

Application Awareness Makes Storage More Useful

Neal Leavitt

Traditionally, computer storage is divided into silos, with one application attached to a specific piece of “dumb” storage hardware. However, this model is no longer effective for all users because storage is no longer always a one-size-fits-all concept.

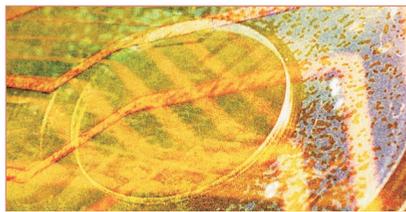
Many organizations now store an increasing amount of data of various types and importance, which will be used by multiple applications for different purposes including some that are mission-critical. They thus need to ensure that their storage technology can respond appropriately and quickly enough to meet the demands of their different users and applications.

Setting up independent storage systems for each type of application is inefficient, inflexible, and expensive.

Even tiering, which creates different levels of storage with different capabilities, doesn't always use resources efficiently and isn't always flexible enough to be truly dynamic.

One solution is *application-awareness storage*.

The technology would make sure that organizations could access critical data quickly by placing it in a high-performance storage system. Companies would be willing to use expensive storage, such as a storage area network (SAN), because the



data has a high business value. Other types of data might go in less expensive storage, using technologies like Small Computer System Interface (SCSI) and Serial Advanced Technology Attachment (SATA).

Application-aware storage would also recognize programs that try to access information and determine where to get the requested data and how to best deliver it.

The approach isn't new, but the growing demand for its benefits is starting to make it more popular.

“It makes storage variably responsive and instantly malleable in line with the needs of differing applications,” said Mark Peters, an analyst with Enterprise Strategy Group, a market-research firm. “This is particularly crucial in a mixed workload environment where multiple application types are concurrently accessing the storage system.”

The technology also adds flexibility, reliability, and performance to storage.

Many types of media—including hard drives, flash memory, and

CDs—can benefit from application-aware storage, as can SANs and distributed storage grids.

To satisfy the growing demand for the technology, vendors have released a number of application-aware products such as Bycast's StorageGRID, IBM's Tivoli Storage Manager, and Pillar's Axiom series. And companies of all sizes are increasingly buying them.

The approach, however, must still overcome some hurdles before it's ready for prime time.

DRIVING DEMAND

The need to store huge amounts of data is the main driver for application-aware storage, noted Peters. Accessing data is critical and storing it can be expensive, so organizations are looking for ways to optimize the process, he added.

However, current approaches don't do this, so users keep asking for more capacity, even though between 60 and 70 percent of the storage within most data centers is already underutilized, said Rick Clark, CEO of application-aware vendor Aptare.

SANs are creating demand for application-aware systems because they virtualize the storage of data that is spread across geographically dispersed sites. According to Glen Shok, director of marketing at application-aware storage vendor Pillar Data Systems, “Virtualization is the single leading demand generator.”

Along with its benefits, virtualization also entails large amounts of data, which can hurt the performance of existing storage approaches, noted Ed Moyle, an analyst with market research firm Security Curve.

Tiered storage doesn't adequately address these challenges. Each tier requires its own storage array with its own disk, software, maintenance, and management costs, said Shok.

Moreover, the approach doesn't provide the capability for data to move automatically to the optimal tier, added Charlie Andrews, director of product marketing for IBM's Storage Technology Division.

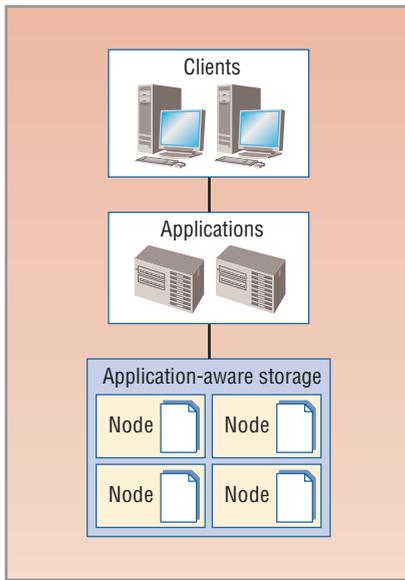


Figure 1. Application-aware systems work with storage arrays located throughout an organization's infrastructure. The systems have the intelligence to determine the best array in which to store data, based on the application that will use the information and its importance to the organization. Thus, high-value data used in real-time transactions will be stored in fast arrays. When a client requests data via a program, the application-aware technology can determine where to get the information and how best to deliver it.

INSIDE THE TECHNOLOGY

The first vendor to sell an application-aware system was Bycast, which released StorageGRID in 2002. Pillar began shipping its Axiom system in 2004.

However, noted Andrews, IBM storage attached to mainframes has had application-aware characteristics since the 1980s.

The technology

Application-aware products improve operations by passing context about the business value of data from the application to the storage in the form of policies.

In some cases, application-aware capabilities are integrated within storage hardware. However, adding application-aware software on top of existing storage resources is more common.

Most application-aware products handle general storage-related tasks. And most work with different servers, databases, and operating systems to enable interoperability.

Scalability is achieved via the systems' modular architecture. Bycast's software, for instance, lets organizations add both compute and storage resources independently without interruptions to applications and users.

Security is provided by the host system.

Intelligence and storage optimization. Application-aware storage recognizes programs, and thus the importance of their data, via the metadata they contain.

The systems also evaluate and determine how to handle data by tracking applications' utilization patterns. They use this information to adjust storage-related behaviors—such as data and file-system layouts, caching, archiving, backups, and data modeling—to optimize performance. For example, said Bycast alliance manager Douglas Ko, the systems could place important data on higher-performance storage in locations closer to the applications that most frequently use it. Figure 1 illustrates this concept.

The systems thus might send a backup application's large volume of lower-priority data to slower, less-expensive, high-capacity storage. They might send a critical database's information, on the other hand, to a fast SAN because it tends to be used in real-time transactions for which performance is critical, noted Andrews.

Application-aware products also include built-in intelligence for managing various storage hardware resources. For example, Bycast's StorageGRID recognizes if one storage facility is under heavy load or near capacity and automatically redirects data to a less-taxed resource.

Profiles

Application-aware systems work with profiles for different applications, said Greg Schulz, founder of

and senior analyst at market research firm StorageIO.

A profile is a set of elements, descriptions, policies, best practices, and guidelines for a particular application, combined in a single schema.

Application-aware systems use profiles to identify the needs of applications and their data and determine where they fit within the host organization's operations.

In essence, profiles provide a way to teach application aware storage how to work with different programs.

The system could then assign data to the storage that offers the appropriate priority, cache, and speed for the application involved and also provide the information to programs in the optimal manner.

Business policies

Application-aware tools use business policies to automate the assignment and management of storage for specific programs.

These policies comprise a set of rules that relate to the way an enterprise conducts its operations, including the way it handles its data. They include rules that enforce internal organizational policies, regulations, professional standards, and laws.

"They need to integrate through the application to the storage," said Bob Woolery, senior vice president of marketing for application-aware vendor Nexsan Technologies.

Advantages

Along with optimizing data usage by an organization's programs, application-aware storage offers several other important benefits. For example, the technology saves money by optimizing utilization of an organization's entire range of storage facilities, from inexpensive to costly.

Automation. Application-aware storage automates some manual provisioning processes. Traditional storage requires middleware and manual procedures to provision, back up,

replicate, virtualize, and replace storage, noted Ko. Automation thus reduces the amount of time administrators have to spend on storage.

Increased performance and reliability. By making sure that important programs get the data they need as quickly as possible, application-aware storage optimizes software performance, said Nexsan's Woolery.

And by maximizing storage systems' efficiency and providing redundancy, the technology also improves uptime and reliability.

ISSUES TO OVERCOME

Interoperability with major business programs is a challenge for application-aware storage. Moreover, said Moyle, "Applications are constantly in flux, and there are a bunch of them. Application-aware storage needs to, at some level, have an awareness of these applications in order to provide value."

The technology has provided organizations with new challenges in capacity management. "It has created more storage pools. And the need to accurately monitor and trend their utilization is paramount to high levels of availability with minimal overprovisioned storage," said Clark. Traditional tools of tracking these capacity thresholds at the storage array are no longer adequate, he explained.

Designing effective business policies can be very complex.

And as is frequently the case with newer technologies, smaller companies have been the first to roll out application-aware-storage products, noted Woolery. He said the technology is not likely to be adopted quickly until larger, better-known vendors release products.

Organizations are adding more and increasingly complex storage units to their systems. Administrators will thus need better tools to analyze their storage capabilities and help them make decisions about provisioning, which is important to application-aware systems, according to Bycast's Ko.

To maximize application-aware storage's effectiveness, administrators must implement prudent storage-management practices, said Sean Derrington, director of storage management for vendor Symantec. These include reducing wasted storage space and accurately forecasting future needs.

And, noted Shok, application-aware products will need easier-to-administer interfaces for the technology to really take off.

Companies of all sizes are starting to purchase application-aware storage systems and components. In the future, said IBM's Andrews, the technology will become better able to meet the changing needs of applications.

A key will be whether the technology can overcome the challenges it faces.

"Dynamically reassigning storage services to changing application needs is required to achieve value out of the storage investment," Shok said.

"The applicability of application-aware storage is boundless in terms of business size and type," added the Enterprise Strategy Group's Peters. "Like many new technologies, it tends to start at the high end and filter down, but it's likely to become a standard capability a few years from now." ■

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