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Dynamic deployment of a PROOF-based analysis facility for the ALICE experiment over virtual machines using PoD and OpenNebula

The conversion of existing computing centres to cloud facilities is becoming popular also because of a more optimal usage of existing resources. Inside a medium to large cloud facility, many specific virtual computing facilities might concur for the same resources based on their usage and destination elastically, i.e. by expanding or reducing allocated resources for currently running VMs, or by turning them on and off. In the ALICE experiment PROOF, a parallel processing infrastructure, has become very popular for interactive analysis. The locality of PROOF-based analysis facilities forces sysadmins to scavenge enough resources to dedicate, yet the chaotic nature of user-written analysis tasks would deem these resources to be unstable and used intensively only at small bursts typically during working hours, making PROOF a typical use-case for HPC cloud computing. Currently, a solution named PROOF-on-Demand (PoD) does exist to dynamically and quickly provide a PROOF-enabled cluster by enqueuing agents to a job scheduler. In a medium-sized computing centre, namely a Tier-2, sharing a queue between PROOF and ordinary Grid jobs is not viable due to the very large time to wait in order to get enough workers ready: however, an elastic cloud approach will enable existing machines currently running Grid jobs to temporarily make room for many personal PoD-provided PROOF clusters on the same hardware in near-real-time, with no stability issues for long-running Grid jobs, through the perfect sandboxing intrinsically offered by virtual machines. In this work we will show a usable prototype of a dynamically-deployed PROOF-based analysis facility by using existing tools, such as PoD and OpenNebula, orchestrated by a simple and lightweight control daemon.

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