Contribution ID: **72** Type: **oral presentation**

Performance analysis of Cluster File System on Linux

Monday, 27 September 2004 17:30 (20 minutes)

With the development of Linux and improvement of PC's performance, PC cluster used as high performance computing system is becoming much popular. The performance of I/O subsystem and cluster file system is critical to a high performance computing system. In this work the basic characteristics of cluster file systems and their performance are reviewed. The performance of four distributed cluster file systems, AFS, NFS, PVFS and CASTOR, were measured. The measurements were carried out on CERN version RedHat 7.3.3 Linux using standard I/O performance benchmarks. Measurements show that for single-server single client configuration, NFS, CASTOR and PVFS have better performance and write rate slightly increases while the record length becomes larger. CASTOR has the best throughput when the number of write processes increases. PVFS and CASTOR are tested on multi-server and multi-client system. The two file systems nicely distribute data I/O to all servers. CASTOR RFIO protocol shows the best utilization of network bandwidth and optimized to large data size files. CASTOR also has the better scalability as a cluster file system. Based on the test some methods are proposed to improve the performance of cluster file system.

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Session Classification: Computer Fabrics

Track Classification: Track 6 - Computer Fabrics