Abstract

The Cluster Agenda: first Achieve World Domination, then Kick Ass

This year marks the tenth anniversary of the first Beowulf PC cluster and the end of an extraordinary decade of expansion in the capabilities of commodity clusters in general. During this historic period, clusters have advanced from modest experimental systems delivering a few hundred Megaflops to the dominant class of high-end computing systems today delivering on the order of ten Teraflops or more. The majority of systems on the Top 500 list measured by the Linpack Benchmark are commodity clusters (including Constellations). From a few academic laboratories in the early 1990s commodity clusters are now nearly everywhere including National labs and centers, university machine rooms, industrial facilities, and general commercial services providers. But even now, emerging trends in component technology, processor architecture, interconnect networks, and programming and resource management software promises dramatic improvements in performance, performance to cost, power, and footprint to deliver unprecedented capability of multiple Petaflops a decade hence. This keynote address will explore those trends that will drive commodity clusters towards a realm of performance that will exceed the total aggregate throughput of all the machines on the Top 500 list today. In this context, key research issues will be discussed that are likely to provide the critical enablers to power this exciting next decade of advance in commodity cluster computing.