failure.

**Returns:**

false when an failure was detected otherwise true.

**4.8.2.6** `bool tango_get_object_property_list (void * db_proxy, char * obj_name, char * name_filter, DbDatum * prop_list, ErrorStack * error)`

Get a list of property names for a given free property object, using a name filter.

**Parameters:**

- ← *db\_proxy* The pointer to the database handle.
- ← *obj\_name* The name of the free property object.
- ← *name\_filter* The property name filter string
- *prop\_list* **DbDatum** (p. 46) structure containing a string array with the list of property names.
- *error* The error stack of a Tango exception in case of failure.

**Returns:**

false when an failure was detected otherwise true.

#### 4.8.2.7 **bool tango\_get\_property (void \* *db\_proxy*, char \* *obj\_name*, DbData \* *prop\_list*, ErrorStack \* *error*)**

Get a list of properties for a given free property object.

**Parameters:**

- ← *db\_proxy* The pointer to the database handle.
- ← *obj\_name* The name of the free property object.
- *prop\_list* A sequence of **DbDatum** (p. 46) structures containing the property names and the returned values.
- *error* The error stack of a Tango exception in case of failure.

**Returns:**

false when an failure was detected otherwise true.

#### 4.8.2.8 **bool tango\_put\_property (void \* *db\_proxy*, char \* *obj\_name*, DbData \* *prop\_list*, ErrorStack \* *error*)**

Put a list of properties for a given free property object.

**Parameters:**

- ← *db\_proxy* The pointer to the database handle.
- ← *obj\_name* The name of the free property object.
- ← *prop\_list* A sequence of **DbDatum** (p. 46) structures containing the properties to write.
- *error* The error stack of a Tango exception in case of failure.

**Returns:**

false when an failure was detected otherwise true.

#### 4.8.2.9 `bool tango_delete_property (void * db_proxy, char * obj_name, DbData * prop_list, ErrorStack * error)`

Delete a list of properties for a given free property object.

##### Parameters:

- ← *db\_proxy* The pointer to the database handle.
- ← *obj\_name* The name of the free property object.
- ← *prop\_list* A sequence of **DbDatum** (p. 46) structures containing the property names to delete.
- *error* The error stack of a Tango exception in case of failure.

##### Returns:

false when an failure was detected otherwise true.

#### 4.8.2.10 `bool tango_get_device_property (void * dev_proxy, DbData * prop_list, ErrorStack * error)`

Get a list of device properties.

The function uses the device handle and not the database handle.

##### Parameters:

- ← *dproxy* The pointer to the device handle.
- *prop\_list* A sequence of **DbDatum** (p. 46) structures containing the property names and the returned values.
- *error* The error stack of a Tango exception in case of failure.

##### Returns:

false when an failure was detected otherwise true.

#### 4.8.2.11 `bool tango_put_device_property (void * dev_proxy, DbData * prop_list, ErrorStack * error)`

Put a list of device properties.

The function uses the device handle and not the database handle.

##### Parameters:

- ← *dproxy* The pointer to the device handle.
- ← *prop\_list* A sequence of **DbDatum** (p. 46) structures containing the properties to write.
- *error* The error stack of a Tango exception in case of failure.

##### Returns:

false when an failure was detected otherwise true.

#### 4.8.2.12 `bool tango_delete_device_property (void * dev_proxy, DbData * prop_list, ErrorStack * error)`

Delete a list of device properties.

The function uses the device handle and not the database handle.

##### Parameters:

- ← *dproxy* The pointer to the device handle.
- ← *prop\_list* A sequence of **DbDatum** (p. 46) structures containing the property names to delete.
- *error* The error stack of a Tango exception in case of failure.

##### Returns:

false when an failure was detected otherwise true.

#### 4.8.2.13 `void tango_free_DbDatum (DbDatum * db_datum)`

Free the allocated database data structure.

##### Parameters:

- ← *db\_datum* The returned database data structure with allocated fields.

#### 4.8.2.14 `void tango_free_DbData (DbData * db_data)`

Free the list of all allocated database data structures.

##### Parameters:

- ← *db\_data* The sequence of returned database data structures with allocated fields.



# Chapter 5

## Data Structure Documentation

### 5.1 AttributeData Struct Reference

#### 5.1.1 Detailed Description

A structure containing the scalar Tango data type and the attribute data union to transfer attribute data to and from a server.

The structure also contains the data dimension, the data quality and a time stamp when the data was acquired.

#### Data Fields

- **TangoDataType data\_type**  
*Tango scalar data type.*
- **TangoAttributeData attr\_data**  
*Union for attribute data.*
- **AttrQuality quality**  
*Data quality factor.*
- **char \* name**  
*Attribute name.*
- **int dim\_x**  
*Data dimension X.*
- **int dim\_y**  
*Data dimension Y.*
- **struct timeval time\_stamp**  
*Time stanp in seconds and milliseconds since epoch.*

## 5.2 AttributeDataList Struct Reference

### 5.2.1 Detailed Description

A structure containing a pointer to a sequence of attribute data structures and the number of elements in the sequence.

#### Data Fields

- unsigned int **length**
- **AttributeData** \* **sequence**

## 5.3 AttributeInfo Struct Reference

### 5.3.1 Detailed Description

The attribute info structure contains descriptive attribute properties.

#### Data Fields

- **char \* name**  
*Attribute name string.*
- **AttrWriteType writable**  
*Attribute type READ, WRITE, READ and WRITE.*
- **AttrDataFormat data\_format**  
*scalar, 1D or 2D data*
- **TangoDataType data\_type**  
*The scalar Tango data type.*
- **int max\_dim\_x**  
*Maximum data size X.*
- **int max\_dim\_y**  
*Maximum data size Y.*
- **char \* description**  
*Attribute description text.*
- **char \* label**  
*Attribute GUI label.*
- **char \* unit**  
*Attribute unit.*
- **char \* standard\_unit**  
*Conversion factor to MKS unit.*
- **char \* display\_unit**  
*Conversion factor to GUI display unit.*
- **char \* format**  
*Attribute display format (printf format).*
- **char \* min\_value**  
*Min value, checked when writing to an attribute.*
- **char \* max\_value**  
*Max value, checked when writing to an attribute.*

- **char \* min\_alarm**  
*Min alarm value, checked during state reading.*
- **char \* max\_alarm**  
*Max alarm value, checked during state reading.*
- **char \* writable\_attr\_name**  
*Used only for READ\_ WTH\_ WRITE attributes.*
- **DispLevel disp\_level**  
*operator or expert display*

## 5.4 AttributeInfoList Struct Reference

### 5.4.1 Detailed Description

A structure containing a pointer to a sequence of attribute info structures and the number of elements in the sequence.

#### Data Fields

- unsigned int **length**
- **AttributeInfo \* sequence**

## 5.5 CommandData Struct Reference

### 5.5.1 Detailed Description

A structure containing the Tango data type and the command data union to transfer command data to and from a server.

#### Data Fields

- **TangoDataType** `arg_type`  
*Tango data type.*
- **TangoCommandData** `cmd_data`  
*Union for command data.*

## 5.6 CommandInfo Struct Reference

### 5.6.1 Detailed Description

The command info structure contains descriptive command properties.

#### Data Fields

- **char \* cmd\_name**  
*Command name string.*
- **int cmd\_tag**  
*Command as binary value (for TACO).*
- **int in\_type**  
*in type as binary value*
- **int out\_type**  
*out type as binary value*
- **char \* in\_type\_desc**  
*description of in type (optional)*
- **char \* out\_type\_desc**  
*description of out type (optional)*
- **DispLevel disp\_level**  
*Command display level.*

## 5.7 CommandInfoList Struct Reference

### 5.7.1 Detailed Description

A structure containing a pointer to a sequence of command info structures and the number of elements in the sequence.

#### Data Fields

- unsigned int **length**
- **CommandInfo** \* **sequence**



## 5.8 DbData Struct Reference

### 5.8.1 Detailed Description

A structure containing a pointer to a sequence of **DbDatum** (p. 46) structures and the number of elements in the sequence.

#### Data Fields

- unsigned int **length**
- **DbDatum** \* **sequence**

## 5.9 DbDatum Struct Reference

### 5.9.1 Detailed Description

A container structure for the Tango database access.

All Tango query data and property related data is passed with this structure.

#### Data Fields

- **char \* property\_name**  
*Name of the property.*
- **TangoDataType data\_type**  
*Tango data type.*
- **TangoPropertyData prop\_data**  
*Union for property data.*
- **bool is\_empty**  
*set when no properties available*
- **bool wrong\_data\_type**  
*set when the property value cannot be converted to the given data type*

## 5.10 DevFailed Struct Reference

### 5.10.1 Detailed Description

A structure that maps all fields of the Tango::DevFailed exception.

#### Data Fields

- **char \* desc**  
*Error description.*
- **char \* reason**  
*Error reason.*
- **char \* origin**  
*Error origin (class and method).*
- **ErrSeverity severity**  
*Error severity.*

## 5.11 ErrorStack Struct Reference

### 5.11.1 Detailed Description

A structure containing a pointer to a sequence of error structures and the number of elements in the sequence.

#### Data Fields

- unsigned int **length**
- **DevFailed** \* **sequence**

## 5.12 TangoAttributeData Union Reference

### 5.12.1 Detailed Description

An union of all Tango array data types used for attribute reading and writing.

#### Data Fields

- VarBoolArray bool\_arr
- VarCharArray char\_arr
- VarShortArray short\_arr
- VarUShortArray ushort\_arr
- VarLongArray long\_arr
- VarULongArray ulong\_arr
- VarLong64Array long64\_arr
- VarULong64Array ulong64\_arr
- VarFloatArray float\_arr
- VarDoubleArray double\_arr
- VarStringArray string\_arr
- VarStateArray state\_arr
- VarEncodedArray encoded\_arr

## 5.13 TangoCommandData Union Reference

### 5.13.1 Detailed Description

An union of all Tango scalar and array data types used for command data reading and writing.

#### Data Fields

- bool **bool\_val**
- short **short\_val**
- unsigned short **ushort\_val**
- int **long\_val**
- unsigned int **ulong\_val**
- float **float\_val**
- double **double\_val**
- char \* **string\_val**
- TangoDevState **state\_val**
- TangoDevLong64 **long64\_val**
- TangoDevULong64 **ulong64\_val**
- VarBoolArray **bool\_arr**
- VarCharArray **char\_arr**
- VarShortArray **short\_arr**
- VarUShortArray **ushort\_arr**
- VarLongArray **long\_arr**
- VarULongArray **ulong\_arr**
- VarLong64Array **long64\_arr**
- VarULong64Array **ulong64\_arr**
- VarFloatArray **float\_arr**
- VarDoubleArray **double\_arr**
- VarStringArray **string\_arr**
- VarStateArray **state\_arr**
- TangoDevEncoded **encoded\_val**
- VarLongStringArray **long\_string\_arr**
- VarDoubleStringArray **double\_string\_arr**

## 5.14 TangoDevEncoded Struct Reference

### 5.14.1 Detailed Description

A structure containing a data description string and a pointer to the data buffer.

#### Data Fields

- char \* **encoded\_format**
- unsigned int **encoded\_length**
- unsigned char \* **encoded\_data**

## 5.15 TangoPropertyData Union Reference

### 5.15.1 Detailed Description

An union of all Tango scalar and array data types used for property reading and writing.

#### Data Fields

- bool **bool\_val**
- unsigned char **char\_val**
- short **short\_val**
- unsigned short **ushort\_val**
- int **long\_val**
- unsigned int **ulong\_val**
- float **float\_val**
- double **double\_val**
- char \* **string\_val**
- **TangoDevLong64** **long64\_val**
- **TangoDevULong64** **ulong64\_val**
- **VarShortArray** **short\_arr**
- **VarUShortArray** **ushort\_arr**
- **VarLongArray** **long\_arr**
- **VarULongArray** **ulong\_arr**
- **VarLong64Array** **long64\_arr**
- **VarULong64Array** **ulong64\_arr**
- **VarFloatArray** **float\_arr**
- **VarDoubleArray** **double\_arr**
- **VarStringArray** **string\_arr**



## 5.16 VarBoolArray Struct Reference

### 5.16.1 Detailed Description

A structure containing a pointer to a sequence of boolean values and the number of elements in the sequence.

#### Data Fields

- unsigned int **length**
- bool \* **sequence**

## 5.17 VarCharArray Struct Reference

### 5.17.1 Detailed Description

A structure containing a pointer to a sequence of char values and the number of elements in the sequence.

#### Data Fields

- unsigned int **length**
- unsigned char \* **sequence**

## 5.18 VarDoubleArray Struct Reference

### 5.18.1 Detailed Description

A structure containing a pointer to a sequence of double values and the number of elements in the sequence.

#### Data Fields

- unsigned int **length**
- double \* **sequence**

## 5.19 VarDoubleStringArray Struct Reference

### 5.19.1 Detailed Description

A structure containing a pointer to a sequence of double and the number of elements in the sequence as well as a pointer to a sequence of strings and the number of elements in the sequence.

#### Data Fields

- unsigned int **double\_length**
- double \* **double\_sequence**
- unsigned int **string\_length**
- char \*\* **string\_sequence**

## 5.20 VarEncodedArray Struct Reference

### 5.20.1 Detailed Description

A structure containing a pointer to a sequence of **TangoDevEncoded** (p. 51) values and the number of elements in the sequence.

#### Data Fields

- unsigned int **length**
- **TangoDevEncoded** \* **sequence**

## 5.21 VarFloatArray Struct Reference

### 5.21.1 Detailed Description

A structure containing a pointer to a sequence of float values and the number of elements in the sequence.

#### Data Fields

- unsigned int **length**
- float \* **sequence**

## 5.22 VarLong64Array Struct Reference

### 5.22.1 Detailed Description

A structure containing a pointer to a sequence of 64 bit long values and the number of elements in the sequence.

#### Data Fields

- unsigned int **length**
- **TangoDevLong64** \* **sequence**

## 5.23 VarLongArray Struct Reference

### 5.23.1 Detailed Description

A structure containing a pointer to a sequence of 32 bit long values and the number of elements in the sequence.

#### Data Fields

- unsigned int **length**
- **TangoDevLong** \* **sequence**



## 5.24 VarLongStringArray Struct Reference

### 5.24.1 Detailed Description

A structure containing a pointer to a sequence of long and the number of elements in the sequence as well as a pointer to a sequence of strings and the number of elements in the sequence.

#### Data Fields

- unsigned int **long\_length**
- **TangoDevLong \*** **long\_sequence**
- unsigned int **string\_length**
- char \*\* **string\_sequence**

## 5.25 VarShortArray Struct Reference

### 5.25.1 Detailed Description

A structure containing a pointer to a sequence of short values and the number of elements in the sequence.

#### Data Fields

- unsigned int **length**
- short \* **sequence**

## 5.26 VarStateArray Struct Reference

### 5.26.1 Detailed Description

A structure containing a pointer to a sequence of TangoDevState values and the number of elements in the sequence.

#### Data Fields

- unsigned int **length**
- **TangoDevState \* sequence**

## 5.27 VarStringArray Struct Reference

### 5.27.1 Detailed Description

A structure containing a pointer to a sequence of strings and the number of elements in the sequence.

#### Data Fields

- unsigned int **length**
- char \*\* **sequence**

## 5.28 VarULong64Array Struct Reference

### 5.28.1 Detailed Description

A structure containing a pointer to a sequence of 64 bit unsigned long values and the number of elements in the sequence.

#### Data Fields

- unsigned int **length**
- **TangoDevULong64** \* **sequence**

## 5.29 VarULongArray Struct Reference

### 5.29.1 Detailed Description

A structure containing a pointer to a sequence of 32 bit unsigned long values and the number of elements in the sequence.

#### Data Fields

- unsigned int **length**
- **TangoDevULong \* sequence**

## 5.30 VarUShortArray Struct Reference

### 5.30.1 Detailed Description

A structure containing a pointer to a sequence of unsigned short values and the number of elements in the sequence.

#### Data Fields

- unsigned int **length**
- unsigned short \* **sequence**

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