



IBM hardware-assisted data migration services

*Helping simplify data migration to IBM TotalStorage
systems with minimal complexity and disruption*



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Many IT professionals are aware of the advantages of adopting new storage technologies—the long history of continual improvements in price/performance is legendary. Not only can you get bigger, faster and cheaper disks to handle the growing amount of data needed online, but today, new storage system functions can add flexibility for on demand computing, help simplify storage management and provide automation to help reduce manpower needs—all helping to lower the total cost of storage.

Yet many IT groups postpone highly justifiable upgrades simply because they are concerned that the upgrade process itself could disrupt ongoing business operations. IBM can help address that concern with hardware-assisted data migration services. These services are designed to help migrate data from various vendors' storage systems to new IBM TotalStorage® systems, with minimal complexity and impact on your staff and IT systems.

This IBM hardware-assisted data migration service is part of the overall IBM data migration services family of offerings. Whether migrating from another vendor's storage device to IBM TotalStorage, or helping IBM storage customers upgrade, move, consolidate or replace existing IBM storage, the process of migrating data off an old storage array onto a new IBM TotalStorage subsystem can be a challenge.

This services capability can help meet the growing need for critical data migration using the latest technologies that address customer issues of complexity, disruption, performance and host availability. It can be an effective alternative to traditional software-based migration approaches by helping reduce operational disruptions and avoid the use of host CPU resources.

This hardware-assisted approach uses a data migration hardware appliance connected between the existing storage devices and the new devices. The method of connection depends on the type of host servers—open systems or mainframes. Both are described in this white paper.

This white paper reviews various approaches to data migration and describes the IBM hardware-assisted data migration services for both open systems and mainframe environments. Here, *data migration* refers to moving data from one or more storage systems to a new disk storage system—either on the same servers or different servers.



1.0 Alternative approaches to data migration

The need for a safe, nondisruptive data transfer mechanism has existed since the first disk drives were upgraded. Two traditional approaches include dumping the data to tape and restoring it to the new devices, and using host-based software to transfer the data from the old devices to the new devices. However, both involve outages. The traditional “scheduled outage window” for server maintenance and changes is all but gone, as businesses increasingly require continuous systems operations. Typically, a special outage must be planned solely for the purpose of upgrading storage—often difficult for IT management to schedule.

The data migration task is typically complex and labor-intensive in today’s computing environments because of the myriad of application servers, operating systems, file systems, volume management methodologies, physical devices and networks. IT departments face several challenges in migrating data: the downtime incurred; the need to add data migration software to servers; the potential for data loss and corruption; additional errors from the complexities of heterogeneous environments; and simply running out of time before the job is done.

The traditional tape dump (backup and restore)

The traditional path to migration—a tape dump—involves manually taking a point-in-time copy of data and staging it to tape. After new storage devices are installed, the data on tape is restored to the new device. Conceptually simple, this process has one significant disadvantage: it can involve significant downtime.

To maintain data consistency, application access to stored data generally must be stopped throughout the backup and restore process. For business applications that can accommodate an outage, this procedure is a simple and straightforward means of populating new storage devices. However, those applications with demanding uptime requirements need a less intrusive alternative.

The host-based software approach

Host-based software data transfer tools help address some of the inadequacies of traditional tape-based migration by allowing a degree of application access



to data during the copy process. The host software captures application I/O operations before they leave the server and replicates them on the new storage devices. But installing the software may require one or more reboots or IPLs. This approach typically requires additional software between the operating system and the physical devices on each host system being migrated. Often, additional hardware may be necessary to maintain host system performance at pre-migration levels.

2.0 The IBM hardware-assisted data migration

IBM hardware-assisted data migration services can help address many of the problems of these traditional approaches. The IBM services team uses an appliance that transfers data between source and target volumes. This portable appliance is designed to be easily installed.

IBM hardware-assisted data migration is designed to be accomplished while the host is either online or offline. Obviously, online migration helps minimize the need for application downtime during storage upgrades. But if downtime is not a concern, offline migration (where the host applications are stopped) allows for greater data migration speed.

This appliance approach can help minimize the disruption to production servers during the data transfer process. As application I/Os pass across the fabric, they are synchronized to new storage devices. This synchronization can help simplify heterogeneous storage subsystem migrations by helping reduce the complexities of multi-system migrations and the time-consuming intricacies of each individual host.

The low-impact nature of the dedicated migration appliance helps provide a simple approach to the complexities of fallback planning. The appliance is designed so that if a problem occurs, the appliance can be removed from the environment and the system returned to its original configuration. With no host components to deploy, the time-consuming, costly and sensitive task of installing and licensing hardware and software on servers may be avoided.



Data migration from various storage systems to IBM TotalStorage

The IBM hardware-assisted data migration services are designed to migrate data from many different storage subsystems, including systems from the following vendors:

- Amdahl
- Dell
- EMC
- Fujitsu
- Hewlett-Packard
- Hitachi Data Systems
- IBM
- LSI
- NCR
- StorageTek
- Sun Microsystems

The services can be used to migrate data to the following IBM TotalStorage systems:

- IBM TotalStorage Enterprise Storage Server®
- IBM TotalStorage FAStT Storage Server
- Externally attached IBM 7133 Serial Disk System

IBM data migration services professionals can help manage your data migration process—from planning and implementation to post-migration reporting and testing.

These services include:

- Jointly building a plan for the data migration activities
- Installing, setting up and configuring the data migration hardware appliance
- Performing the data migration activities
- Providing migration report and volume records
- Reviewing results

As a result, you can take advantage of new developments in storage technology when they make sense for your business, with little concern about disrupting ongoing operations. IBM data migration services are designed to help you achieve lower IT costs, greater scalability to help address the needs

of your business and the ability to leverage new features such as virtualization to help simplify your storage operations.

IBM also offers a long-distance migration option. Using a synchronous channel extender while the host servers are still accessing source devices, IBM professional services consultants can help migrate your data to a remote data center.

3.0 IBM data migration service for open systems

Unlike software-based approaches, IBM hardware-assisted data migration services for open systems do not require host agents to be installed and removed from production servers. This approach helps avoid software-licensing issues and helps to mitigate concerns about installing new software.

Advantages compared to software-based migration approaches

System administrators are understandably hesitant about installing new software on production hosts. Adding new software could cause systems to become unstable. Traditional migration software typically runs deep within the operating system, requiring careful installation and removal by knowledgeable people. The often intrusive nature of the software, its potential to destabilize an environment and its demand for resources from application hosts are obstacles that can postpone migrations as long as possible.

If no direct connections exist between the old and new storage devices, the impact of migration traffic on local area networks can be considerable. Just think about several terabytes of data flowing through host servers and a LAN while employees are trying to use those servers and the network. Yet, adding those interconnections can require extensive planning and testing as well as a thorough understanding of your internal change-management procedures. All of this can add days and weeks to the migration timeline.

Non-intrusive installation

The data migration hardware appliance used by IBM for open systems is a half-height, rack-mounted device with Fibre Channel switches, patch panels, an Ethernet hub, management console, eight data migration engines and dual power distribution—all packaged in a rugged box on wheels (see Figure 1).



Figure 1. The IBM migration appliance for open systems is designed to be rugged and portable.

IBM services professionals can connect the appliance into the old and new disks using SCSI, serial storage architecture (SSA) or Fibre Channel connections (see Figure 2).

Migration is typically a straightforward process

The data migration process typically follows this process:

1. Install the data migration hardware appliance in the data path.
2. Migrate the data from the source volumes to the target volumes. All host system I/O is accessed through the data migration hardware appliance.
3. Remove the data migration hardware appliance from the data path upon completion of the migration and attach the target volumes to the host systems.

Generally no more intrusive than a Fibre Channel switch, the data migration appliance is designed for simple installation. IBM services professionals simply connect it to the host system’s storage interfaces. Because the data migration appliance can be configured before it is placed in the

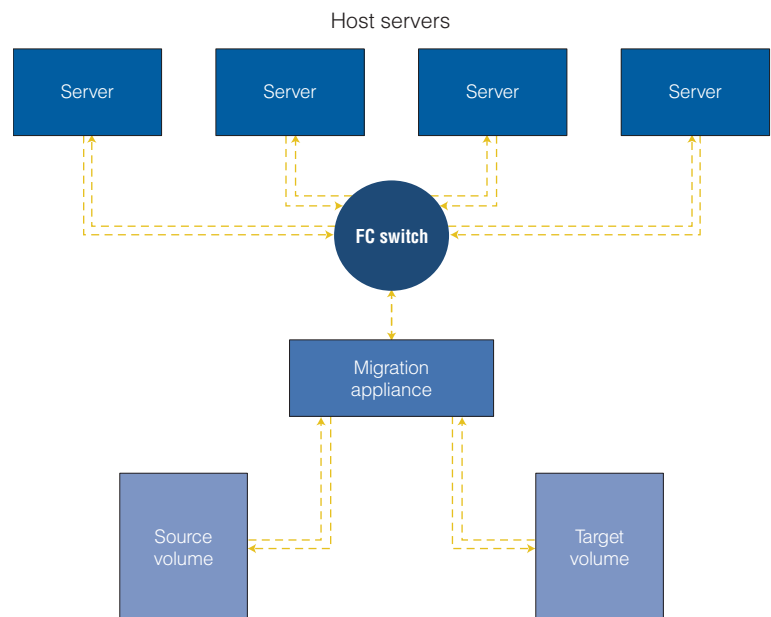


Figure 2: Open systems data migration configuration

IBM open systems data migration

Requirements

- Minimal system downtime for insertion of tool into data path
- Extended outage if migrating offline for high performance
- Dual 20A power feed
- Access to hosts to execute storage and file-system inquiry scripts
- Information on current logical volume management
- Information on raw or file-system layout not under volume management
- 3' x 3' of floor space

Not required

- Host agent
- Ethernet connection
- Added CPU cycles
- Logical volume management software
- Extensive planning and preparation by IT staff
- Extensive migration management by IT staff
- Permission from current storage vendor

data path, the time to physically attach and remove it can be as little as 15 minutes—generally much less time than required for software-based migration approaches.

Typically, no changes to the customer host systems or storage area network (SAN) fabric are required. The data-moving elements of the data migration hardware appliance report the source storage system's vital product data. Because no data flows through the management interface, there is no external access to the proprietary data being migrated—thereby helping maintain data security and integrity.

Performance and availability are maintained

The data migration hardware appliance is designed to be tuned for maximum host system performance to help reduce the performance impact of the data migration process on end users running their applications.

The appliance also is designed to take advantage of multipath redundancy between itself, the hosts and the storage systems. It is designed so that if a problem occurs, the appliance can be removed from the environment and the system returned to its original configuration.

4.0 IBM data migration services for mainframe systems

The IBM hardware-assisted mainframe migration services use a data migration hardware appliance based on an IBM S/390® Multiprise® 3000 Enterprise Server with the z/OS® operating system and an ESCON® Director. The services can be used for the following tasks:

- Upgrading installed source disk volumes to a new IBM TotalStorage disk subsystem
- Moving volumes within the target subsystem for load balancing
- Migrating from an IBM 3390 Model 3 to an IBM 3390 Model 9 disk subsystem

Shown in Figure 3, the appliance is mounted in a standard 30" rack on wheels. The appliance uses standard 110V AC power and requires no communication connections. The IBM services team sets it up and provides the necessary cabling.



Figure 3. The IBM migration appliance for mainframes

As shown in Figure 4, IBM services professionals connect the mainframe data migration appliance to the old and new storage systems using ESCON interfaces. Any available ESCON adapter ports on the new storage systems can be used. The connections from the storage system or ESCON Directors are designed to be made with no disruption to host services while data is being accessed by the active logical partitions (LPARs). Typically, no host outage is required for the migration. If only FICON™ adapters or ports are available on the target storage, the IBM team can install temporary ESCON adapters for use during the migration.

The mainframe data migration appliance uses a specialized software utility that is designed to move data with little or no degradation to host processing cycles. Online applications and batch jobs can typically operate normally, unaware that the appliance is migrating data. For online migrations, a monitoring agent must be installed on each LPAR. For offline migrations, no monitoring agent is required.

The appliance is designed to migrate data in either the online or offline mode for IBM OS/390® and z/OS systems. DOS/VSE, VM/VSE and Linux systems can be migrated in offline mode only.

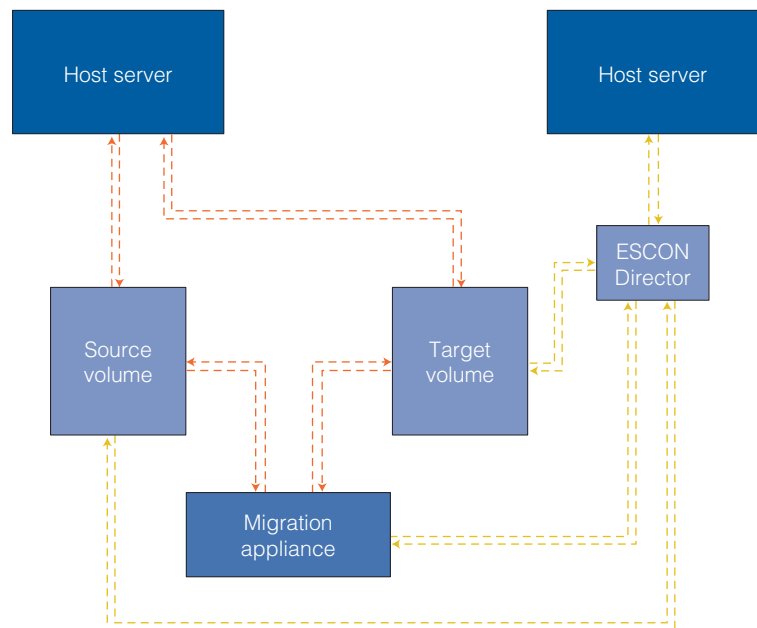


Figure 4: Configuration for mainframe storage migration



The IBM service is designed to allow migration of OS/390 and z/OS volumes, including the SYSRES volume, other system volumes, open catalog volumes, application data volumes, CICS® volumes, data volumes, DB2® volumes, TSO volumes, SMS-managed volumes and work volumes. The migration appliance supports PAV and Consistency Groups. Special considerations and planning are required to process volumes containing active page, swap or active coupling facility data sets.

Migration is typically a straightforward process

The data migration generally follows this process:

1. Install the data migration hardware appliance.
2. Migrate the data from the source volumes to the target volumes. No host system I/O is accessed through the data migration hardware appliance.
3. Remove the data migration hardware appliance upon completion of the migration. The target volumes will already be attached and accessible to the host systems.
4. An optional formatting of the source volumes is available.

Generally, no more intrusive than an ESCON Director, the data migration appliance is designed for simple installation. IBM services professionals simply connect it to the host system's storage interfaces. Because the data migration appliance can be configured before it is placed in the data path, the time to physically attach and remove it can be as little as 15 minutes—generally much less time than required for software-based migration approaches.

Because no data flows through the management interface, there is no external access to the proprietary data being migrated—thereby helping to maintain data security and integrity.

Performance and availability are maintained

The speed of data migration depends on a number of factors: the number of channels provided for the source as well as the target storage system, whether the data goes through a director and the level of volume activity when the volumes are moved.



The appliance is designed so that if a problem occurs, the appliance can be removed from the environment and the system returned to its original configuration.

It is also designed to help reduce or eliminate the impact of a power failure or IPL during migration from the source volumes. The volumes being copied would need to be restarted. All volumes that had been swapped before the event would be on the new disk subsystem and no action would be necessary.

5.0 Advantages of using IBM data migration services

A key advantage of the IBM hardware assisted data migration services is the combination of a dedicated migration appliance and the experience of IBM services professionals. By using a dedicated data migration appliance, IBM migration services are designed to avoid disruption of production servers and minimize the impact on application performance.

Above all, the migration services allow IT departments to reap the benefits of IBM's storage technologies without the need to endure some of the complexities and risks of traditional data migration approaches. IBM TotalStorage systems can help your enterprise move to an on demand business model—with IT providing the flexibility to be more responsive to customer needs.

Another advantage of the IBM hardware-assisted migration approach, unlike that of other vendors, is that once an online migration is started, the IBM professional services team can slow down or speed up the process to meet your specific processing needs. For example, if you are running applications during the migration that need additional resources, IBM can throttle back the migration process. Or, if you need to get a specific volume of data migrated by a certain deadline—or within a specific time frame—IBM can help do that, too. IBM also can help move your data application by application, as opposed to competing solutions that can migrate only from one subsystem to another subsystem.

The experience to accomplish the job

IBM storage services professionals can help mitigate some of the risks of data migration by freeing your IT staff to concentrate on your core business. IBM works with your IT staff to create a plan for the migration.

For more information, contact your IBM representative or IBM Business Partner. In the United States or Canada, you also can call IBM Direct: 1-800-IBM-CALL (1-800-426-2255). Or visit ibm.com/totalstorage.



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