Windows' Perspective on NVMe

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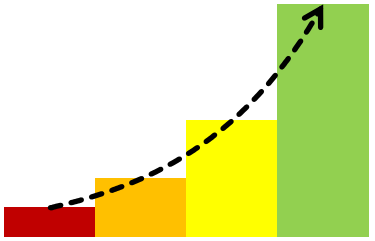
Windows Core – Storage and File Systems

NVMe in Windows

- The Protocol
  - Standardized PCIe Storage
  - Natural Progression



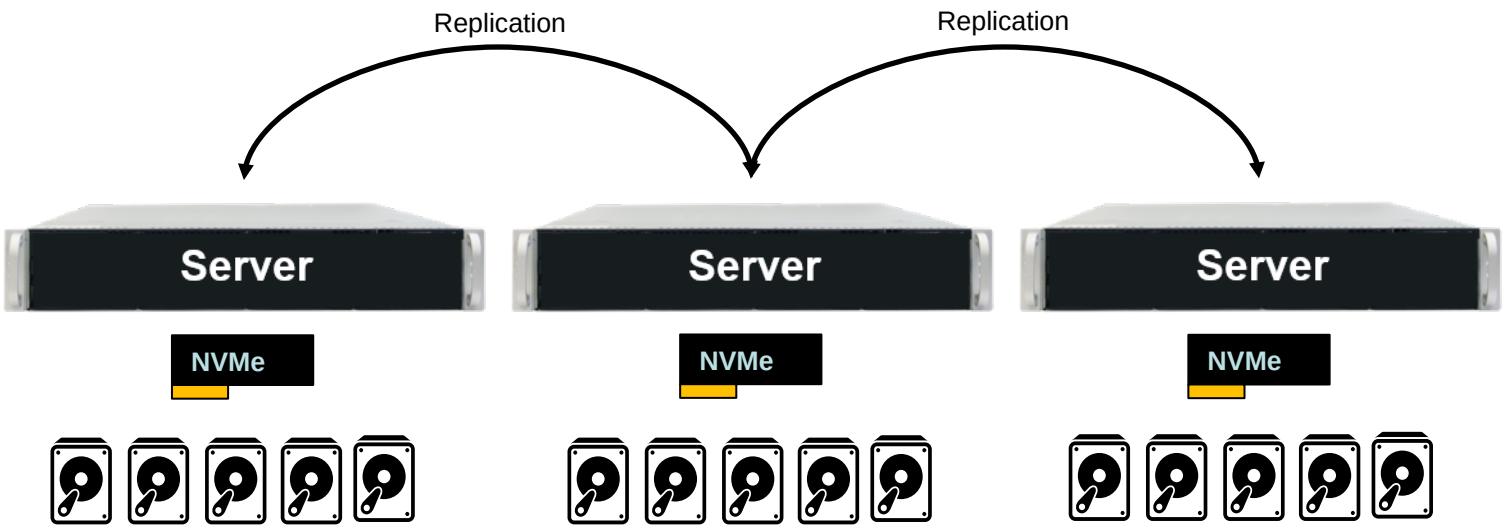
- The OS
  - Windows Inbox Driver (StorNVMe.sys)
    - Windows Server 2012 R2 (high-density/performance)
    - Windows 8.1 (small form factors)
  - Stable Base Driver

Server/ Client Considerations

- Server
  - First devices are enterprise-class
  - High-Density / Performance
  - Closing the latency gap with RAM
- Client
  - Boot
    - UEFI\Platform support required first
  - Granular Power Management needed
  - AHCI PCIe SSDs causing confusion

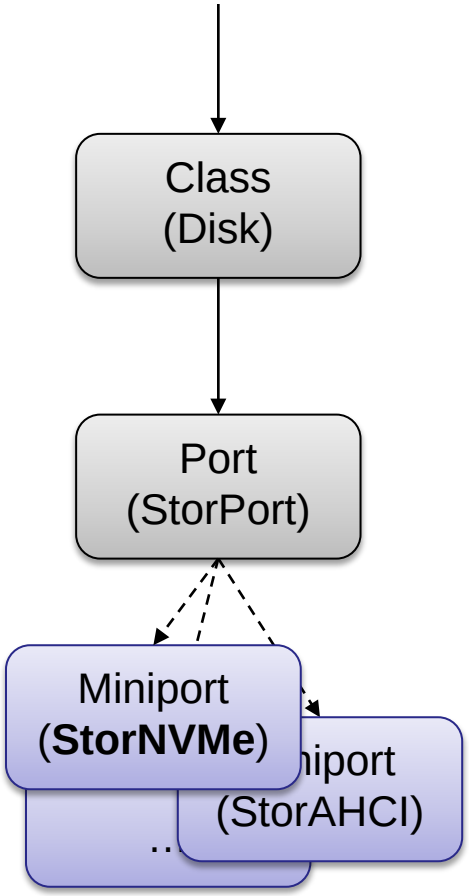
NVMe Use Cases

- Replicated Systems / Custom Deployment
- Non-Clustered Storage Spaces

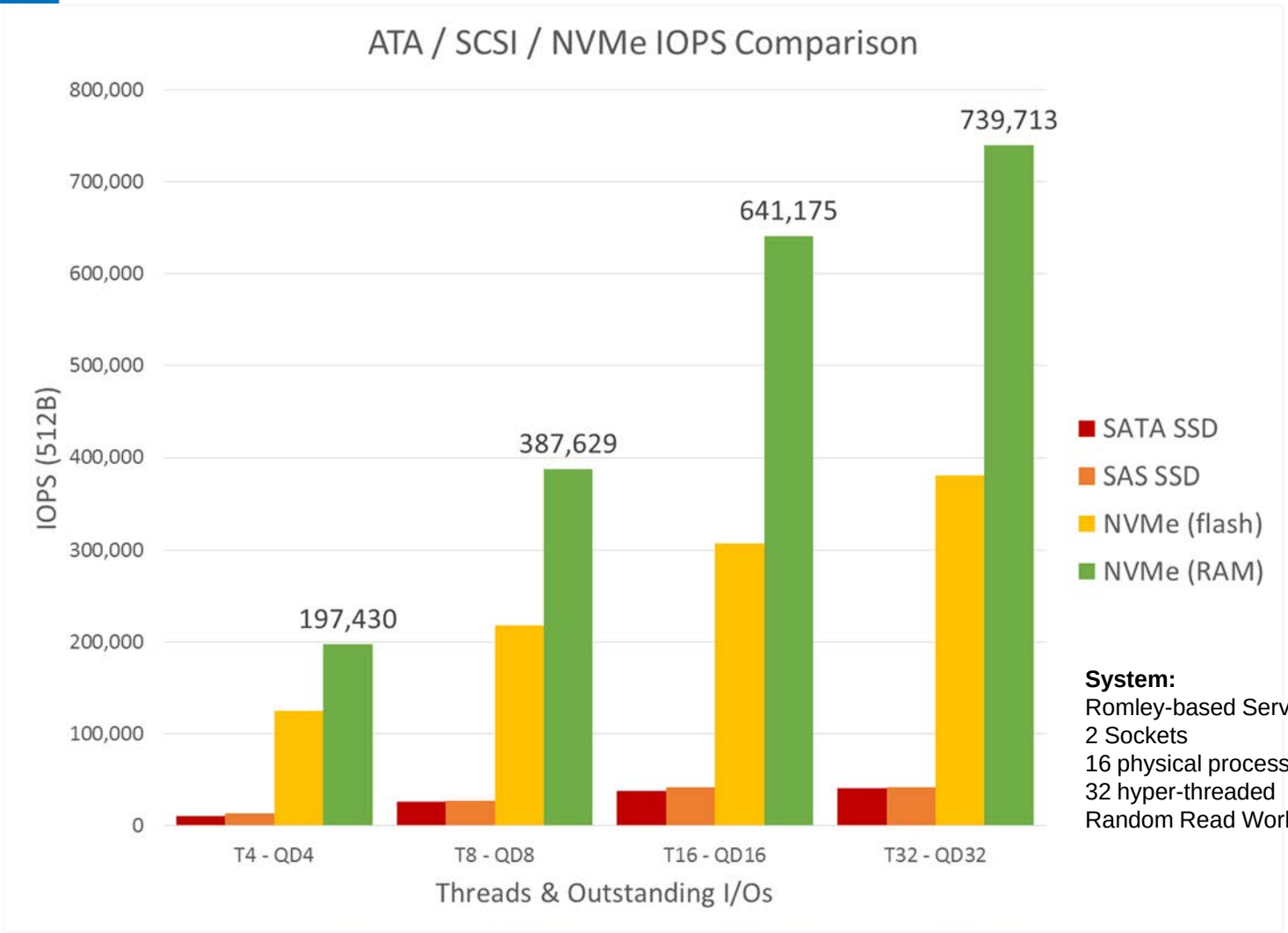


The Windows Storage Driver Model

- The Storport Model
  - Reduced development cost
    - Offloads Basics: PnP, Power, Setup, Crash, Boot*
  - Mature / Hardened Model
  - Storport optimized for performance
  - RAM-backed NVMe device
    - > 1 million IOPS | < 20µs latencies



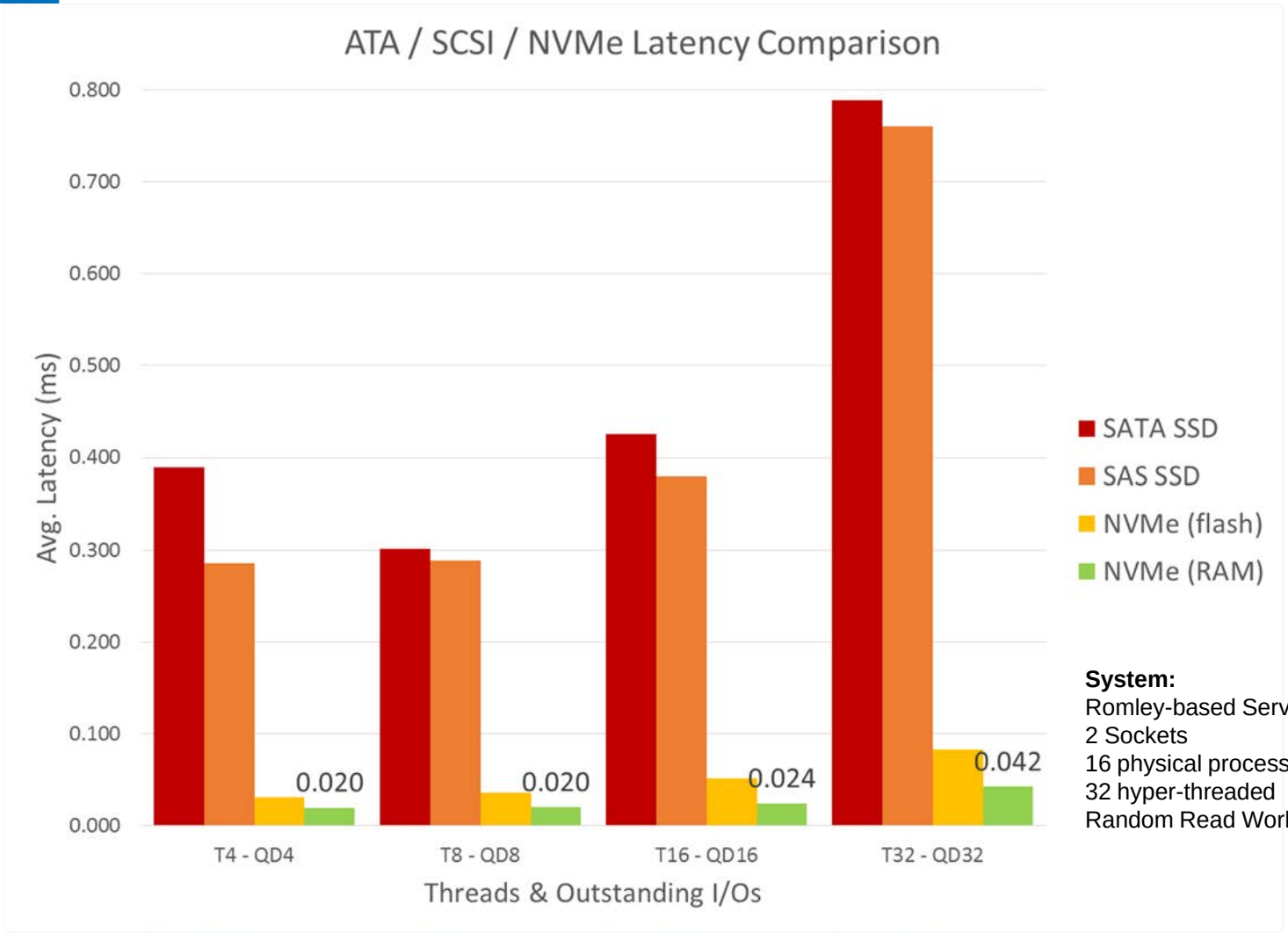
Windows Stack Performance



System:
Romley-based Server
2 Sockets
16 physical processors
32 hyper-threaded
Random Read Workload

Source: Internal Testing on prototype NVMe devices

Windows Stack Latency



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Future Challenges

- Shareable Devices
  - High Availability (Clustering)
  - Fault Tolerance (Storage Spaces)
- Form Factor
  - Small Devices, High Density, Power
- Transition
  - SATA → NVMe

Summary

Test it, Send us Feedback!

Questions?