DataDirect
N E T W O R K S

Reducing Service Latency in Large Storage Systems

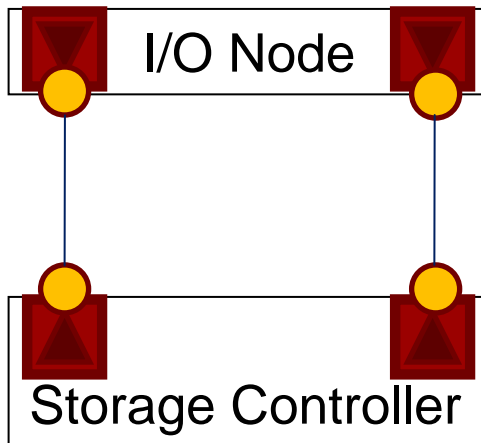## Dave Fellinger, CTO
September 28, 2010

Bottleneck analysis

- Hardware chain

    - Drive servo operation

    - Mutiple SCSI layers

    - Multiple bus transitions

    - Memory bandwidth limitations

- Software chain

    - Memory copies

    - Kernel operations

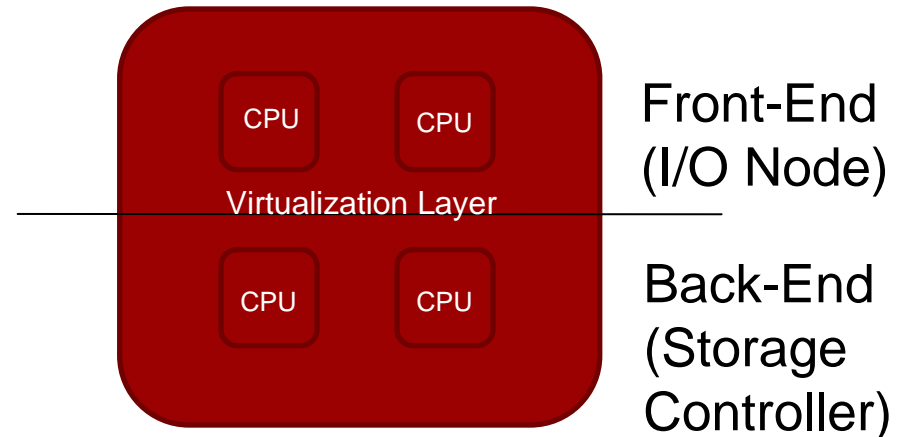   - Layers of consecutive operations including Vnodes, Inodes, and FAT

Hardware Simplification

System Simplification/Cost Reduction

Today

I/O Node

Storage Controller

Simplified I/O Path

CPU CPU

Virtualization Layer

CPU CPU

Front-End
(I/O Node)

Back-End
(Storage
Controller)

 HBA/HCA

 SFP/XENPAK/XFP

—— Cable

- All I/O Node to Storage Controller interconnect components *__eliminated__*
- Protocol overhead and conversions __reduced__
- Shared memory space
- High-speed internal connections

Software Simplification

System Simplification

- Use virtualization technology to eliminate layers
    - File system services
    - Metadata services
    - Data analysis

- Use Object based file system technology to reduce software layers
    - Eliminate the need for FAT
    - Eliminate the possibility of fragmentation
    - Force one disk seek for small to medium objects
    - Enable external metadata search engines

Conclusion

- Simplifications must be employed at every level of the system

    - Local networks can be simplified and can employ RDMA technologies

    - Concentration should be place on the end goal of file reads per second rather than system IOPs

    - All legacy protocols should be reviewed and optimized for the current task requirements

    - Analysis tools should be as close to the storage as possible in terms of processor and network layers

Thank You