

What's So Different About Cluster Architectures?

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Riding the technology wave of inexpensive, low-latency, high-bandwidth interconnects, clusters have become a popular vehicle for parallel computing and for scalable services. The complete system on every node in these architectures is more than a happenstance of building from commodity nodes, it is the distinguishing feature of clusters, as compared to traditional parallel machines. This talk explores three innovative aspects of cluster system design that stem from this basic feature in the Berkeley NOW:

The first is Virtual Networks, which allow direct, protected user access to shared communication resources by integrating communication and virtual memory management.

The second is Implicit Co-scheduling, which uses communication events occurring naturally in parallel programs to cause processes to be scheduled together across nodes with commercial operating system schedulers.

The third is high bandwidth file transfers using all nodal file systems in parallel. Together these innovations extend the role of clusters far beyond the "personal supercomputer."