An Analysis of Scaling in QuickSAN

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Abstract

Solid State Disks (SSDs) based on flash and other non-volatile memory technologies reduce storage latencies from 10s of milliseconds to 10s or 100s of microseconds, transforming previously inconsequential storage overheads into performance bottlenecks. This problem is especially acute in storage area network (SAN) environments where complex hardware and software layers (distributed file systems, block severs, network stacks, etc.) lie between applications and remote data. These layers can add hundreds of microseconds to requests, obscuring the performance of both flash memory and faster, emerging non-volatile memory technologies.

This work examines the performance of QuickSAN, a SAN prototype that eliminates most software overheads and significantly reduces hardware overheads in SANs, as the number of nodes in the SAN increases. QuickSAN integrates a network adapter directly into SSDs, so the SSDs can communicate directly with one another to service storage accesses as quickly as possible. As the number of nodes in the network increases, the potential for bottlenecks in the network to hurt performance also increases. We examines these effects and the resulting impact on the performance and efficiency of QuickSAN.

A copy of this technical report can be obtained by sending a request to swanson@cs.ucsd.edu