

The ATLAS Production System Evolution. New Data Processing and Analysis Paradigm for the LHC Run2 and High-Luminosity

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The second generation of the ATLAS production system called ProdSys2 is a distributed workload manager that runs daily hundreds of thousands of jobs, from dozens of different ATLAS specific workflows, across more than hundred heterogeneous sites. It achieves high utilization by combining dynamic job definition based on many criteria, such as input and output size, memory requirements and CPU consumption, with manageable scheduling policies and by supporting different kind of computational resources, such as GRID, clouds, supercomputers and volunteering computers. The system dynamically assigns a group of jobs (task) to a group of geographically distributed computing resources. Dynamic assignment and resources utilization is one of the major features of the system, it didn't exist in the earliest versions of the production system where Grid resources topology has been predefined using national or/and geographical pattern.

Production System has a sophisticated job fault-recovery mechanism, which efficiently allows to run a multi-Terabyte tasks without human intervention. We have implemented train model and open-ended production which allows to submit tasks automatically as soon as new set of data is available and to chain physics groups data processing and analysis with central production run by the experiment.

ProdSys2 simplifies life to ATLAS scientists by offering a flexible web user interface, which implements a user-friendly environment for main ATLAS workflows, e.g. simple way of combining different data flows, and a real-time monitoring optimised to present a huge amount of information.

We present an overview of the ATLAS Production System and its major components features and architecture: task definition, web user interface and monitoring. We describe the important design decisions and lessons learned from an operational experience during the first years of LHC Run2. We also report the performance of the designed system and how various workflows such as data (re)processing, Monte-Carlo and physics group production, users analysis are scheduled and executed within one production system on heterogeneous computing resources.

Tertiary Keyword (Optional)

High performance computing

Secondary Keyword (Optional)

Distributed data handling

Primary Keyword (Mandatory)

Distributed workload management

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