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Session 1: HPC Data Management Challenges

Pulipati Madhav, CEO, Photonics Valley Corporation,
Government of Telangana, India

Title: Photonics

Jean-Thomas Acquaviva Senior Software Architect
Data Direct Networks, France

Title: Understanding Exascale HPC Applications with I/O Profiling

Abstract:

The current storage software stack is the center of a perfect storm. Only five years ago systems were assembled with clearly identified building blocks, each with its own order of magnitude: CPU –nanosecond, network – microsecond, storage – millisecond. But storage devices are filtering down to faster levels, from hard drive to storage class memory, the factor of acceleration is a multiple order of magnitude. While the hardware landscape has been radically redefined, simultaneously a new ecosystem is flourishing, big data applications exhibit different workloads which are at this time still not well understood by the community. Thus the storage stack has to deal simultaneously with new and more complex hardware with a deeper hierarchy and new application requirements. Before rushing to the keyboard, it seems the right time to get more and better quality insights about what's exactly going on!

This talk focuses on I/O profiling efforts undertaken by us to understand application behavior using tools like DIO-Pro. The DIO-pro effort is an on-going development at DDN Storage which is trying to build new a set of I/O performance analysis tools. Once an I/O trace has been captured on the client side, we propose to compress it with some structural compression based methods and *replay* it against new hardware. This is an original way to extrapolate the performance of a given application on different hardware platforms. Doing so opens the path to a better understanding of what is actually needed for future storage platforms. While still being at a prototyping stage, initial results are promising and we hope to trigger the interest of the community on such method.

Kalyana Chadalavada, Intel

Title: Exascale I/O Systems

P Shasidhar Reddy, National Remote Sensing Centre, ISRO

Title: Data Management for Satellite Data Platform