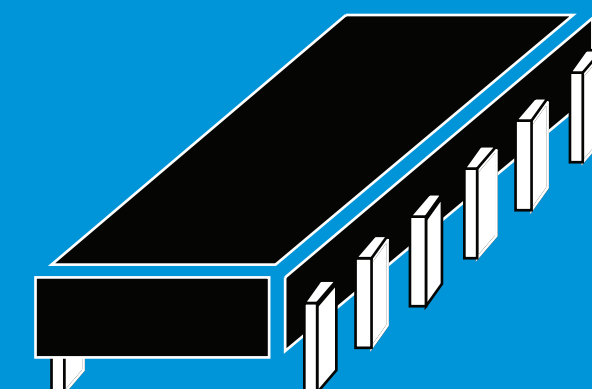




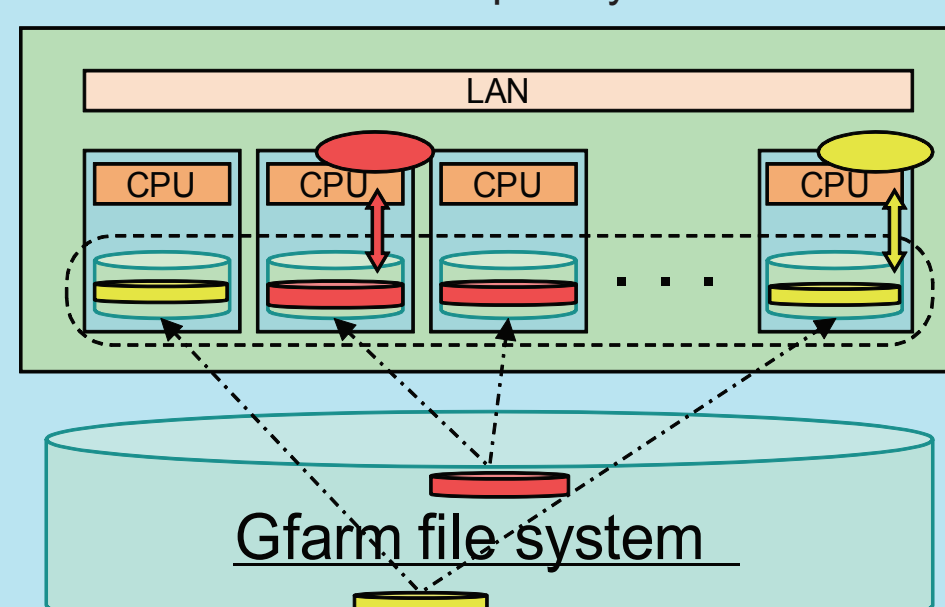
High Performance Computing Research

Gfarm Grid/Cluster File System version 2

- Award-winning commodity-based distributed file system
- Scalable I/O performance and high reliability
- Low metadata overhead that competes with NFS
- Secure, robust, and fast
- Tight interaction with job scheduler to exploit data affinity
- **Now available at <http://sf.net/projects/gfarm/>**

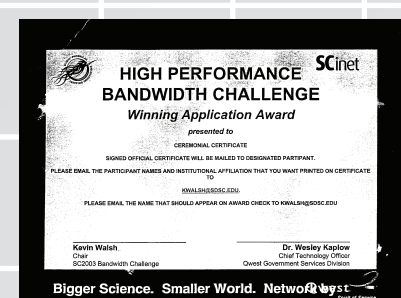
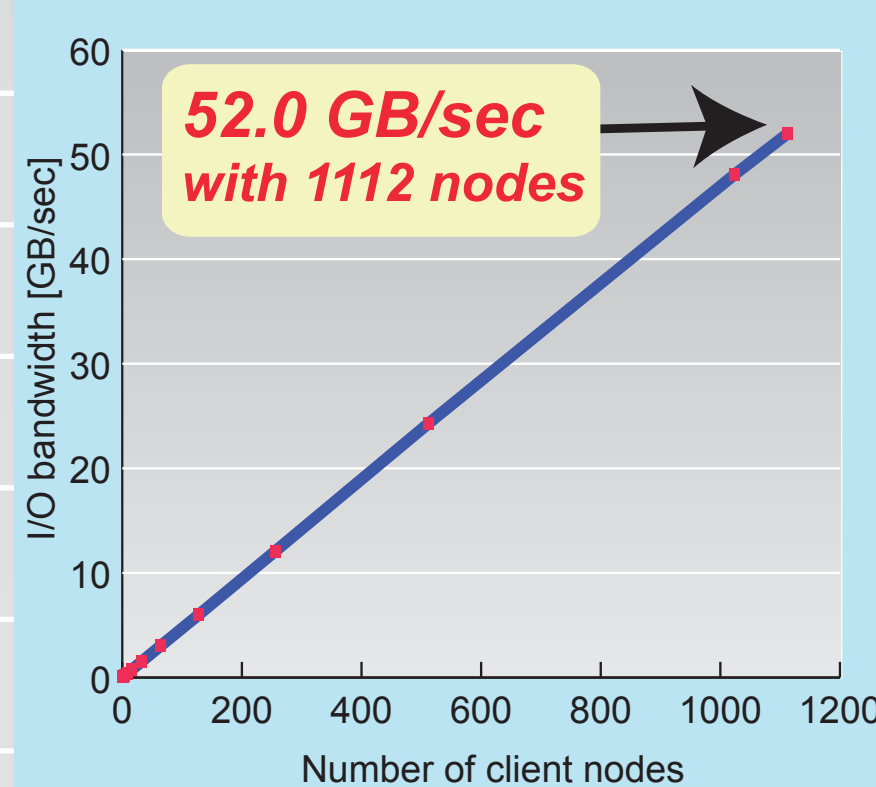
System feature for scalable and robust I/O

Physically, file copies are stored on compute nodes. Local disk has a priority to be accessed.



For user programs, it can be accessed as a network shared file system.

Sustained Parallel Read Performance



SC05 High Performance Bandwidth Challenge
Winning Application Award

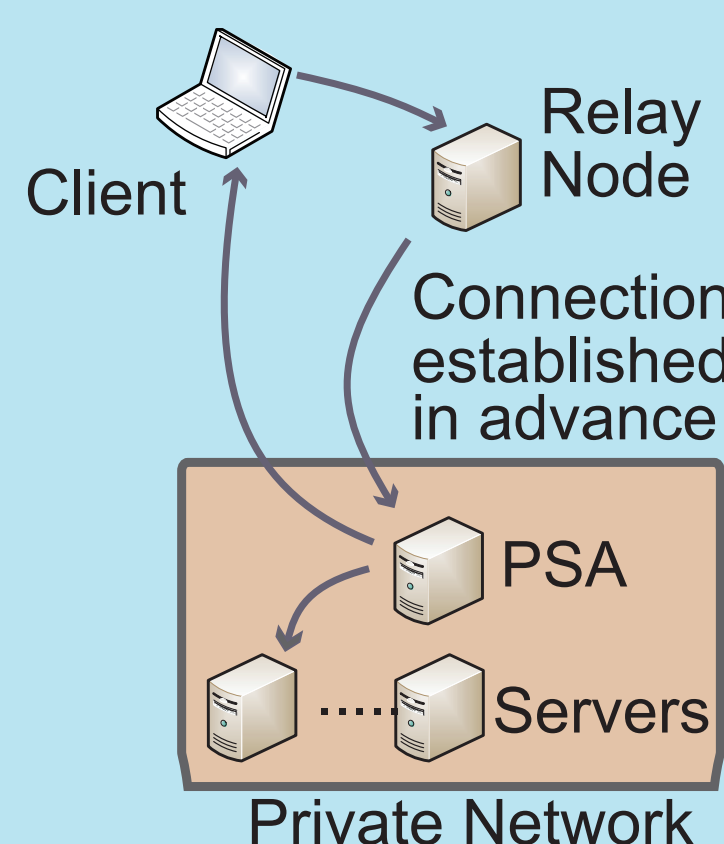


SC05 StorCloud Challenge
Most Innovative Use of Storage
in Support of Science



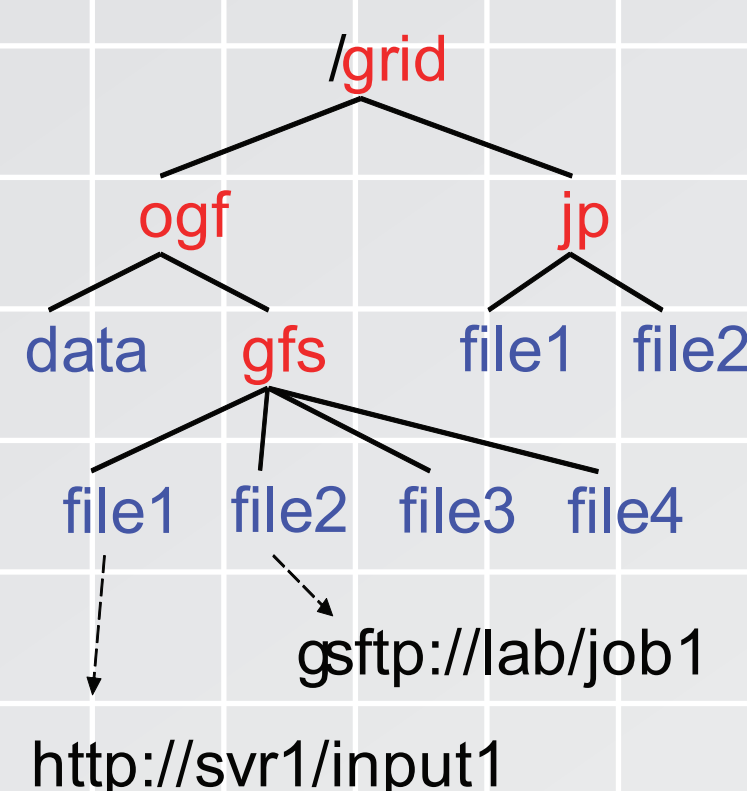
SC06 HPC Storage Challenge
Winner - Large Systems

Transparent Access to Servers within Private Network Using Virtual IP



- This allows nodes in private network to join Gfarm file system
- Servers need no modification
- Multi-home node is not required
- Virtual IP address is used to specify a server within private network
- Shorter path between client and server is analysed

Resource Namespace Service (RNS)

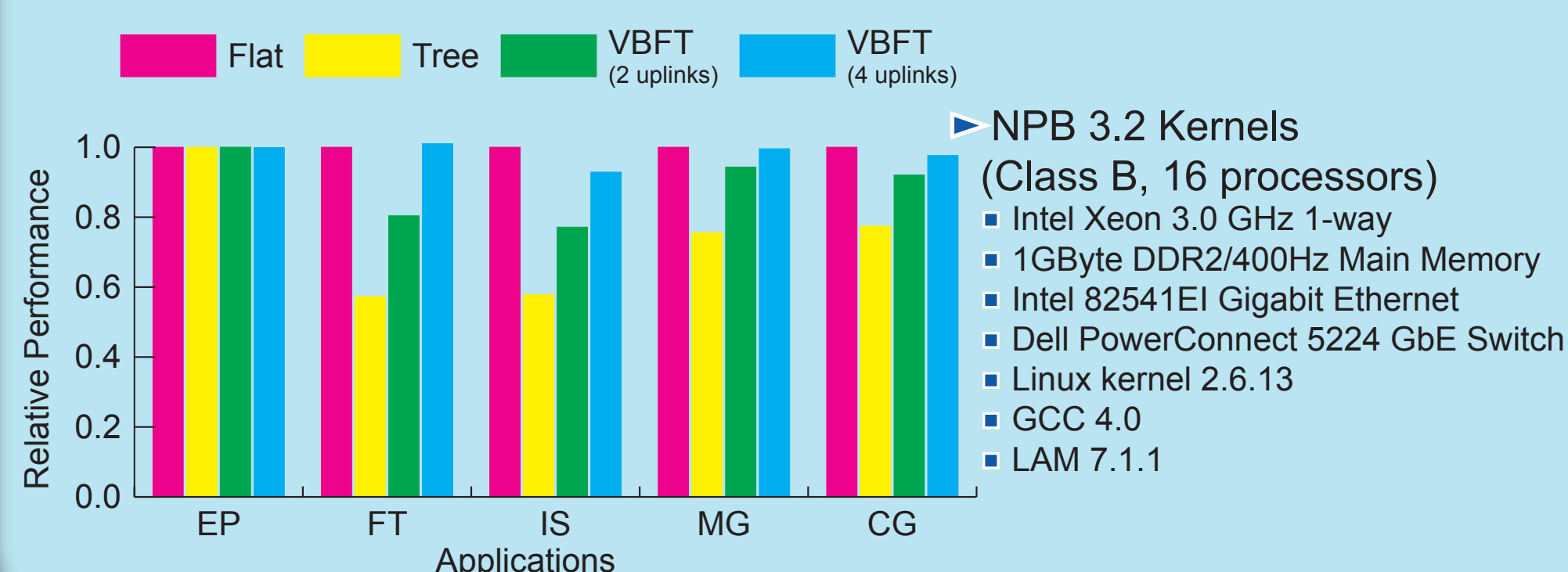
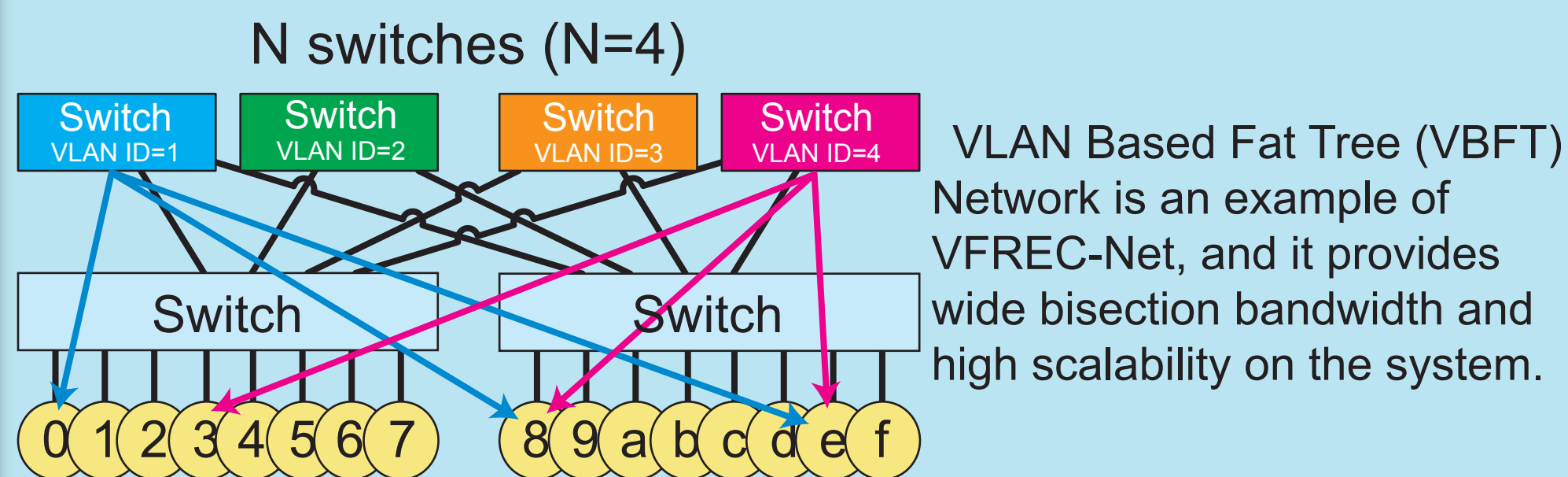


- RNS is a web service which enables mapping of resource into single, hierarchical namespace
- Various profiles can be attached to utilize specific metadata in RNS
- Resources are referred to by WS-Addressing Endpoint References
- RNS Specification is published as GFD-R-P.101 by Open Grid Forum
- We have developed a reference implementation of RNS

VFREC-Net

(VLAN-based Flexible, Redundant and Expandable Commodity Network)

- An interconnection network system based on multi-path Ethernet links to provide high-scalability and wide-bandwidth with inexpensive Layer-2 switches
- Tagged-VLAN technology controlled by a dedicated pseudo device driver makes an explicit routing on VLAN-ready Layer-2 switches
- Various topologies are available including fat-tree and traditional MPP networks



FFTE:

A High-Performance FFT Library

FFTE is a Fortran subroutine library for computing the Fast Fourier Transform (FFT) in one or more dimensions. The API of FFTE is similar to sequential SGI SCSL or Intel MKL routines.

Features

- High speed. (Supports SSE2/SSE3)
- Complex and mixed-radix transforms
- Parallel transforms:
 - Shared / Distributed memory parallel computers (OpenMP, MPI and OpenMP+MPI)
- High portability: Fortran77 + OpenMP + MPI
- FFTE's 1-D parallel FFT routine has been incorporated into the HPC Challenge (HPCC) benchmark

★ HPC Challenge benchmark

Performance of FFTE 4.0

Data:
 $N_1 \times N_2 \times N_3 = 2^{24} \times P$
Machines:
Xeon EM64T 3.0GHz
Gigabit Ethernet
1024 MB DDR2/400

