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Building an Outsourcing Ecosystem for Science

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Infrastructure-as-a-Service (IaaS) cloud computing is revolutionizing the way we acquire and manage computational and storage resources: by allowing on-demand resource leases and supporting user control over those resources it enables us to treat resource acquisition as an operational consideration rather than capital investment. The emergence of this new model raises many questions, in particular for special requirements groups such as scientific computing. Can cloud computing be used by scientific applications? Does it, or will it ever, provide sufficient capabilities for high-performance applications? How will it change our work patterns? What challenges need to be overcome, and what is its overall potential for accelerating science?

In this talk, I will give an overview of the challenges and potential of cloud computing projects in scientific community. I will describe what attracted various scientific communities to cloud computing, give examples of how they integrated this new model into their work, and describe the challenges they encountered while doing so. I will then discuss how those challenges drove the development of Nimbus Infrastructure, which allows users to provide cycle outsourcing via their clouds, as well as the Nimbus Platform, which provides ecosystem tools allowing users to leverage infrastructure cloud resources across different academic and commercial platforms ranging from proporitary (Amazon Web Services) to open source (Nimbus, OpenStack, Eucalyptus and others). I will also discuss challenges and issues –related to performance, logistics, utilization, and privacy that need to be overcome to make the benefits of cloud computing available to an ever larger set of scientific applications. Finally, I will discuss the emerging technology trends and discuss how they can benefit science.

Bio: Kate Keahey is a Scientist in the Distributed Systems Lab at Argonne National Laboratory and a Fellow at the Computation Institute at the University of Chicago. Kate pioneered the use of cloud computing for scientific applications and created and leads the open source Nimbus project which provides an Infrastructure-as-a-Service cloud computing implementation as well as a set of higher-level services allowing users to build elastic application by combining on-demand commercial and scientific cloud resources.

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