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Addressing Complexity in Emerging Cyber-Ecosystems - Exploring the Role of Autonomics in E-Science

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Significant strategic investments are quickly realizing a pervasive computational cyberinfrastructure that integrates large-scale computing, high-speed networks, massive data archives, instruments, observatories, experiments, and embedded sensors and actuators, and are catalyzing new thinking, paradigms and practices in computational science and engineering –those that are collaborative and information/data-driven. However the ability of scientists to realize this potential is being severely hampered by the complexity of the applications and infrastructure, which together present unprecedented development, configuration and management challenges. Autonomic computing has the potential to fundamentally address these challenges. The goal of autonomic computing is to design and engineer systems and applications that are capable of managing themselves, adapting their resources and operations to workloads and execution context, and anticipating needs, all with minimal involvement of users. In this talk I will explore the role of autonomics in computational science and engineering, both in managing systems and applications as well as in enabling new application formulations. I will then describe specific research efforts aimed at enabling autonomic scientific and engineering applications that can address the challenges of (and benefit from) pervasive cyber-ecosystems.

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