# Software Defined Storage Solution - ScaleIO and Samsung SSD

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# Software Defined Storage - Solution Overview

Support IT best practices for Storage – Consolidate and Standardize

ScaleIO software defined storage:

* ScaleIO MDM - ScaleIO MetaData Manger – like a master node  
  SDS - ScaleIO Data Server – like a storage target  
  SDC – ScaleIO DataClient – like an application server
* Scale IO can be configured with dedicated application servers (SDC) and dedicated storage servers (SDS). Or ScaleIO can be configured as hyper-converged where every server is both application and storage.
* Scale IO employs a special protocol, so Scale IO software is installed on both SDS and SDC (both clients and servers).

Scope of work –

* The analysis is a non-Tiered configuration where both SDS and SDC software runs on every server (hence the high DRAM).
* Beyond the scope of this paper – this paper is NOT involving VMware and/or Docker. These services can be added on top of the hardware foundation provided by this paper.

# ScaleIO Hyper-converged approach

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|  | **Hyper-Converged Per-NODE View** | | |
|  | H1 - (baseline) published by Dell | H2 - Samsung SSD  SSD performance  and SSD bulk | H3 - Samsung SSD  performance optimized |
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| ScaleIO SDS+SDC | Server (Dell R730xd or equivalent)  2 socket, total 20 Core CPU | Server (Dell R730xd or equivalent)  2 socket, total 20 Core CPU | Server (Dell R730xd or equivalent)  2 socket, total 20 Core CPU |
| Server CPU | E5-2600 Intel 10 Core | Intel 20 Core | Intel 20 Core |
| RAM | 512GB DDR4 - Samsung | 512GB DDR4 - Samsung | 768GB DDR4 - Samsung |
| Storage Controller | Raid controller (PERC H730 or similar) | Raid controller (PERC H730 or similar) | none |
| Storage | 24x 1.2TB 10K RPM HDD | * 2x 1.9 TB NVMe SSD Samsung SM963 * 18x 15.4TB SAS SSD Samsung 1633a | * 4x 6.4 TB NVMe SSD Samsung PM1725a |
| OS version | Linux 4.4.0-040400-generic | Linux 4.4.0-040400-generic | Linux 4.4.0-040400-generic |
| ScaleIO Software | * Both SDC and SDS – ScaleIO Data Client and ScaleIO Data Server | * Both SDC and SDS – ScaleIO Data Client and ScaleIO Data Server | * Both SDC and SDS – ScaleIO Data Client and ScaleIO Data Server |
| Network | 4x 10Gbe | 2x 40Gbe | 4x 40Gbe |
| Storage | TOR switch S4048-ON  48x 10Gbe, 6x 40Gbe ports | TOR switch S6010-ON 32x 40Gbe ports | TOR switch S6100-ON 64x 40Gbe ports |



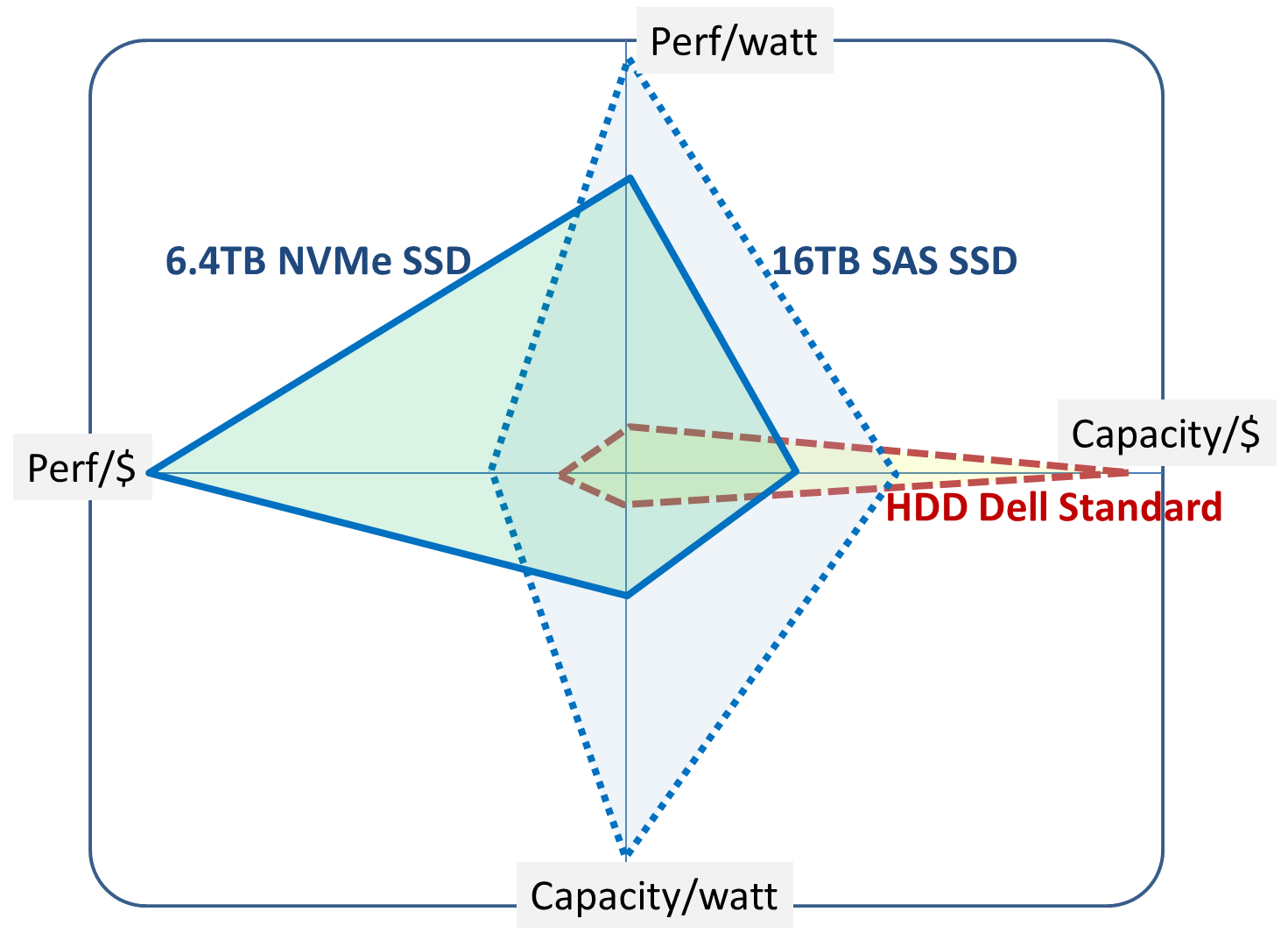
Server – 2U Rack Mount, 24 Slots for SAS, 4 slots for NVMe (Dell R730xd or equivalent)

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| **RACK LEVEL– Hyper-Converged View** | | | |
| Rack Level | **Baseline** | **Samsung SSD**  **SSD performance/SSD bulk** | **Samsung SSD**  **performance optimized** |
| Network Top of Rack | 2x S4048   * 48x 10Gb ports ea * 6x 40Gb ports ea   MDM – 3x 4x 10Gb ports  SDS+SDC – 12x 4x 10Gb ports  TOR Out – 12x 40Gb ports  Out of Band – 15x 1Gb port | 2x S6010-ON   * 32x 40Gb ports ea   MDM – 3x 4x 10Gb ports  SDS+SDC – 12x 2x 40Gb ports  TOR Out – 12x 40Gb ports  Out of Band – 15x 1Gb port | 2x S6100-ON   * 64x 40Gb ports ea   MDM – 3x 4x 10Gb ports  SDS+SDC – 12x 4x 40Gb ports  TOR Out – 12x 40Gb ports  Out of Band – 15x 1Gb port |
| MDM - Scale IO Manager Node | 3 server nodes (Dell R630 or equivalent)  128GB RAM  1x 400GB SSD, 3x 1.2TB HDD PERC H730 controller  4x 10GBe | 3 server nodes (Dell R630 or equivalent)  128GB RAM  2x 1.9 TB SSD, no PERC  4x 10GBe | 3 server nodes (Dell R630 or equivalent)  128GB RAM  2x 1.9 TB SSD, no PERC  4x 10GBe |
| SDS+SDC Servers | 12 nodes (Dell R730xd or equivalent) | 12 nodes (Dell R730xd or equivalent) | 12 Nodes (Dell R730xd or equivalent) |
| Usable Storage | 129TB | 1.7PB | 130TB |
| Estimated price | $171K | $4.2M | $569K |
| Est. Performance | 72,000 IOPs | 45M | 46M |
| Est. Power | 7.2 KWatts per year  $10,844 per year | 5.6 KWatts per year  $8,414 per year | 4.3 KWatts per year  $6,564 per year |

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| Key Ratios Bigger is better | | | |
|  | Baseline with 1.2TB 10K rpm HDD/node | SSD performance /SSD bulk  15.4TB SAS SSD+ 2x NVMe | Samsung SSD performance  4x 6.4TB NVMe |
| Perf/$ | 0.42 | 11 | 84 |
| Capacity/$ | 755 | 411 | 229 |
| Perf/Watt | 10 | 8190 | 1150 |
| Capacity/Watt | 18 | 314 | 30 |

Key Ratio summary

* HDD wins on GB/$, but loses badly on Performance value and Power consumed
* SSD 16TB design is the all-around winner, a good balance between performance-capacity-price-power
* SSD 6.4TB NVMe is the performance winner



# APPENDIX - HA Feature Coverage

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| RAID Functionality  at SSD speed | RAID does not slow down SSD in ScaleIO the penalty, is 2x replication  ScaleIO Provides recovery if device fails  ScaleIO provides recovery if node fails |  |
| Snapshot and replication | Yes, supported |  |
| Compression | ?? |  |

Performance bench - <https://www.youtube.com/watch?v=M5h2X5bq8fQ>

Slideshare - <http://www.slideshare.net/walshe1/emc-scaleio-overview>