



Contribution ID: 53

Type: **Oral presentation to parallel session**

ARIADNE: a Tracking System for Relationships in LHCb Metadata

Thursday, 17 October 2013 11:00 (20 minutes)

The computing model of the LHCb experiment implies handling of an evolving set of heterogeneous metadata entities and relationships between them. The entities range from software and databases states to architecture specifiers and software/data deployment locations. For instance, there is an important relation between the LHCb Conditions Database (CondDB), which provides versioned, time dependent geometry and conditions data, and the LHCb software, which is the data processing applications (used for simulation, high level triggering, reconstruction and analysis of physics data). The evolution of CondDB and of the LHCb applications is a weakly-homomorphic process. It means that relationships between a CondDB state and LHCb application state may not be preserved across different database and application generations. These issues may lead to various kinds of problems in the LHCb production, varying from unexpected application crashes to incorrect data processing results. In this paper we present the ARIADNE - a generic metadata relationships tracking system based on the novel NoSQL Neo4j graph database. Its aim is to track and store many thousands of evolving relationships for the cases such as the one described above, and several others, which would otherwise remain unmanaged and potentially harmful. The highlights of the paper include the system's implementation and management details, infrastructure needed for running it, security issues, first experience of usage in the LHCb production and potential of the system to be applied to a wider set of LHCb tasks.

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Session Classification: Data Stores, Data Bases, and Storage Systems

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