Single Server 40 Gbit/s Disk to Network Streaming
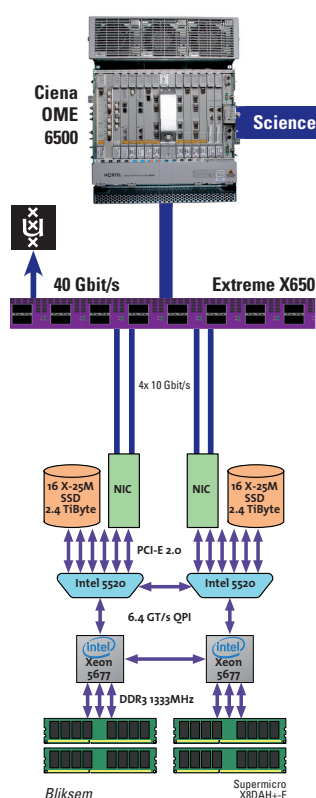
SARA has built a server with off-the-shelf components that is capable of transmitting well over 30 Gbit/s from disk to the network. Previously, clusters and grid setups were needed to reach these application speeds. This creates new possibilities for demanding applications. A systematic approach was used to tune the end-to-end performance, with studies on file systems, I/O system design, processor and interrupt affinity, link bonding and 40 Gbit/s interworking. The result is a remote visualization demonstration that shows how applications can benefit from an integrated approach towards end-to-end performance optimization.

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Ciena OME 6500 — Science Park Amsterdam — Brussels — 40 Gbit/s — SURF NET — 1650 km — Paris — CERN, Geneva — Ciena OME 6500

40 Gbit/s — Extreme X650

4x 10 Gbit/s

16 X-25M SSD 2.4 TiByte — NIC — NIC — 16 X-25M SSD 2.4 TiByte

PCI-E 2.0

Intel 5520 — Intel 5520

6.4 GT/s QPI

Intel Xeon 5677 — Intel Xeon 5677

DDR3 1333MHz

Bliksem — Supermicro X8DAH+-F

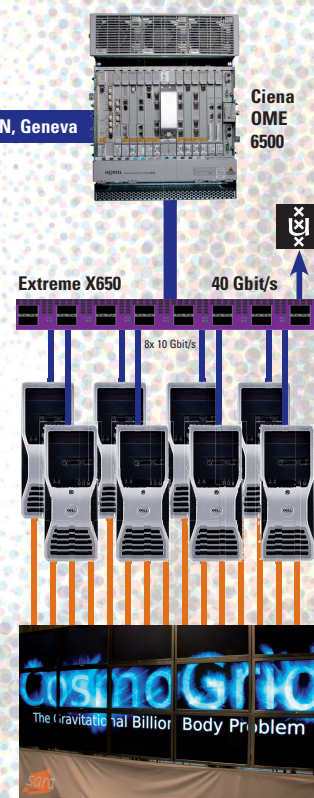Extreme X650 — 40 Gbit/s

8x 10 Gbit/s

End-to-End Performance

A pre-rendered interactive visualization is streamed from 32 solid state disks on a single server in Amsterdam to a 61 Megapixel Tiled Panel Display in Geneva. By streamlining the application around system design of the I/O busses of the sending server, a disk-to-network throughput of over 34 Gbit/s (back-to-back) was achieved.

Remote Scientific Visualization

The visual content being streamed shows data from CosmoGrid, an astrophysical N-body simulation using 8,589,934,592 interacting particles. The simulation was performed on multiple supercomputers, including SARA's Huygens. Displaying on a tiled panel display allows researchers to see very small details, as well as a bird's eye view using a single display setup.

Sending Server
Brand Supermicro X8DAH+-F
CPU 2x Intel Xeon X5677
Memory 24 GiB DDR3
Disk XFS on 32x 160 GB Intel X25-M SSDs
Controller 4x 3Ware 9750-8i
Network 2x Myricom 10G-PCIE2-8B2-2S
OS Linux 2.6.32 (64 bit)

Tiled Panel Display
Monitor 15x Dell 3008 WFP 30" LCD
Frame 5x3 monitors
Pixels 12800 x 4800 (61.44 Mpixel)
PC Dell Precision T5500
Video card NVidia GeForce GTX 460
OS Linux 2.6.31

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