

Elastic Workflows with PMIx

Abstract

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LA-UR-23-28979

Scientific workflow applications are growing in complexity. Elastic workflow applications that can change the number of processors while being executed promise improved application and system performance. The current High-Performance Computing (HPC) software infrastructure that includes resource managers(RM), workflow managers(WMS) and application runtime does not support malleable applications and workflows. In this work, we investigate the challenges and requirements for an elastic workflow identifying shortcomings in middlewares, RMs, or WMS themselves that impact the ability to support malleable applications. We also present our early experience with using PMIx as an advanced middleware to support one of the popular workflow management systems, Parsl to enable fine grained dynamic resource management. Our evaluation indicates that fine grained elastic resource management results in an improved system and application performance in system utilization and application turnaround time.