ENTERPRISE STORAGE STACK

Advanced Technology for Maximum Performance

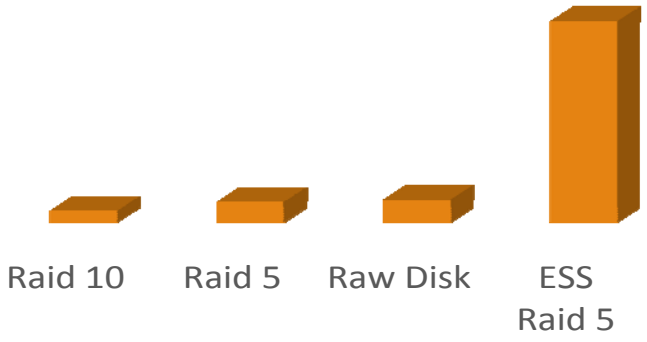
Bigger, Faster, Stronger, Cheaper

With Enterprise Storage Stack software, you can build Flash based storage servers that have superior performance and durability while costing far less than alternative technologies.

ESS includes a patented Linux block layer which converts random writes into perfectly sized linear writes that are ideal for Flash media and Linux parity RAID.

ESS delivers more usable storage: ESS lets you store 3x to 10x more data on the same set of disks. ESS includes real-time compression, real-time duplication, thin provisioning, virtual empty space management, and Raid support which allows the use of Raid-5 or Raid-6 with performance greater than that possible with Raid-10. ESS real-time data reduction lets you store more in less physical space.

Usable Storage
Per Unit of Physical Storage

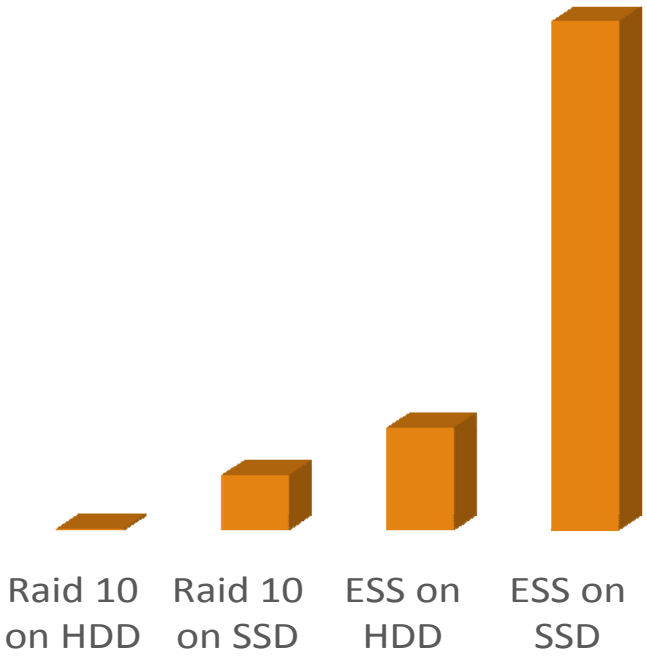


ESS lets you build faster systems: Storage needs to be fast to keep up with demanding workloads. ESS excels in random write IOPS. Even after the overhead of data reduction, ESS easily beats the write performance of traditional arrays by 20x to 50x.

ALL-flash ESS delivers more than a million 4KB random writes with 24 SSDs, even when compressing and deduping. It's so fast that it actually writes several times faster than it can random read the same 4KB blocks. This is about 20 times faster than the same flash media run with traditional Linux Raid-10 settings, and more than 70 times faster than the same media run Linux Raid-5.

Similarly, Hybrid ESS (running on hard disks) can easily deliver more than a hundred thousand write IOPS and its matching caching engine will deliver 20,000. Hybrid ESS delivers 4KB IOPS 20 to 60 times faster than traditional 7200 rpm Hard Disks can.

Relative 4KB Random Write
IOs per Second of Different Technologies



ESS lets you build stronger, more durable systems. Your data is important. ESS works hard to protect it.

ESS's linear writes reduce flash wear on enterprise SSDs by a factor of 8x to 10x.

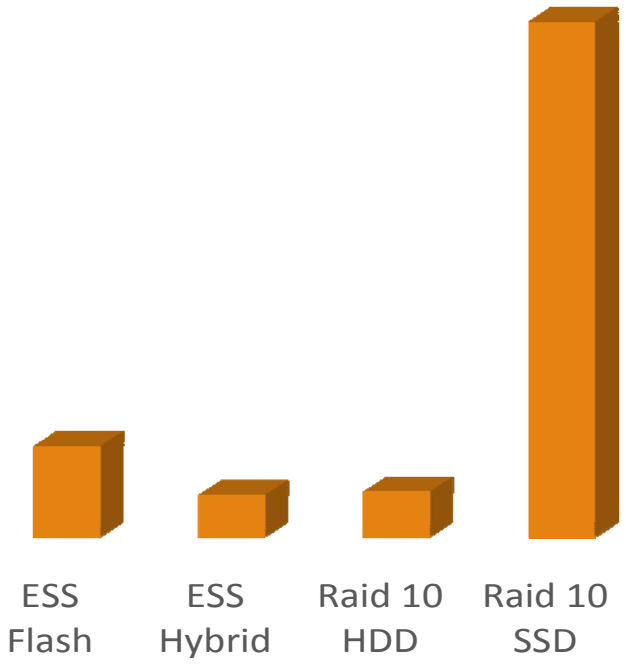
ESS always writes to "empty" space. By not overwriting existing data, ESS avoids whole classes of data errors. ESS writes are long and linear. This eliminates most SSD power fail corruption issues.

Finally, ESS validates the content of every block read and written with high-speed hashing, and can repair corrupted blocks.

ESS lets you build systems at significantly lower cost: All of ESS's superior strength and performance can be turned into extremely high performance devices, or some of it can be diverted to reduce costs with marginal performance degradation.

When a strategy of balance is pursued, the cost savings are staggering. A Linux Raid-10 device using traditional "enterprise grade" flash has a build cost of about $4,700 a terabyte, assuming that it can be built with $2/GB media.

Relative Costs per Terabyte Of Different Technologies



By comparison, a device using ESS can be produced for less than $800 a terabyte with superior speed and longevity even though using commercial grade media such as the Crucial M550. Using the same techniques, you can also build low cost heavy duty Enterprise storage.

This is not the end of possible cost savings from ESS. The use of compression and deduplication can further reduce unit costs of addressable storage while not impinging on performance. In some environments such as VDI, unit costs of storage can be reduced by a further factor of 10. But in many common environments, a further cost reduction factor of 2x to 3x is readily attainable.

Given that Raid-10 systems built with 7200 rpm Hard Disks typically have a build cost of around $400 a terabyte, the ESS approach offers the potential for dramatic performance and durability gains without increase in cost.

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