Evaluating storage and drive optimization
in custom hardware platforms

By Franklin Flint

The way an OEM configures storage elements for a dedicated hardware solution has important cost, capacity, and performance ramifications. Making informed decisions about storage type and drive options advances IT efficiency and business response.

Get in on the storage conversation

Find out more about advances in storage platforms, what the experts are thinking, and how emerging technologies affect decision making for enterprise IT.

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When software vendors and original equipment manufacturers (OEMs) assess potential hardware to run a targeted application, the server platform is only part of the equation. Designing a successful appliance or other combined hardware and software platforms also involves determining the most suitable capacity and type of storage.

Possibilities range from server-centric internal or direct attach storage (DAS) to network-oriented options such as network attached storage (NAS) or a storage area network (SAN). Each storage option offers a viable approach, depending on particular system requirements for capacity, feature set, performance characteristics, and cost efficiencies.

Matching storage type to system requirements

When deploying a compact network appliance, it may be desirable to fit storage inside the server itself. The Dell™ PowerEdge™ R510 server, for example, can house up to 12 internal drives to provide ample internal storage for many application scenarios. Enterprises can add more storage capacity by connecting a secondary chassis directly to the main server.

If the enterprise requires additional terabytes or enhanced manageability, a storage environment such as the Dell EqualLogic™

PS Series Internet SCSI (iSCSI) SAN offers a cost-effective, easy-to-use alternative that can be deployed quickly into an existing Ethernet infrastructure. Other system requirements may include a Fibre Channel SAN for low latency or compatibility with an existing Fibre Channel environment, a NAS unit for backup and restore capabilities, or a SAN array for archiving long-term storage.

Understanding hard drive options

Once the appropriate storage type has been specified, the next consideration is to identify appropriate hard drives (see Figure 1). This decision depends on essential drive characteristics such as high performance, large capacity, ruggedness, and low cost. Trade-offs among these characteristics may be required. Some implementations may even call for a mix of drive types in a single, hybrid enclosure such as the Dell EqualLogic PS6000XVS series array.

For cost-effective, high-performance arrays, spinning media designed to deliver the highest performance available is currently 15,000 rpm, 2.5-inch Serial Attached SCSI (SAS) drives. However, the sweet spot for balancing performance and cost can often be achieved using 10,000 rpm, 2.5-inch SAS drives. These drives typically cost less per gigabyte than 15,000 rpm, 3.5-inch drives. Also, because more

2.5-inch drives can fit into a chassis than 3.5-inch drives, RAID array performance may exceed that of the bulkier 3.5-inch drives.

When capacity is more important than performance, alternatives to 10,000 or 15,000 rpm, 2.5-inch SAS drives may be desirable. Today's large 2.5-inch SAS drives have a capacity of about 1 TB. In a 2U chassis with 24 drive slots, the total raw capacity provided by these high-speed drives is 24 TB. In contrast, the same basic chassis with twelve 7,200 rpm, 3.5-inch Serial ATA (SATA) or nearline SAS drives with current peak capacity of 3 TB each can house a total raw capacity of 36 TB in the same rack space. Therefore, 3.5-inch SATA or nearline SAS drives may be a suitable alternative for high capacity when high performance is not critical.

Solid-state drives (SSDs) can be the appropriate choice for power-efficient, high-performance arrays. Clear advantages of SSDs over traditional mechanical disks include high performance, low power consumption, high reliability, and resiliency in adverse environmental conditions such as those prone to vibration, high temperatures, and humidity. SSDs also come with relatively high cost and low capacity per drive compared to typical mechanical drive alternatives. However, when performance is the top requirement, or when reliability over a 3- to 5-year period is critical,
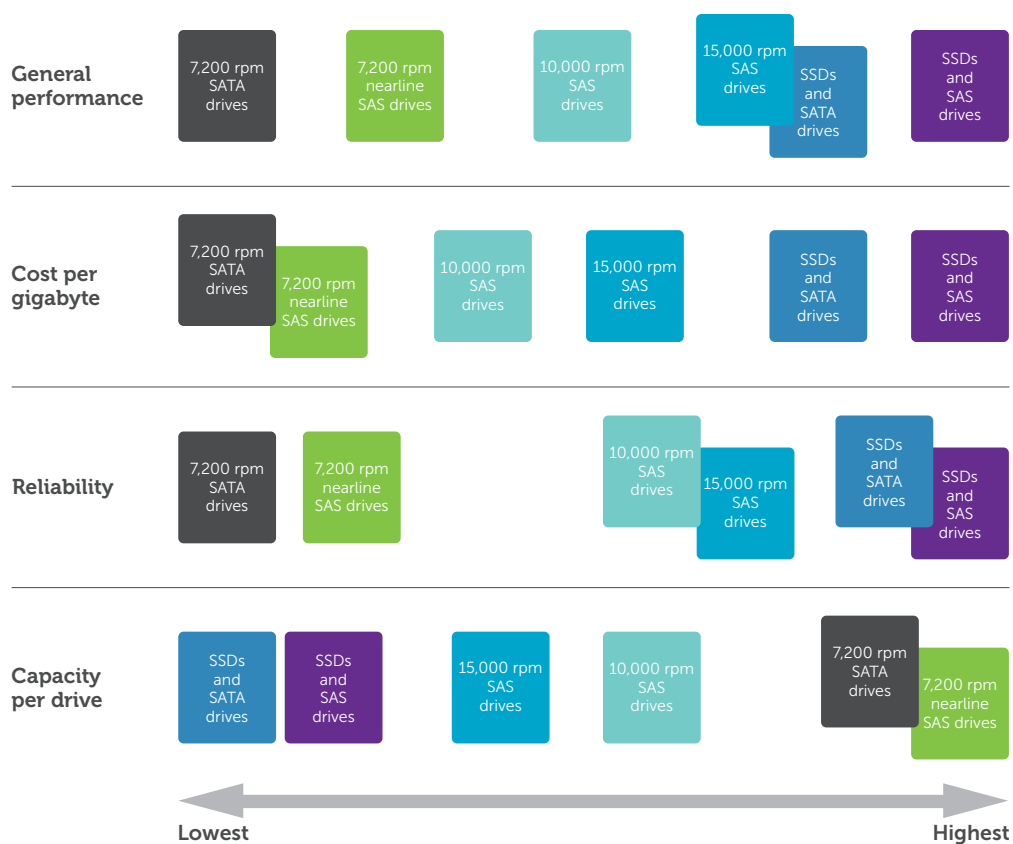
Note: Drive characteristics help determine optimal drive placement; variables and exceptions in specific use cases may also influence drive placement.

Figure 1. Considerations for making the appropriate enterprise hard drive choice

SSDs may offer an attractive cost/benefits scenario.

Providing flexible storage for dedicated platforms

Dell storage designs and technologies continue to mature with each release, enabling advancements such as high-performance iSCSI SANs. Dell shares its technology road map with OEMs to maximize product life cycles, help optimize IT deployments, and address storage challenges for enterprise IT organizations.

Storage technology is developing along several different lines, enabling OEMs to configure dedicated server platforms with different types and combinations of drive arrays to meet specific enterprise IT needs. Deciding on appropriate hard drives for storage depends on essential drive characteristics such as performance, capacity, durability, and cost. Trade-offs among these characteristics can influence decisions on hard drive options.

Dell's open, capable, and affordable approach to storage enables enterprises to deploy dedicated server platforms that are designed to keep pace with advances in technology. PS

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