INFINIBAND AND 10-GIGABIT ETHERNET FOR DUMMIES

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Abstract

InfiniBand Architecture (IB) and 10-Gigabit Ethernet (10GE) technologies are generating significant excitement towards building next generation High-End Computing (HEC) systems. This tutorial will provide an overview of these emerging technologies, their offered features, their current market standing, and their suitability for prime-time HEC. It will start with a brief overview of IB, 10GE, and their architectural features. An overview of the emerging OpenFabrics stack which encapsulates both IB and 10GE in a unified manner will be presented. Issues related to converged/unified fabric will be discussed. IB and 10GE hardware/software solutions and the market trends will be highlighted. Finally, sample performance numbers highlighting the performance these technologies can achieve in different environments such as MPI, Sockets, Parallel File Systems and Multi-tier Datacenters, will be shown.

Detailed Outline

The tutorial is organized along the following topics:
1. What are IBA and 10GigE/iWARP?
   • TCP vs. User-level communication protocols
   • Requirements (communication, I/O, performance, cost, RAS) from the perspective of designing next generation high-end systems and scalable data centers

2. Short Overview of InfiniBand Architecture
   • Architecture and Basic Hardware Components
   • Novel Features (Hardware Protocol Offload and Communication Semantics)
   • IBVerbs Interface
   • Management and Services (Subnet Management and Hardware Support for Scalable Network Management)

3. Overview of 10-Gigabit Ethernet Family
   • Architecture and Basic Components (Similarity and Differences with InfiniBand)
   • Out-of-Order Data Placement
   • Dynamic and Fine-Grained Data Rate Control
   • Existing Implementations of 10GE/iWARP

4. Overview of IBA and iWARP Products (hardware and software), Time-frames, and Market Trends
   • Vendors, Switches, and Host Channel Adapters
   • Overview of ConnectX architecture
   • Overview of OpenFabrics Architecture and Convergence
   • Pointers to IBA and iWARP installations

5. Sample performance numbers with InfiniBand and 10-Gigabit Ethernet

6. Conclusions, Final Q&A, and Discussion