

HDB++

Design and implementation

Draft

Summary

The HDB++ is a novel TANGO device server for Historical Data Base (HDB) archiving. It's written in C++ and is fully event-driven.

Keywords

TANGO Device Server, Historical Data Base, HDB, Archiving, C++

Notes

No notes so far.

Contributions

R. Bourtembourg, J.M. Chaize, F.Poncet, J.L. Pons, P.Verdier - ESRF
C.Scafuri, G.Scalamera, G.Strangolino, L.Zambon - ELETTRA

Revisions

Date	Rev.	Author	
2012-12-04	1.0	L.Pivetta	First release
2013-01-29	1.1	L.Pivetta	Merged suggestions from ESRF
2013-01-31	1.2	L.Pivetta	Cleanup
2013-05-10	1.3	L.Pivetta	Revision after HDB++ meeting on 2013.03.14
2014-01-30	1.4	L.Pivetta	Configuration Manager details + Extraction library
2014-03-07	1.5	L.Pivetta	Database interface
2014-05-05	1.6	L.Pivetta	Cleanup, full ES and CM doc
2014-07-28	1.7	L.Pivetta	Revision after HDB++ meeting on 2014.06.25
2016-08-12	1.8	L.Pivetta	Revision after HDB++ meeting on 2016.05.10

Contents

1	Historical Database	5
2	HDB++ TANGO Device Server	6
3	Event Subscriber	7
3.1	Event Subscriber interface	9
3.1.1	Commands	9
3.1.2	Attributes	10
3.1.3	Class properties	11
3.1.4	Device properties	12
4	Configuration Manager	13
4.1	Configuration Manager interface	13
4.1.1	Commands	14
4.1.2	Attributes	14
4.1.3	Class properties	15
4.1.4	Device properties	16
5	Configuration and diagnostic tools	17
6	Database interface	18
6.1	HDB++ database structure	18
7	Deployment best practices	21
8	Data Extraction	22
9	General remarks	23
10	Project references and source code	24
A	Legacy HDB tables structure	25
B	HDB++ tables SQL source	27
C	Event Subscriber full documentation	42
D	Configuration Manager full documentation	71

List of Tables

1	Context default labels.	8
2	Event Subscriber Commands.	9
3	Event Subscriber Attributes.	10
4	Event Subscriber Class properties.	11
5	LibConfiguration parameters for MySQL.	11
6	HdbppContext enum default values.	11
7	Event Subscriber Device properties.	12
8	AttributeList example.	12
9	Configuration Manager Commands.	14
10	Configuration Manager Attributes.	15
11	Event Subscriber Class properties.	15
12	Configuration Manager device properties.	16
13	Available database interfacement libraries.	18
14	Database setup scripts.	18
15	Supported data types.	20

Draft

1 Historical Database

The TANGO Historical Database is a tool that allows to store the values of TANGO Attributes into a database. The TANGO core implements an event-based interface to allow TANGO device servers to publish the data to be archived. The **archive** event can be triggered by two mechanisms:

- `delta_change`: the attribute value changed *significantly*
- `periodic`: at a fixed periodic interval

The configuration parameters of each attribute, i.e. polling period, delta change thresholds, archiving period, are defined as properties in the TANGO database. In addition the archive event can be manually pushed from the device server code.

For additional information concerning the TANGO event subsystem please refer to *The TANGO Control System Manual Version 9.2*.

Draft

2 HDB++ TANGO Device Server

The HDB++ architecture is composed by several TANGO device servers. More in detail, at least one, but actually many, Event Subscriber TANGO device server jointly with one Configuration Manager TANGO device server and one or more Data Extraction TANGO device servers for each TANGO domain are foreseen.

Draft

3 Event Subscriber

The Event Subscriber TANGO device server, also called archiver device server, will subscribe to archive events on request by the Configuration Manager. The Event Subscriber will be able to start archiving all the already configured events even if the Configuration Manager is not running. The Event Subscriber device server must have the following characteristics:

1. the archiving mechanism is event-based, thus the device server tries to subscribe to the event; an error means a fault. A transparent re-subscription to the faulty event is required.
2. one additional thread is in charge of events subscription and call-back execution; the call back, acting as producer, must put the complete data of the received events in a FIFO queue; the thread and the callback must be able to handle an *arbitrary* number of events, possibly limited just by the available memory and/or the required performances; moreover, a high-mark threshold must be setup on the FIFO in order to alert for an overloaded Event Subscriber
3. one additional thread, acting as consumer of the FIFO, is in charge of pushing the data into the database, preserving the event data time stamp too; the code to access the database engine shall be structured to allow the use of different back-ends (MySQL, Oracle, etc...)
4. the device server methods, commands and attributes, must allow to perform the following per-instance operations:
 - start the archiving for all attributes
 - stop the archiving for all attributes
 - start the archiving for one attribute
 - stop the archiving for one attribute
 - read the number of attributes in charge
 - read the list of attributes in charge
 - read the configuration parameters of each attribute
 - read the number of working attributes
 - read the list of working attributes
 - read the number of faulty attributes
 - read the list of faulty attributes with diagnostics
 - read the size of the FIFO queue
 - read the number of attributes pending in the FIFO
 - read the list of attributes pending in the FIFO

The list of attributes in charge of each Event Subscriber is stored in the TANGO database as property of the Event Subscriber device server.

The Event Subscriber device server must be able to run and report on the working/faulty attributes/events by means of the standard API (commands and/or attributes) without the need of a graphical interface.

The diagnostics of faults could also be stored in the general info about each attribute; the diagnostics are used by the HDB++ Device Server itself to detect that some data is not being stored as requested. Moreover, whenever the archive event period for a given Attribute has been configured, the Event Subscriber TANGO device server checks that at least the one archive event/period is received; if not, a timeout-on-periodic-event error is raised and the Attribute marked as faulty (NOK).

Stopping the archiving of an attribute does not persist after a restart, i.e. restarting an Event Subscriber device server instance triggers the archiving of *all* configured attributes. A property can be setup not to start archiving at Event Subscriber startup (see 3.1.3 and 3.1.4).

One NULL value with time stamp is inserted whenever the archiving of an attribute is stopped, due to error or by a specific stop command. Moreover, if an error occurred, the corresponding attribute is marked as faulty in the archiving engine and the error description stored. In case the archiving was suspended due to error, it is automatically resumed when good data is available again. The quality factor of the attribute is also stored into the historical database. One or more alarms could be configured in the TANGO Alarm System to asynchronously inform about the status of the archiving device server.

Some of the attribute configuration parameters, such as *display-unit*, *format-string* and *label* will also be available in the HDB++ and updated by means of the attribute configuration change event.

A mechanism to specify per-attribute archiving strategies, called context, has been defined and added to the HDB++. The syntax of the AttributeList Property has been modified to support a *name=value* syntax for the context, except for the Attribute name; fields are separated by semicolon. Keeping the current syntax for the attribute field allows for unchanged backwards compatibility:

```
tango://srv-tango-srf.fcs.elettra.trieste.it:20000/eos/climate/18b20_eos.01/State;context=RUN|SHUTDOWN
```

The labels for the context, implemented as enum, are defined in a free property, and/or in the class property and/or in the device property, with increasing priority. The default values, as well as the default context, are pre-defined but can be modified by the user. The default values are shown in table 1. Whenever not specified the default context is ALWAYS.

label	value
ALWAYS	0
RUN	1
SHUTDOWN	2
SERVICE	3

Table 1: Context default labels.

A new memorized attribute, named **Context**, written by upper layer logic, tells the archiver about the current context status or rather the required context transition.

The Event Subscriber TANGO device server shall also expose some additional figures of merit such as:

- for each instance, total number of records per time
- for each instance, total number of failures per time

- for each attribute, number of records per time
- for each attribute, number of failures per time
- for each attribute, time stamp of last record

The system can sum these numbers in a counter which can be reset every hours/days/weeks to rank each attribute in term of data rate, error rate etc. This allows preventive maintenance and fine tuning, detecting, for instance, when an attribute is too verbose (e.g. variation threshold below the noise level). These statistics are a key element for qualifying the health of the system. All these attributes will be themselves archived to enable a follow-up versus time.

The Event Subscriber TANGO device server must maintain at least the following operating states:

- **ON**: archiving running, everything works
- **ALARM**: one or more attributes faulty or the FIFO size grows above high-mark threshold
- **FAULT**: all attributes faulty
- **OFF**: archiving stopped

3.1 Event Subscriber interface

More in detail the Event Subscriber device server interface is summarized in table 2 and 3.

3.1.1 Commands

AttributeAdd	add an attribute to archiving; the complete FQDN has to be specified otherwise it is completed by the Event Subscriber using getaddrinfo()
AttributeContext	read the specified attribute current context
AttributePause	pause archiving specified attribute but do not unsubscribe archive event
AttributeRemove	remove an attribute from archiving; the archived data and the attribute archive event configuration are left untouched
AttributeStatus	read attribute status
AttributeStart	start archiving specified attribute
AttributeStop	stop archiving specified attribute, unsubscribe archive event
AttributeUpdate	update context of an already archived attribute
Pause	pause archiving all attributes but do not unsubscribe archive events
Start	start archiving
Stop	stop archiving, unsubscribe all archive events
ResetStatistics	reset Event Subscriber statistics

Table 2: Event Subscriber Commands.

3.1.2 Attributes

AttributeContextList	return the list of attribute contexts
AttributeErrorList	return the list of attribute errors
AttributeEventNumberList	number of events received for each attribute
AttributeFailureFreq	total number of failures per time
AttributeFailureFreqList	per-attribute number of failures per time
AttributeList	return configured attribute list
AttributeMaxPendingNumber	maximum number of attributes waiting to be archived
AttributeMaxProcessingTime	max processing time
AttributeMaxStoreTime	max storing time
AttributeMinProcessingTime	min processing time
AttributeMinStoreTime	min storing time
AttributeNokList	return the list of attribute in error
AttributeNokNumber	number of archived attribute in error
AttributeNumber	number of attributes configured for archiving
AttributeOkList	return the list of attributes not in error
AttributeOkNumber	number of archived attributes not in error
AttributePausedList	list of paused attributes
AttributePausedNumber	number of paused attributes
AttributePendingList	list of attributes waiting to be archived
AttributePendingNumber	number of attributes waiting to be archived
AttributeRecordFreq	total number of records per time
AttributeRecordFreqList	per-attribute number of records per time
AttributeStartedList	list of started attributes
AttributeStartedNumber	number of started attributes
AttributeStoppedList	list of stopped attributes
AttributeStoppedNumber	number of stopped attributes
Context	archiver current context (r/w)
StatisticsResetTime	seconds elapsed since last statistics reset

Table 3: Event Subscriber Attributes.

The class and device properties available for configuration are shown in table 4 and 7. According to TANGO device server design guidelines Device Properties, when defined, override Class properties. Please note that class and device Properties have changed since release 08 of the Event Subscriber TANGO device server.

3.1.3 Class properties

CheckPeriodicTimeoutDelay	delay before timeout when checking periodic events, in seconds
PollingThreadPeriod	default period for polling thread, in seconds
LibConfiguration	configuration parameters for backend support library
HdbppContext	definition of possible archiver operating contexts
DefaultContext	archiver default context
StartArchivingAtStartup	start archiving at Event Subscriber startup
StatisticsTimeWindow	timeslot for statistics in seconds
SubscribeRetryPeriod	retry period for subscribe event, in seconds

Table 4: Event Subscriber Class properties.

The LibConfiguration property contains the following multi-line configuration parameters *host*, *user*, *password*, *dbname*, *port*. Table 5 shows example configuration parameters for MySQL backend.

```
host=svr-log-srf.fcs.elettra.trieste.it
user=hdbarchiver
password=myownpassword
dbname=hdbpp
port=3306
```

Table 5: LibConfiguration parameters for MySQL.

The HdbppContext property contains the enum specifying the possible user-defined operating contexts in the form *number:label*. The default values are:

```
0:ALWAYS
1:RUN
2:SHUTDOWN
3:SERVICE
```

Table 6: HdbppContext enum default values.

3.1.4 Device properties

AttributeList	list of configured attributes
CheckPeriodicTimeoutDelay	delay before timeout when checking periodic events, in seconds
PollingThreadPeriod	default period for polling thread, in seconds
LibConfiguration	configuration parameters for backend support library
HdbppContext	definition of possible archiver operating contexts
DefaultContext	archiver default context
StartArchivingAtStartup	start archiving at Event Subscriber startup
StatisticsTimeWindow	timeslot for statistics
SubscribeRetryPeriod	retry period for subscribe event, in seconds

Table 7: Event Subscriber Device properties.

In addition to the already described Class properties, device Properties comprehend the AttributeList property which contains the list of attributes in charge of the current device. The syntax is *fully-qualified-attribute-name;context=CONTEXT* where *CONTEXT* can be one or a combination of the defined contexts (logic OR). Whenever not specified the DefaultContext specified in the Class property or in the Device Property applies. Table 8 shows some examples:

```
tango://srv-tango-srf.fcs.elettra.trieste.it:20000/eos/climate/18b20_eos.01/State;context=RUN|SHUTDOWN
tango://srv-tango-srf.fcs.elettra.trieste.it:20000/eos/climate/18b20_eos.01/Temperature;context=RUN|SHUTDOWN
tango://srv-tango-srf.fcs.elettra.trieste.it:20000/ctf/diagnostics/ccd_ctf.01/State;context=RUN
tango://srv-tango-srf.fcs.elettra.trieste.it:20000/ctf/diagnostics/ccd_ctf.01/HorProfile;context=RUN
tango://srv-tango-srf.fcs.elettra.trieste.it:20000/ctf/diagnostics/ccd_ctf.01/VerProfile;context=RUN
```

Table 8: AttributeList example.

The first two attributes will be archived in both RUN and SHUTDOWN contexts; the last three only when in RUN.

4 Configuration Manager

In order to address large archiving systems the need to distribute the workload over a large number of threads/processes shows up. A Configuration Manager device server will assist in the operations of adding, editing, moving, deleting an attribute to/from the archiving system. All the configuration parameters, such as polling period, variation thresholds etc., are kept in the TANGO database as properties of the archived attribute. In order to be managed by the Configuration Manager device server each Event Subscriber instance has to be added to the Configuration Manager pool using the ArchiverAdd command.

The Configuration Manager device server shall be able to perform the following operations on the managed Event Subscriber pool:

1. manage the request of archiving a new attribute
 - 1.1 create an entry in the HDB++ if not already done
 - 1.2 setup the attribute's archive event configuration
 - 1.3 assign the new attribute to one of the Event Subscriber device servers
 - following some rules of load balancing
 - to the specified Event Subscriber device server
2. move an attribute from an Event Subscriber device server to another one
3. keep trace of which attribute is assigned to which Event Subscriber
4. start/stop the archiving of an attribute at runtime
5. remove an attribute from archiving

The configuration shall be possible via the Configuration Manager device server API as well as via a dedicated GUI interface; the GUI just use the provided API.

The Configuration Manager may also expose a certain number of attributes to give the status of what is going on:

- total number of Event Subscriber
- total number of working attributes
- total number of faulty attributes
- total number of calls per second

These attributes could be themselves archived to enable a follow up versus time.

4.1 Configuration Manager interface

More in detail the Configuration Manager device server exposes the following interface.

4.1.1 Commands

The commands available in the Configuration Manager are summarized in table 9.

ArchiverAdd	add a new Event Subscriber instance to the archivers list; the instance must have been already created and configured via jive/astor and the device shall be running; as per HDB++ Configuration Manager release 08 adding an Event Subscriber device to an existing instance is not supported
ArchiverRemove	remove an Event Subscriber from the Configuration Manager list; neither the Event Subscriber TANGO device instance nor the attributes configured are removed from the TANGO database
AttributeAdd	add an attribute to archiving
AttributeAssign	assign attribute to Event Subscriber
AttributeGetArchiver	return Event Subscriber in charge of attribute
AttributePause	pause archiving specified attribute
AttributeRemove	remove an attribute from archiving; the archived data and the attribute archive event configuration are left untouched
AttributeSearch	return list of attributes containing input pattern
AttributeStart	start archiving an attribute
AttributeStatus	read attribute archiving status
AttributeStop	stop archiving an attribute
AttributeUpdate	update context of an already archived attribute
Context	set context to all managed archivers
ResetStatistics	reset statistics of Configuration Manager and all Event Subscribers

Table 9: Configuration Manager Commands.

Note that the list of managed Event Subscribers is stored into the ArchiverList device property (see 4.1.4) that is maintained via the ArchiverAdd, ArchiverRemove and Attribute-SetArchiver commands. Therefore in the HDB++ archiving system the Event Subscriber device server instances can also be configured by hand, if required, and run independently.

4.1.2 Attributes

The attributes of the Configuration Manager are summarized in table 10.

ArchiverContext	return archiver context
ArchiverList	return list of managed archivers
ArchiverStatisticsResetTime	seconds elapsed since last statistics reset
ArchiverStatus	return archiver status information
AttributeFailureFreq	total number of failures per time
AttributeMaxPendingNumber	max number of attributes waiting to be archived (all archivers)
AttributeMaxProcessingTime	max processing time (all archivers)
AttributeMaxStoreTime	max storing time (all archivers)
AttributeMinProcessingTime	min processing time (all archivers)
AttributeMinStoreTime	min storing time (all archivers)
AttributeNokNumber	total number of archived attribute in error
AttributeNumber	total number of attributes configured for archiving
AttributeOkNumber	total number of archived attribute not in error
AttributePausedNumber	total number of paused attributes
AttributePendingNumber	total number of attributes waiting to be archived
AttributeRecordFreq	total number of records per time
AttributeStartedNumber	total number of started attributes
AttributeStoppedNumber	total number of stopped attributes
SetAbsoluteEvent	set archive absolute thresholds; for archiving setup
SetArchiver	support attribute for setup
SetAttributeName	support attribute for setup
SetCodePushedEvent	specify event pushed in the code
SetContext	set archiving context; for archiving setup
SetPeriodEvent	set archive period; for archiving setup
SetPollingPeriod	set polling period; for archiving setup
SetRelativeEvent	set archive relative thresholds; for archiving setup
SetTTL	set time-to-live for temporary storage; for archiving setup

Table 10: Configuration Manager Attributes.

The SetXxxYyy attributes are used for archive event and archiver instance configuration setup and must be filled before calling the AttributeAdd command. The AttributeAdd checks the consistency of the desired event configuration and then adds the new attribute to the archiver instance specified with SetArchiver. Then the AttributeAdd command creates the required entries into the historical database.

4.1.3 Class properties

LibConfiguration	configuration parameters for backend support library
MaxSearchSize	max size for AttributeSearch result

Table 11: Event Subscriber Class properties.

4.1.4 Device properties

ArchiverList	list of existing archivers
LibConfiguration	configuration parameters for backend support library
MaxSearchSize	max size for AttributeSearch result

Table 12: Configuration Manager device properties.

Draft

5 Configuration and diagnostic tools

With all the statistics kept in the Event Subscriber device servers and the Configuration Manager device server, the diagnostic tool can be straightforward to develop as a simple QTango or ATK GUI. This GUI will also give read access to the configuration data stored as attribute properties in the TANGO database to display the attribute polling frequency of the involved device servers, whenever available, and the archive event configuration. The HDB++ Configurator GUI is available for archiving configuration, management and diagnostics. It is written in Java. Refer to the documentation page for any additional information:

http://www.esrf.eu/computing/cs/tango/tango_doc/tools_doc/hdb++-configurator/index.html

Draft

6 Database interface

A C++ API will be developed to address the writing and reading operations on the database and made available as a library. This library will provide the *essential* methods for accessing the database. The Event Subscriber, the Configuration Manager, the Data Extraction device servers, library and tools will eventually take advantage of the library. Actually a number of libraries are already available to encapsulate database access decouple the back-end:

<i>libhdb++</i>	:	HDB++ abstraction layer
<i>libhdb++mysql</i>	:	HDB++ table support, MySQL back-end
<i>libhdb++cassandra</i>	:	HDB++ table support, Cassandra back-end
<i>libhdbmysql</i>	:	legacy HDB table support, MySQL back-end

Table 13: Available database interfacement libraries.

Additional libraries are foreseen to support different database engines, such as Oracle, Postgres or possibly noSQL implementations.

6.1 HDB++ database structure

The structure of the legacy HDB is based on three tables, (*adt*, *amt*, *apt*) shown in appendix A. In addition, one table, named *att_xxxxx* is created for each attribute or command to be archived. Many of the columns in the legacy tables are used for storing HDB archiving engine configuration parameters and are no more required.

The new database structure, whose tables have been designed for the HDB++ archiver, provides just the necessary columns and takes advantage of μ s resolution support for day-time. Three SQL scripts are provided to create the necessary database structure for MySQL or Cassandra backend:

<i>create_hdb_mysql.sql</i>	:	legacy HDB MySQL schema
<i>create_hdb++_mysql.sql</i>	:	HDB++ MySQL schema
<i>create_hdb_cassandra.sql</i>	:	HDB++ Cassandra schema

Table 14: Database setup scripts.

The *att_conf* table associates the attribute name with a unique id and selects the data type; it's worth notice that the *att_name* raw always contains the complete FQDN, e.g. with the hostname and the domainname.

```
mysql> desc att_conf;
```

Field	Type	Null	Key	Default	Extra
<i>att_conf_id</i>	int(10) unsigned	NO	PRI	NULL	auto_increment
<i>att_name</i>	varchar(255)	NO	UNI	NULL	
<i>att_conf_data_type_id</i>	int(10) unsigned	NO	MUL	NULL	
<i>att_ttl</i>	int(10) unsigned	YES		NULL	
<i>facility</i>	varchar(255)	NO			
<i>domain</i>	varchar(255)	NO			
<i>family</i>	varchar(255)	NO			
<i>member</i>	varchar(255)	NO			
<i>name</i>	varchar(255)	NO			

The *att_conf_data_type* table creates an unique ID for each TANGO data type.

```
mysql> desc att_conf_data_type;
```

Field	Type	Null	Key	Default	Extra
att_conf_data_type_id	int(10) unsigned	NO	PRI	NULL	auto_increment
data_type	varchar(255)	NO		NULL	
tango_data_type	tinyint(1)	NO		NULL	

The *att_history* table stores the timestamps relevant for archiving diagnostics together with the *att_history_event*. The complete list of supported TANGO data types is shown in table 15. As an example the table *att_scalar_devlong_rw*, for archiving one long-size read/write value, is also shown below. Three timestamp rows are currently supported: the datum timestamp, the receive time timestamp and the database insertion timestamp.

```
mysql> desc att_history;
```

Field	Type	Null	Key	Default	Extra
att_conf_id	int(10) unsigned	NO	MUL	NULL	
time	datetime(6)	NO		NULL	
att_history_event_id	int(10) unsigned	NO	MUL	NULL	

```
mysql> desc att_history_event;
```

Field	Type	Null	Key	Default	Extra
att_history_event_id	int(10) unsigned	NO	PRI	NULL	auto_increment
event	varchar(255)	NO		NULL	

```
mysql> desc att_scalar_devlong_rw;
```

Field	Type	Null	Key	Default	Extra
att_conf_id	int(10) unsigned	NO	MUL	NULL	
data_time	timestamp(6)	NO		0000-00-00 00:00:00.000000	
recv_time	timestamp(6)	NO		0000-00-00 00:00:00.000000	
insert_time	timestamp(6)	NO		0000-00-00 00:00:00.000000	
value_r	int(11)	YES		NULL	
value_w	int(11)	YES		NULL	
quality	tinyint(1)	YES		NULL	
att_error_desc_id	int(10) unsigned	YES	MUL	NULL	

scalar	vector
att_scalar_devboolean_ro	att_array_devboolean_ro
att_scalar_devboolean_rw	att_array_devboolean_rw
att_scalar_devdouble_ro	att_array_devdouble_ro
att_scalar_devdouble_rw	att_array_devdouble_rw
att_scalar_devencoded_ro	att_array_devencoded_ro
att_scalar_devencoded_rw	att_array_devencoded_rw
att_scalar_devfloat_ro	att_array_devfloat_ro
att_scalar_devfloat_rw	att_array_devfloat_rw
att_scalar_devlong64_ro	att_array_devlong64_ro
att_scalar_devlong64_rw	att_array_devlong64_rw
att_scalar_devlong_ro	att_array_devlong_ro
att_scalar_devlong_rw	att_array_devlong_rw
att_scalar_devshort_ro	att_array_devshort_ro
att_scalar_devshort_rw	att_array_devshort_rw
att_scalar_devstate_ro	att_array_devstate_ro
att_scalar_devstate_rw	att_array_devstate_rw
att_scalar_devstring_ro	att_array_devstring_ro
att_scalar_devstring_rw	att_array_devstring_rw
att_scalar_devuchar_ro	att_array_devuchar_ro
att_scalar_devuchar_rw	att_array_devuchar_rw
att_scalar_devulong64_ro	att_array_devulong64_ro
att_scalar_devulong64_rw	att_array_devulong64_rw
att_scalar_devulong_ro	att_array_devulong_ro
att_scalar_devulong_rw	att_array_devulong_rw
att_scalar_devushort_ro	att_array_devushort_ro
att_scalar_devushort_rw	att_array_devushort_rw
att_scalar_double_ro	att_array_double_ro
att_scalar_double_rw	att_array_double_rw
att_scalar_string_ro	att_array_string_ro
att_scalar_string_rw	att_array_string_rw

Table 15: Supported data types.

To support temporary storage of historical data the att_ttl column has to be added to the att_conf table. The att_ttl defines the time-to-live in hours on a per-attribute basis. Deleting expired data is delegated to the SQL backend; the basic mechanism foreseen is a SQL script run by cron.

The complete SQL source for all the tables is reported in appendix B. The main points can be summarized as:

- μ s timestamp resolution
- no per-attribute additional tables; the number of tables used is fixed and does not depend on the number of archived attributes
- specific data type support
- temporary storage support

7 Deployment best practices

To take full advantage of the high performance and scaling capability of the HDB++ TANGO device server some constraints have to be taken into account. Though a single instance of the HDB++ device server is capable of handling thousands of events per second, the following setup is preferable:

- setup per-subsystem instances of the Event Subscriber device server (homogeneous dedicated archiving)
- possibly separate attributes that have to be archived all the time, e.g. also during maintenance periods, from attributes that are run-centric

Draft

8 Data Extraction

A native tool, available to be run locally, as well as a reworked web interface (E-Giga) are foreseen. A specific library with a dedicated API could be developed to address the extraction and be used into whatever tool may be provided: a TANGO device server, a web interface, a native graphical panel, etc. The Data Extraction library shall be able to deal with event based archived data. The possible lack of data inside the requested time window shall be properly managed:

- returning some *no-data-available* error: in this case the reply contains no data and a *no-data-available* error is triggered. Care must be taken whenever the requirement of getting multiple data simultaneously is foreseen.
- enlarging the time window itself to include some archived data: the requested time interval is enlarged in order to incorporate some archived data. A mechanism shall be provided to notify the client of the modified data set. No fake samples have to be introduced to fill the values in correspondence of the requested timestamps.
- returning the value of the last archived data anyhow: the requested time interval is kept and the last available data sample is returned. The validity of the data is guaranteed when the archiving mechanism is based on archive event on change; care must be taken when using the data in case of periodic event.

Moreover, whenever extracting multiple rows, the Data Extraction library shall allow to select one of the following behaviours:

- return variable length data arrays for each row
- return equal length data arrays for all rows, filling the gaps with the previous data value

A C++ native implementation, as well as a Java implementation, exposing the same API, are foreseen and are currently available. Please refer to the *hdbextractor* reference manual for the C++ implementation

<https://sourceforge.net/p/tango-cs/code/HEAD/tree/archiving/hdb++/hdbextractor>

and the *HDB++ Java Extraction Library* for Java

<http://www.tango-controls.org/community/project-docs/hdbplusplus/hdbplusplus-doc/java-extraction-api>

9 General remarks

Care must be taken to avoid introducing dependencies from libraries not already needed by the TANGO core.

Draft

10 Project references and source code

The HDB++ project page is available on the TANGO Controls web site:

<http://www.tango-controls.org/community/projects/hdbplus/>

The HDB++ source code for the archiving engine as well as the configuration tools, extraction libraries and GUI are available on Sourceforge:

<https://sourceforge.net/p/tango-cs/code/HEAD/tree/archiving/hdb++/>

Draft

A Legacy HDB tables structure

```
mysql> describe adt;
```

Field	Type	Null	Key	Default	Extra
ID	smallint(5) unsigned zerofill	NO	PRI	NULL	auto_increment
time	datetime	YES		NULL	
full_name	varchar(200)	NO	PRI		
device	varchar(150)	NO			
domain	varchar(35)	NO			
family	varchar(35)	NO			
member	varchar(35)	NO			
att_name	varchar(50)	NO			
data_type	tinyint(1)	NO		0	
data_format	tinyint(1)	NO		0	
writable	tinyint(1)	NO		0	
max_dim_x	smallint(6) unsigned	NO		0	
max_dim_y	smallint(6) unsigned	NO		0	
levelg	tinyint(1)	NO		0	
facility	varchar(45)	NO			
archivable	tinyint(1)	NO		0	
substitute	smallint(9)	NO		0	

```
mysql> describe amt;
```

Field	Type	Null	Key	Default	Extra
ID	smallint(5) unsigned zerofill	NO		00000	
archiver	varchar(255)	NO			
start_date	datetime	YES		NULL	
stop_date	datetime	YES		NULL	
per_mod	int(1)	NO		0	
per_per_mod	int(5)	YES		NULL	
abs_mod	int(1)	NO		0	
per_abs_mod	int(5)	YES		NULL	
dec_del_abs_mod	double	YES		NULL	
gro_del_abs_mod	double	YES		NULL	
rel_mod	int(1)	NO		0	
per_rel_mod	int(5)	YES		NULL	
n_percent_rel_mod	double	YES		NULL	
p_percent_rel_mod	double	YES		NULL	
thr_mod	int(1)	NO		0	
per_thr_mod	int(5)	YES		NULL	
min_val_thr_mod	double	YES		NULL	
max_val_thr_mod	double	YES		NULL	
cal_mod	int(1)	NO		0	
per_cal_mod	int(5)	YES		NULL	
val_cal_mod	int(3)	YES		NULL	
type_cal_mod	int(2)	YES		NULL	
algo_cal_mod	varchar(20)	YES		NULL	
dif_mod	int(1)	NO		0	
per_dif_mod	int(5)	YES		NULL	
ext_mod	int(1)	NO		0	
refresh_mode	tinyint(4)	YES		0	

```
mysql> describe apt;
```

```
-----
```

Field	Type	Null	Key	Default	Extra
ID	int(5) unsigned zerofill	NO	PRI	00000	
time	datetime	YES		NULL	
description	varchar(255)	NO			
label	varchar(64)	NO			
unit	varchar(64)	NO		1	
standard_unit	varchar(64)	NO		1	
display_unit	varchar(64)	NO			
format	varchar(64)	NO			
min_value	varchar(64)	NO		0	
max_value	varchar(64)	NO		0	
min_alarm	varchar(64)	NO		0	
max_alarm	varchar(64)	NO		0	

Draft

B HDB++ tables SQL source

```

CREATE TABLE IF NOT EXISTS att_conf
(
att_conf_id INT UNSIGNED NOT NULL AUTO_INCREMENT PRIMARY KEY,
att_name VARCHAR(255) UNIQUE NOT NULL,
att_conf_data_type_id INT UNSIGNED NOT NULL,
att_ttl INT UNSIGNED NULL DEFAULT NULL,
facility VARCHAR(255) NOT NULL DEFAULT '',
domain VARCHAR(255) NOT NULL DEFAULT '',
family VARCHAR(255) NOT NULL DEFAULT '',
member VARCHAR(255) NOT NULL DEFAULT '',
name VARCHAR(255) NOT NULL DEFAULT '',
INDEX(att_conf_data_type_id)
) ENGINE=MyISAM COMMENT='Attribute Configuration Table';

DROP TABLE att_conf_data_type;
CREATE TABLE IF NOT EXISTS att_conf_data_type
(
att_conf_data_type_id INT UNSIGNED NOT NULL AUTO_INCREMENT PRIMARY KEY,
data_type VARCHAR(255) NOT NULL,
tango_data_type TINYINT(1) NOT NULL
) ENGINE=MyISAM COMMENT='Attribute types description';

INSERT INTO att_conf_data_type (data_type, tango_data_type) VALUES
('scalar_devboolean_ro', 1),('scalar_devboolean_rw', 1),('array_devboolean_ro', 1),
('array_devboolean_rw', 1),('scalar_devuchar_ro', 22),('scalar_devuchar_rw', 22),
('array_devuchar_ro', 22),('array_devuchar_rw', 22),('scalar_devshort_ro', 2),
('scalar_devshort_rw', 2),('array_devshort_ro', 2),('array_devshort_rw', 2),
('scalar_devushort_ro', 6),('scalar_devushort_rw', 6),('array_devushort_ro', 6),
('array_devushort_rw', 6),('scalar_devlong_ro', 3),('scalar_devlong_rw', 3),
('array_devlong_ro', 3),('array_devlong_rw', 3),('scalar_devulong_ro', 7),
('scalar_devulong_rw', 7),('array_devulong_ro', 7),('array_devulong_rw', 7),
('scalar_devlong64_ro', 23),('scalar_devlong64_rw', 23),('array_devlong64_ro', 23),
('array_devlong64_rw', 23),('scalar_devulong64_ro', 24),('scalar_devulong64_rw', 24),
('array_devulong64_ro', 24),('array_devulong64_rw', 24),('scalar_devfloat_ro', 4),
('scalar_devfloat_rw', 4),('array_devfloat_ro', 4),('array_devfloat_rw', 4),
('scalar_devdouble_ro', 5),('scalar_devdouble_rw', 5),('array_devdouble_ro', 5),
('array_devdouble_rw', 5),('scalar_devstring_ro', 8),('scalar_devstring_rw', 8),
('array_devstring_ro', 8),('array_devstring_rw', 8),('scalar_devstate_ro', 19),
('scalar_devstate_rw', 19),('array_devstate_ro', 19),('array_devstate_rw', 19),
('scalar_devencoded_ro', 28),('scalar_devencoded_rw', 28),('array_devencoded_ro', 28),
('array_devencoded_rw', 28);

CREATE TABLE IF NOT EXISTS att_history
(
att_conf_id INT UNSIGNED NOT NULL,
time TIMESTAMP(6) DEFAULT 0,
att_history_event_id INT UNSIGNED NOT NULL,
INDEX(att_conf_id),
INDEX(att_history_event_id)
) ENGINE=MyISAM COMMENT='Attribute Configuration Events History Table';

DROP TABLE att_history_event;
CREATE TABLE IF NOT EXISTS att_history_event
(
att_history_event_id INT UNSIGNED NOT NULL AUTO_INCREMENT PRIMARY KEY,
event VARCHAR(255) NOT NULL
) ENGINE=MyISAM COMMENT='Attribute history events description';

```

```
INSERT INTO att_history_event (event) VALUES
('add'),('remove'),('start'),('stop'),('crash'),('pause');

CREATE TABLE IF NOT EXISTS att_parameter
(
att_conf_id INT UNSIGNED NOT NULL,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
label VARCHAR(255) NOT NULL DEFAULT '',
unit VARCHAR(64) NOT NULL DEFAULT '',
standard_unit VARCHAR(64) NOT NULL DEFAULT '1',
display_unit VARCHAR(64) NOT NULL DEFAULT '',
format VARCHAR(64) NOT NULL DEFAULT '',
archive_rel_change VARCHAR(64) NOT NULL DEFAULT '',
archive_abs_change VARCHAR(64) NOT NULL DEFAULT '',
archive_period VARCHAR(64) NOT NULL DEFAULT '',
description VARCHAR(1024) NOT NULL DEFAULT '',
INDEX(recv_time),
INDEX(att_conf_id)
) ENGINE=MyISAM COMMENT='Attribute configuration parameters';

CREATE TABLE IF NOT EXISTS att_error_desc
(
att_error_desc_id INT UNSIGNED NOT NULL AUTO_INCREMENT PRIMARY KEY,
error_desc VARCHAR(255) UNIQUE NOT NULL
) ENGINE=MyISAM COMMENT='Error Description Table';

CREATE TABLE IF NOT EXISTS att_scalar_devboolean_ro
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
value_r TINYINT(1) UNSIGNED DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Scalar Boolean ReadOnly Values Table';

CREATE TABLE IF NOT EXISTS att_scalar_devboolean_rw
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
value_r TINYINT(1) UNSIGNED DEFAULT NULL,
value_w TINYINT(1) UNSIGNED DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Scalar Boolean ReadWrite Values Table';

CREATE TABLE IF NOT EXISTS att_array_devboolean_ro
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
```

```
idx INT UNSIGNED NOT NULL,  
dim_x_r INT UNSIGNED NOT NULL,  
dim_y_r INT UNSIGNED NOT NULL DEFAULT 0,  
value_r TINYINT(1) UNSIGNED DEFAULT NULL,  
quality TINYINT(1) DEFAULT NULL,  
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,  
INDEX att_conf_id_data_time (att_conf_id,data_time)  
) ENGINE=MyISAM COMMENT='Array Boolean ReadOnly Values Table';
```

```
CREATE TABLE IF NOT EXISTS att_array_devboolean_rw  
(  
att_conf_id INT UNSIGNED NOT NULL,  
data_time TIMESTAMP(6) DEFAULT 0,  
recv_time TIMESTAMP(6) DEFAULT 0,  
insert_time TIMESTAMP(6) DEFAULT 0,  
idx INT UNSIGNED NOT NULL,  
dim_x_r INT UNSIGNED NOT NULL,  
dim_y_r INT UNSIGNED NOT NULL DEFAULT 0,  
value_r TINYINT(1) UNSIGNED DEFAULT NULL,  
dim_x_w INT UNSIGNED NOT NULL,  
dim_y_w INT UNSIGNED NOT NULL DEFAULT 0,  
value_w TINYINT(1) UNSIGNED DEFAULT NULL,  
quality TINYINT(1) DEFAULT NULL,  
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,  
INDEX att_conf_id_data_time (att_conf_id,data_time)  
) ENGINE=MyISAM COMMENT='Array Boolean ReadWrite Values Table';
```

```
CREATE TABLE IF NOT EXISTS att_scalar_devuchar_ro  
(  
att_conf_id INT UNSIGNED NOT NULL,  
data_time TIMESTAMP(6) DEFAULT 0,  
recv_time TIMESTAMP(6) DEFAULT 0,  
insert_time TIMESTAMP(6) DEFAULT 0,  
value_r TINYINT UNSIGNED DEFAULT NULL,  
quality TINYINT(1) DEFAULT NULL,  
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,  
INDEX att_conf_id_data_time (att_conf_id,data_time)  
) ENGINE=MyISAM COMMENT='Scalar UChar ReadOnly Values Table';
```

```
CREATE TABLE IF NOT EXISTS att_scalar_devuchar_rw  
(  
att_conf_id INT UNSIGNED NOT NULL,  
data_time TIMESTAMP(6) DEFAULT 0,  
recv_time TIMESTAMP(6) DEFAULT 0,  
insert_time TIMESTAMP(6) DEFAULT 0,  
value_r TINYINT UNSIGNED DEFAULT NULL,  
value_w TINYINT UNSIGNED DEFAULT NULL,  
quality TINYINT(1) DEFAULT NULL,  
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,  
INDEX att_conf_id_data_time (att_conf_id,data_time)  
) ENGINE=MyISAM COMMENT='Scalar UChar ReadWrite Values Table';
```

```
CREATE TABLE IF NOT EXISTS att_array_devuchar_ro  
(  
att_conf_id INT UNSIGNED NOT NULL,  
data_time TIMESTAMP(6) DEFAULT 0,  
recv_time TIMESTAMP(6) DEFAULT 0,  
insert_time TIMESTAMP(6) DEFAULT 0,  
idx INT UNSIGNED NOT NULL,
```

```
dim_x_r INT UNSIGNED NOT NULL,
dim_y_r INT UNSIGNED NOT NULL DEFAULT 0,
value_r TINYINT UNSIGNED DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Array UChar ReadOnly Values Table';

CREATE TABLE IF NOT EXISTS att_array_devuchar_rw
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
idx INT UNSIGNED NOT NULL,
dim_x_r INT UNSIGNED NOT NULL,
dim_y_r INT UNSIGNED NOT NULL DEFAULT 0,
value_r TINYINT UNSIGNED DEFAULT NULL,
dim_x_w INT UNSIGNED NOT NULL,
dim_y_w INT UNSIGNED NOT NULL DEFAULT 0,
value_w TINYINT UNSIGNED DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Array UChar ReadWrite Values Table';

CREATE TABLE IF NOT EXISTS att_scalar_devshort_ro
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
value_r SMALLINT DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Scalar Short ReadOnly Values Table';

CREATE TABLE IF NOT EXISTS att_scalar_devshort_rw
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
value_r SMALLINT DEFAULT NULL,
value_w SMALLINT DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Scalar Short ReadWrite Values Table';

CREATE TABLE IF NOT EXISTS att_array_devshort_ro
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
idx INT UNSIGNED NOT NULL,
dim_x_r INT UNSIGNED NOT NULL,
```

```

dim_y_r INT UNSIGNED NOT NULL DEFAULT 0,
value_r SMALLINT DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Array Short ReadOnly Values Table';

```

```

CREATE TABLE IF NOT EXISTS att_array_devshort_rw
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
idx INT UNSIGNED NOT NULL,
dim_x_r INT UNSIGNED NOT NULL,
dim_y_r INT UNSIGNED NOT NULL DEFAULT 0,
value_r SMALLINT DEFAULT NULL,
dim_x_w INT UNSIGNED NOT NULL,
dim_y_w INT UNSIGNED NOT NULL DEFAULT 0,
value_w SMALLINT DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Array Short ReadWrite Values Table';

```

```

CREATE TABLE IF NOT EXISTS att_scalar_devushort_ro
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
value_r SMALLINT UNSIGNED DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Scalar UShort ReadOnly Values Table';

```

```

CREATE TABLE IF NOT EXISTS att_scalar_devushort_rw
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
value_r SMALLINT UNSIGNED DEFAULT NULL,
value_w SMALLINT UNSIGNED DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Scalar UShort ReadWrite Values Table';

```

```

CREATE TABLE IF NOT EXISTS att_array_devushort_ro
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
idx INT UNSIGNED NOT NULL,
dim_x_r INT UNSIGNED NOT NULL,
dim_y_r INT UNSIGNED NOT NULL DEFAULT 0,

```

```

value_r SMALLINT UNSIGNED DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Array UShort ReadOnly Values Table';

```

```

CREATE TABLE IF NOT EXISTS att_array_devushort_rw
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
idx INT UNSIGNED NOT NULL,
dim_x_r INT UNSIGNED NOT NULL,
dim_y_r INT UNSIGNED NOT NULL DEFAULT 0,
value_r SMALLINT UNSIGNED DEFAULT NULL,
dim_x_w INT UNSIGNED NOT NULL,
dim_y_w INT UNSIGNED NOT NULL DEFAULT 0,
value_w SMALLINT UNSIGNED DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Array UShort ReadWrite Values Table';

```

```

CREATE TABLE IF NOT EXISTS att_scalar_devlong_ro
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
value_r INT DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Scalar Long ReadOnly Values Table';

```

```

CREATE TABLE IF NOT EXISTS att_scalar_devlong_rw
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
value_r INT DEFAULT NULL,
value_w INT DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Scalar Long ReadWrite Values Table';

```

```

CREATE TABLE IF NOT EXISTS att_array_devlong_ro
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
idx INT UNSIGNED NOT NULL,
dim_x_r INT UNSIGNED NOT NULL,
dim_y_r INT UNSIGNED NOT NULL DEFAULT 0,
value_r INT DEFAULT NULL,

```



```
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Array Long ReadOnly Values Table';

CREATE TABLE IF NOT EXISTS att_array_devlong_rw
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
idx INT UNSIGNED NOT NULL,
dim_x_r INT UNSIGNED NOT NULL,
dim_y_r INT UNSIGNED NOT NULL DEFAULT 0,
value_r INT DEFAULT NULL,
dim_x_w INT UNSIGNED NOT NULL,
dim_y_w INT UNSIGNED NOT NULL DEFAULT 0,
value_w INT DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Array Long ReadWrite Values Table';

CREATE TABLE IF NOT EXISTS att_scalar_devulong_ro
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
value_r INT UNSIGNED DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Scalar ULong ReadOnly Values Table';

CREATE TABLE IF NOT EXISTS att_scalar_devulong_rw
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
value_r INT UNSIGNED DEFAULT NULL,
value_w INT UNSIGNED DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Scalar ULong ReadWrite Values Table';

CREATE TABLE IF NOT EXISTS att_array_devulong_ro
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
idx INT UNSIGNED NOT NULL,
dim_x_r INT UNSIGNED NOT NULL,
dim_y_r INT UNSIGNED NOT NULL DEFAULT 0,
value_r INT UNSIGNED DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
```

```
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Array ULong ReadOnly Values Table';

CREATE TABLE IF NOT EXISTS att_array_devulong_rw
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
idx INT UNSIGNED NOT NULL,
dim_x_r INT UNSIGNED NOT NULL,
dim_y_r INT UNSIGNED NOT NULL DEFAULT 0,
value_r INT UNSIGNED DEFAULT NULL,
dim_x_w INT UNSIGNED NOT NULL,
dim_y_w INT UNSIGNED NOT NULL DEFAULT 0,
value_w INT UNSIGNED DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Array ULong ReadWrite Values Table';

CREATE TABLE IF NOT EXISTS att_scalar_devlong64_ro
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
value_r BIGINT DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Scalar Long64 ReadOnly Values Table';

CREATE TABLE IF NOT EXISTS att_scalar_devlong64_rw
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
value_r BIGINT DEFAULT NULL,
value_w BIGINT DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Scalar Long64 ReadWrite Values Table';

CREATE TABLE IF NOT EXISTS att_array_devlong64_ro
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
idx INT UNSIGNED NOT NULL,
dim_x_r INT UNSIGNED NOT NULL,
dim_y_r INT UNSIGNED NOT NULL DEFAULT 0,
value_r BIGINT DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
```

```
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Array Long64 ReadOnly Values Table';

CREATE TABLE IF NOT EXISTS att_array_devlong64_rw
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
idx INT UNSIGNED NOT NULL,
dim_x_r INT UNSIGNED NOT NULL,
dim_y_r INT UNSIGNED NOT NULL DEFAULT 0,
value_r BIGINT DEFAULT NULL,
dim_x_w INT UNSIGNED NOT NULL,
dim_y_w INT UNSIGNED NOT NULL DEFAULT 0,
value_w BIGINT DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Array Long64 ReadWrite Values Table';

CREATE TABLE IF NOT EXISTS att_scalar_devulong64_ro
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
value_r BIGINT UNSIGNED DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Scalar ULong64 ReadOnly Values Table';

CREATE TABLE IF NOT EXISTS att_scalar_devulong64_rw
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
value_r BIGINT UNSIGNED DEFAULT NULL,
value_w BIGINT UNSIGNED DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Scalar ULong64 ReadWrite Values Table';

CREATE TABLE IF NOT EXISTS att_array_devulong64_ro
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
idx INT UNSIGNED NOT NULL,
dim_x_r INT UNSIGNED NOT NULL,
dim_y_r INT UNSIGNED NOT NULL DEFAULT 0,
value_r BIGINT UNSIGNED DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
```

```
) ENGINE=MyISAM COMMENT='Array ULong64 ReadOnly Values Table';

CREATE TABLE IF NOT EXISTS att_array_devulong64_rw
(
  att_conf_id INT UNSIGNED NOT NULL,
  data_time TIMESTAMP(6) DEFAULT 0,
  recv_time TIMESTAMP(6) DEFAULT 0,
  insert_time TIMESTAMP(6) DEFAULT 0,
  idx INT UNSIGNED NOT NULL,
  dim_x_r INT UNSIGNED NOT NULL,
  dim_y_r INT UNSIGNED NOT NULL DEFAULT 0,
  value_r BIGINT UNSIGNED DEFAULT NULL,
  dim_x_w INT UNSIGNED NOT NULL,
  dim_y_w INT UNSIGNED NOT NULL DEFAULT 0,
  value_w BIGINT UNSIGNED DEFAULT NULL,
  quality TINYINT(1) DEFAULT NULL,
  att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
  INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Array ULong64 ReadWrite Values Table';

CREATE TABLE IF NOT EXISTS att_scalar_devfloat_ro
(
  att_conf_id INT UNSIGNED NOT NULL,
  data_time TIMESTAMP(6) DEFAULT 0,
  recv_time TIMESTAMP(6) DEFAULT 0,
  insert_time TIMESTAMP(6) DEFAULT 0,
  value_r FLOAT DEFAULT NULL,
  quality TINYINT(1) DEFAULT NULL,
  att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
  INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Scalar Float ReadOnly Values Table';

CREATE TABLE IF NOT EXISTS att_scalar_devfloat_rw
(
  att_conf_id INT UNSIGNED NOT NULL,
  data_time TIMESTAMP(6) DEFAULT 0,
  recv_time TIMESTAMP(6) DEFAULT 0,
  insert_time TIMESTAMP(6) DEFAULT 0,
  value_r FLOAT DEFAULT NULL,
  value_w FLOAT DEFAULT NULL,
  quality TINYINT(1) DEFAULT NULL,
  att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
  INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Scalar Float ReadWrite Values Table';

CREATE TABLE IF NOT EXISTS att_array_devfloat_ro
(
  att_conf_id INT UNSIGNED NOT NULL,
  data_time TIMESTAMP(6) DEFAULT 0,
  recv_time TIMESTAMP(6) DEFAULT 0,
  insert_time TIMESTAMP(6) DEFAULT 0,
  idx INT UNSIGNED NOT NULL,
  dim_x_r INT UNSIGNED NOT NULL,
  dim_y_r INT UNSIGNED NOT NULL DEFAULT 0,
  value_r FLOAT DEFAULT NULL,
  quality TINYINT(1) DEFAULT NULL,
  att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
  INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Array Float ReadOnly Values Table';
```

```
CREATE TABLE IF NOT EXISTS att_array_devfloat_rw
(
  att_conf_id INT UNSIGNED NOT NULL,
  data_time TIMESTAMP(6) DEFAULT 0,
  recv_time TIMESTAMP(6) DEFAULT 0,
  insert_time TIMESTAMP(6) DEFAULT 0,
  idx INT UNSIGNED NOT NULL,
  dim_x_r INT UNSIGNED NOT NULL,
  dim_y_r INT UNSIGNED NOT NULL DEFAULT 0,
  value_r FLOAT DEFAULT NULL,
  dim_x_w INT UNSIGNED NOT NULL,
  dim_y_w INT UNSIGNED NOT NULL DEFAULT 0,
  value_w FLOAT DEFAULT NULL,
  quality TINYINT(1) DEFAULT NULL,
  att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
  INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Array Float ReadWrite Values Table';

CREATE TABLE IF NOT EXISTS att_scalar_devdouble_ro
(
  att_conf_id INT UNSIGNED NOT NULL,
  data_time TIMESTAMP(6) DEFAULT 0,
  recv_time TIMESTAMP(6) DEFAULT 0,
  insert_time TIMESTAMP(6) DEFAULT 0,
  value_r DOUBLE DEFAULT NULL,
  quality TINYINT(1) DEFAULT NULL,
  att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
  INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Scalar Double ReadOnly Values Table';

CREATE TABLE IF NOT EXISTS att_scalar_devdouble_rw
(
  att_conf_id INT UNSIGNED NOT NULL,
  data_time TIMESTAMP(6) DEFAULT 0,
  recv_time TIMESTAMP(6) DEFAULT 0,
  insert_time TIMESTAMP(6) DEFAULT 0,
  value_r DOUBLE DEFAULT NULL,
  value_w DOUBLE DEFAULT NULL,
  quality TINYINT(1) DEFAULT NULL,
  att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
  INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Scalar Double ReadWrite Values Table';

CREATE TABLE IF NOT EXISTS att_array_devdouble_ro
(
  att_conf_id INT UNSIGNED NOT NULL,
  data_time TIMESTAMP(6) DEFAULT 0,
  recv_time TIMESTAMP(6) DEFAULT 0,
  insert_time TIMESTAMP(6) DEFAULT 0,
  idx INT UNSIGNED NOT NULL,
  dim_x_r INT UNSIGNED NOT NULL,
  dim_y_r INT UNSIGNED NOT NULL DEFAULT 0,
  value_r DOUBLE DEFAULT NULL,
  quality TINYINT(1) DEFAULT NULL,
  att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
  INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Array Double ReadOnly Values Table';
```

```
CREATE TABLE IF NOT EXISTS att_array_devdouble_rw
(
  att_conf_id INT UNSIGNED NOT NULL,
  data_time TIMESTAMP(6) DEFAULT 0,
  recv_time TIMESTAMP(6) DEFAULT 0,
  insert_time TIMESTAMP(6) DEFAULT 0,
  idx INT UNSIGNED NOT NULL,
  dim_x_r INT UNSIGNED NOT NULL,
  dim_y_r INT UNSIGNED NOT NULL DEFAULT 0,
  value_r DOUBLE DEFAULT NULL,
  dim_x_w INT UNSIGNED NOT NULL,
  dim_y_w INT UNSIGNED NOT NULL DEFAULT 0,
  value_w DOUBLE DEFAULT NULL,
  quality TINYINT(1) DEFAULT NULL,
  att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
  INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Array Double ReadWrite Values Table';

CREATE TABLE IF NOT EXISTS att_scalar_devstring_ro
(
  att_conf_id INT UNSIGNED NOT NULL,
  data_time TIMESTAMP(6) DEFAULT 0,
  recv_time TIMESTAMP(6) DEFAULT 0,
  insert_time TIMESTAMP(6) DEFAULT 0,
  value_r VARCHAR(16384) DEFAULT NULL,
  quality TINYINT(1) DEFAULT NULL,
  att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
  INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Scalar String ReadOnly Values Table';

CREATE TABLE IF NOT EXISTS att_scalar_devstring_rw
(
  att_conf_id INT UNSIGNED NOT NULL,
  data_time TIMESTAMP(6) DEFAULT 0,
  recv_time TIMESTAMP(6) DEFAULT 0,
  insert_time TIMESTAMP(6) DEFAULT 0,
  value_r VARCHAR(16384) DEFAULT NULL,
  value_w VARCHAR(16384) DEFAULT NULL,
  quality TINYINT(1) DEFAULT NULL,
  att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
  INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Scalar String ReadWrite Values Table';

CREATE TABLE IF NOT EXISTS att_array_devstring_ro
(
  att_conf_id INT UNSIGNED NOT NULL,
  data_time TIMESTAMP(6) DEFAULT 0,
  recv_time TIMESTAMP(6) DEFAULT 0,
  insert_time TIMESTAMP(6) DEFAULT 0,
  idx INT UNSIGNED NOT NULL,
  dim_x_r INT UNSIGNED NOT NULL,
  dim_y_r INT UNSIGNED NOT NULL DEFAULT 0,
  value_r VARCHAR(16384) DEFAULT NULL,
  quality TINYINT(1) DEFAULT NULL,
  att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
  INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Array String ReadOnly Values Table';

CREATE TABLE IF NOT EXISTS att_array_devstring_rw
```

```
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
idx INT UNSIGNED NOT NULL,
dim_x_r INT UNSIGNED NOT NULL,
dim_y_r INT UNSIGNED NOT NULL DEFAULT 0,
value_r VARCHAR(16384) DEFAULT NULL,
dim_x_w INT UNSIGNED NOT NULL,
dim_y_w INT UNSIGNED NOT NULL DEFAULT 0,
value_w VARCHAR(16384) DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Array String ReadWrite Values Table';
```

```
CREATE TABLE IF NOT EXISTS att_scalar_devstate_ro
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
value_r TINYINT UNSIGNED DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Scalar State ReadOnly Values Table';
```

```
CREATE TABLE IF NOT EXISTS att_scalar_devstate_rw
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
value_r TINYINT UNSIGNED DEFAULT NULL,
value_w TINYINT UNSIGNED DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Scalar State ReadWrite Values Table';
```

```
CREATE TABLE IF NOT EXISTS att_array_devstate_ro
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
idx INT UNSIGNED NOT NULL,
dim_x_r INT UNSIGNED NOT NULL,
dim_y_r INT UNSIGNED NOT NULL DEFAULT 0,
value_r TINYINT UNSIGNED DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Array State ReadOnly Values Table';
```

```
CREATE TABLE IF NOT EXISTS att_array_devstate_rw
(
```

```
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
idx INT UNSIGNED NOT NULL,
dim_x_r INT UNSIGNED NOT NULL,
dim_y_r INT UNSIGNED NOT NULL DEFAULT 0,
value_r TINYINT UNSIGNED DEFAULT NULL,
dim_x_w INT UNSIGNED NOT NULL,
dim_y_w INT UNSIGNED NOT NULL DEFAULT 0,
value_w TINYINT UNSIGNED DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Array State ReadWrite Values Table';

CREATE TABLE IF NOT EXISTS att_scalar_devencoded_ro
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
value_r BLOB DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Scalar Encoded ReadOnly Values Table';

CREATE TABLE IF NOT EXISTS att_scalar_devencoded_rw
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
value_r BLOB DEFAULT NULL,
value_w BLOB DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Scalar Encoded ReadWrite Values Table';

CREATE TABLE IF NOT EXISTS att_array_devencoded_ro
(
att_conf_id INT UNSIGNED NOT NULL,
data_time TIMESTAMP(6) DEFAULT 0,
recv_time TIMESTAMP(6) DEFAULT 0,
insert_time TIMESTAMP(6) DEFAULT 0,
idx INT UNSIGNED NOT NULL,
dim_x_r INT UNSIGNED NOT NULL,
dim_y_r INT UNSIGNED NOT NULL DEFAULT 0,
value_r BLOB DEFAULT NULL,
quality TINYINT(1) DEFAULT NULL,
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,
INDEX att_conf_id_data_time (att_conf_id,data_time)
) ENGINE=MyISAM COMMENT='Array Encoded ReadOnly Values Table';

CREATE TABLE IF NOT EXISTS att_array_devencoded_rw
(
att_conf_id INT UNSIGNED NOT NULL,
```



```
data_time TIMESTAMP(6) DEFAULT 0,  
recv_time TIMESTAMP(6) DEFAULT 0,  
insert_time TIMESTAMP(6) DEFAULT 0,  
idx INT UNSIGNED NOT NULL,  
dim_x_r INT UNSIGNED NOT NULL,  
dim_y_r INT UNSIGNED NOT NULL DEFAULT 0,  
value_r BLOB DEFAULT NULL,  
dim_x_w INT UNSIGNED NOT NULL,  
dim_y_w INT UNSIGNED NOT NULL DEFAULT 0,  
value_w BLOB DEFAULT NULL,  
quality TINYINT(1) DEFAULT NULL,  
att_error_desc_id INT UNSIGNED NULL DEFAULT NULL,  
INDEX att_conf_id_data_time (att_conf_id,data_time)  
) ENGINE=MyISAM COMMENT='Array Encoded ReadWrite Values Table';
```

Draft

C Event Subscriber full documentation

Draft

HdbEventSubscriber Tango Cpp Class

Contents :

- [Description](#)
- [Properties](#)
- [Commands](#)
 - [State](#)
 - [Status](#)
 - [AttributeAdd](#)
 - [AttributeRemove](#)
 - [AttributeStatus](#)
 - [Start](#)
 - [Stop](#)
 - [AttributeStart](#)
 - [AttributeStop](#)
 - [ResetStatistics](#)
 - [Pause](#)
 - [AttributePause](#)
 - [AttributeUpdate](#)
 - [AttributeContext](#)
- [Attributes](#)
 - [AttributeOkNumber](#)
 - [AttributeNokNumber](#)
 - [AttributePendingNumber](#)
 - [AttributeNumber](#)
 - [AttributeMaxStoreTime](#)
 - [AttributeMinStoreTime](#)
 - [AttributeMaxProcessingTime](#)
 - [AttributeMinProcessingTime](#)
 - [AttributeRecordFreq](#)
 - [AttributeFailureFreq](#)
 - [AttributeStartedNumber](#)
 - [AttributeStoppedNumber](#)
 - [AttributeMaxPendingNumber](#)
 - [StatisticsResetTime](#)
 - [AttributePausedNumber](#)
 - [Context](#)
 - [AttributeList](#)
 - [AttributeOkList](#)
 - [AttributeNokList](#)
 - [AttributePendingList](#)
 - [AttributeRecordFreqList](#)
 - [AttributeFailureFreqList](#)
 - [AttributeStartedList](#)
 - [AttributeStoppedList](#)
 - [AttributeEventNumberList](#)
 - [AttributeErrorList](#)
 - [AttributePausedList](#)
 - [AttributeContextList](#)
- [States](#)

HdbEventSubscriber Class Identification :

HdbEventSubscriber Class Inheritance :

HdbEventSubscriber Class Commands				
Name	Input type	Output type	Level	Description
State	DEV_VOID	DEV_STATE	OPERATOR	This command gets the device state (stored in its <i>device_state</i> data member) and returns it to the caller.
Status	DEV_VOID	CONST_DEV_STRING	OPERATOR	This command gets the device status (stored in its <i>device_status</i> data member) and returns it to the caller.
AttributeAdd	DEVVAR_STRINGARRAY	DEV_VOID	OPERATOR	Add a new attribute to archive in HDB.
AttributeRemove	DEV_STRING	DEV_VOID	OPERATOR	Remove attribute from configuration.
AttributeStatus	DEV_STRING	DEV_STRING	OPERATOR	Read a attribute status.
Start	DEV_VOID	DEV_VOID	OPERATOR	Start archiving
Stop	DEV_VOID	DEV_VOID	OPERATOR	Stop archiving
AttributeStart	DEV_STRING	DEV_VOID	OPERATOR	Start archiving single attribute
AttributeStop	DEV_STRING	DEV_VOID	OPERATOR	Stop archiving single attribute
ResetStatistics	DEV_VOID	DEV_VOID	OPERATOR	Reset statistic counter
Pause	DEV_VOID	DEV_VOID	OPERATOR	Pause archiving
AttributePause	DEV_STRING	DEV_VOID	OPERATOR	Pause archiving single attribute
AttributeUpdate	DEVVAR_STRINGARRAY	DEV_VOID	OPERATOR	Update contexts associated to an already archived attribute.
AttributeContext	DEV_STRING	DEV_STRING	OPERATOR	Read a attribute contexts.

Command State :

This command gets the device state (stored in its *device_state* data member) and returns it to the caller.

State Definition		
Input Argument	Tango::DEV_VOID	none.
Output Argument	Tango::DEV_STATE	State Code
DisplayLevel	OPERATOR	..
Inherited	true	..
Abstract	true	..
Polling Period	Not polled	..
Command allowed for	All states	..

Command Status :

This command gets the device status (stored in its *device_status* data member) and returns it to the caller.

Status Definition		
Input Argument	Tango::DEV_VOID	none.
Output Argument	Tango::CONST_DEV_STRING	Status description
DisplayLevel	OPERATOR	..
Inherited	true	..
Abstract	true	..
Polling Period	Not polled	..
Command allowed for	All states	..

Command AttributeAdd :

Add a new attribute to archive in HDB.

AttributeAdd Definition		
Input Argument	Tango::DEVVAR_STRING	Attribute name contexts
Output Argument	Tango::DEV_VOID	
DisplayLevel	OPERATOR	..
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
Command allowed for	All states	..

Command AttributeRemove :

Remove attribute from configuration.

AttributeRemove Definition		
Input Argument	Tango::DEV_STRING	Attribute name
Output Argument	Tango::DEV_VOID	
DisplayLevel	OPERATOR	..
Inherited	false	..

HdbEventSubscriber Tango Class User's Guide

Abstract	false	..
Polling Period	Not polled	..
Command allowed for	All states	..

Command AttributeStatus :

Read a attribute status.

AttributeStatus Definition		
Input Argument	Tango::DEV_STRING	The attribute name
Output Argument	Tango::DEV_STRING	The attribute status
DisplayLevel	OPERATOR	..
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
Command allowed for	All states	..

Command Start :

Start archiving

Start Definition		
Input Argument	Tango::DEV_VOID	
Output Argument	Tango::DEV_VOID	
DisplayLevel	OPERATOR	..
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
Command allowed for	All states	..

Command Stop :

Stop archiving

Stop Definition		
Input Argument	Tango::DEV_VOID	
Output Argument	Tango::DEV_VOID	
DisplayLevel	OPERATOR	..
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
		-
Command allowed for	All states	..

Command AttributeStart :

Start archiving single attribute

AttributeStart Definition		
Input Argument	Tango::DEV_STRING	Attribute name
Output Argument	Tango::DEV_VOID	
DisplayLevel	OPERATOR	..
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
		-
Command allowed for	All states	..

Command AttributeStop :

Stop archiving single attribute

AttributeStop Definition		
Input Argument	Tango::DEV_STRING	Attribute name
Output Argument	Tango::DEV_VOID	
DisplayLevel	OPERATOR	..
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
		-

Command allowed for	All states	..
---------------------	------------	----

Command ResetStatistics :

Reset statistic counters

ResetStatistics Definition		
Input Argument	Tango::DEV_VOID	
Output Argument	Tango::DEV_VOID	
DisplayLevel	OPERATOR	..
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
		-
Command allowed for	All states	..

Command Pause :

Pause archiving

Pause Definition		
Input Argument	Tango::DEV_VOID	
Output Argument	Tango::DEV_VOID	
DisplayLevel	OPERATOR	..
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
		-
Command allowed for	All states	..

Command AttributePause :

Pause archiving single attribute

AttributePause Definition		
Input Argument	Tango::DEV_STRING	Attribute name
Output Argument	Tango::DEV_VOID	
DisplayLevel	OPERATOR	..
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
Command allowed for	All states	..

Command AttributeUpdate :

Update contexts associated to an already archived attribute.

AttributeUpdate Definition		
Input Argument	Tango::DEVVAR_STRINGARRAY	Attribute name, contexts
Output Argument	Tango::DEV_VOID	
DisplayLevel	OPERATOR	
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
Command allowed for	All states	

Command AttributeContext :

Read a attribute contexts.

AttributeContext Definition		
Input Argument	Tango::DEV_STRING	The attribute name
Output Argument	Tango::DEV_STRING	The attribute contexts.
DisplayLevel	OPERATOR	..
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
Command allowed for	All states	..

HdbEventSubscriber Class Attributes							
Name	Inherited	Abstract	Attr. type	R/W type	Data type	Level	Description
AttributeOkNumber	false	false	Scalar	READ	Tango::DEV_LONG	OPERATOR	Number of archived attributes not in error
AttributeNokNumber	false	false	Scalar	READ	Tango::DEV_LONG	OPERATOR	Number of archived attributes in error
AttributePendingNumber	false	false	Scalar	READ	Tango::DEV_LONG	OPERATOR	Number of attributes waiting to be archived
AttributeNumber	false	false	Scalar	READ	Tango::DEV_LONG	OPERATOR	Number of configured attributes
AttributeMaxStoreTime	false	false	Scalar	READ	Tango::DEV_DOUBLE	OPERATOR	Maximum storing time
AttributeMinStoreTime	false	false	Scalar	READ	Tango::DEV_DOUBLE	OPERATOR	Minimum storing time
AttributeMaxProcessingTime	false	false	Scalar	READ	Tango::DEV_DOUBLE	OPERATOR	Maximum processing (from event reception to storage) time
AttributeMinProcessingTime	false	false	Scalar	READ	Tango::DEV_DOUBLE	OPERATOR	Minimum processing (from event reception to storage) time
AttributeRecordFreq	false	false	Scalar	READ	Tango::DEV_DOUBLE	OPERATOR	Record frequency
AttributeFailureFreq	false	false	Scalar	READ	Tango::DEV_DOUBLE	OPERATOR	Failure frequency
AttributeStartedNumber	false	false	Scalar	READ	Tango::DEV_LONG	OPERATOR	Number of archived attributes started
AttributeStoppedNumber	false	false	Scalar	READ	Tango::DEV_LONG	OPERATOR	Number of archived attributes stopped
AttributeMaxPendingNumber	false	false	Scalar	READ	Tango::DEV_LONG	OPERATOR	Max number of attributes waiting to be archived
StatisticsResetTime	false	false	Scalar	READ	Tango::DEV_DOUBLE	OPERATOR	Seconds elapsed

HdbEventSubscriber Tango Class User's Guide

							since the last statistics reset
AttributePausedNumber	false	false	Scalar	READ	Tango::DEV_LONG	OPERATOR	Number of archived attributes paused
Context	false	false	Scalar	READ_WRITE	Tango::DEV_UCHAR	OPERATOR	
AttributeList	false	false	Spectrum	READ	Tango::DEV_STRING	OPERATOR	Returns the configured attribute list
AttributeOkList	false	false	Spectrum	READ	Tango::DEV_STRING	OPERATOR	Returns the attributes not on error list
AttributeNokList	false	false	Spectrum	READ	Tango::DEV_STRING	OPERATOR	Returns the attributes on error list
AttributePendingList	false	false	Spectrum	READ	Tango::DEV_STRING	OPERATOR	Returns the list attributes waiting to be archived
AttributeRecordFreqList	false	false	Spectrum	READ	Tango::DEV_DOUBLE	OPERATOR	Returns the list of record frequencies
AttributeFailureFreqList	false	false	Spectrum	READ	Tango::DEV_DOUBLE	OPERATOR	Returns the list of failure frequencies
AttributeStartedList	false	false	Spectrum	READ	Tango::DEV_STRING	OPERATOR	Returns the attributes started list
AttributeStoppedList	false	false	Spectrum	READ	Tango::DEV_STRING	OPERATOR	Returns the attributes stopped list
AttributeEventNumberList	false	false	Spectrum	READ	Tango::DEV_LONG	OPERATOR	Returns the list of numbers of events received
AttributeErrorList	false	false	Spectrum	READ	Tango::DEV_STRING	OPERATOR	Returns the list of attribute errors
AttributePausedList	false	false	Spectrum	READ	Tango::DEV_STRING	OPERATOR	Returns the attributes stopped list
AttributeContextList	false	false	Spectrum	READ	Tango::DEV_STRING	OPERATOR	Returns the list of attribute contexts

There is no dynamic attribute defined.

Attribute AttributeOkNumber :

Number of archived attributes not in error

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_LONG	standard unit		Absolute Change	1
Display Level	OPERATOR	display unit		Archive Periodic	3600000
Inherited	false	format		Archive Relative Change	Not set
Abstract	false	max_value		Archive Absolute Change	1
Polling Period	Not polled	min_value		Push Change event by user code	true
Memorized	Not set	max_alarm		Criteria checked by TANGO	true
		min_alarm		Push Archive event by user code	true
		max_warning		Criteria checked by TANGO	true
		min_warning			
Read allowed for	All states	delta_min		Push DataReady event by user code	false
		delta_max			

Attribute AttributeNokNumber :

Number of archived attributes in error

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_LONG	standard unit		Absolute Change	1
Display Level	OPERATOR	display unit		Archive Periodic	3600000
Inherited	false	format		Archive Relative Change	Not set
Abstract	false	max_value		Archive Absolute Change	1
Polling Period	Not polled	min_value			

HdbEventSubscriber Tango Class User's Guide

Memorized	Not set	max_alarm	1	Push Change event by user code	true
		min_alarm		Criteria checked by TANGO	true
Read allowed for	All states	max_warning		Push Archive event by user code	true
		min_warning		Criteria checked by TANGO	true
		delta_time		Push DataReady event by user code	false
		delta_val			

Attribute AttributePendingNumber :

Number of attributes waiting to be archived

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_LONG	standard unit		Absolute Change	2
Display Level	OPERATOR	display unit		Archive Periodic	3600000
Inherited	false	format		Archive Relative Change	Not set
Abstract	false	max_value		Archive Absolute Change	2
Polling Period	Not polled	min_value			
Memorized	Not set	max_alarm		Push Change event by user code	true
		min_alarm		Criteria checked by TANGO	true
Read allowed for	All states	max_warning		Push Archive event by user code	true
		min_warning		Criteria checked by TANGO	true
		delta_time		Push DataReady event by user code	false
		delta_val			

Attribute AttributeNumber :

Number of configured attributes

Attribute		Attribute		Attribute Event Criteria	
------------------	--	------------------	--	---------------------------------	--

HdbEventSubscriber Tango Class User's Guide

Definition		Properties		Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_LONG	standard unit		Absolute Change	1
Display Level	OPERATOR	display unit		Archive Periodic	3600000
Inherited	false	format		Archive Relative Change	Not set
Abstract	false	max_value		Archive Absolute Change	1
Polling Period	Not polled	min_value		Push Change event by user code	true
Memorized	Not set	max_alarm		Criteria checked by TANGO	true
Read allowed for	All states	min_alarm		Push Archive event by user code	true
		max_warning		Criteria checked by TANGO	true
		min_warning		Push DataReady event by user code	false
		delta_time			
		delta_val			

Attribute AttributeMaxStoreTime :

Maximum storing time

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ	unit	s	Relative Change	Not set
Data Type	Tango::DEV_LONG	standard unit	1	Absolute Change	0.001
Display Level	OPERATOR	display unit	s	Archive Periodic	3600000
Inherited	false	format		Archive Relative Change	Not set
Abstract	false	max_value		Archive Absolute Change	0.001
Polling Period	Not polled	min_value		Push Change event by user code	true
Memorized	Not set	max_alarm		Criteria checked by TANGO	true
Read allowed for	All states	min_alarm		Push Archive event by user code	true
		max_warning		Criteria checked by TANGO	true
		min_warning		Push DataReady event by user code	false
		delta_time			
		delta_val			

Attribute AttributeMinStoreTime :

Minimum storing time

Attribute Definition	
Attribute Type	Scalar
R/W Type	READ
Data Type	Tango::DEV_DOUBLE
Display Level	OPERATOR
Inherited	false
Abstract	false
Polling Period	Not polled
Memorized	Not set
Read allowed for	All states

Attribute Properties	
label	
unit	s
standard unit	1
display unit	s
format	
max_value	
min_value	
max_alarm	
min_alarm	
max_warning	
min_warning	
delta_time	
delta_val	

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	0.00001
Archive Periodic	3600000
Archive Relative Change	Not set
Archive Absolute Change	0.00001
Push Change event by user code	true
Criteria checked by TANGO	true
Push Archive event by user code	true
Criteria checked by TANGO	true
Push DataReady event by user code	false

Attribute AttributeMaxProcessingTime :

Maximum processing (from event reception to storage) time

Attribute Definition	
Attribute Type	Scalar
R/W Type	READ
Data Type	Tango::DEV_DOUBLE
Display Level	OPERATOR
Inherited	false
Abstract	false
Polling Period	Not polled

Attribute Properties	
label	
unit	s
standard unit	1
display unit	s
format	
max_value	
min_value	

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	0.001
Archive Periodic	3600000
Archive Relative Change	Not set
Archive Absolute Change	0.001

HdbEventSubscriber Tango Class User's Guide

Memorized	Not set	max_alarm		Push Change event by user code	true
		min_alarm		Criteria checked by TANGO	true
Read allowed for	All states	max_warning		Push Archive event by user code	true
		min_warning		Criteria checked by TANGO	true
		delta_time		Push DataReady event by user code	false
		delta_val			

Attribute AttributeMinProcessingTime :

Minimum processing (from event reception to storage) time

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ	unit	s	Relative Change	Not set
Data Type	Tango::DEFINITION	standard unit		Absolute Change	0.00001
Display Level	OPERATOR	display unit	s	Archive Periodic	3600000
Inherited	false	format		Archive Relative Change	Not set
Abstract	false	max_value		Archive Absolute Change	0.00001
Polling Period	Not poll	min_value		Push Change event by user code	true
Memorized	Not set	max_alarm		Criteria checked by TANGO	true
		min_alarm		Push Archive event by user code	true
Read allowed for	All states	max_warning		Criteria checked by TANGO	true
		min_warning		Push DataReady event by user code	false
		delta_time			
		delta_val			

Attribute AttributeRecordFreq :

Record frequency

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ	unit	ev/period	Relative Change	Not set
Data Type	Tango::DEV_DOUBLE	standard unit	1	Absolute Change	1
Display Level	OPERATOR	display unit	ev/period		
Inherited	false	format		Archive Periodic	3600000
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	1
Memorized	Not set	max_alarm			
		min_alarm		Push Change event by user code	true
Read allowed for	All states	max_warning		Criteria checked by TANGO	true
		min_warning			
		delta_time		Push Archive event by user code	true
		delta_val		Criteria checked by TANGO	true
				Push DataReady event by user code	false

Attribute AttributeFailureFreq:

Failure frequency

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ	unit	ev/period	Relative Change	Not set
Data Type	Tango::DEV_DOUBLE	standard unit	1	Absolute Change	1
Display Level	OPERATOR	display unit	ev/period		
Inherited	false	format		Archive Periodic	3600000
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	1
Memorized	Not set	max_alarm			
		min_alarm		Push Change event by user code	true
Read allowed for	All states	max_warning			
		min_warning			

delta_time		Criteria checked by TANGO	true
delta_val			
		Push Archive event by user code	true
		Criteria checked by TANGO	true
		Push DataReady event by user code	false

Attribute AttributeStartedNumber :

Number of archived attributes started

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_LONG	standard unit		Absolute Change	1
Display Level	OPERATOR	display unit		Archive Periodic	3600000
Inherited	false	format		Archive Relative Change	Not set
Abstract	false	min_value		Archive Absolute Change	1
Polling Period	Not set	min_alarm			
Memorized	Not set	max_alarm		Push Change event by user code	true
		min_warning		Criteria checked by TANGO	true
Read allowed for	All states	max_warning			
		min_warning		Push Archive event by user code	true
		delta_time		Criteria checked by TANGO	true
		delta_val			
				Push DataReady event by user code	false

Attribute AttributeStoppedNumber :

Number of archived attributes stopped

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_LONG	standard unit		Absolute Change	1
Display Level	OPERATOR	display unit			
Inherited	false	format		Archive Periodic	3600000
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	1
Memorized	Not set	max_alarm			
		min_alarm		Push Change event by user code	true
Read allowed for	All states	max_warning		Criteria checked by TANGO	true
		min_warning			
		delta_time		Push Archive event by user code	true
		delta_val		Criteria checked by TANGO	true
				Push DataReady event by user code	false

Attribute AttributeMaxPendingNumber :

Max number of attributes waiting to be archived

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_LONG	standard unit		Absolute Change	1
Display Level	OPERATOR	display unit			
Inherited	false	format		Archive Periodic	3600000
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	1
Memorized	Not set	max_alarm			
		min_alarm		Push Change event by user code	true
Read allowed for	All states	max_warning		Criteria checked by TANGO	true
		min_warning			
		delta_time		Push Archive event by user code	true
		delta_val		Criteria checked by TANGO	true
				Push DataReady event by user code	false

Attribute StatisticsResetTime :

Seconds elapsed since the last statistics reset

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ	unit	s	Relative Change	Not set
Data Type	Tango::DEV_DOUBLE	standard unit	1	Absolute Change	Not set
Display Level	OPERATOR	display unit	s		
Inherited	false	format		Archive Periodic	Not set
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	Not set
Memorized	Not set	max_alarm			
		min_alarm		Push Change event by user code	false
		max_warning		Push Archive event by user code	false
		min_warning			
Read allowed for	All states	delta_time		Push DataReady event by user code	false
		delta_val			

Attribute AttributePausedNumber :

Number of archived attributes paused

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_LONG	standard unit		Absolute Change	1
Display Level	OPERATOR	display unit			
Inherited	false	format		Archive Periodic	3600000
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	1
Memorized	Not set	max_alarm			
				Push Change event by user code	true

HdbEventSubscriber Tango Class User's Guide

Read allowed for	All states
------------------	------------

min_alarm
max_warning
min_warning
delta_time
delta_val

Criteria checked by TANGO	true
Push Archive event by user code	true
Criteria checked by TANGO	true
Push DataReady event by user code	false

Attribute Context :

Attribute Definition	
Attribute Type	Scalar
R/W Type	READ_WRITE
Data Type	Tango::DEV_UCHAR
Display Level	OPERATOR
Inherited	false
Abstract	false
Polling Period	Not polled
Memorized	true
Write hardware at init.	true
Read allowed for	All states
Write allowed for	All states

Attribute Properties	
label	
unit	
standard unit	
display unit	
format	
max_value	
min_value	
max_alarm	
min_alarm	
max_warning	
min_warning	
delta_time	
delta_val	

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	Not set
Archive Periodic	Not set
Archive Relative Change	Not set
Archive Absolute Change	Not set
Push Change event by user code	false
Push Archive event by user code	false
Push DataReady event by user code	false

Attribute AttributeList :

Returns the configured attribute list

Attribute Definition	Attribute Properties	Attribute Event Criteria	
		Periodic	Not set

HdbEventSubscriber Tango Class User's Guide

Attribute Type	Spectrum (10000)	label	Relative Change	Not set
R/W Type	READ	unit	Absolute Change	Not set
Data Type	Tango::DEV_STRING	standard unit		
Display Level	OPERATOR	display unit	Archive Periodic	3600000
Inherited	false	format	Archive Relative Change	Not set
Abstract	false	max_value	Archive Absolute Change	Not set
Polling Period	Not polled	min_value		
Memorized	Not set	max_alarm	Push Change event by user code	true
		min_alarm	Criteria checked by TANGO	true
		max_warning		
Read allowed for	All states	min_warning	Push Archive event by user code	true
		delta_time	Criteria checked by TANGO	true
		delta_val		
			Push DataReady event by user code	false

Attribute AttributeOkList :

Returns the attributes not on error list

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Spectrum (10000)	label	Relative Change	Not set	
R/W Type	READ	unit	Absolute Change	Not set	
Data Type	Tango::DEV_STRING	standard unit			
Display Level	OPERATOR	display unit	Archive Periodic	3600000	
Inherited	false	format	Archive Relative Change	Not set	
Abstract	false	max_value	Archive Absolute Change	Not set	
Polling Period	Not polled	min_value			
Memorized	Not set	max_alarm	Push Change event by user code	true	
		min_alarm	Criteria checked by TANGO	true	
		max_warning			
Read allowed for	All states	min_warning	Push Archive event by user code	true	
		delta_time	Criteria checked by TANGO	true	
		delta_val			
			Push DataReady event by user code	false	

Attribute AttributeNokList :

Returns the attributes on error list

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Spectrum (10000)	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_STRING	standard unit		Absolute Change	Not set
Display Level	OPERATOR	display unit			
Inherited	false	format		Archive Periodic	3600000
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	Not set
Memorized	Not set	max_alarm			
		min_alarm		Push Change event by user code	true
Read allowed for	All states	max_warning		Criteria checked by TANGO	true
		min_warning			
		delta_time		Push Archive event by user code	true
		delta_val		Criteria checked by TANGO	true
				Push Ready event by user code	false

Attribute AttributePendingList :

Returns the list attributes waiting to be archived

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Spectrum (10000)	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_STRING	standard unit		Absolute Change	Not set
Display Level	OPERATOR	display unit			
Inherited	false	format		Archive Periodic	3600000
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	Not set
Memorized	Not set	max_alarm			
		min_alarm		Push Change event by user code	true
Read allowed for	All states	max_warning		Criteria checked by TANGO	true
		min_warning			
		delta_time		Push Archive event by user code	true

delta_val	Criteria checked by TANGO	true
	Push DataReady event by user code	false

Attribute AttributeRecordFreqList :

Returns the list of record frequencies

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Spectrum (10000)	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_DOUBLE	standard unit		Absolute Change	1
Display Level	OPERATOR	display unit		Archive Periodic	3600000
Inherited	false	format		Archive Relative Change	Not set
Abstract	false	max_value		Archive Absolute Change	1
Polling Period	Not polled	min_value		Push Change event by user code	true
Memorized	Not set	max_alarm		Criteria checked by TANGO	true
		min_alarm		Push Archive event by user code	true
Read allowed for	All states	max_warning		Criteria checked by TANGO	true
		no_warning		Push DataReady event by user code	false
		dead_time			
		delta_val			

Attribute AttributeFailureFreqList :

Returns the list of failure frequencies

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Spectrum (10000)	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_DOUBLE	standard unit		Absolute Change	1

HdbEventSubscriber Tango Class User's Guide

Display Level	OPERATOR	display unit	Archive Periodic	3600000
Inherited	false	format	Archive Relative Change	Not set
Abstract	false	max_value	Archive Absolute Change	1
Polling Period	Not polled	min_value		
Memorized	Not set	max_alarm	Push Change event by user code	true
		min_alarm	Criteria checked by TANGO	true
		max_warning		
Read allowed for	All states	min_warning	Push Archive event by user code	true
		delta_time	Criteria checked by TANGO	true
		delta_val		
			Push DataReady event by user code	false

Attribute AttributeStartedList :

Returns the attributes started list

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Spectrum (10000)	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_STRING	standard unit		Absolute Change	Not set
Display Level	OPERATOR	display unit			
Inherited	false	format		Archive Periodic	3600000
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	Not set
Memorized	Not set	max_alarm			
		min_alarm		Push Change event by user code	true
		max_warning		Criteria checked by TANGO	true
Read allowed for	All states	min_warning			
		delta_time		Push Archive event by user code	true
		delta_val		Criteria checked by TANGO	true
				Push DataReady event by user code	false

Attribute AttributeStoppedList :

Returns the attributes stopped list

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Spectrum (10000)	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_STRING	standard unit		Absolute Change	Not set
Display Level	OPERATOR	display unit		Archive Periodic	3600000
Inherited	false	format		Archive Relative Change	Not set
Abstract	false	max_value		Archive Absolute Change	Not set
Polling Period	Not polled	min_value		Push Change event by user code	true
Memorized	Not set	max_alarm		Criteria checked by TANGO	true
		min_alarm		Push Archive event by user code	true
Read allowed for	All states	max_warning		Criteria checked by TANGO	true
		min_warning		Push DataReady event by user code	false
		delta_time			
		delta_val			

Attribute AttributeEventNumberList :

Returns the list of numbers of events received

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Spectrum (10000)	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_LONG	standard unit		Absolute Change	1
Display Level	OPERATOR	display unit		Archive Periodic	3600000
Inherited	false	format		Archive Relative Change	Not set
Abstract	false	max_value		Archive Absolute Change	1
Polling Period	Not polled	min_value		Push Change event by user code	true
Memorized	Not set	max_alarm		Criteria checked by TANGO	true
		min_alarm		Push Archive event by user code	true
Read allowed for	All states	max_warning		Criteria checked by TANGO	true
		min_warning		Push DataReady event by user code	false
		delta_time			
		delta_val			

Attribute AttributeErrorList :

Returns the list of attribute errors

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Spectrum (10000)	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_STRING	standard unit		Absolute Change	Not set
Display Level	OPERATOR	display unit			
Inherited	false	format		Archive Periodic	3600000
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	Not set
Memorized	Not set	max_alarm		Push Change event by user code	true
		min_alarm		Criteria checked by TANGO	true
		max_warning			
Read allowed for	All states	min_warning		Push Archive event by user code	true
		delta_time		Criteria checked by TANGO	true
		delta_value			
				Push DataReady event by user code	false

Attribute AttributePausedList :

Returns the attributes stopped list

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Spectrum (10000)	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_STRING	standard unit		Absolute Change	Not set
Display Level	OPERATOR	display unit			
Inherited	false	format		Archive Periodic	3600000
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	Not set
Memorized	Not set	max_alarm			
				Push Change event by user code	true

HdbEventSubscriber Tango Class User's Guide

Read allowed for	All states
------------------	------------

min_alarm
max_warning
min_warning
delta_time
delta_val

Criteria checked by TANGO	true
Push Archive event by user code	true
Criteria checked by TANGO	true
Push DataReady event by user code	false

Attribute AttributeContextList :

Returns the list of attribute contexts

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Spectrum (10000)	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_STRING	standard unit		Absolute Change	Not set
Display Level	OPERATOR	display unit		Archive Periodic	3600000
Inherited	false	format		Archive Relative Change	Not set
Abstract	false	max_value		Archive Absolute Change	Not set
Polling Period	Not polled	min_value			
Memorized	Not set	min_alarm		Push Change event by user code	true
Read allowed for	All states	max_alarm		Criteria checked by TANGO	true
		min_warning		Push Archive event by user code	true
		max_warning		Criteria checked by TANGO	true
		min_warning			
		delta_time		Push DataReady event by user code	false
		delta_val			

HdbEventSubscriber Class States	
Name	Description
ON	Archiving running and everything is OK.
ALARM	One or more attributes faulty or FIFO size above threshold
OFF	Archiving stopped

FAULT	All attributes faulty
-------	-----------------------

Draft

D Configuration Manager full documentation

Draft

HdbConfigurationManager Tango Cpp Class

Contents :

- [Description](#)
- [Properties](#)
- [Commands](#)
 - [State](#)
 - [Status](#)
 - [AttributeAdd](#)
 - [AttributeRemove](#)
 - [AttributeStart](#)
 - [AttributeStop](#)
 - [ArchiverAdd](#)
 - [AttributeAssign](#)
 - [AttributeStatus](#)
 - [AttributeGetArchiver](#)
 - [AttributeSearch](#)
 - [ArchiverRemove](#)
 - [ResetStatistics](#)
 - [AttributePause](#)
 - [AttributeUpdate](#)
 - [Context](#)
- [Attributes](#)
 - [AttributeOKNumber](#)
 - [AttributeNokNumber](#)
 - [AttributePendingNumber](#)
 - [AttributeNumber](#)
 - [SetAttributeName](#)
 - [SetPollingPeriod](#)
 - [SetAbsoluteEvent](#)
 - [SetRelativeEvent](#)
 - [SetPeriodEvent](#)
 - [SetCodePushEvent](#)
 - [SetArchiver](#)
 - [AttributeMaxStoreTime](#)
 - [AttributeMinStoreTime](#)
 - [AttributeMaxProcessingTime](#)
 - [AttributeMinProcessingTime](#)
 - [AttributeRecordFreq](#)
 - [AttributeFailureFreq](#)
 - [AttributeStartedNumber](#)
 - [AttributeStoppedNumber](#)
 - [AttributeMaxPendingNumber](#)
 - [AttributePausedNumber](#)
 - [SetTTL](#)
 - [SetContext](#)
 - [ArchiverList](#)
 - [ArchiverStatus](#)
 - [ArchiverStatisticsResetTime](#)
 - [ArchiverContext](#)
- [States](#)

HdbConfigurationManager Class Identification :

HdbConfigurationManager Class Inheritance :

HdbConfigurationManager Tango Class User's Guide

AttributeGetArchiver	DEV_STRING	DEV_STRING	OPERATOR	Return archiver associated to attribute.
AttributeSearch	DEV_STRING	DEVVAR_STRINGARRAY	OPERATOR	Return list of attributes containing input argument
ArchiverRemove	DEV_STRING	DEV_VOID	OPERATOR	Remove archiver instance.
ResetStatistics	DEV_VOID	DEV_VOID	OPERATOR	Reset statistic counters
AttributePause	DEV_STRING	DEV_VOID	OPERATOR	Pause archiving single attribute
AttributeUpdate	DEVVAR_STRINGARRAY	DEV_VOID	OPERATOR	Update strategies for an already archived attribute.
Context	DEV_USHORT	DEV_VOID	OPERATOR	Set Context to all controlled archivers.

Command State :

This command gets the device state (stored in its device_state data member) and returns it to the caller.

State Definition		
Input Argument	Tango::DEV_VOID	none
Output Argument	Tango::DEV_STATE	Device state
DisplayLevel	OPERATOR	..
Inherited	true	..
Abstract	true	..
Polling Period	Not polled	..
Command allowed for	All states	..

Command Status :

This command gets the device status (stored in its device_status data member) and returns it to the caller.

Status Definition		
Input Argument	Tango::DEV_VOID	none
Output Argument	Tango::CONST_DEV_STRING	Device status
DisplayLevel	OPERATOR	..
Inherited	true	..
Abstract	true	..
Polling Period	Not polled	..
Command allowed for	All states	..

Command AttributeAdd :

Add a new attribute to archive in HDB.

AttributeAdd Definition		
Input Argument	Tango::DEV_VOID	
Output Argument	Tango::DEV_VOID	
DisplayLevel	OPERATOR	..
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
		..
Command allowed for	All states	..

Command AttributeRemove :

Remove attribute from configuration.

AttributeRemove Definition		
Input Argument	Tango::DEV_STRING	Attribute name
Output Argument	Tango::DEV_VOID	
DisplayLevel	OPERATOR	
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
		..
Command allowed for	All states	..

Command AttributeStart :

Start archiving single attribute

AttributeStart Definition		
Input Argument	Tango::DEV_STRING	Attribute name
Output Argument	Tango::DEV_VOID	
DisplayLevel	OPERATOR	..

HdbConfigurationManager Tango Class User's Guide

Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
Command allowed for	All states	..

Command AttributeStop :

Stop archiving single attribute

AttributeStop Definition		
Input Argument	Tango::DEV_STRING	Attribute name
Output Argument	Tango::DEV_VOID	
DisplayLevel	OPERATOR	..
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
Command allowed for	All states	..

Command ArchiverAdd :

Add a new archiver to archive in HDB.

ArchiverAdd Definition		
Input Argument	Tango::DEV_STRING	Archiver name
Output Argument	Tango::DEV_VOID	
DisplayLevel	OPERATOR	..
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
Command allowed for	All states	..

Command AttributeAssign :

Assigne attribute to archiver

AttributeAssign Definition		
Input Argument	Tango::DEVVAR_STRINGARRAY	[0]: Attribute name [1]: Archiver name
Output Argument	Tango::DEV_VOID	
DisplayLevel	OPERATOR	..
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
Command allowed for	All states	..

Command AttributeStatus :

Read an attribute status

AttributeStatus Definition		
Input Argument	Tango::DEV_STRING	The attribute name
Output Argument	Tango::DEV_STRING	The attribute status (TODO: DevString OK?)
DisplayLevel	OPERATOR	..
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
Command allowed for	All states	..

Command AttributeGetArchiver :

Return archiver associated to attribute.

AttributeGetArchiver Definition		
Input Argument	Tango::DEV_STRING	Attribute name
Output Argument	Tango::DEV_STRING	Archiver name
DisplayLevel	OPERATOR	..
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..

Command allowed for	All states	..
---------------------	------------	----

Command AttributeSearch :

Return list of attributes containing input argument

AttributeSearch Definition		
Input Argument	Tango::DEV_STRING	Attribute name or part of it
Output Argument	Tango::DEVVAR_STRINGARRAY	Attribute list
DisplayLevel	OPERATOR	..
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
Command allowed for	All states	..

Command ArchiverRemove :

Remove archiver instance.

ArchiverRemove Definition		
Input Argument	Tango::DEV_STRING	archiver name
Output Argument	Tango::DEV_VOID	
DisplayLevel	OPERATOR	..
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
Command allowed for	All states	..

Command ResetStatistics :

Reset statistic counters

ResetStatistics Definition		

Input Argument	Tango::DEV_VOID	
Output Argument	Tango::DEV_VOID	
DisplayLevel	OPERATOR	..
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
		-
Command allowed for	All states	..

Command AttributePause :

Pause archiving single attribute

AttributePause Definition		
Input Argument	Tango::DEV_STRING	Attribute name
Output Argument	Tango::DEV_VOID	
DisplayLevel	OPERATOR	..
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
		-
Command allowed for	All	..

Command AttributeUpdate :

Update strategies for an already archived attribute.

AttributeUpdate Definition		
Input Argument	Tango::DEVVAR_STRINGARRAY	Attribute name, strategies
Output Argument	Tango::DEV_VOID	
DisplayLevel	OPERATOR	..
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
		-
Command allowed for	All states	..

Command Context :

Set Context to all controlled archivers.

Context Definition		
Input Argument	Tango::DEV_USHORT	Context
Output Argument	Tango::DEV_VOID	
DisplayLevel	OPERATOR	..
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
Command allowed for	All states	..

HdbConfigurationManager Class Attributes							
Name	Inherited	Abstract	Attr. type	W type	Data type	Level	Description
AttributeOKNumber	false	false	Scalar	READ	Tango::DEV_LONG	OPERATOR	Number of archived attributes not in error
AttributeNokNumber	false	false	Scalar	READ	Tango::DEV_LONG	OPERATOR	Number of archived attributes in error
AttributePendingNumber	false	false	Scalar	READ	Tango::DEV_LONG	OPERATOR	Number of attributes waiting to be archived
AttributeNumber	false	false	Scalar	READ	Tango::DEV_LONG	OPERATOR	Number of configured attributes
SetAttributeName	false	false	Scalar	READ_WRITE	Tango::DEV_STRING	OPERATOR	
SetPollingPeriod	false	false	Scalar	READ_WRITE	Tango::DEV_LONG	OPERATOR	
SetAbsoluteEvent	false	false	Scalar	READ_WRITE	Tango::DEV_DOUBLE	OPERATOR	
SetRelativeEvent	false	false	Scalar	READ_WRITE	Tango::DEV_DOUBLE	OPERATOR	
SetPeriodEvent	false	false	Scalar	READ_WRITE	Tango::DEV_LONG	OPERATOR	
SetCodePushedEvent	false	false	Scalar	READ_WRITE	Tango::DEV_BOOLEAN	OPERATOR	
SetArchiver	false	false	Scalar	READ_WRITE	Tango::DEV_STRING	OPERATOR	
AttributeMaxStoreTime	false	false	Scalar	READ	Tango::DEV_DOUBLE	OPERATOR	Maximum storing time
AttributeMinStoreTime	false	false	Scalar	READ	Tango::DEV_DOUBLE	OPERATOR	Minimum storing time

HdbConfigurationManager Tango Class User's Guide

AttributeMaxProcessingTime	false	false	Scalar	READ	Tango::DEV_DOUBLE	OPERATOR	Maximum processing (from event reception to storage) time
AttributeMinProcessingTime	false	false	Scalar	READ	Tango::DEV_DOUBLE	OPERATOR	Minimum processing (from event reception to storage) time
AttributeRecordFreq	false	false	Scalar	READ	Tango::DEV_DOUBLE	OPERATOR	Record frequency
AttributeFailureFreq	false	false	Scalar	READ	Tango::DEV_DOUBLE	OPERATOR	Failure frequency
AttributeStartedNumber	false	false	Scalar	READ	Tango::DEV_LONG	OPERATOR	Number of archived attributes started
AttributeStoppedNumber	false	false	Scalar	READ	Tango::DEV_LONG	OPERATOR	Number of archived attributes stopped
AttributeMaxPendingNumber	false	false	Scalar	READ	Tango::DEV_LONG	OPERATOR	Max number of attributes waiting to be archived
AttributePausedNumber	false	false	Scalar	READ	Tango::DEV_LONG	OPERATOR	Number of archived attributes paused
SetTTL	false	false	Scalar	READ_WRITE	Tango::DEV_ULONG	OPERATOR	Time To Live for temporary storage in hours
SetContext	false	false	Scalar	READ_WRITE	Tango::DEV_STRING	OPERATOR	list of strategies separated with
ArchiverList	false	false	Spectrum	READ	Tango::DEV_STRING	OPERATOR	
ArchiverStatus	false	false	Spectrum	READ	Tango::DEV_STRING	OPERATOR	
ArchiverStatisticsResetTime	false	false	Spectrum	READ	Tango::DEV_DOUBLE	OPERATOR	Seconds elapsed since last statistics reset
ArchiverContext	false	false	Spectrum	READ	Tango::DEV_UCHAR	OPERATOR	Archiver context

There is no dynamic attribute defined.

Attribute AttributeOKNumber :

Number of archived attributes not in error

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_LONG	standard unit		Absolute Change	Not set
Display Level	OPERATOR	display unit			
Inherited	false	format		Archive Periodic	Not set
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	Not set
Memorized	Not set	max_alarm			
		min_alarm		Push Change event by user code	false
Read allowed for	All states	max_warning		Push Archive event by user code	false
		min_warning		Push DataReady event by user code	false
		delta_time			
		delta_val			

Attribute AttributeNokNumber :

Number of archived attributes in error

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_LONG	standard unit		Absolute Change	Not set
Display Level	OPERATOR	display unit			
Inherited	false	format		Archive Periodic	Not set
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	Not set
Memorized	Not set	max_alarm	1		
		min_alarm		Push Change event by user code	false
Read allowed for	All states	max_warning			
		min_warning			
		delta_time			
		delta_val			

Push Archive event by user code	false
Push DataReady event by user code	false

Attribute AttributePendingNumber :

Number of attributes waiting to be archived

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_LONG	standard unit		Absolute Change	Not set
Display Level	OPERATOR	display unit			
Inherited	false	format		Archive Periodic	Not set
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	Not set
Memorized	Not set	max_alarm			
		min_alarm		Push Change event by user code	false
		max_waiting		Push Archive event by user code	false
Read allowed for	All states	min_waiting		Push DataReady event by user code	false
		data_time			
		delay_val			

Attribute AttributeNumber :

Number of configured attributes

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_LONG	standard unit		Absolute Change	Not set
Display Level	OPERATOR	display unit			
Inherited	false	format		Archive Periodic	Not set
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	Not set

HdbConfigurationManager Tango Class User's Guide

Memorized	Not set	max_alarm	
		min_alarm	Push Change event by user code
Read allowed for	All states	max_warning	Push Archive event by user code
		min_warning	Push DataReady event by user code
		delta_time	false
		delta_val	

Attribute SetAttributeName :

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ_WRITE	unit		Relative Change	Not set
Data Type	Tango::DEV_STRING	standard unit		Absolute Change	Not set
Display Level	OPERATOR	display unit			
Inherited	false	format		Archive Periodic	Not set
Abstract	false	max_val		Archive Relative Change	Not set
Polling Period	Not polled	min_val		Archive Absolute Change	Not set
Memorized	Not set	max_alarm			
		min_alarm		Push Change event by user code	false
Read allowed for	All states	max_warning		Push Archive event by user code	false
Write allowed for	All states	min_warning		Push DataReady event by user code	false
		delta_time			
		delta_val			

Attribute SetPollingPeriod :

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ_WRITE	unit		Relative Change	Not set
Data Type	Tango::DEV_LONG	standard unit		Absolute Change	Not set

Display Level	OPERATOR	display unit	
Inherited	false	format	Archive Periodic
Abstract	false	max_value	Archive Relative Change
Polling Period	Not polled	min_value	Archive Absolute Change
Memorized	Not set	max_alarm	
		min_alarm	Push Change event by user code
Read allowed for	All states	max_warning	Push Archive event by user code
Write allowed for	All states	min_warning	Push DataReady event by user code
		delta_time	false
		delta_val	false

Attribute SetAbsoluteEvent :

Attribute Definition	Attribute Properties	Attribute Event Criteria
Attribute Type	Scalar	Periodic
R/W Type	READ_WRITE	Relative Change
Data Type	Tango::DEV_DOUBLE	Absolute Change
Display Level	OPERATOR	Archive Periodic
Inherited	false	Archive Relative Change
Abstract	false	Archive Absolute Change
Polling Period	Not polled	Push Change event by user code
Memorized	Not set	Push Archive event by user code
Read allowed for	All states	Push DataReady event by user code
Write allowed for	All states	

Attribute SetRelativeEvent :

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ_WRITE	unit		Relative Change	Not set
Data Type	Tango::DEV_DOUBLE	standard unit		Absolute Change	Not set
Display Level	OPERATOR	display unit			
Inherited	false	format		Archive Periodic	Not set
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	Not set
Memorized	Not set	max_alarm			
		min_alarm		Push Change event by user code	false
Read allowed for	All states	max_warning			
Write allowed for	All states	min_warning		Push Archive event by user code	false
		delta_time			
		delta_val		Push DataReady event by user code	false

Attribute SetPeriodEvent :

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ_WRITE	unit		Relative Change	Not set
Data Type	Tango::DEV_DOUBLE	standard unit		Absolute Change	Not set
Display Level	OPERATOR	display unit			
Inherited	false	format		Archive Periodic	Not set
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	Not set
Memorized	Not set	max_alarm			
		min_alarm		Push Change event by user code	false
Read allowed for	All states	max_warning			
Write allowed for	All states	min_warning		Push Archive event by user code	false
		delta_time			
		delta_val		Push DataReady event by user code	false

Attribute SetCodePushedEvent :

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ_WRITE	unit		Relative Change	Not set
Data Type	Tango::DEV_BOOLEAN	standard unit		Absolute Change	Not set
Display Level	OPERATOR	display unit			
Inherited	false	format		Archive Periodic	Not set
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	Not set
Memorized	Not set	max_alarm			
		min_alarm		Push Change event by user code	false
Read allowed for	All states	max_warning		Push Archive event by user code	false
Write allowed for	All states	min_warning		Push DataReady event by user	false
		delta_time			
		delta_val			

Attribute SetArchiver :

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ_WRITE	unit		Relative Change	Not set
Data Type	Tango::DEV_STRING	standard unit		Absolute Change	Not set
Display Level	OPERATOR	display unit			
Inherited	false	format		Archive Periodic	Not set
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	Not set
Memorized	Not set	max_alarm			
		min_alarm		Push Change event by user code	false
Read allowed for	All states	max_warning		Push Archive event by user code	false
Write allowed for	All states	min_warning			
		delta_time			
		delta_val			

Push DataReady event by user code	false
-----------------------------------	-------

Attribute AttributeMaxStoreTime :

Maximum storing time

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ	unit	s	Relative Change	Not set
Data Type	Tango::DEV_DOUBLE	standard unit	1	Absolute Change	Not set
Display Level	OPERATOR	display unit			
Inherited	false	format		Archive Periodic	Not set
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	Not set
Memorized	Not set	max_alarm			
		min_alarm		Push Change event by user code	false
		max_warning		Push Archive event by user code	false
		min_warning			
Read allowed for	All states	delta_time		Push DataReady event by user code	false
		max_val			

Attribute AttributeMinStoreTime :

Minimum storing time

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ	unit	s	Relative Change	Not set
Data Type	Tango::DEV_DOUBLE	standard unit	1		
Display Level	OPERATOR	display unit	s		

Inherited	false	format		Absolute Change	Not set
Abstract	false	max_value			
Polling Period	Not polled	min_value		Archive Periodic	Not set
Memorized	Not set	max_alarm		Archive Relative Change	Not set
		min_alarm		Archive Absolute Change	Not set
		max_warning			
Read allowed for	All states	min_warning		Push Change event by user code	false
		delta_time		Push Archive event by user code	false
		delta_val		Push DataReady event by user code	false

Attribute AttributeMaxProcessingTime :

Maximum processing (from event reception to storage) time

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	Label		Periodic	Not set
R/W Type	R/W	Unit	s	Relative Change	Not set
Data Type	TADEV_DOUBLE	Standard unit	1	Absolute Change	Not set
Display Level	OPERATOR	Display unit	s		
Inherited	false	format		Archive Periodic	Not set
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	Not set
Memorized	Not set	max_alarm			
		min_alarm		Push Change event by user code	false
		max_warning		Push Archive event by user code	false
Read allowed for	All states	min_warning		Push DataReady event by user code	false
		delta_time			
		delta_val			

Attribute AttributeMinProcessingTime :

Minimum processing (from event reception to storage) time

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ	unit	s	Relative Change	Not set
Data Type	Tango::DEV_DOUBLE	standard unit	1	Absolute Change	Not set
Display Level	OPERATOR	display unit	s	Archive Periodic	Not set
Inherited	false	format		Archive Relative Change	Not set
Abstract	false	max_value		Archive Absolute Change	Not set
Polling Period	Not polled	min_value		Push Change event by user code	false
Memorized	Not set	max_alarm		Push Archive event by user code	false
		min_alarm		Push dataReady event by user code	false
Read allowed for	All states	max_warning			
		min_warning			
		delta_time			
		delta_val			

Attribute AttributeRecordFreq :

Record frequency

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ	unit	ev/period	Relative Change	Not set
Data Type	Tango::DEV_DOUBLE	standard unit	1	Absolute Change	Not set
Display Level	OPERATOR	display unit	ev/period	Archive Periodic	Not set
Inherited	false	format		Archive Relative Change	Not set
Abstract	false	max_value		Archive Absolute Change	Not set
Polling Period	Not polled	min_value			
Memorized	Not set	max_alarm			
		min_alarm			
Read allowed for	All states	max_warning			
		min_warning			
		delta_time			

delta_val		Push Change event by user code	false
		Push Archive event by user code	false
		Push DataReady event by user code	false

Attribute AttributeFailureFreq :

Failure frequency

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ	unit	ev/period	Relative Change	Not set
Data Type	Tango::DEV_DOUBLE	standard unit		Absolute Change	Not set
Display Level	OPERATOR	display unit	ev/period		
Inherited	false	format		Archive Periodic	Not set
Abstract	false	max_val		Archive Relative Change	Not set
Polling Period	Not polled	min_val		Archive Absolute Change	Not set
Memorized	Not set	max_alarm			
		min_alarm		Push Change event by user code	false
Read allowed for	All users	max_arming		Push Archive event by user code	false
		min_arming			
		delt_time		Push DataReady event by user code	false
		delta_val			

Attribute AttributeStartedNumber :

Number of archived attributes started

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_LONG	standard unit		Absolute Change	Not set
Display Level	OPERATOR	display unit			
Inherited	false	format		Archive Periodic	Not set
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	Not set
Memorized	Not set	max_alarm			
		min_alarm		Push Change event by user code	false
Read allowed for	All states	max_warning		Push Archive event by user code	false
		min_warning			
		delta_time		Push DataReady event by user code	false
		delta_val			

Attribute AttributeStoppedNumber :

Number of archived attributes stopped

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_LONG	standard unit		Absolute Change	Not set
Display Level	OPERATOR	display unit			
Inherited	false	format		Archive Periodic	Not set
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	Not set
Memorized	Not set	max_alarm			
		min_alarm		Push Change event by user code	false
Read allowed for	All states	max_warning		Push Archive event by user code	false
		min_warning			
		delta_time		Push DataReady event by user code	false
		delta_val			

Attribute AttributeMaxPendingNumber :

Max number of attributes waiting to be archived

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_LONG	standard unit		Absolute Change	Not set
Display Level	OPERATOR	display unit			
Inherited	false	format		Archive Periodic	Not set
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	Not set
Memorized	Not set	max_alarm			
		min_alarm		Push Change event by user code	false
		max_warning		Push Archive event by user code	false
Read allowed for	All states	min_warning		Push DataReady event by user code	false
		delta_time			
		delta_val			

Attribute AttributePausedNumber :

Number of archived attributes paused

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_LONG	standard unit		Absolute Change	Not set
Display Level	OPERATOR	display unit			
Inherited	false	format		Archive Periodic	Not set
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	Not set
Memorized	Not set	max_alarm			
		min_alarm		Push Change event by user code	false
		max_warning		Push Archive event by user code	false
Read allowed for	All states	min_warning		Push DataReady event by user code	false
		delta_time			
		delta_val			

Attribute SetTTL :

Time To Live for temporary storage in hours

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ_WRITE	unit	hours	Relative Change	Not set
Data Type	Tango::DEV_ULONG	standard unit	1	Absolute Change	Not set
Display Level	OPERATOR	display unit	hours		
Inherited	false	format		Archive Periodic	Not set
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	Not set
Memorized	Not set	max_alarm			
		min_alarm		Push Change event by user code	false
Read allowed for	All states	max_warning			
Write allowed for	All states	min_warning		Push Archive event by user code	false
		delta_time			
		delta_val		Push DataReady event by user code	false

Attribute SetContext :

list of strategies separated with

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Scalar	label		Periodic	Not set
R/W Type	READ_WRITE	unit		Relative Change	Not set
Data Type	Tango::DEV_STRING	standard unit		Absolute Change	Not set
Display Level	OPERATOR	display unit			
Inherited	false	format		Archive Periodic	Not set
Abstract	false	max_value		Archive Relative Change	Not set
Polling Period	Not polled	min_value		Archive Absolute Change	Not set
Memorized	Not set	max_alarm			
		min_alarm			
Read allowed for	All states	max_warning			
Write allowed for	All states	min_warning			

delta_time	Push Change event by user code	false
delta_val	Push Archive event by user code	false
	Push DataReady event by user code	false

Attribute ArchiverList :

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Spectrum (1000)	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_STRING	standard unit		Absolute Change	Not set
Display Level	OPERATOR	display unit			
Inherited	false	format			
Abstract	false	max_value		Archive Periodic	Not set
Polling Period	Not polled	min_value		Archive Relative Change	Not set
Memorized	Not set	max_alarm		Archive Absolute Change	Not set
		min_alarm			
Read allowed for	All states	max_warning		Push Change event by user code	false
		min_warning		Push Archive event by user code	false
		delta_time		Push DataReady event by user code	false
		delta_val			

Attribute ArchiverStatus :

Attribute Definition		Attribute Properties		Attribute Event Criteria	
Attribute Type	Spectrum (1000)	label		Periodic	Not set
R/W Type	READ	unit		Relative Change	Not set
Data Type	Tango::DEV_STRING	standard unit			
Display Level	OPERATOR	display unit			

Inherited	false
Abstract	false
Polling Period	Not polled
Memorized	Not set
Read allowed for	All states

format
max_value
min_value
max_alarm
min_alarm
max_warning
min_warning
delta_time
delta_val

Absolute Change	Not set
Archive Periodic	Not set
Archive Relative Change	Not set
Archive Absolute Change	Not set
Push Change event by user code	false
Push Archive event by user code	false
Push DataReady event by user code	false

Attribute ArchiverStatisticsResetTime :

Seconds elapsed since last statistics reset

Attribute Definition	
Attribute Type	Spec (1000)
R/W Type	READ
Data Type	Tango DEV_DOUBLE
Display Level	OPERATOR
Inherited	false
Abstract	false
Polling Period	Not polled
Memorized	Not set
Read allowed for	All states

Attribute Properties	
label	
unit	s
standard unit	1
display unit	s
format	
max_value	
min_value	
max_alarm	
min_alarm	
max_warning	
min_warning	
delta_time	
delta_val	

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	Not set
Archive Periodic	Not set
Archive Relative Change	Not set
Archive Absolute Change	Not set
Push Change event by user code	false
Push Archive event by user code	false
Push DataReady event by user code	false

Attribute ArchiverContext :

Archiver context

Attribute Definition	
Attribute Type	Spectrum (1000)
R/W Type	READ
Data Type	Tango::DEV_UCHAR
Display Level	OPERATOR
Inherited	false
Abstract	false
Polling Period	Not polled
Memorized	Not set
Read allowed for	All states

Attribute Properties	
label	
unit	s
standard unit	1
display unit	s
format	
max_value	
min_value	
max_alarm	
min_alarm	
max_warning	
min_warning	
delta_time	
delta_val	

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	Not set
Archive Periodic	Not set
Archive Relative Change	Not set
Archive Absolute Change	Not set
Push Change event by user code	false
Push Archive event by user code	false
Push DataReady event by user code	false

HdbConfigurationManager Class States	
Name	Description
ON	
ALARM	At least one archiver is in ALARM