



HDB++

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- **Written in C++**
- **Event-driven**: exploit the TANGO publish/subscribe mechanism
- Architecture based on:
 - One or more archivers (EventSubscriber TANGO ds)
 - Configuration management (ConfigurationManager TANGO ds)
 - Libraries for data insertion and extraction (C++ and Java)
 - Data extraction: TANGO ds / clients
- **Fast**
 - One database for slow and fast archiving (up to 1000 samples/s, possibly more)
- **Flexible**
 - Easy to manage and maintain even without GUI front-ends
- **Self contained**
 - Single source for all configuration parameters (TANGO database)
- **Modular**
 - Abstraction+implementation libraries to support different database engines and schema
 - Support for existing HDB schema on MySQL
 - Support for **hdb++ new schema** with improved features (μ s timestamp)
 - Support for **noSQL** back-end (Apache Cassandra)
 - Easily extensible to additional database/schema
- **Scalable**: same as TANGO, deploy as many DS as needed
- **GUI**: for HDB++ configuration and data extraction as well

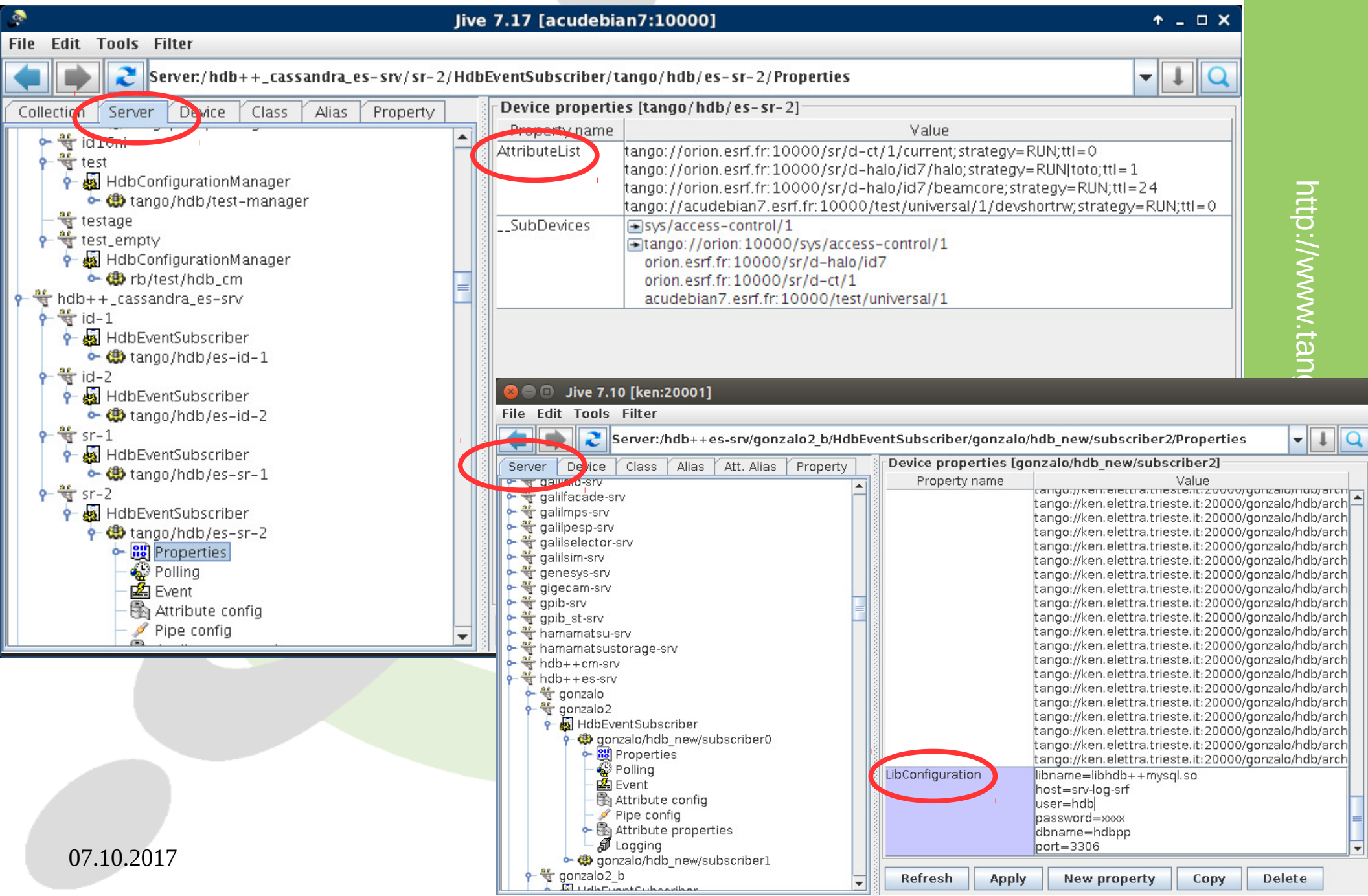
- TANGO provides specific event for archiving purposes
- The **archive** event can be sent:
 - on value change → specify absolute or relative threshold
 - periodically → specify period
-
- Choosing the right thresholds is mandatory:
 - if the threshold is too large no events are sent → no archiving
 - if the threshold is too small too many events are sent → “noisy” archiving
- The right threshold is **strictly related to the variable/signal** to be archived (type, bandwidth, sampling rate...)

The EventSubscriber TANGO device server is the core of the HDB++ archiving system

- Event based; TANGO provides **archive events** on change and periodic basis
- Configuration stored in the TANGO database (device)
- One thread in charge of event(s) subscription and callback execution: fills a FIFO acting as producer
- One thread in charge of pushing data into the database; reads the FIFO as consumer
- Device methods allow to perform the following per-instance operations:
 - **add/remove** an Attribute to/from archiving
 - **start/stop** the archiving for all Attributes
 - start/stop the archiving for one Attribute
 - read the status of an Attribute
 - read the number/list of Attributes currently archived (started)
 - read the number/list of Attributes currently not archived (stopped)
 - read the number/list of Attributes in charge
 - read the configuration parameters of each Attribute
 - read the number/list of working Attributes
 - read the number/list of faulty Attributes with diagnostics
 - read the number/list of Attributes pending in the FIFO
- The EventSubscriber exposes some **additional figures**:
 - **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
 - for each attribute, min and max processing and storing times

+ Manage context
+ Manage time-to-live

EventSubscriber device configuration



The image shows two screenshots of the Jive configuration tool. The top screenshot is from Jive 7.17 [acudebian7:10000] and the bottom screenshot is from Jive 7.10 [ken:20001].

Jive 7.17 [acudebian7:10000] - Server: /hdb+_cassandra_es-srv/sr-2/HdbEventSubscriber/tango/hdb/es-sr-2/Properties

The **Server** tab is selected. The **Device properties [tango/hdb/es-sr-2]** table is shown:

Property name	Value
AttributeList	tango://orion.esrf.fr:10000/sr/d-ct/1/current;strategy=RUN;ttl=0 tango://orion.esrf.fr:10000/sr/d-halo/id7/halo;strategy=RUN toto;ttl=1 tango://orion.esrf.fr:10000/sr/d-halo/id7/beamcore;strategy=RUN;ttl=24 tango://acudebian7.esrf.fr:10000/test/universal/1/devshortw;strategy=RUN;ttl=0
__SubDevices	sys/access-control/1 tango://orion:10000/sys/access-control/1 orion.esrf.fr:10000/sr/d-halo/id7 orion.esrf.fr:10000/sr/d-ct/1 acudebian7.esrf.fr:10000/test/universal/1

Jive 7.10 [ken:20001] - Server: /hdb+_es-srv/gonzalo2_b/HdbEventSubscriber/gonzalo/hdb_new/subscriber2/Properties

The **Server** tab is selected. The **Device properties [gonzalo/hdb_new/subscriber2]** table is shown:

Property name	Value
LibConfiguration	libname=libhdb+_mysql.so host=svr-log-srf user=hdbj password=xxx dbname=hdbpp port=3306

EventSubscriber Class configuration

jive 7.17 [acudebian7:10000]

File Edit Tools Filter

Class: /HdbEventSubscriber/Properties

Collection Server Device **Class** Alias Property

Group3Dtm141
HakaPoC
HarmAnalysis
HdbAccess
HdbArchiver
HdbArchivingWatcher
HdbConfigServer
HdbConfigurationManager
Properties
Attribute properties
Devices
HdbConfiguratorServer
HdbEventHandler
HdbEventSubscriber
Properties
Attribute properties
Devices
HdbExtractor
HdbLogger
HdbManagerSimu
HdbRecordCounter
HdbSigArchiveSurvey
HdbUtilities
HlsCaptor

Class properties [HdbEventSubscriber]

Property name	Value
ContextsList	ALWAYS: Store in HDB++ under any circumstances SHUTDOWN: Store in HDB++ in SHUTDOWN period RUN: Store in HDB++ in RUN period toto: tsoin tsoin
cvs_location	/home/cvsadm/cvsroot/fermi/servers/hdb++/hdb++es/src/
DbHost	cassandra2
DbName	hdbtest
DefaultStrategy	RUN
Description	This class is able to subscribe on archive events and store value in Historical DB
doc_url	http://www.esrf.eu/computing/cs/tango/tango_doc/ds_doc/
InheritedFrom	TANGO_BASE_CLASS
LibConfiguration	keyspace=hdbtest contact_points=cassandra2 user=hdbwriter password=MyPass libname=libhdb++cassandra.so logging_enabled=true
PollingThreadPeriod	1
ProjectTitle	Tango Device Server
StartArchivingAtStartup	false
StatisticsTimeWindow	1
SubscribeRetryPeriod	10

Refresh Apply New property Copy Delete

The ConfigurationManager TANGO device server simplifies HDB++ archiving system management:

- **handle** the request of archiving a new Attribute
 - create an entry in the database if not already present
 - setup the Attribute archive event configuration
 - assign the Attribute to one of the archivers
- **move** an Attribute from one archiver to another
- keep trace of which Attribute is assigned to which archiver
- **start/stop** the archiving
- **remove** an Attribute from archiving
- + manage EventSubscriber context
- + manage Attribute time-to-live

The Configuration manager exposes some **global statistics**:

- total number of Archivers
- total number of working/faulty attributes
- total number of events per second
- overall minimum and maximum processing and storing time

ConfigurationManager

Class configuration

Jive 7.17 [acudebian7:10000]

File Edit Tools Filter

Class:/HdbConfigurationManager/Properties

Class Alias Property
Collection Server Device

- Group3Dtm141
- HakaPoC
- HarmAnalysis
- HdbAccess
- HdbArchiver
- HdbArchivingWatcher
- HdbConfigServer
- HdbConfigurationManager
 - Properties**
 - Attribute properties
 - Devices
- HdbConfiguratorServer
- HdbEventHandler
- HdbEventSubscriber
- HdbExtractor
- HdbLogger
- HdbManagerSimu
- HdbRecordCounter
- HdbSigArchiveSurvey
- HdbUtilities
- HLsCaptor

Class properties [HdbConfigurationManager]

Property name	Value
cvs_location	/home/cvsadm/cvsroot/fermi/servers/hdb++/hdb++cm/src/
DbHost	cassandra2
DbName	hdbtest
Description	
doc_url	http://www.esrf.eu/computing/cs/tango/tango_doc/ds_doc/
InheritedFrom	TANGO_BASE_CLASS
LibConfiguration	keyspace=hdbtest contact_points=cassandra2 user=hdbwriter password=MyPass libname=libhdb++cassandra.so
ProjectTitle	Hdb++ configuration manager

Refresh Apply New property Copy Delete

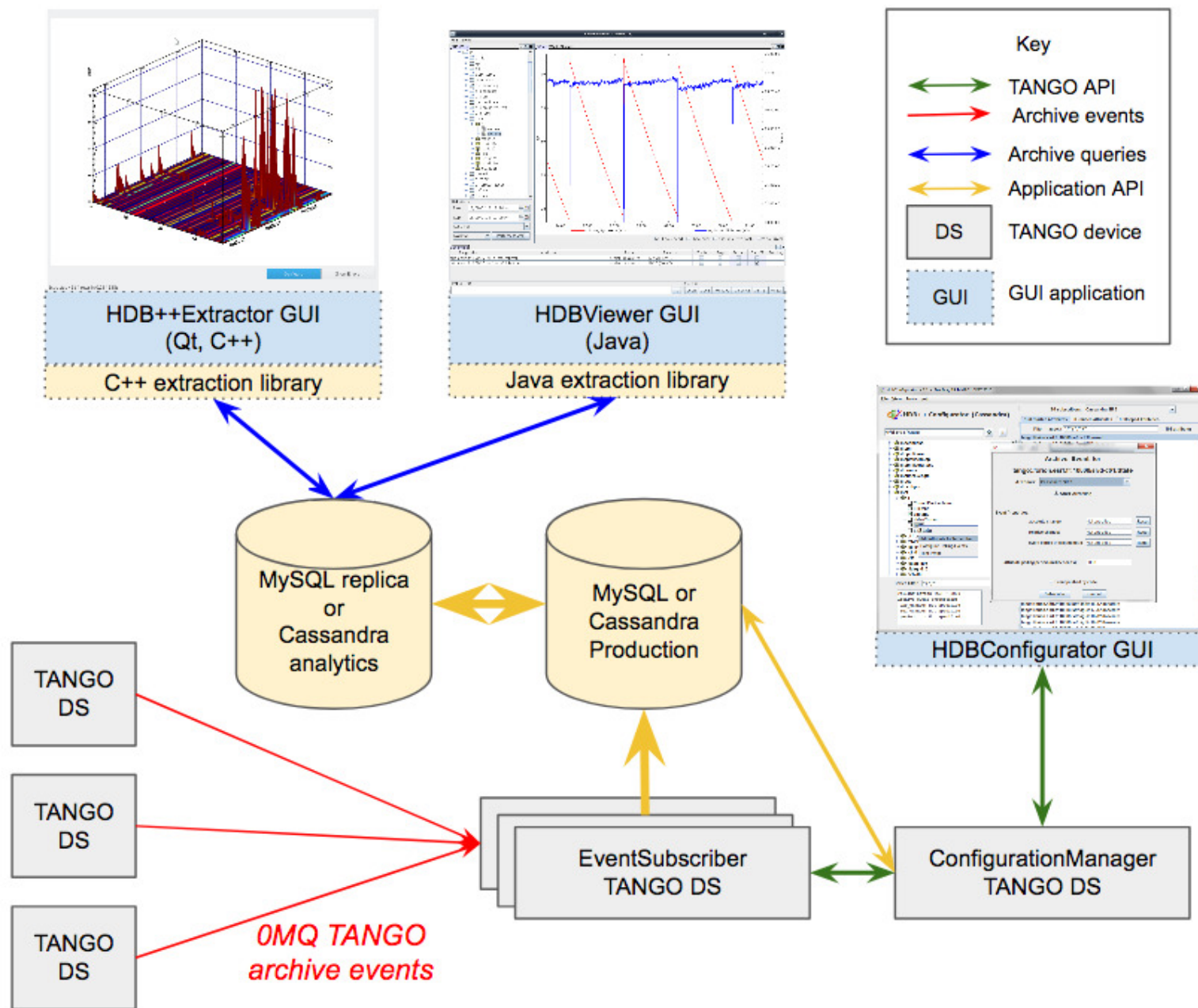
A C++ API decouples the archiving engine (EventSubscriber) from the database back-end

- **libhdb++** : database abstraction layer
- **libhdb++mysql** : implementation, HDB++ schema support, MySQL back-end
- **libhdb++cassandra** : implementation, HDB++ schema support, Cassandra back-end
- **libhdbmysql** : implementation, legacy HDB schema support, MySQL back-end

The libraries allow reusing the EventSubscriber, the ConfigurationManager and the GUIs without any change

HDB++ is easily extendable to support additional back-ends(*) just writing the specific implementation library

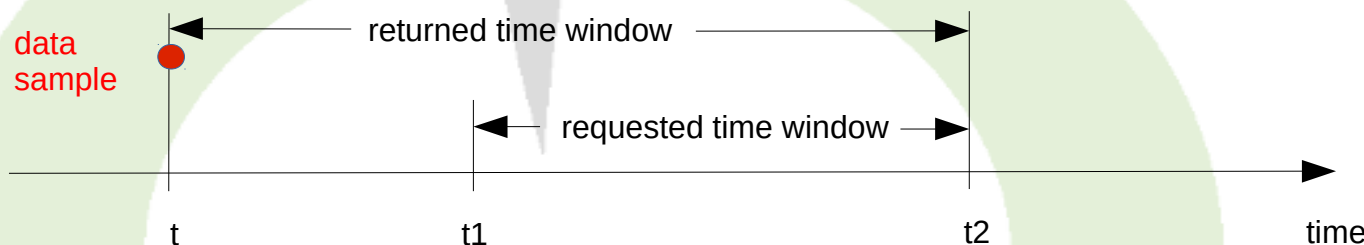
(*) not limited to database engines... HDF5 format on file?



C++ and Java native extraction libraries

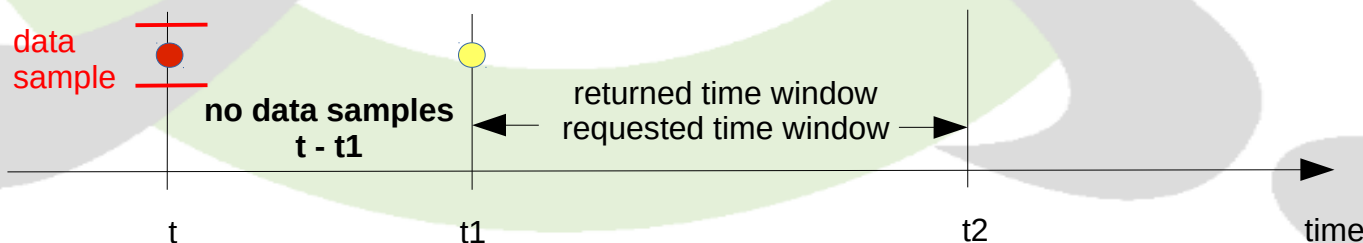
The data extraction library shall be able to **deal with event based archiving, i.e. data value change with respect to specified thresholds**; the possible lack of data in the requested time window shall be properly managed:

- returning some no-data-available error: in this case the reply contains no data
- enlarging the time window to include some archived data; no fake samples introduced



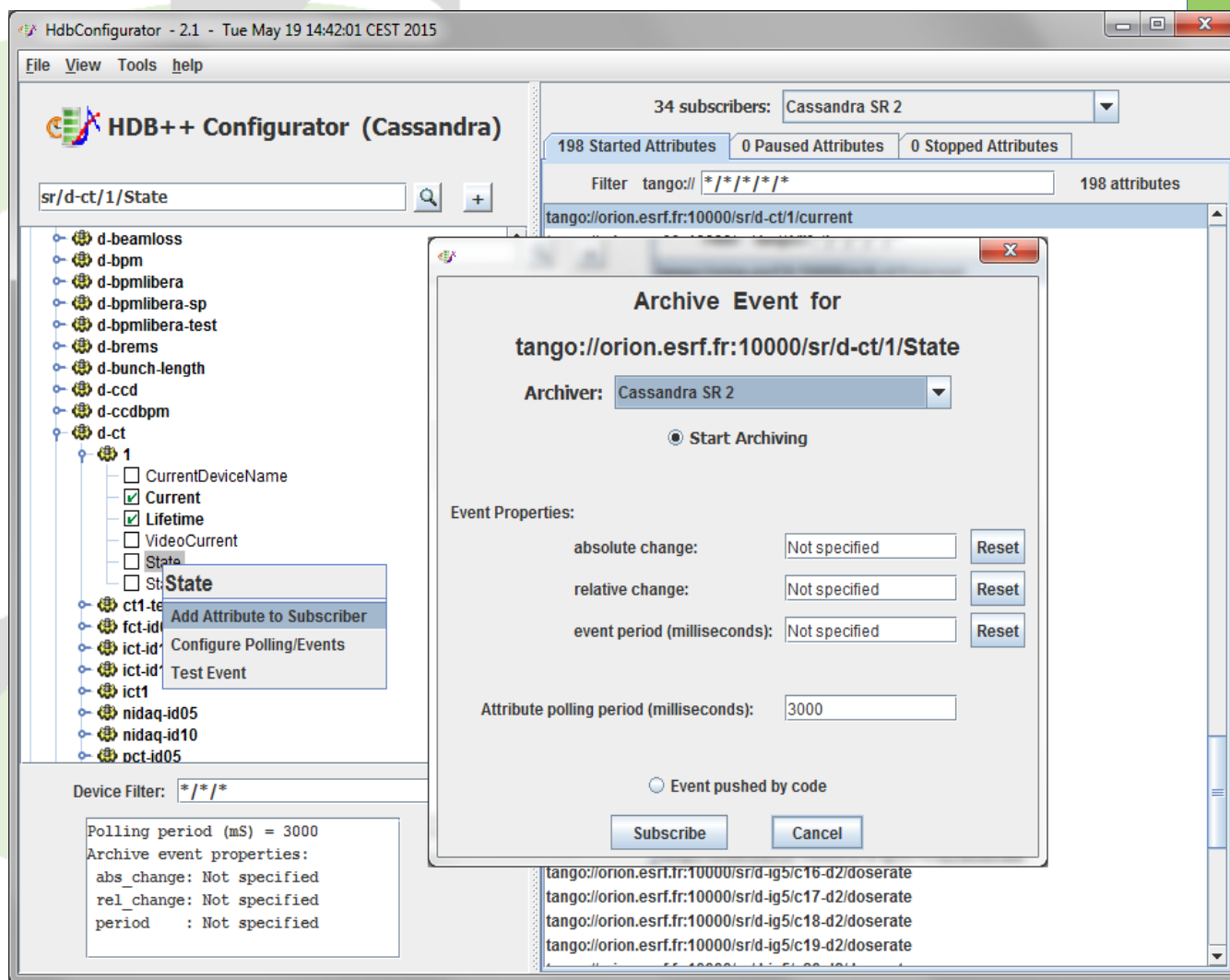
- returning the value of the last archived data anyhow; the requested time interval is kept and the last available data sample returned; the data value is guaranteed when **archiving on change**, care must be taken in case of **periodic archiving**

archive change event thresholds

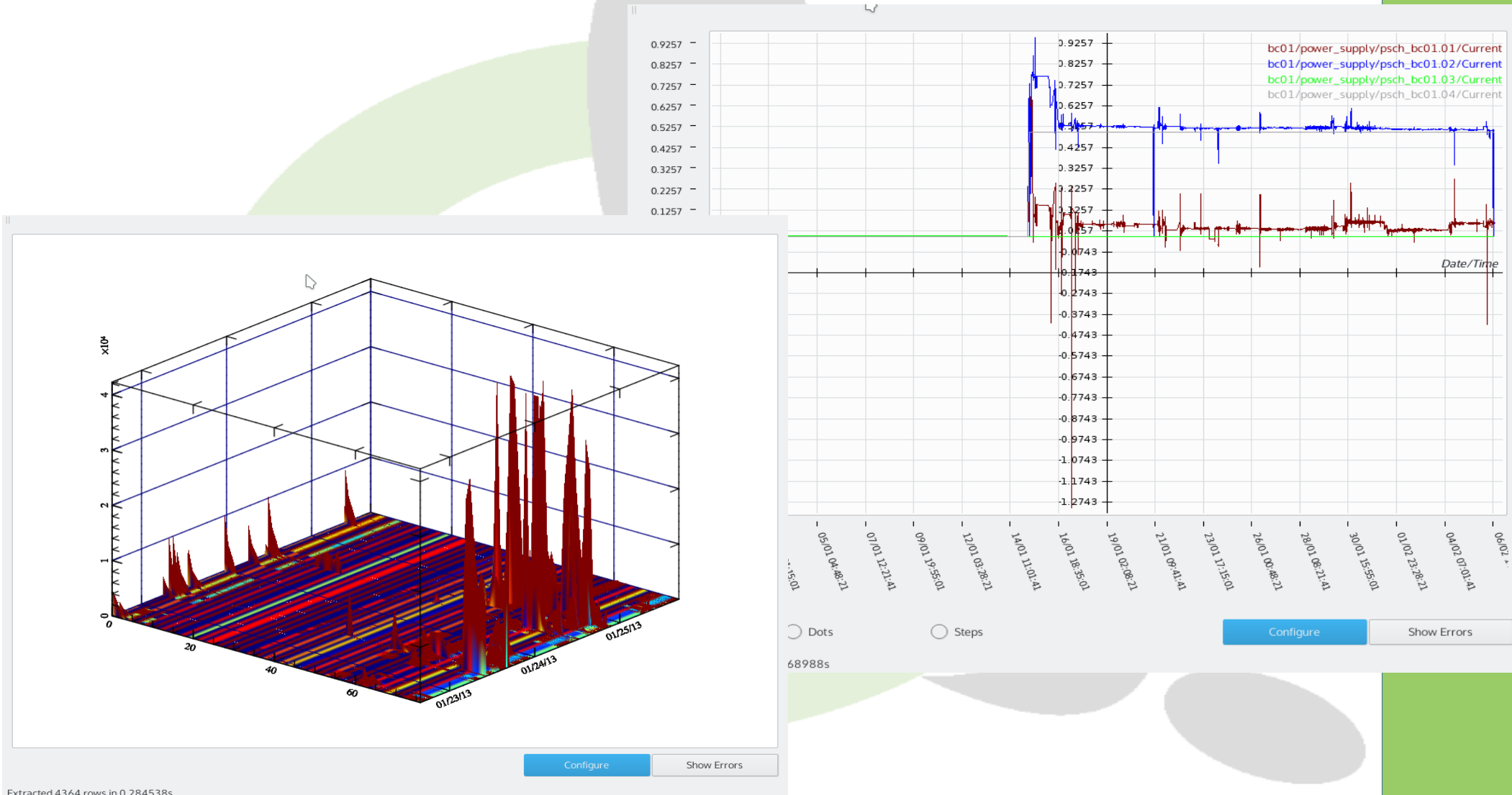


HdbConfigurator: a graphical user interface for the ConfigurationManager device

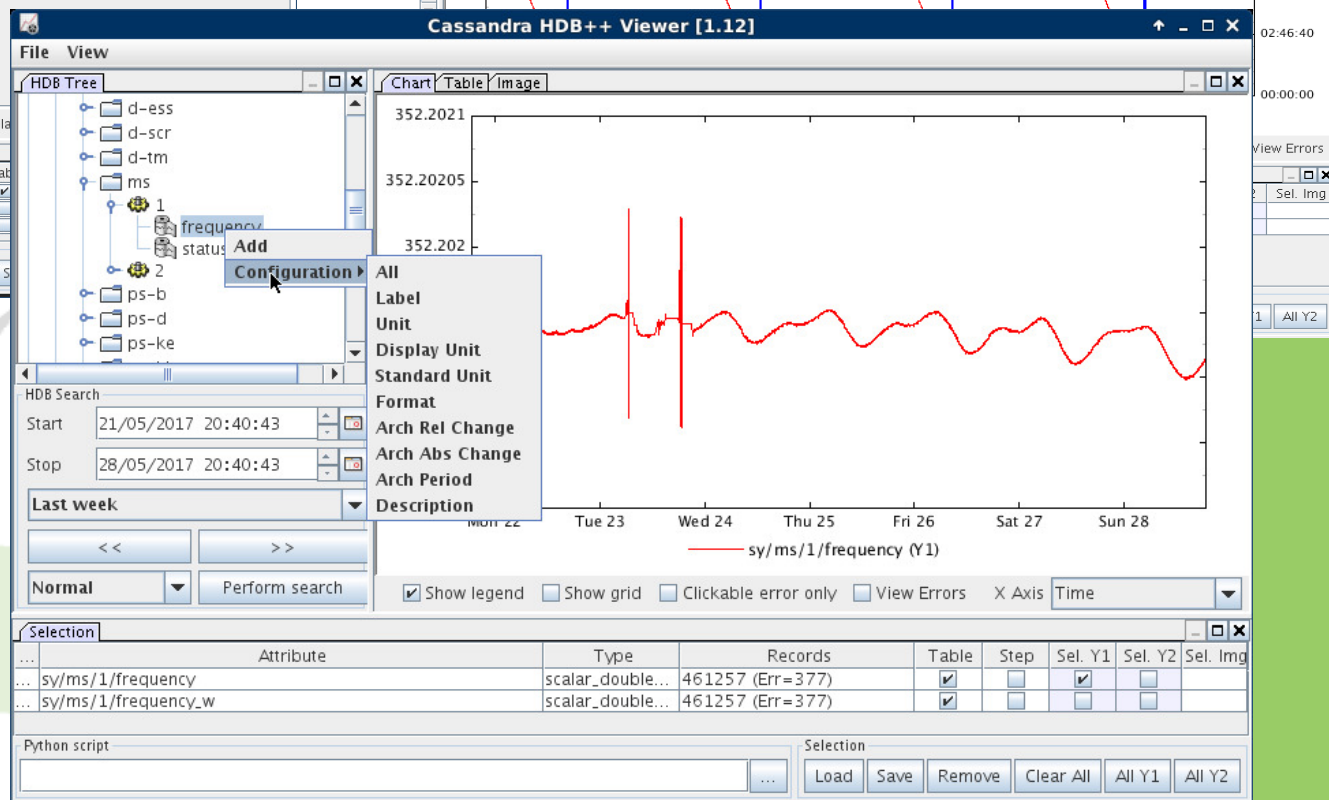
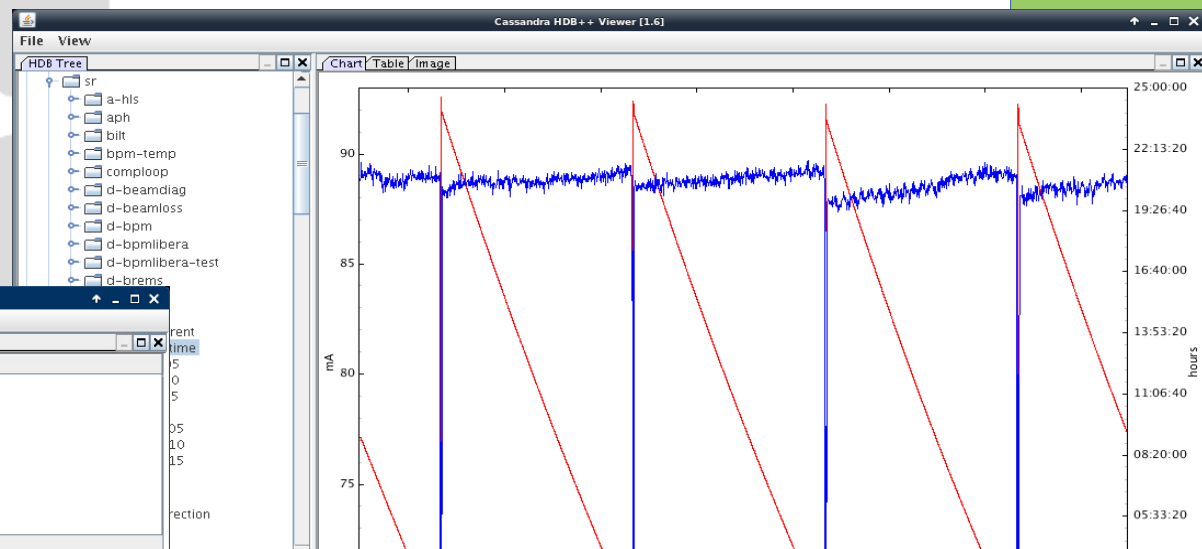
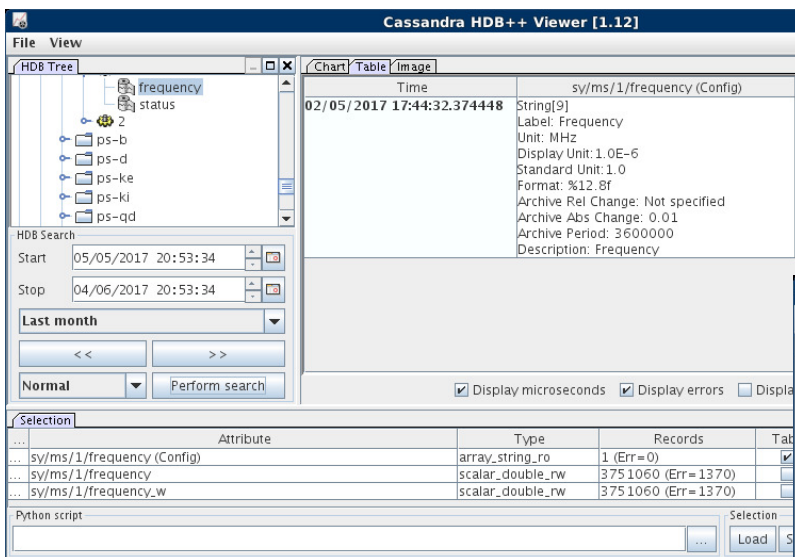
- Jive-like device tree
- Selected Attribute archive event parameters bottom left
- Started, stopped, paused attribute lists
- Pop-up to select archiver and parameters



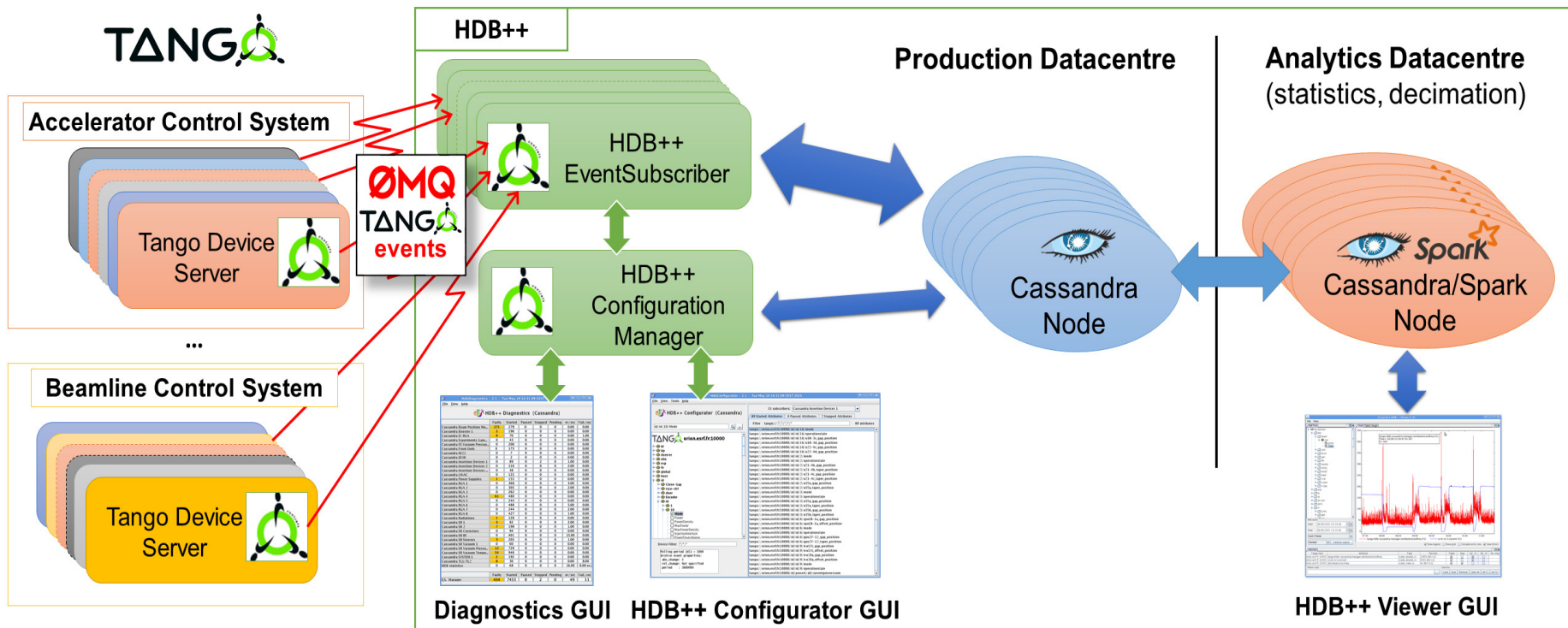
- Qt based GUI using the MathGL framework for plotting
- Exploits the C++ extraction library
- Supports multiline and surface plots

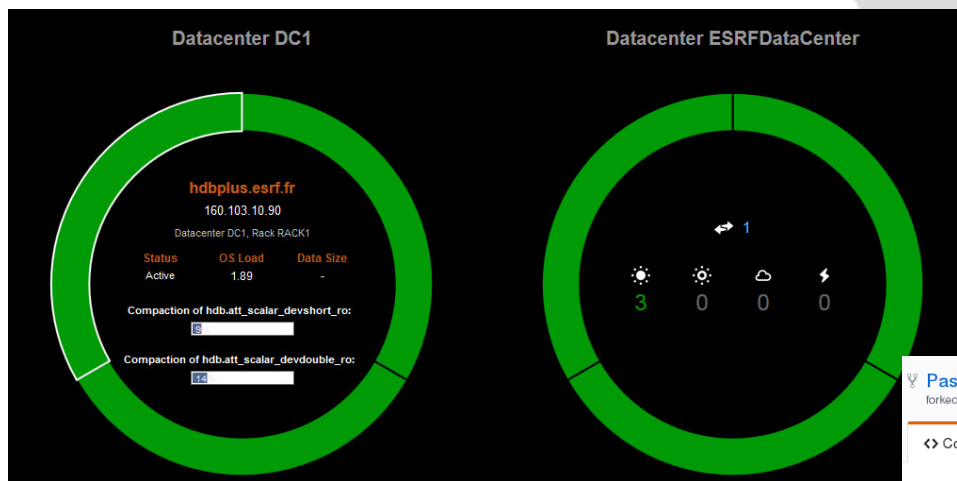


- Java based GUI for plotting
- Exploits the Java extraction library
- Table and multiline plots



HdbDiagnostics - 2.2 - 23-05-2017 13:18:05								
File View help								
HDB++ Diagnostics (Cassandra)								
	Faulty	Started	Paused	Stopped	Pending	ev/sec	Fail./sec	Context
"HDB++" statistics	0	78	0	0	0	12.00	0.00	Run
Beam Position Monitors	0	293	0	1	0	0.00	0.00	Run
Booster 1	0	234	0	0	0	2.00	0.00	Run
D-RGA	0	62	0	0	0	8.00	0.00	Run
Experiments Gamma Monitors	0	43	0	0	0	6.00	0.00	Run
FE Vacuum Pressures	0	375	0	0	0	0.00	0.00	Run
Fast BPM	0	4	0	0	0	0.00	0.00	Run
Front Ends	0	175	0	2	0	0.00	0.00	Run
ID22	0	7	0	0	0	0.00	0.00	Run
Injext	0	38	0	0	0	1.00	0.00	Run
Insertion Devices 1	0	94	0	0	0	0.00	0.00	Run
Insertion Devices 2	0	115	0	0	0	0.00	0.00	Run
Insertion Devices Corrections	0	32	0	0	0	0.00	0.00	Run
LINAC	0	121	0	0	0	0.00	0.00	Run
Power Supplies	0	188	0	1	0	2.00	0.00	Run
RGA 1	0	368	0	0	0	2.00	0.00	Run
RGA 2	0	305	0	0	0	0.00	0.00	Run
RGA 3	0	364	0	0	0	2.00	0.00	Run
RGA 4	0	497	0	0	0	0.00	0.00	Run
RGA 5	0	303	0	0	0	3.00	0.00	Run
RGA 6	0	427	0	61	0	0.00	0.00	Run
RGA 7	0	244	0	0	0	1.00	0.00	Run
RGA 8	0	363	0	61	0	0.00	0.00	Run
Radiations	0	199	0	0	0	0.00	0.00	Run
SR 1	3	65	0	17	0	6.00	0.00	Run
SR 2	0	200	0	0	0	1.00	0.00	Run
SR Correctors	0	94	0	0	0	0.00	0.00	Run
SR RF	7	443	0	0	0	16.00	0.00	Run
SR Steerers	0	201	0	0	0	0.00	0.00	Run
SR Vacuum 1	0	61	0	0	0	0.00	0.00	Run
SR Vacuum Pressures	0	741	0	0	0	0.00	0.00 ev/	Run
SR Vacuum Temperatures	0	934	0	1	0	1.00	0.00 ev/	Run
SY RF	1	107	0	0	0	2.00	0.00	Run
SYSTEM 1	1	215	0	0	0	0.00	0.00	Run
TL1/TL2	0	43	0	0	0	2.00	0.00 ev/	Run
test labs	0	12	0	58	0	0.00	0.00 ev/	Run
	Faulty	Started	Paused	Stopped	Pending	ev/sec	Fail./sec	Context
E.S. Manager	12	8045	0	202	0	85	0	run





Pascal-Verdier / **CassandraMonitor**
forked from bourtemb/CassandraMonitor

Watch 1 Star 0 Fork 1

Code Pull requests 0 Projects 0 Wiki Insights

The CassandraMonitoring device server is a Tango device server (see <http://www.tango-controls.org>), able to monitor what's happening on a given Apache Cassandra node.

6 commits 1 branch 2 releases 1 contributor

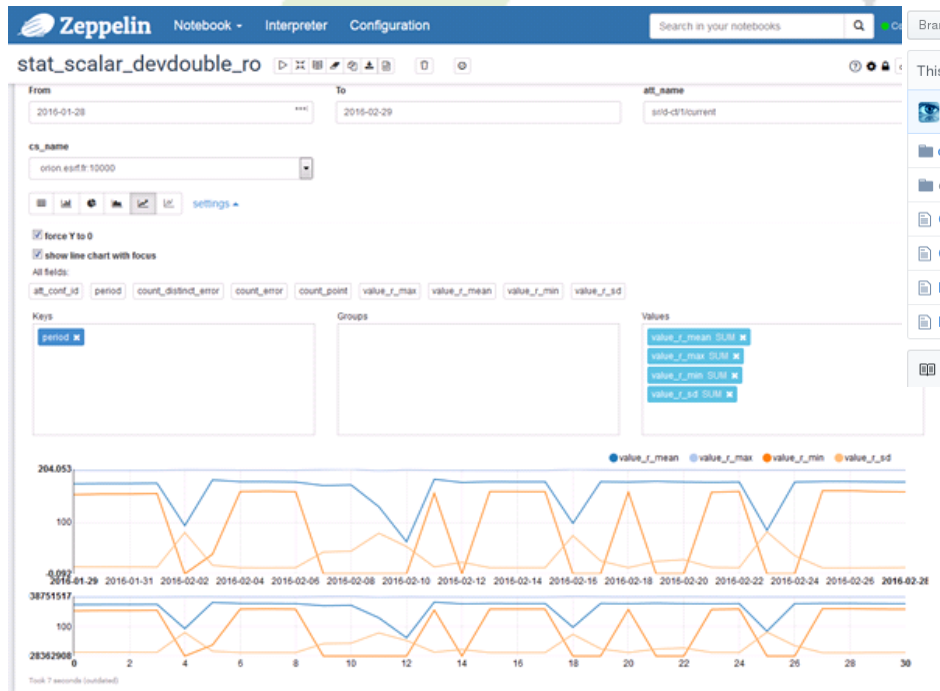
Branch: master New pull request

Create new file Upload files Find file Clone or download

This branch is even with bourtemb:master.

Clone with HTTPS
Use Git or checkout with SVN using the web URL.
<https://github.com/Pascal-verdier/CassandraMonitor>
Download ZIP

File	Commit Message	Time
doc_html	First commit	
org/tango/cassandramonitor	Added default event configuration for DataLoad and OperationMode attr...	
CONTRIBUTING.md	First commit	7 months ago
CassandraMonitor.xmi	Added default event configuration for DataLoad and OperationMode attr...	7 months ago
LICENSE.md	First commit	7 months ago
README.md	Reformat Getting Started section	7 months ago



Important: learn it before putting it in production:

<https://academy.datastax.com/courses>

<http://cassandra.apache.org/doc/latest/>

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

<https://github.com/search?q=org%3Atango-controls+hdbpp>

Two branches

- “master” – legacy hdb++ stuff, Makefile based build
- “build-and-package” - cmake based build, WIP
- Move to <https://github.com/tango-controls-hdbpp> organization in progress

Compiling from “master” branch:

```
git clone --recursive http://github.com/tango-controls/libhdbpp-mysql.git
cd libhdbpp-mysql
export TANGO_DIR=/usr/local/tango-9.2.5a
export OMNIORB_DIR=/usr/local/omniorb-4.2.1
export ZMQ_DIR=/usr/local/zeromq-4.0.7
make
```

```
git clone --recursive http://github.com/tango-controls/hdbpp-es.git
cd libhdbpp-mysql
export TANGO_DIR=/usr/local/tango-9.2.5a
export OMNIORB_DIR=/usr/local/omniorb-4.2.1
export ZMQ_DIR=/usr/local/zeromq-4.0.7
make
```

```
git clone --recursive http://github.com/tango-controls/hdbpp-cm.git
cd libhdbpp-mysql
export TANGO_DIR=/usr/local/tango-9.2.5a
export OMNIORB_DIR=/usr/local/omniorb-4.2.1
export ZMQ_DIR=/usr/local/zeromq-4.0.7
make
```

Note: Makefile uses “mysql_config” script to retrieve MySQL installation paths.
Adapt Makefile to use “mariadb_config” if you’re using MariaDB

Pre-release debian package available on bintray:

- <https://bintray.com/tango-controls/debian>

```
> echo "deb https://dl.bintray.com/tango-controls/debian stretch main" |  
sudo tee -a /etc/apt/sources.list
```

```
> sudo apt-get update
```

```
> sudo apt-get install hdb++mysql
```

```
> sudo apt-get install cassandra-cpp-driver
```

```
> sudo apt-get install hdb++cassandra
```

hdb++xxx are meta-packages that install all the dependencies
To be included in the official debian repository