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Evolution of Cloud Computing in ATLAS

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The ATLAS experiment has successfully incorporated cloud computing technology and cloud resources into its primarily grid-based model of distributed computing. Cloud R&D activities continue to mature and transition into stable production systems, while ongoing evolutionary changes are still needed to adapt and refine the approaches used, in response to changes in prevailing cloud technology. In addition, completely new developments are needed to handle emerging requirements.

This work will describe the overall evolution of cloud computing in ATLAS. The current status of the VM management systems used for harnessing IAAS resources will be discussed. Monitoring and accounting systems tailored for clouds are needed to complete the integration of cloud resources within ATLAS' distributed computing framework. We are developing and deploying new solutions to address the challenge of operation in a geographically distributed multi-cloud scenario, including a system for managing VM images across multiple clouds, a system for dynamic location-based discovery of caching proxy servers, and the usage of a data federation to unify the worldwide grid of storage elements into a single namespace and access point. The usage of the experiment's HLT farm
for Monte Carlo production, in a specialized cloud environment, will be presented. Finally, we evaluate commercial clouds, and have conducted a study assessing cost vs. benchmark performance.

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