Overview

Around the world and across all industries, high performance computing (HPC) is used to solve today’s most demanding computing problems. As today’s high performance computing challenges grow in complexity and importance, it is vital that the software tools used to install, configure, optimize, and manage HPC fabrics also grow more powerful. Today’s HPC workloads are too large and complex to be managed using software tools that are not focused on the unique needs of HPC.

Designed specifically for HPC, Intel® Fabric Suite 7 is a complete fabric management solution that maximizes the return on HPC investments, by allowing users to achieve the highest levels of performance, efficiency, and ease of management from InfiniBand-connected HPC clusters of any size.
Highlights

• Intel FastFabric and Fabric Viewer integration with leading third-party HPC cluster management suites
• Simple but powerful Fabric Viewer dashboard for monitoring fabric performance
• Intel Fabric Manager integration with leading HPC workload management suites that combine virtual fabrics and compute
• Quality of Service (QoS) levels that maximize fabric efficiency and application performance
• Smart, powerful software tools that make Intel® True Scale Fabric solutions easy to install, configure, verify, optimize, and manage

Superior Fabric Performance and Simplified Management are Vital for HPC

As HPC clusters scale to take advantage of multi-core and GPU-accelerated nodes attached to ever-larger and more complex fabrics, simple but powerful management tools are vital for maximizing return on HPC investments.

Intel® Fabric Suite 7 provides the performance and management tools for today’s demanding HPC cluster environments. As clusters grow larger, management functions, from installation and configuration to fabric verification and optimization, are vital in ensuring that the interconnect fabric can support growing workloads. Besides fabric deployment and monitoring, IFS optimizes the performance of message passing applications—from advanced routing algorithms to quality of service (QoS)—that ensure all HPC resources are optimally utilized.

Scalable Fabric Performance

• Purpose-built for HPC, IFS is designed to make HPC clusters faster, easier, and simpler to deploy, manage, and optimize
• The Intel® True Scale Fabric on-load host architecture exploits the processing power of today’s faster multi-core processors for superior application scaling and performance
• Policy-driven vFabric* virtual fabrics optimize HPC resource utilization by prioritizing and isolating compute and storage traffic flows
• Advanced fabric routing options—including adaptive and dispersive routing—that distribute traffic across all potential links that improve the overall fabric performance, lowering congestion to improve throughput and latency

Scalable Fabric Intelligence

• Routing intelligence scales linearly as Intel® True Scale Fabric switches are added to the fabric
• Intel Fabric Manager can initialize fabrics having several thousand nodes within seconds
• Advanced and optimized routing algorithms overcome the limitations of typical subnet managers
• Smart management tools quickly detect and respond to fabric changes, including isolating and correcting problems that can result in unstable fabrics

Standards-based Foundation

Intel® True Scale Fabric solutions are compliant with all industry software and hardware standards. Intel® Fabric Suite (IFS) redefines IBTA* management by coupling powerful management tools with intuitive user interfaces. InfiniBand* fabrics built using IFS deliver the highest levels of fabric performance, efficiency, and management simplicity, allowing users to realize the full benefits from their HPC investments.
Major components of Intel®Fabric Suite 7 include:
• FastFabric Toolset
• Fabric Viewer
• Fabric Manager

Intel FastFabric Toolset
Ensures rapid, error-free installation and configuration of Intel® True Scale Fabric switch, host, and management software tools. Guided by an intuitive interface, users can easily install, configure, validate, and optimize HPC fabrics.

Key features include:
• Automated host software installation and configuration
• Powerful fabric deployment, verification, analysis, and reporting tools for measuring connectivity, latency, and bandwidth
• Automated chassis and switch firmware installation and update
• Fabric route and error analysis tools
• Benchmarking and tuning tools
• Easy-to-use fabric health checking tools

Intel Fabric Viewer
A key component that provides an intuitive, Java*-based user interface with a “topology-down” view for fabric status and diagnostics, with the ability to drill down to the device layer to identify and help correct errors. IFS 7 includes fabric dashboard, a simple and intuitive user interface that presents vital fabric performance statistics.

Key features include:
• Bandwidth and performance monitoring
• Device and device group level displays
• Definition of cluster-specific node groups so that displays can be oriented toward end-user node types
• Support for user-defined hierarchy
• Easy-to-use virtual fabrics interface

Intel Fabric Manager
Provides comprehensive control of administrative functions using a commercial-grade subnet manager. With advanced routing algorithms, powerful diagnostic tools, and full subnet manager failover, Fabric Manager simplifies subnet, fabric, and individual component management, making even the largest fabrics easy to deploy and optimize.

Key features include:
• Designed and optimized for large fabric support
• Integrated with both adaptive and dispersive routing systems
• Congestion control architecture (CCA)
• Robust failover of subnet management
• Path/route management
• Fabric/chassis management
• Fabric initialization in seconds, even for very large fabrics
• Performance and fabric error monitoring

Adaptive Routing
While most HPC fabrics are configured to have multiple paths between switches, standard InfiniBand® switches may not be capable of taking advantage of them to reduce congestion. Adaptive routing monitors the performance of each possible path, and automatically chooses the least congested route to the destination node. Unlike other implementations that rely on a purely subnet manager-based approach, the intelligent path selection capabilities within Fabric Manager, a key part of IFS and Intel 12000 series switches, scales as your fabric grows larger and more complex.

Key adaptive routing features include:
• Highly scalable—adaptive routing intelligence scales as the fabric grows
• Hundreds of real-time adjustments per second per switch
• Topology awareness through Intel Fabric Manager
• Supports all InfiniBand Trade Association* (IBTA*)-compliant adapters

Dispersive Routing
One of the critical roles of the fabric management is the initialization and configuration of routes through the fabric between a single pair of nodes. Intel Fabric Manager supports a variety of routing methods, including defining alternate routes that disperse traffic flows for redundancy, performance, and load balancing. Instead of sending all packets to a destination on a single path, Intel dispersive routing distributes traffic across all possible paths. Once received, packets are reassembled in their proper order for rapid, efficient processing. By leveraging the entire fabric to deliver maximum communications performance for all jobs, dispersive routing ensures optimal fabric efficiency.

Key dispersive routing features include:
• Fabric routing algorithms that provide the widest separation of paths possible
• Fabric “hotspot” reductions to avoid fabric congestion
• Balances traffic across all potential routes
• May be combined with vFabrics and adaptive routing
• Very low latency for small messages and time sensitive control protocols
• Messages can be spread across multiple paths—Intel Performance Scaled Messaging (PSM) ensures messages are reassembled correctly
• Supports all leading MPI libraries

Mesh and Torus Topology Support
Fat-tree configurations are the most common topology used in HPC cluster environments today, but other topologies are gaining broader use as organizations try to create increasingly larger, more cost-effective fabrics. Intel is leading the way with full support of emerging mesh and torus topologies that can help reduce networking costs as clusters scale to thousands of nodes. IFS has been enhanced to support these emerging options—from failure handling that maximizes performance, to even higher reliability for complex networking environments.
Intel® Fabric Suite 7 Specifications

Supported standards, operating systems, and devices are continually changing—check www.Intel.com for the latest information about tested and supported configurations.

Comprehensive Support

- Rich implementation of SM/SA protocols, including advanced features such as traceroute
- Performance Management Agent protocol support, including support for 64-bit counters and an extensive featured PM/PA interface
- Baseboard Management protocol with a full featured BM/BA interface

Supported Host Channel Adapters and Switches

- All Intel® True Scale Fabric host channel adapters and switches
- All IBTA*-compliant host channel adapters and switches

Processor Core Support: Single-Core and Multi-Core Processors

- Intel® EMT64
- AMD Opteron®
- NVIDIA Tesla* general-purpose graphics processing units

Supported Operating Systems

- Red Hat Enterprise Linux*
- Novell SUSE Linux Enterprise Server*
- CentOS*
- Scientific Linux*

Supported Operating Systems and Web Browsers for Intel Fabric Viewer

- Windows XP* with Internet Explorer*
- Red Hat Enterprise Linux* with Firefox*
- Novell SUSE Linux Enterprise Server* with Firefox*
Qualified Cluster Management Tools

• Platform Cluster Manager* from Platform Computing
• ROCKS+ Rolls* from StackIQ

Qualified Workload Scheduling Tools

• Load Sharing Facility* from Platform Computing
• Moab Adaptive HPC Suite* from Adaptive Computing