



# ICALEPCS 2015

International Conference on Accelerator  
& Large Experimental Physics  
Control Systems

## **How Cassandra Improves Performances and Availability of HDB++ TANGO Archiving System**

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WEM310



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## Project goal

HDB++ = TANGO collaborative project (Ref: WED3O04)



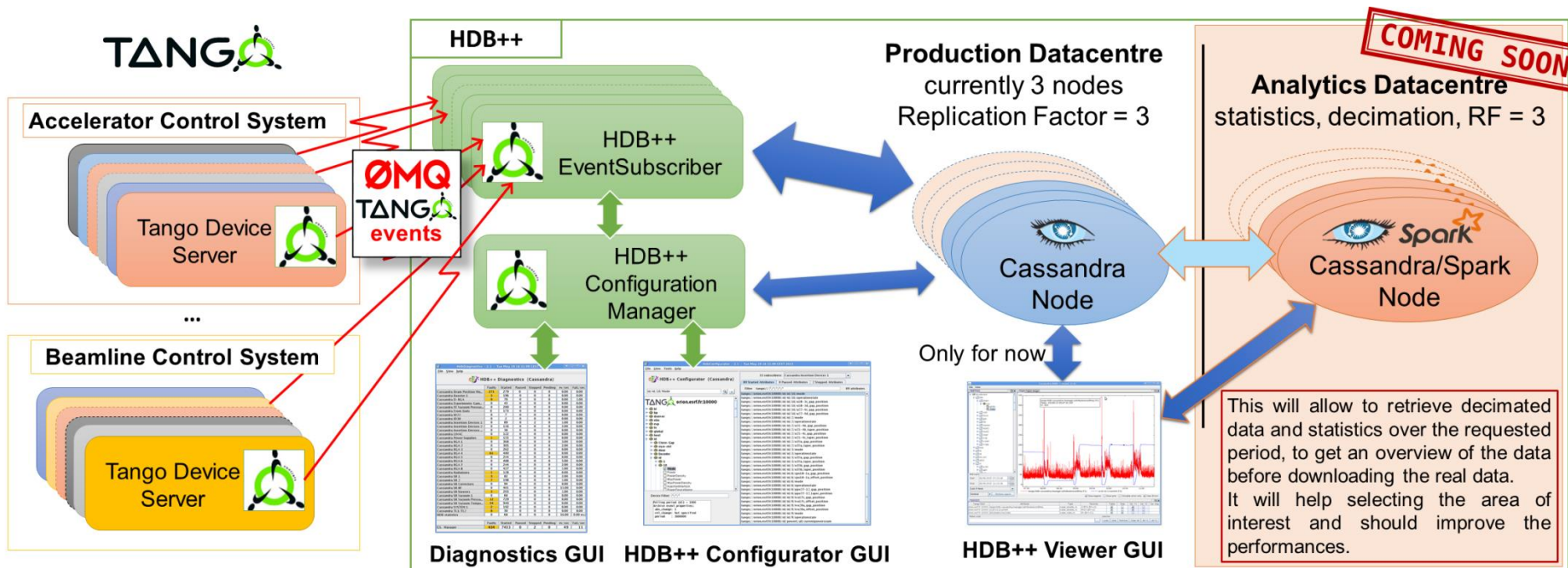
- Continuous availability with no SPOF
- Linear Scalability
- Multi Datacentre replication
- Analytics with **Spark**



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## Solution outline and future plan







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### Conclusion

- ✓ **Great HDB++ design!**
  - ✓ Easy to add support to new DB back-end
- ✓ **Cassandra works!**
  - ✓ Continuous availability (when well used)
  - ✓ Write Performances
  - ✓ Scalability
- **Next Step:**
  - Reduce partitions size
  - Analytics datacentre with 



### HOW CASSANDRA IMPROVES PERFORMANCES AND AVAILABILITY OF HDB++ TANGO ARCHIVING SYSTEM

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HDB++, the new TANGO event-driven archiving system is being developed as part of a collaboration between the ESRF and Elettra.

Specific libraries have been developed, giving the possibility to store HDB++ data into Apache Cassandra, the world famous and worldwide used NoSQL database.


Using Cassandra adds high-availability with no single point of failure and scalability to the new TANGO archiving system.

**HDB++ Design**

HDB++ (see WED3004) was designed in a modular way, using TANGO device servers to handle the configuration and the events subscribing/archiving process. These device servers can be compiled with C++ libraries inheriting from the *Ibhd++* library and implementing access to the database of your choice. Up to now libraries for MySQL (developed by Elettra) and Apache Cassandra have been implemented.

**HDB++ Tools for free**

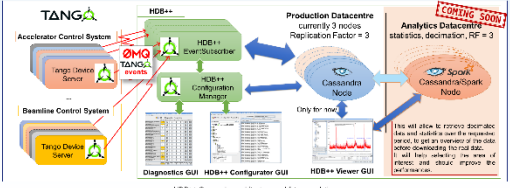
Implementing specific Cassandra HDB++ libraries inheriting from the HDB++ C++ abstract libraries or implementing the Java HDB++ interfaces was enough to be able to create and manage a Cassandra-based HDB++ system. All the already developed HDB++ tools (device servers, configurator GUI, diagnostics GUI, extractor GUIs) could be reused directly.



HDB++ tools overview showing some statistics from the system in operation at the ESRF.

**HDB++ Cassandra @ ESRF**

At the ESRF 3 Cassandra nodes with a replication factor of 3 are in operation since October 2014, in parallel with the old HDB system and the HDB++ MySQL version. It is planned to add a new datacentre composed of 3 Cassandra nodes soon. This datacentre will be dedicated to analytics and will be using Apache Spark to compute statistics and fill in decision tables.



**COMING SOON!**  
statistics, decision, RF = 3

This will allow to correct dramatic data and statistics from the immediate period to get an overview of the data before down-loading to the data centre. It will help identify the new set of filters and should improve the performance.

HDB++ Cassandra architecture and future evolution

TANGO

<http://www.tango-synchrotron.org>

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MDS/Spark, apache.org

<http://spark.apache.org>

ESRF

Elettra Synchrotron Trieste

Come and see the poster for more details! ➔ WEM310