



**STORAGE AREA
NETWORK**

Simplifying Data Migration in Heterogeneous Environments

Brocade Data Migration Manager (DMM) provides a fast, secure, and cost-effective solution for enterprise data centers to simplify data migration

BROCADE

In today's dynamic enterprises, migrating block-level data has become a common occurrence, especially when IT organizations consolidate storage, purchase or lease new storage arrays, or refresh their technology. They must migrate data from one array to another and often from one vendor array to another. Even if an older array will remain in production, organizations often choose to move critical, frequently accessed data to newer high-performance arrays.

Brocade® Data Migration Manager (DMM) is a powerful tool that enables affordable, secure, high-performance data migration in heterogeneous server and storage environments. This paper describes the unique challenges of data migration in dynamic IT environments and the key business advantages that Brocade DMM delivers over traditional migration tools.

THE CHALLENGE OF DATA MIGRATION IN DYNAMIC IT ENVIRONMENTS

Although data migration is common, it still carries an element of risk and often requires extensive planning. If organizations do not account for business needs or if they perform data migration improperly, it can be highly disruptive, cause corruption, and lead to sizable downtime costs. Moreover, the need to keep storage and applications online reduces migration windows, resulting in longer migration projects and growing resource commitments.

In 2007 approximately one million terabytes (1,000 petabytes) of new array-based storage will be purchased. Yet much of this new storage will be populated with data from older storage resources. In addition to one-time “project-oriented” data migration, there is a growing demand for operational migration to fulfill Information Life Cycle (ILM) strategies and meet compliance requirements for data retention. For this activity, organizations have implemented a tiered-storage architecture whereby static and less-frequently accessed data is moved to lower-performance (older, lower cost) disk storage on a regular basis. The different types or tiers of storage typically have different management interfaces, complicating the data movement process.

Because relatively few tools have been specifically designed to solve data migration challenges in open systems environments, organizations have been forced to use “umbrella” tools designed to solve a broad set of data issues. These tools can have significant limitations, however, when applied to migration activities, particularly in heterogeneous server and storage environments.

THE INNOVATIVE BROCADE APPROACH TO DATA MIGRATION

Brocade understands the growing need for a more effective data migration tool designed specifically for efficient data movement in heterogeneous environments. To address a wide range of migration issues, Brocade has developed Brocade Data Migration Manager (DMM), a Storage Area Network (SAN-based solution that provides several advantages over traditional tools used for data migration.

Brocade DMM is designed exclusively to unify data migration across many IT configurations— independent of servers, storage arrays, operating systems, and multipath software. It is a high-performance solution with terabyte-per-hour migration rates that move more data in shorter downtime windows. In this way, Brocade DMM is designed to be a fast, predictable, storage-centric migration solution that supports truly heterogeneous data centers.

To provide the most flexible solution possible, Brocade DMM resides on the Brocade Application Platform using a migrate-and-remove architecture. Organizations can quickly deploy Brocade DMM by connecting the Brocade Application Platform to an existing SAN. Because Brocade DMM is a SAN-based solution managed by storage administrators, it is non-disruptive and easier to plan for than server-based methods.

The “wire-once” setup is designed to help organizations easily insert Brocade DMM into the data path prior to a migration project—and remove it after the project is complete. Moreover, predictive behavior keeps administrators informed about the state of migration and probable completion time. Throughout the migration process, Brocade DMM maintains the source data volumes to provide an essential “failback to source” capability.

To support the widest range of IT environments and users, Brocade DMM provides two management approaches. An intuitive Windows-based management console provides easy-to-use wizards, advanced automation functions (such as array, host, and LUN discovery, and automated zoning), and monitoring. For organizations that wish to use third-party tools and customized scripts, DMM also has a robust Command-Line Interface (CLI).

Brocade DMM at a Glance

- Simplifies and accelerates block data migration during data center relocation or consolidation, array replacements, or ILM activities
- Up to 5 *terabytes per hour* for multiple I/O streams
- Migrates up to 128 LUNs in parallel (128 offline, 64 online)
- Performs online (as well as offline) migration without impacting critical applications, eliminating costly downtime
- Moves data between heterogeneous storage arrays from EMC, Hitachi, HP, IBM, Network Appliance, Sun, and other leading vendors
- Enables fast, seamless deployment in existing SAN fabrics through a migrate-and-remove architecture
- Automates multiple migration operations with easy start, stop, resume, and throttle control
- Utilizes an intuitive Windows management console or CLI scripting

CAPABILITIES FOR TWO TYPES OF MIGRATION

Brocade DMM is designed to operate in two modes:

- **Online:** The application can continue to access data in the source storage element during the migration process via the Brocade Application Platform.
- **Offline:** No I/O from the application is allowed during the migration process, and the Brocade Application Platform is used as a copy engine to perform the migration.

Online Migration

Brocade DMM can perform high-speed data migration while server applications remain online. For online implementations, multipath software must be running on all hosts accessing data volumes that will be migrated—DMM supports several types of multipath software. Two DMM units are then connected into dual-redundant SAN fabrics in an “active-active” cluster. This configuration helps ensure the availability of server I/O streams when DMM joins the fabric and enters the data path, as well as helping to maintain fast, uninterrupted I/O throughout migration operations.

Each DMM unit presents Virtual Targets (VTs) to the host multipath software, which recognizes the VTs as another path to LUNs on the source storage. By simply zoning out the original paths to the source array, no multipath software reconfiguration is required. All server reads and writes now travel only to the DMM VTs. Virtual Initiators (VIs) on the DMM units then pass reads and writes to disk storage.

Once all I/O traffic begins moving through the DMM units, online data migration can begin. One “master” DMM unit copies block data from the source disk array to the destination disk array. When a server sends a write to one of the DMM units (managed by multipath software), it is then split—one copy is sent to the source disk and another copy is sent to the destination disk. All read I/O travels between DMM units and the source disk only.

If either DMM path fails, migration is suspended and the remaining DMM unit takes over all I/O traffic, ensuring application availability and data integrity. Migration of LUNs that were not fully copied to destination storage can be manually restarted using the remaining DMM unit. If server I/O becomes strained, DMM provides policy-based throttling to maintain high host application performance.

Once migration is complete, DMM synchronizes the source and destination LUNs. Applications are then redirected to the destination LUNs, enabling DMM to be removed from the fabric.

Offline Migration

Brocade DMM supports offline migration by copying data from the source storage to the destination storage. The source and destination storage is configured exactly as in online migration, although only one DMM unit is required (versus two units). However, all application access is disabled to ensure that the data on the source storage is not modified during the migration. After the migration is complete, applications are then directed to the destination LUNs.

THE MOST COMMON USE CASES FOR DATA MIGRATION

Brocade DMM supports key migration use cases, including storage array expansion, data center relocation, data volume publishing, volume cloning (for testing), and manual ILM operations. However, the two most common applications are storage array replacement and storage array consolidation.

- **Storage array replacement:** The primary application for Brocade DMM is the migration of data from a retiring storage array to a replacement array. Because some of the greatest challenges for this type of migration are related to cross-functional planning, the entire process can often take several months to complete. A solution owned exclusively by the storage group (such as Brocade DMM) can help to significantly reduce both planning and execution time to support efficient storage array replacement.
- **Storage array consolidation:** Storage consolidation is similar to replacement, with less time pressure. For example, an organization might have an aging storage array whose data needs to be migrated to an existing array at the storage group's convenience. Conversely, if the consolidation is imperative, the need to migrate data might arise during a crisis situation (with almost no advance notice). In such a case, a readily available solution with a consistent, proven methodology, such as Brocade DMM, provides enormous value in streamlining the data migration process.

THE KEYS TO SOLVING DATA MIGRATION ISSUES

Brocade DMM offers numerous advantages over existing tools used for data migration. Compared to alternative offerings, it is typically much faster, less expensive, and easier to use. In fact, Brocade DMM is designed to provide the following benefits:

- Supports heterogeneous and multivendor environments
- Migrates data between SANs and over distance
- Increases migration performance and application uptime
- Simplifies planning, management, and predictability
- Reduces costs compared to host-based volume management offerings
- Increases storage purchasing flexibility

Supports Heterogeneous and Multivendor Environments

Many organizations utilize a multivendor strategy resulting in a heterogeneous IT environment and associated data mobility issues. For instance, some organizations maintain heterogeneous environments for reasons such as a tiered storage practice, a legacy of decentralized purchasing decisions, or the result of a merger or acquisition. In addition, most organizations support a variety of operating systems in their data centers. A consequence is that migration options are much more limited between heterogeneous storage and multiple operating systems due to the complexity and the relative lack of adequate tools.

Many organizations have aging but important applications running on older storage arrays. Unfortunately, the latest array-based copy tools are usually not compatible with the older arrays. Volume managers and multipath software often have significant limitations with server-based migration tools as well. To help organizations overcome all of these complexity issues, Brocade DMM standardizes support for heterogeneous environments, and as a result, is designed to support both legacy and new storage arrays in heterogeneous and multivendor environments.

Migrates Data between SANs and Over Distance

Approximately 50 percent of data migrations require moving data between storage arrays in different SANs, a capability lacking in most traditional solutions. Another large part of migration involves moving data over WAN-type distances, which often requires inter-SAN migration. These cases are typically related to data center relocation, corporate acquisition, or the addition of a disaster recovery facility. As a SAN-based solution, Brocade DMM is well suited for these types of requirements.

Increases Migration Performance and Application Uptime

Most organizations can tolerate a minor performance impact to their applications during data migration, which might be expected from traditional tools (such as volume managers). However, some use cases (such as electronic trading, where response time is critical) are highly sensitive to performance. In these cases, organizations typically prefer an offline migration solution. In other cases, organizations might choose online migration as long as the migration bandwidth can be adjusted to mitigate the performance impact on storage arrays and SANs. With its multi-terabyte-per-hour migration speeds, Brocade DMM is designed to provide a reliable, high-performance solution that supports the need for little or potentially no application downtime.

Simplifies Planning, Management, and Predictability

In organizations where storage administrators are in a different group from the server or database administrators, migrations tend to be more complex because of the associated cross-functional planning issues. In these situations, the storage group (which typically drives the data migration process) must coordinate with other teams that have their own priorities and challenges. As a storage-centric tool, Brocade DMM minimizes the need for other groups to be involved in planning or execution. In addition, Brocade DMM provides a deterministic, predictive solution with proactive e-mail notification of data migration progress and completion—further streamlining the entire process.

Reduces Costs Compared to Host-based Volume Management Offerings

Some organizations use third-party host-based volume management software to address their migration needs. Although this software is designed to perform numerous functions in addition to migration, the need for online migration is often the deciding factor in purchasing volume management software. Volume management software must be installed on every host for which volumes will be migrated, which is operationally complex and requires the coordination of server and storage administrators. Since the migration is being powered by the host CPU, it is typically performed as a low-priority job to ensure minimal application impact, which results in extremely slow and long migrations. Typical throughput is well below 100 GB/hour. Although it is a straightforward approach to migration, the management software tends to be expensive. Every host in the data center requires initial licensing, which typically starts at \$10,000 per host plus annual maintenance costs of \$5,000 per host. In contrast, Brocade DMM is designed to be a more powerful, storage-centric, cost-effective solution that can help reduce both initial and long-term operating expenses.

Increases Storage Purchasing Flexibility

Whether or not organizations have heterogeneous storage environments, they usually want pricing leverage and flexibility in their storage purchasing decisions. In addition, many organizations are implementing as many as six tiers of storage (including tape). Whether these tiers are part of a single-vendor or multivendor environment, they introduce additional challenges that the standardized Brocade DMM approach helps solve.

FOR MORE INFORMATION

The complete Brocade family of SAN solutions is designed to address the vast array of issues facing IT organizations. Today, these organizations can utilize Brocade solutions to overcome some of their most difficult business challenges. In particular, Brocade DMM can provide a much more effective way to streamline the entire data migration process for efficient ILM and long-term cost savings.

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