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Advancing Opportunistic Resource Management via Simulation

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Modern high energy physics experiments and similar compute intensive fields are pushing the limits of dedicated grid and cloud infrastructure. In the past years research into augmenting this dedicated infrastructure by integrating opportunistic resources, i.e. compute resources temporarily acquired from third party resource providers, has yielded various strategies to approach this challenge. However, work on this topic is usually driven by practical needs to use specific resource providers for production workflows; in this context, research is ad hoc and relies on impressions gained during unique situations of resource providers, resource demand and opportunistic resource management. Replicating or even preparing a specific situation to investigate opportunistic resource management is extremely challenging or even impossible. More importantly research in the field of opportunistic resource management is therefore extremely limited.

We propose to tackle this challenge using simulation and to this end present the simulation framework LAPIS, a general purpose scheduling simulator offering programmatic control of resources. We demonstrate this approach by integrating LAPIS with the COBalD/TARDIS resource manager to investigate the behaviour of this resource manager in a simulated environment.

Significance

Our work is integral for advancing opportunistic resource management in a principled way. To our knowledge, this is the first successful attempt to run a production resource manager in a completely simulated environment.

References

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Experiment context, if any

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