

The Future of Distributed Computing Systems in ATLAS: Boldly Venturing Beyond Grids

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The Production and Distributed Analysis system (PanDA) for the ATLAS experiment at the Large Hadron Collider has seen big changes over the past couple of years to accommodate new types of distributed computing resources: clouds, HPCs, volunteer computers and other external resources. While PanDA was originally designed for fairly homogeneous resources available through the Worldwide LHC Computing Grid, the new resources are heterogeneous, at diverse scales and with diverse interfaces. Up to a fifth of the resources available to ATLAS are of such new types and require special techniques for integration into PanDA. In this talk, we present the nature and scale of these resources. We provide an overview of the various challenges faced, spanning infrastructure, software distribution, workload requirements, scaling requirements, workflow management, data management, network provisioning, and associated software and computing facilities. We describe the strategies for integrating these heterogeneous resources into ATLAS, and the new software components being developed in PanDA to efficiently use them. Plans for software and computing evolution to meet the needs of LHC operations and upgrade in the long term future will be discussed.

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