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ATLAS R&D Towards Next-Generation Distributed Computing

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The ATLAS Distributed Computing (ADC) project delivers production quality tools and services for ATLAS offline activities such as data placement and data processing on the Grid. The system has been capable of sustaining with large contingency the needed computing activities in the first years of LHC data taking, and has demonstrated flexibility in reacting promptly to new challenges. Development activities in this period have focused on consolidating existing services and increasing automation to be able to sustain existing loads. At the same time, an R&D program has evaluated new solutions and promising technologies capable of extending the operational scale, manageability and feature set of ATLAS distributed computing, several of which have selectively been brought to maturity as production-level tools and services. We will give an overview of R&D work in evaluating new tools and approaches and their integration into production services. A non exhaustive list of items includes cloud computing and virtualization, non-relational databases, utilizing multi-core processors, the CERNVM File System, end to end network monitoring, event and file level caching, and federated distributed storage systems. The R&D initiative, while focused on ATLAS needs, has aimed for a broad scope involving many other parties including other LHC experiments, ATLAS Grid sites, the CERN IT department, and WLCG and OSG programs.

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