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ATLAS Detector Description Database Architecture

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In addition to the well-known challenges of computing and data handling at LHC scales, LHC experiments have also approached the scalability limit of manual management and control of the steering parameters ("primary numbers") provided to their software systems. The laborious task of detector description benefits from the implementation of a scalable relational database approach. We have created and extensively exercised in the ATLAS production environment a primary numbers database utilizing NOVA relational database technologies. In our report we describe the architecture of the relational database deployed for the storage, management, and uniform treatment of primary numbers in ATLAS detector description. We describe the benefits of the ATLAS software framework (Athena) on-demand data access architecture, and an automatic system for code generation of more than 300 classes (about 10% of ATLAS offline code) for primary numbers access from the Athena framework. Integration with the LHC Interval-of-Validity database infrastructure, measures for tighter primary numbers database input control, experience with ATLAS Combined Testbeam geometry and conditions payload storage using NOVA technologies integrated with the LHC ConditionsDB implementation, methods for application-side resource pooling, new user tools for knowledge discovery, navigation and browsing, and plans for new primary numbers database developments, are also described.

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