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## Controls and Configuration software for the ATLAS DAQ system in LHC Run 2

The ATLAS experiment at the Large Hadron Collider (LHC) operated successfully from 2008 to 2018, which included Run 1 (2008-2013), a shutdown period and the Run 2 (2016-2018). In the course of the Run 2, the ATLAS data taking achieved an overall data taking efficiency of 97%, largely constraint by the irreducible dead-time introduced to accommodate the limitations of the detector read-out electronics. Less than 1% of the dead-time could be attributed to the central trigger and DAQ system, and out of these, a negligible fraction was due to the Controls and Configuration sub-system. The first long LHC shutdown (LS1) (2014-2015) was used to carry out a complete revision of the Controls and Configuration software, in order to suitably accommodate additional requirements that could not be seamlessly included during steady operation of the system. As well a refactorization of the software was carried out, software that had been repeatedly modified to include new features becoming less maintainable. Additionally, LS1 was the opportunity of modernizing software written at the beginning of the years 2000, thus profiting from the rapid evolution in IT technologies. This upgrade was carried out retaining the critical constraint of minimally impacting public APIs, and the operation mode of the system, in order to maximize the acceptance of the changes by the large user community. This paper summarizes and illustrates, at hand of a few selected examples, how the work was approached and which new technologies were introduced into the ATLAS DAQ system and were used in the course of the LHC Run 2. Despite these being specific to the system, many solutions can be considered and adapted to different distributed DAQ systems. Additionally, this paper will focus on the behavior of the Controls and Configuration services through the whole Run 2 period, putting particular emphasis on robustness, reliability and performance matters.

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