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The Controls and Configuration Software of the ATLAS Data Acquisition System: evolution towards LHC Run 3

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The ATLAS experiment at the Large Hadron Collider (LHC) op- erated very successfully in the years 2008 to 2018, in two periods identified as Run 1 and Run 2. ATLAS achieved an overall data-taking efficiency of 94%, largely constrained by the irreducible dead-time introduced to accommodate the limitations of the detector read-out electronics. Out of the 6% dead-time only about 15% could be attributed to the central trigger and DAQ system, and out of these, a negligible fraction was due to the Control and Configuration sub- system. Despite these achievements, and in order to improve even more the already excellent efficiency of the whole DAQ system in the coming Run 3, a new campaign of software updates was launched for the second long LHC shutdown (LS2). This paper presents, using a few selected examples, how the work was approached and which new technologies were introduced into the AT- LAS Control and Configuration software. Despite these being specific to this system, many solutions can be considered and adapted to different distributed DAQ systems.

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