Benefits of full TCP/IP offload in the NFS Services.

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Agenda

- Industry trend and role of NFS

- TCP/IP offload Adapters (NACs)

- Performance analysis

- Benefit of the NAC

- Customer success stories

- Availability of Products

- Q & A

Industry trend & role of NFS

- Monolithic to distributed
  - Best price / performance ratio
- Cray to Intel architecture
- Scalable Bandwidth and capacity
  - Better bandwidth, better deployment success
- More stress on CPU and Network
  - Applications are getting more complex and network intensive
  - Need of fast data access
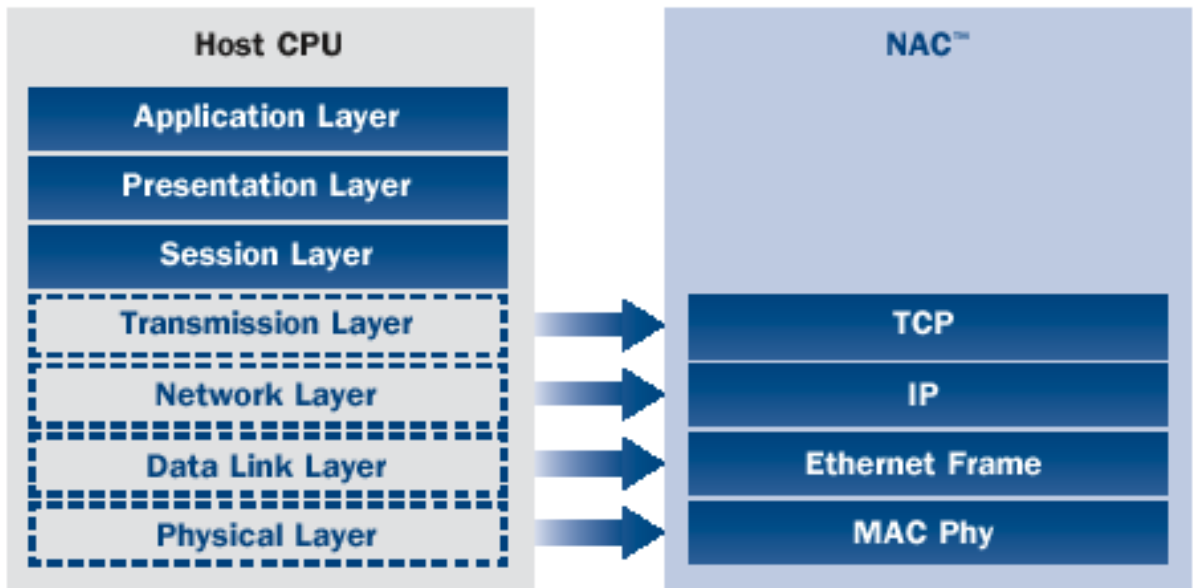 - 24x7 operations
- Storage and Networking are converging

NFS plays key role in this brave new world!

NAC = NIC + ASIC based TCP/IP offload Engine

OSI (Open Systems Interconnect) Model

| Host CPU	NAC™
Application Layer	
Presentation Layer	
Session Layer	
Transmission Layer	**TCP**
Network Layer	**IP**
Data Link Layer	**Ethernet Frame**
Physical Layer	**MAC Phy**

- TCP processing is compute intensive
- With TOE NAC, host processing is streamlined with the Transport, Network and Data Link layers all processed in the hardware
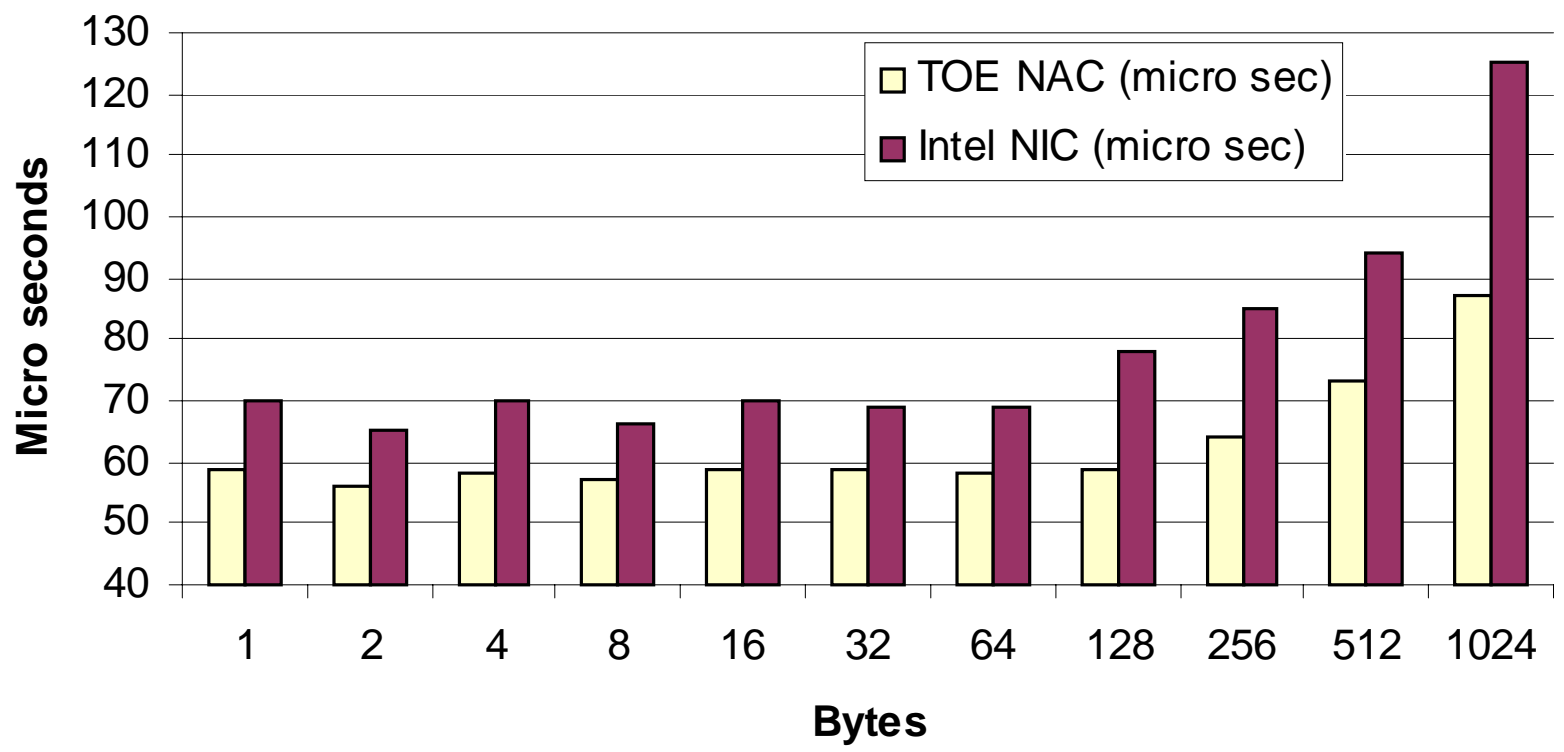
Network Acceleration with NAC

Typical NFS transaction sizes
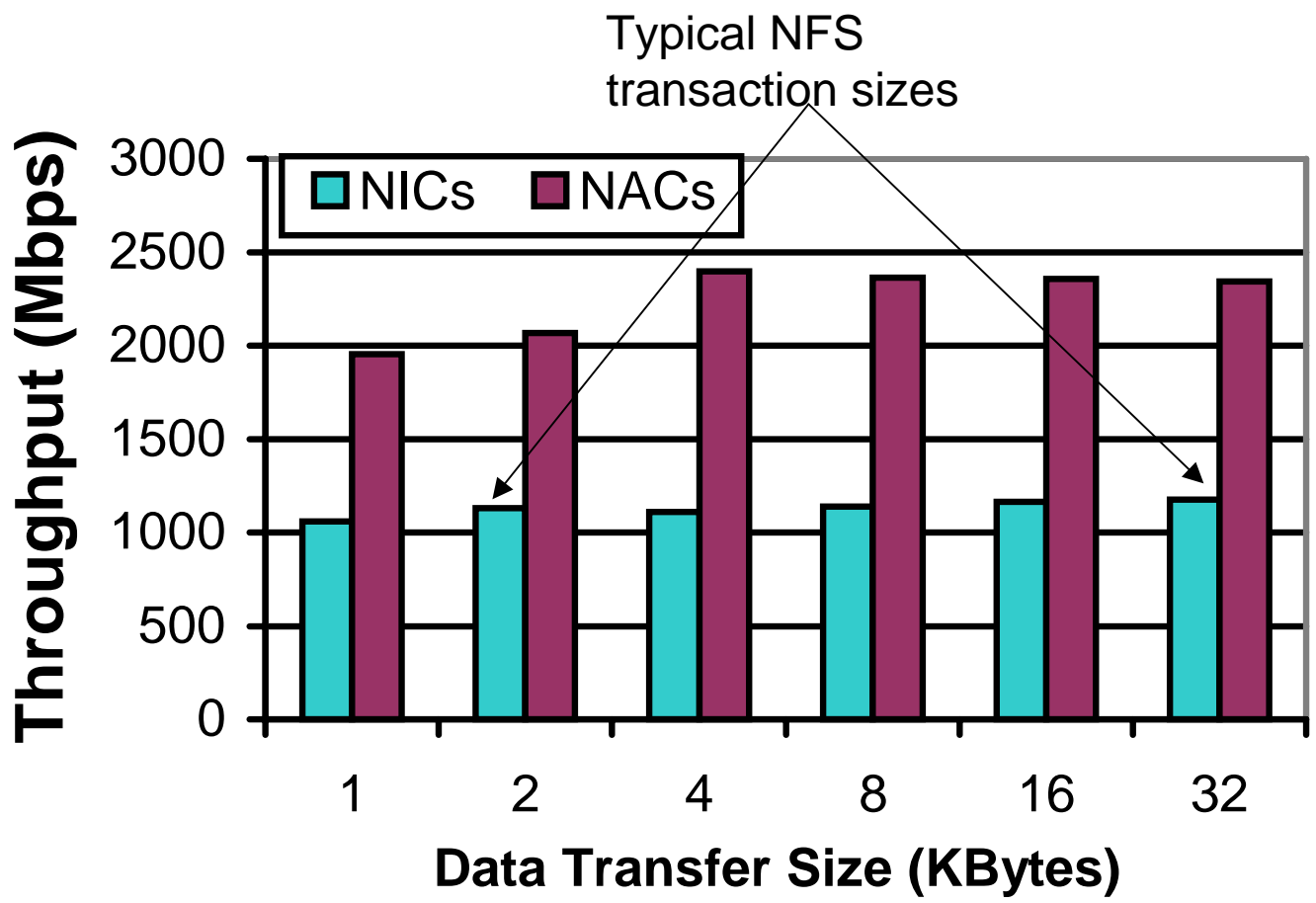
Latency reduction with NAC

Latency: lower is better

NACs provide 20-40% lower latency than NICs

Scaling throughput with NACs

Performance

3rd NAC

2nd NAC

3rd NIC

2nd NIC

1st NAC

1st NIC
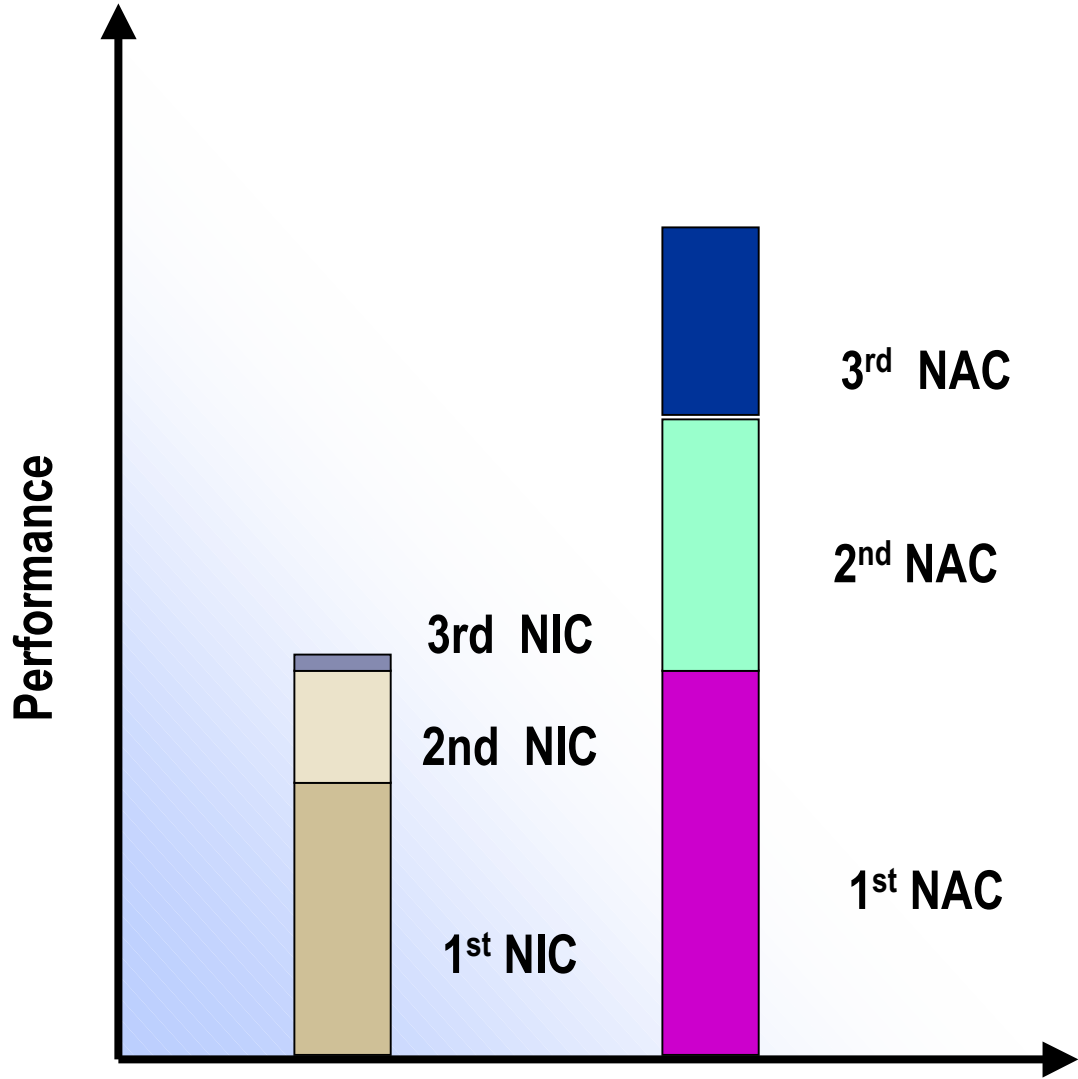
- **NIC performance does not scale**

- **NAC scalability alleviates network bottlenecks**

TOE performance Validation

An Industry standard independent test lab – VeriTest; has done TOE benchmark testing by using well recognized test tools like Chariot and Net Bench.

- Key findings:

    - 42.4% improvement in 1 NAC v/s 1 NIC test

    - 82.5% improvement in 2 NACs v/s 2 NICs test

    - a significant reduction in server CPU utilization in terms of PEI – up to 142.3%

Complete test report can be found at www.veritest.com

Benefits of NAC

- Enables line rate network speed
  - NAC = NIC + ASIC-based TCP offload (TOE)
  - Higher throughput
  - Lower latency
- Reduces CPU utilization
- Scaling network performance
- Simple implementation
- Improve productivity
  - Enhancing server performance
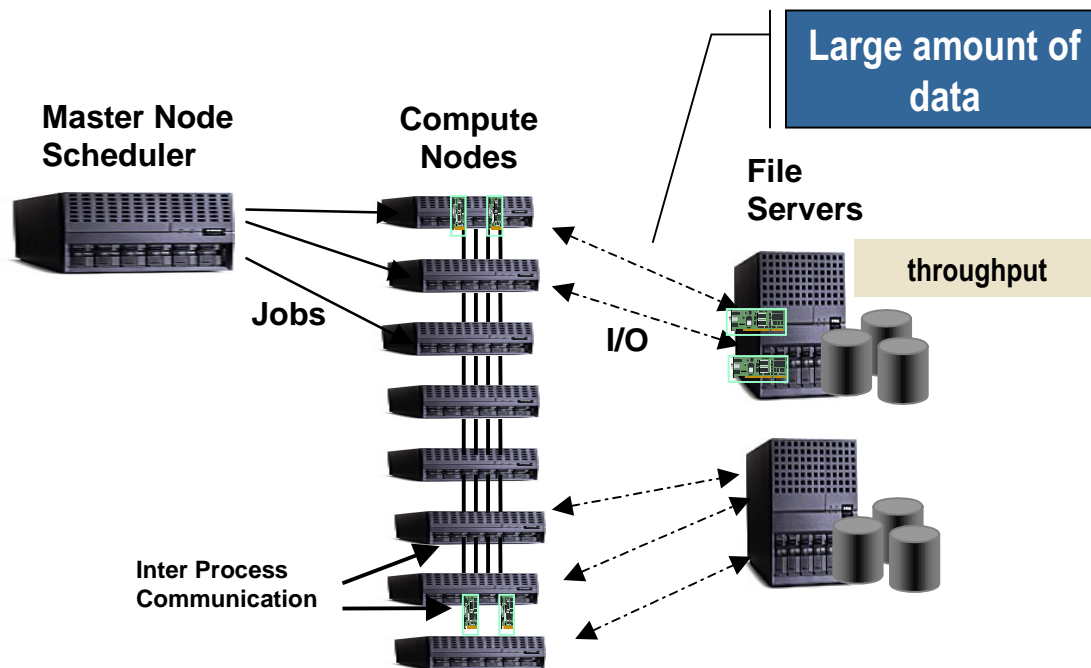 - Faster data access

…to NFS

- Increase in NFS Server performance
  - With increased NFS throughput
  - Same server can support more NFS clients with the NAC then a NIC
- Helps Improve throughput and CPU utilization for back-end traffic (i.e. server to storage)
- Clustering communication can be enhanced by using TOE
- Scaling network performance
- Simple implementation
- Transparent to the user and application.

NAC Deployment in NFS enabled High-Performance Computing

Master Node Scheduler

Compute Nodes

Large amount of data

File Servers

throughput

Jobs

I/O

Inter Process Communication

- **Application**
  - Bio informatics genome research (BLAST)
- **Infrastructure**
  - Linux Compute Farms (High Performance Cluster)
  - Transfer large sets of data between compute nodes and file servers
- **Challenge**
  - Network bottlenecked by increasing number of genome matching jobs submitted by scientist across the globe.
- **TOE Advantage**
  - Improve compute server to file server communication.
  - Scientist can perform more test faster.
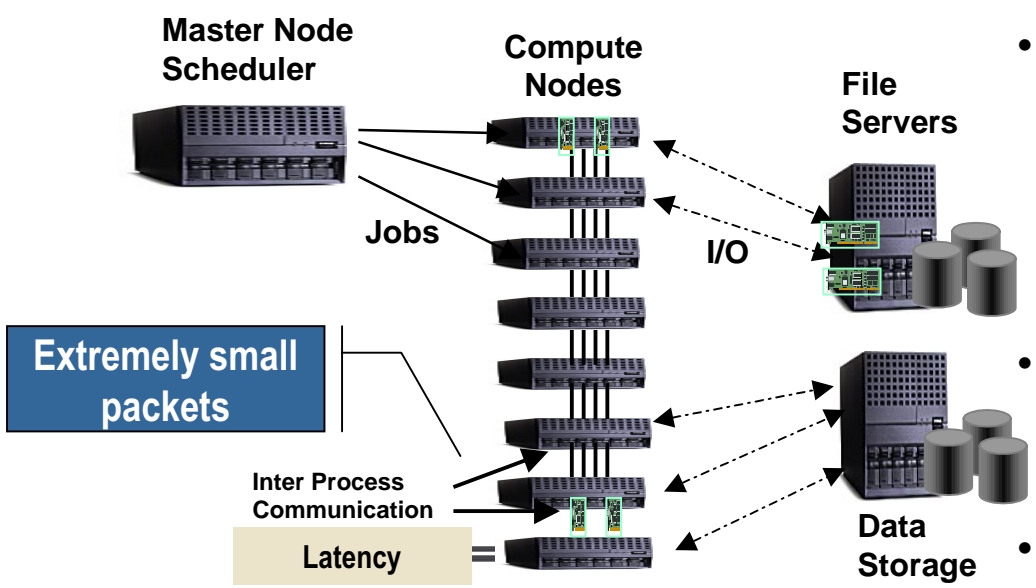 - Nearly doubling of productivity

"*"The TOE NAC is enabling our UCSC genome research team to perform more tests, faster -- in some cases doubling the number of jobs completed and substantially accelerating our research efforts."*

Ann Pace, Deputy Director, UCSC

NAC Deployment in latency sensitive application

Master Node Scheduler

Compute Nodes

File Servers

Jobs

I/O

Extremely small packets

Inter Process Communication

Latency

Data Storage

- **Application**
  - Real time processing of financial data
- **Infrastructure**
  - Linux Compute Farms (High Performance Cluster)
  - Transfer extremely small amount of data between servers
- **Challenges**
  - Latencies associated with inter process communication
- **TOE advantage**
  - Accelerating IPC
  - Results in exponentially faster financial data processing
  - Lower TCO

Products are available now!!

For example, Adaptec ANA-7711F & ANA-7711C:

- **1 Gb Ethernet TOE Adapters**

- **Available with Optical & copper Interfaces**

- **Fits in rack mount servers**

- **Linux Redhat 7.X, 8.0 and more…**

Open Source

N F S   **I N D U S T R Y**   **C O N F E R E N C E**

ADAPTEC

Complete TCP Offload frees CPU resources and accelerates network transmission speeds

ADAPTEC NETWORK ACCELERATOR 7711F

Q & A

Appendix.

TOE performance highlights from VeriTest Test Report

Key Findings

❑ Our testing for network performance and scalability clearly demonstrated the superior performance of Adaptec ANA-7711 Network Accelerator Card (NAC) over one of the highest performing Gigabit Network Interface Cards (NICs) in the market, an Intel Pro/1000 MT Server Adapter.

❑ In our network performance scalability tests, dual Adaptec NACs enhanced network performance up to 82.5 percent, as compared to dual Intel Pro/1000 MT Server NICs.

❑ For a single adapter performance testing, we found the Adaptec NAC enhanced network performance up to 42.4 percent, as compared to a single Intel Pro/1000 MT Server NIC.

❑ In our dual adapter test configurations, the Adaptec ANA-7711 NAC also provided a significant reduction in server CPU utilization in terms of PEI, a 142.3% percent improvement for the 2KB test script, as compared to an Intel Pro/1000 MT Server NIC.