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HL-LHC Inner Triplet String controls and software architecture

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The High Luminosity-Large Hadron Collider (HL-LHC) project at CERN aims to increase the integrated luminosity of the Large Hadron Collider (LHC). As an important milestone of the HL-LHC project, the scope of the Inner Triplet (IT) String test facility is to represent the various operation modes and the controls environment to study and validate the collective behaviour of the different systems. As for the HL-LHC, the IT String operation requires a wide-ranging set of control systems and software for magnet powering, magnet protection, cryogenics, insulation vacuum, and the full remote alignment.
An overview of the control systems and their interfaces is presented with a particular focus on the software layers essential for the powering and magnet protection tests during the IT String validation program. Ensuring integration of the new HL-LHC device types and their operational readiness requires close collaboration between development teams, equipment owners and the IT String operation team which is validated by dedicated Dry Run tests. These tests aiming to validate the functionalities of new device types within the control and software applications are described in detail, with the goal of achieving a smooth transition to the magnet powering phase. The IT String facility presents a unique opportunity to validate all control and software layers ahead of the HL-LHC hardware commissioning (HWC) within the LHC complex and their operation in the High Luminosity era.

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Footnotes

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