Metacomputing with the Harness and IceT Systems

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Abstract

Metacomputing, or network-based concurrent processing, has evolved over the past decade from an experimental methodology to a mainstream technology. We use the term metacomputing in a broad sense to include clusters of workstations with high-speed interconnects, loosely coupled local network clusters, and wide area configurations spanning multiple architectures, machine ranges, and administrative domains. These modes of distributed computing are proving to be highly viable platforms for a wide range of applications, primarily in the high-performance scientific computing domain, but also in other areas, notably web search engines and large databases. From the systems point of view, metacomputing technologies are being driven primarily by new network and switch technologies in closely coupled systems, and by software advances in protocols, tools, and novel runtime paradigms. This short course will discuss two alternative approaches to metacomputing that the Harness and IceT projects are investigating.

Harness is a metacomputing framework based on dynamic reconfigurability and extensible distributed virtual machines. The Harness system seeks to achieve two important goals. First, by enabling reconfiguration of the facilities provided by the virtual machine, Harness is able to provide specialized services appropriate to the platform and adapt to new technological developments. Second, Harness is able to adapt to application needs by configuring the required support services and programming environments on demand. In this talk, we describe the architecture and key features of Harness, and discuss preliminary experiences with its use. IceT is a system being developed to support collaborative metacomputing. While the focus of Harness is on reconfigurability, IceT is aimed at sharing of resources by merging and splitting virtual machines. Multiple users owning different sets of resources may occasionally pool them as problem situations dictate; IceT provides a structured framework and context for this type of sharing, and addresses security and resource management issues. An overview of the IceT system, and a discussion of its salient features will be presented in this talk.

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