RADICAL-Cybertools: An Overview

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PLACEHOLDER LOGO

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What does RADICAL do?

RADICAL Cybertools is an abstractions-based suite of well-defined capabilities that are architected for scalable, interoperable and sustainable approaches to support science on a range of high-performance and distributed computing systems. It currently consists of two components: RADICAL-Pilot: a scalable and flexible Pilot-Job system that provides flexible application-level resource management capabilities, and RADICAL-SAGA: a lightweight interface that provides a standards-based interoperability across a range of computing systems. Using these two tools, the group develops tools for computationally-intensive scientific applications.

Why Pilots?

Currently, many scientific simulations are performed by analyzing many instances of a simulation with varying parameters. Submitting and executing these is proportional to the number of simulations submitted, as each one must wait in the queue and be scheduled individually. The time-to-completion of these tasks becomes extended due to this, causing large experiments to run for undesirable lengths of time. Furthermore, the resources granted to each simulation may not allocated in an efficient way; for example, some instances may be MPI-based and depend on the proximity of one simulation's cores to another's. The Pilot was invented to assuage these issues.

Using RADICAL-Pilot (RP)

To use RP, one must first instantiate at least one Compute Unit and a Pilot; the Compute Unit represents the task to be executed, while the Pilot is the entity that reserves resources on the target machine and maintains communication with the user's script. Using the RP API, the Pilot is launched to the specified machine in order to be scheduled. Once scheduled, the Pilot instantiates the Agent, which receives and schedules the Compute Units appropriately.

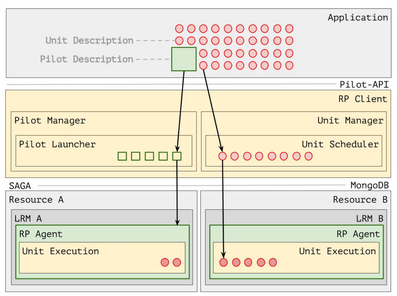

Figure 3: Figure caption

Who uses RADICAL-Cybertoo

A number of groups around the globe use RADICAL-Cybertools. Some of our current collaborators are:

Projects

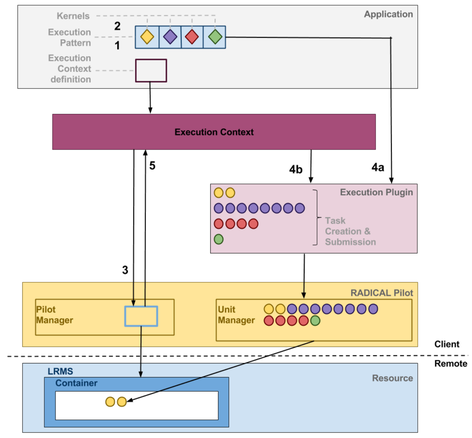

Figure 1: The Simulation-Analysis Pattern

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The EnsembleMD Toolkit consists of a series of Execution Patterns and Kernels that provide a simple interface for running high-performance tasks on a distributed computing resource (DCR). These tasks are usually submitted as a single executable with varying parameters, or what we define as an Ensemble. Using the API, a user can avoid placing each task into the queue by specifying the target machine through the Execution Context interface, the simulation through the Kernel interface, and the Execution Pattern through its own interface. Once these entities are specified, the RADICAL-Pilot API is invoked to translate the descriptions into a Pilot and its associated Compute Units, and then to execute the simulations on the desired resource.

Placeholder

Image

Figure 2: Figure caption

Conclusion

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- Vestibulum sem ante, hendrerit a gravida ac, blandit quis magna.

References

[1] J. M. Smith and A. B. Jones. *Book Title*. Publisher, 7th edition, 2012.

[2] A. B. Jones and J. M. Smith. Article Title. *Journal title*, 13(52):123–456, March 2013.

Future Research

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