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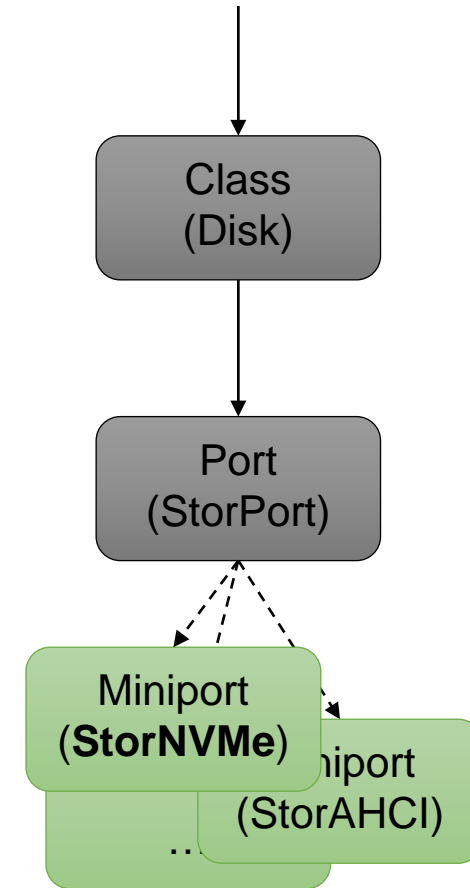
Architect

Microsoft Windows Server

8/14/2013

Windows Support for NVME

- Windows Inbox Driver (StorNVMe.sys)
 - Windows Server 2012 R2 (high-density/performance)
 - Windows 8.1 (small form factors)
- Utilizes the Storport Model
 - Reduced development cost
 - Offloads Basics: PnP, Power, Setup, Crash, Boot*
 - Mature / Hardened driver model
 - Storport is optimized for performance
 - RAM-backed NVMe device
 - > 1 million IOPS | < 20 μ s latencies



Level Set (simplistic view)

- NVME is done (in terms of OS support)
 - **PCIe interface** to low latency non-volatile storage
 - Very efficient command set, highly parallel, friendly to many-core designs
- What's left? – NVM (without the “E”)
 - Memory bus interface for non-volatile block devices
 - Even lower latency than PCIe
 - Memory bus interface for non-volatile memory devices

Why is NVM Interesting to Microsoft?

- New levels of performance for applications & OS
- Lower storage costs
 - Extreme IOPs of NVM, when combined with the capacity of HDD through storage tiering gives excellent \$/IOP while maintaining great \$/GB
 - Power reduction
- New compelling distributed applications
 - Example: Distributed “in-memory” databases that are now non-volatile
 - Example: Remote storage with SMB3 RDMA has the same performance as local
 - **Windows Server 2012 SMB3: 16.8 Gbytes/s, 560K 8 KB IOPs from a single client to SSD storage**
 - But as NVM technology is deployed, the bar is raised.
- Portability and new form factors for devices