

HDB++

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- Novel Tango device server for Historical Data Base archiving
- Written in C++
- Fully event-driven
- Architecture based on:
 - One or more Event Subscriber DS
 - One Configuration Manager
 - One or more Data Extraction DS
 - Libraries for data insertion and extraction API
- Fast, efficient
- Flexible: easy to manage and maintain even **without** graphical frontends
- Self contained: single source for all configuration parameters (Tango DB)
- Modular: dedicated decoupling libraries to support different database engines and schemas, data insertion, data extraction
- Scalable: comes from Tango architecture... for free
- <http://sourceforge.net/p/tango-cs/code/HEAD/tree/archiving/hdb++/>

Commands

AttributeAdd
AttributeRemove
AttributeStatus
AttributeStart
AttributeStop
Start
Stop
ResetStatistics

Attributes

AttributeOkNumber
AttributeNokNumber
AttributePendingNumber
AttributeNumber
AttributeList
AttributeOkList
AttributeNokList
AttributePendingList
AttributeMaxStoreTime
AttributeMinStoreTime
AttributeAVGStoreTime
AttributeMaxProcessingTime
AttributeMinProcessingTime
AttributeAVGProcessingTime

Device Properties

SubscribeRetryPeriod
AttributeList
DbHost
DbUser
DbPassword
DbName
DbPort
StartArchivingAtStartup

Class Properties

SubscribeRetryPeriod
DbHost
DbUser
DbPassword
DbName
DbPort
StartArchivingAtStartup

Commands

AttributeAdd
AttributeRemove
AttributeStatus
AttributeStart
AttributeStop
AttributeAssign
AttributeGetArchiver
AttributeSearch
ArchiverAdd
ArchiverRemove
ResetStatistics

Attributes

AttributeOkNumber
AttributeNokNumber
AttributePendingNumber
AttributeNumber
ArchiverList
ArchiverStatus
SetAttributeName
SetPollingPeriod
SetAbsoluteEvent
SetRelativeEvent
SetPeriodEvent
SetCodePushedEvent
SetArchiver
AttributeMaxStoreTime
AttributeMinStoreTime
AttributeMaxProcessingTime
AttributeMinProcessingTime

Device Properties

ArchiverList
MaxSearchSize

- Event Subscriber device server production-ready since October 2013
- Configuration Manager production-ready since April 2014
- 9 Event Subscriber instances running
- 2515 attributes archived (from 24 to 1000 attributes per instance)

tango://srv-tango-srf.fcs.elettra.trieste.it:20000/scl/radiation_protection/blm_vlv_scl.01/blmintdata
tango://srv-tango-srf.fcs.elettra.trieste.it:20000/spbc01/power_supply/psb_spbc01.01/current

```
Attribute: archiving/hdb++archiver/blm/AttributeNokNumber
Duration: 18 msec
measure date: 15/05/2014 11:42:41 + 451ms
quality: VALID
Read: 0
```

```
-----
Command: archiving/hdb++archiver/blm/AttributeStatus
Duration: 5 msec
Output argument(s) :
Event status      : Subscribed
Events engine     : ZMQ
Archiving         : Started
Event OK counter  : 30560
Event NOK counter : 151
DB ERRORS counter : 0
Store time AVG   : 0.002079s
Processing time AVG: 0.077813s
```

```
Attribute: archiving/hdb++archiver/ps/AttributeNokNumber
Duration: 12 msec
measure date: 15/05/2014 11:48:10 + 379ms
quality: VALID
Read: 0
```

```
-----
Command: archiving/hdb++archiver/ps/AttributeStatus
Duration: 5 msec
Output argument(s) :
Event status      : Subscribed
Events engine     : ZMQ
Archiving         : Started
Event OK counter  : 34680
Event NOK counter : 1812
DB ERRORS counter : 0
Store time AVG   : 0.076170s
Processing time AVG: 0.116983s
```

The screenshot shows a software interface titled "Device Panel [archiving/hdb++archiver/ps]". It has three tabs: "Commands", "Attributes", and "Admin". The "Commands" tab is active. At the top, there is a text input field for "Argin value" containing the URL "tango://srv-tango-srf.fcs.elettra.trieste.it:20000/spbc01/power_supply/psb_spbc01.01/current". Below this, there are two dropdown menus for "Argin Type" and "Argout Type", both set to "DevString". There are three buttons: "Show description", "Execute", and "Plot". A list of commands is visible on the left, with "AttributeStatus" selected. The bottom section of the window displays the output of the "AttributeStatus" command, showing various counters and status information.

```
Archiving : Started
Event OK counter : 33154
Event NOK counter : 1812
DB ERRORS counter : 0
Store time AVG : 0.075360s
Processing time AVG: 0.116438s
-----
Command: archiving/hdb++archiver/ps/AttributeStatus
Duration: 4 msec
Output argument(s) :
Event status : Subscribed
Events engine : ZMQ
Archiving : Started
Event OK counter : 33154
Event NOK counter : 1812
DB ERRORS counter : 0
Store time AVG : 0.075360s
Processing time AVG: 0.116438s
```

The screenshot shows the 'Device Panel [archiving/hdb++manager/0]' window with the 'Attributes' tab active. The 'AttributeNumber' attribute is selected in the left-hand list. The right-hand pane displays the following properties:

Name	AttributeNumber
Label	AttributeNumber
Writable	READ
Data format	Scalar
Data type	DevLong
Max Dim X	1
Max Dim Y	0
Unit	No unit

Below the properties are three buttons: 'Read', 'Write', and 'Plot'. The 'Read' button has been clicked, resulting in the following output in the console area:

```

DTM x: 9
Read length: 9
Read [0]    tango://srv-tango-srf.fcs.elettra.trieste.it:20000/archiving/hdb++archiver/blm
Read [1]    tango://srv-tango-srf.fcs.elettra.trieste.it:20000/archiving/hdb++archiver/climate
Read [2]    tango://srv-tango-srf.fcs.elettra.trieste.it:20000/archiving/hdb++archiver/mod
Read [3]    tango://srv-tango-srf.fcs.elettra.trieste.it:20000/archiving/hdb++archiver/pdu
Read [4]    tango://srv-tango-srf.fcs.elettra.trieste.it:20000/archiving/hdb++archiver/procfs
Read [5]    tango://srv-tango-srf.fcs.elettra.trieste.it:20000/archiving/hdb++archiver/ps
Read [6]    tango://srv-tango-srf.fcs.elettra.trieste.it:20000/archiving/hdb++archiver/radfet
Read [7]    tango://srv-tango-srf.fcs.elettra.trieste.it:20000/archiving/hdb++archiver/stat
Read [8]    tango://srv-tango-srf.fcs.elettra.trieste.it:20000/archiving/hdb++archiver/tertiary

-----
Attribute: archiving/hdb++manager/0/AttributeNumber
Duration: 14 msec
measure date: 14/05/2014 11:00:02 + 379ms
quality: VALID
Read: 2515
  
```

At the bottom right of the window are 'Clear history' and 'Dismiss' buttons.

Database interface: currently three libraries available:

- libhdb++ : HDB++ abstraction layer
- libhdb++mysql : HDB++ table support, MySQL back-end
- libhdbmysql : legacy HDB table support, MySQL back-end

Partitioning:

- legacy HDB schema: partitioning by hand every few months
- HDB++ schema: automatic partitioning by key (fixed number of partitions) + every N months
- HDB++ schema: partitioning on trigger depending on table size (rows)

- Event Subscriber additional statistics
 - per-instance total number of records per time (scalar)
 - per-instance total number of failures per time (scalar)
 - per-attribute number of records per time (vector+AttributeStatus)
 - per-attribute number of failures per time (vector+AttributeStatus)
 - per-attribute timestamp of last record (vector+AttributeStatus)
- Extraction library
 - deal with event-based archived data: lack of data inside the requested time window
 - deal with different lengths on multiple rows
 - manage query and data cache locally (client side)