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Chameleon: A Computer Science Testbed as Application of Cloud Computing

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Did you ever need hundreds of state-of-the-art nodes that you could use to scalably test new ideas on? Run experiments that are not disrupted by what other users are doing? A platform that allows you to reinstall the operating system, recompile the kernel, and gives you access to the console so that you can debug the system? A place where your research team can easily reproduce experiments carried out weeks ago? A lab where your students can work with different hardware configurations, from Infiniband to GPUs, either as part of a class or homework?

This talk will introduce Chameleon, a large-scale, deeply reconfigurable NSF-funded testbed for Computer Science research and education (www.chameleoncloud.org). The testbed consists of ˜600 nodes (˜14,000 cores) and a total of 5PB disk space hosted at the University of Chicago and TACC, and leverages 100 Gbps connection between the sites. The hardware consists primarily of homogenous nodes to support large-scale experiments –but subgroups of those nodes are equipped with additional capabilities including Infiniband networking, high-bandwidth I/O storages nodes, GPUs, and storage hierarchies with a mix of HDDs, SDDs, NVRAM, and high memory. To support Computer Science experiments, ranging from operating system and virtualization to security research, Chameleon provides a configuration system giving users exclusive access to bare metal nodes on an "as if it were in your lab basis", i.e., full control of the software stack including root privileges, kernel customization, and console access. In addition, to facilitate educational and application exploratory projects Chameleon also provides a KVM cloud.

I will describe user facing Chameleon capabilities, describe some of the project that the testbed supported in the past, and explain how the testbed was built and will continue to develop.

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