Data migration program overview

ONTAP FLI

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The data migration program creates data migration solutions that make it easier for customers to migrate to NetApp storage and to migrate LUNs from NetApp 7-Mode to ONTAP. Foreign LUN Import (FLI) is a part of the data migration portfolio.

The program enhances productivity by providing the necessary tools, products, and service collateral required for successful data migration. By providing the proper skills and knowledge to perform data migrations, this program aims to accelerate the adoption of NetApp technologies.

Intended audience

You can use this content to help you migrate data from a foreign array to ONTAP or to transition LUNs from NetApp 7-Mode arrays to ONTAP.

You should be familiar with common SAN concepts and processes including zoning, LUN masking, the host operating systems whose LUNs need to be migrated, ONTAP, and the source third-party array.

Migration types supported by Foreign LUN Import

FLI supports four main types of migration workflows: online, offline, transition, and automated. Your choice of which workflow to use depends on your configuration and other factors.

- In an online migration, FLI from third-party arrays allows the client system to stay online during migration (requires a Windows, Linux, or ESXi host operating system).
- In an offline migration, FLI from third-party arrays takes the client system offline and copies the data to the new LUN before bringing it back online.
- In a transition migration, FLI transitions ONTAP operating in 7-Mode to ONTAP. This is functionally the same process except that the source array is ONTAP. The transition workflow is available in either online or offline mode.
- In an automated migration, FLI uses workflow automation (WFA) software to automate parts of the migration process. FLI with WFA is available in either online or offline mode.

The differences between the workflows have to do with when cutovers occur, length of the disruption window, use of automation, or if the source array is a NetApp array running ONTAP 7-Mode or a third-party array.

Foreign LUN Import concepts

Understanding of basic FLI concepts helps in proper operation and decreases the initial configuration effort.

- **Foreign array**

  A foreign array is a storage device that does not run ONTAP. This is also referred to as a third-party array or source array. In the case of a 7-Mode to ONTAP transition, the foreign array would be an array produced

by NetApp running ONTAP 7-Mode.

- **Foreign LUN**

  A foreign LUN is a LUN containing user data hosted on a third-party array using that array's native disk format.

- **FLI LUN relationship**

  A FLI LUN relationship is a persistent pairing between source and destination storage for the purpose of data import. The source and destination endpoints are LUNs.

- **LUN import**

  LUN import is a process of transferring the data in a foreign LUN from its third-party format into a native NetApp format LUN.

Data migration challenges

Some of the challenges posed by data migration are extended downtime, potential risk, scarce resources, and inadequate expertise.

Data availability requirements have become increasingly demanding and downtime unacceptable, such that business operations drive the data migration process. Risk factors such as performance impacts on production systems, potential data corruption, and loss are a concern in any data migration process.

Professional services for SAN migration solutions

Professional services for SAN migration solutions

NetApp and partner professional services use a time-tested methodology to guide SAN migrations through all major phases.

NetApp FLI technology, along with third-party data migration software, have created proficiencies in data migration that allow professional services to execute SAN data migration projects successfully worldwide. By utilizing NetApp and partner professional services, customers free up internal resources, minimize downtime, and abate risk.

With ONTAP, a professional-services-run migration is no longer mandatory. However, NetApp still strongly recommends a professional services or partner professional services engagement to scope and plan the migration as well as to train customer personnel in how to perform data migrations using FLI.

Data Migration Service for heterogeneous SAN environments

The Data Migration Service for heterogeneous SAN environments is a comprehensive data migration solution using FLI technology. The SAN data migration service provides software and services that reduce error, increase productivity, and promote consistent delivery of data migrations for NetApp and partner professional services.

Data migration methodology

The data migration process consists of phases that provide a tested methodology. You can use the data migration methodology to scope, plan, and document your migration choices and tasks.

1. Discovery phase

   Collect information about hosts, storage, and fabrics in the environment.

2. Analysis phase

   Examine the collected data, and determine the appropriate migration approach for each host or storage array.

3. Planning phase

   Create and test migration plans, provision destination storage, and configure migration tools.

4. Execution phase

   Migrate the data and perform host remediations.

5. Verification phase

   Validate the new system configurations and provide documentation.

Data migration options

In choosing a data migration option, things to consider are the use of a Data Transfer Appliance or an application-based migration.

While FLI might be the best choice for most migrations, other options may be performed non-disruptively and therefore might be preferable to performing a migration using FLI. You should consider your options and choose the right tool for each migration. All of these tools can be used for parts of your migrations for which they are best suited.

- Use of a Data Transfer Appliance (DTA)

  A DTA is a NetApp-branded appliance that is connected to the SAN fabric, is licensed on per-TB data migrated and supports both offline and online migrations.

- Host operating system or application-based migrations

  There are various host operating systems or application-based data migration options including:

  - VMware Storage vMotion
  - Logical volume manager (LVM) based solutions
  - Utilities such as DD (Linux) and Robocopy (Windows)

Regardless of the procedures and tools chosen, you can and should use the data migration methodology to scope, plan, and document your migration choices and tasks.

Recommended tools for data migration

Recommended tools for data migration

Service tools provide a standardized method for performing useful functions such as remote data collection, configuration, and storage management tasks.

The following service tools are used to gather and parse data:

- **OneCollect**

  NetApp Active IQ OneCollect, available with a web-based UI or the CLI, helps you collect data from storage, hosts, fabrics, and switches in both SAN and NAS environments. The collected data is used for troubleshooting, solution validation, data migration, and upgrade assessments. The diagnostic content related to your environment can be either sent to NetApp for further analysis or analyzed on-premises.

- **NetApp Data Migration Solaris Relabeler**

  Solaris Relabeler is a command-line utility that provides the ability to update the ASCII label on volume table of contents (VTOC) disks after migration.

  During the initial VTOC disk initialization routines, the Solaris format command performs a SCSI inquiry against the disk and writes vendor-specific information (manufacturer, product, and revision) to the disk label. All further inquiries are directed to the disk label and not to the actual device. Block-level migration copies this disk label to the new disk, and old SCSI inquiry data is still visible in the system tools and logs. The relabeler updates the disks post-migration with new inquiry data.

These tools and utilities are also useful in FLI migration projects:

- **Interoperability Matrix**

  The Interoperability Matrix tool (IMT) is a NetApp web-based utility that is used for interoperability checks for NetApp and third-party software components.

- **ONTAP System Manager**

  ONTAP System Manager provides remote storage management of NetApp FAS systems using a graphical interface.

- **OnCommand Workflow Automation**

  WFA is a software solution that enables you to create storage workflows and automate storage management tasks such as provisioning, migrating, decommissioning, and cloning storage.

Related information

NetApp Tools

NetApp Interoperability Matrix Tool

NetApp Documentation: OnCommand Workflow Automation (current releases)

Benchmarks for estimating migration durations

For planning purposes certain assumptions can be used to estimate the level of effort and duration of data migrations.

To get an accurate estimate of your actual performance, you should run a number of test migrations of different sizes in order to get accurate performance numbers for your specific environments.

The following benchmarks are strictly for planning purposes and are unlikely to be particularly accurate for specific environments.

Assumptions: Five hours per host migration based on a host with 8 LUNs with a total of 2 TB of data. These parameters provide a planning number of approximately 400 GB per hour.

Foreign LUN Import

Foreign LUN Import overview

Foreign LUN Import (FLI) is a feature built into ONTAP that allows users to import data from foreign array LUNs to NetApp LUNs in a simple and efficient manner.

All FLI migrations operate at the LUN level. FLI is a strictly block-based tool; file, record, NFS, and CIFS-based migrations are not supported. For a discussion of other migration methodologies for file-level protocols, such as NFS and CIFS/SMB, review the Data Migration Tools Quick Reference.

Although ONTAP no longer requires a professional-services-run migration, NetApp does strongly recommend professional services involvement in scoping, planning, and training for all but the simplest migrations.

FLI was developed to migrate SAN LUNs to ONTAP. FLI supports a range of migration requirements, including, but not limited to, the following:

- Migrating data between heterogeneous storage arrays from EMC, Hitachi, HP, and other vendors to NetApp.
- Simplifying and accelerating block data migrations during data center relocation, consolidation, and array replacements.
- Consolidating migration and LUN realignments into a single workflow.

In addition, the 7-Mode to ONTAP transition procedure is able to convert from 32-bit to 64-bit aggregates, fix alignment problems, and migrate LUNS as a single operation.

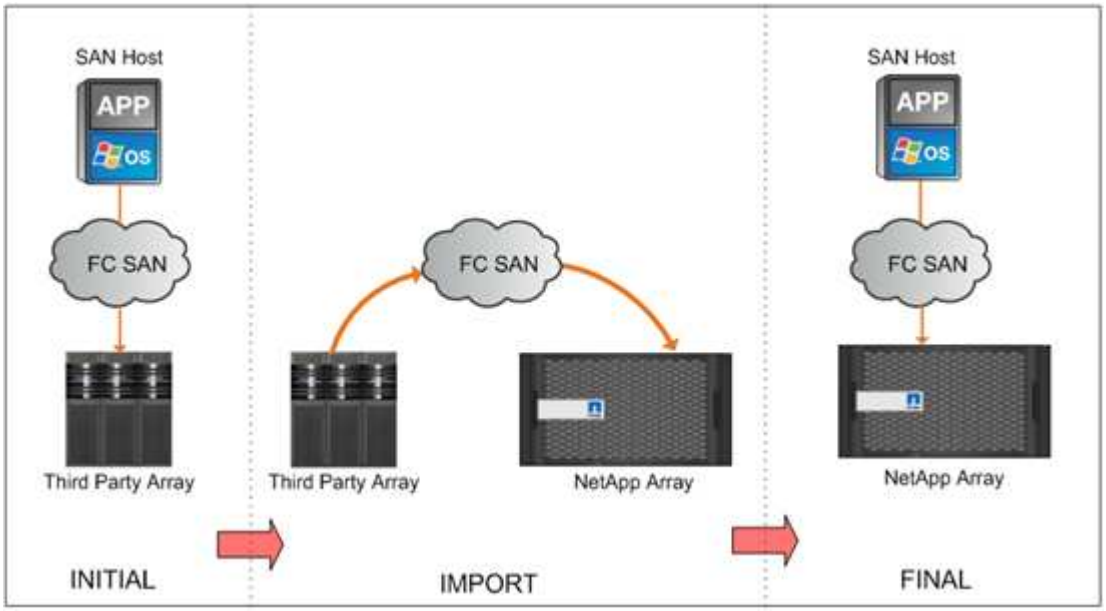
FLI enables the NetApp storage to discover the LUNs to be imported for data migration. The foreign LUNs are shown as disks on the NetApp storage and have no ownership assigned to them automatically so that the user data is not overwritten by mistake. The disks that contain foreign array LUNs must be marked as foreign. The rules for configuring foreign array LUNs must be strictly adhered to in order to use FLI for NetApp storage. See the topic, LUN requirements and limitations.

FLI requires at least one physical FC port on each controller and to have LUNs migrate directly in Initiator mode. Two ports, one to each fabric, are preferred, but a single port can be used. These ports are used to connect to the source array and need to be zoned and masked in order to be able to see and mount the source LUNs. If you need to change a port from target to initiator, see Configure FC adapters.

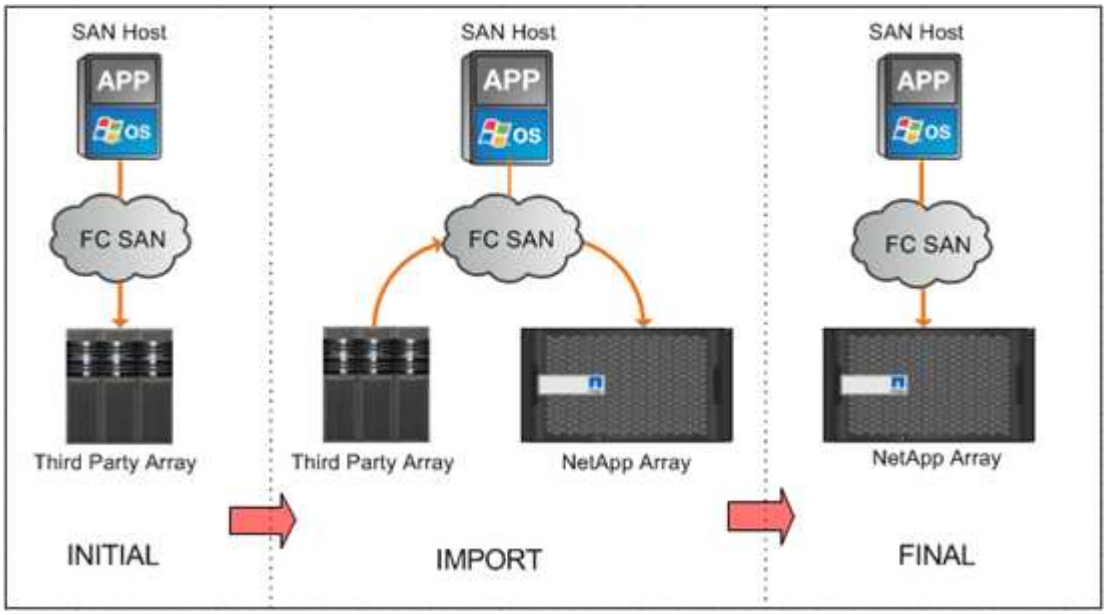
FLI migrations can be performed either offline, which disrupts operations for the duration of the import, or

online, which is mainly non-disruptive.

This figure shows an FLI offline data migration, where the host is taken offline for the migration. The NetApp array copies the data directly from the third-party array.



This figure shows an FLI online data migration. The host is connected to the NetApp controller where the new LUN is now hosted. Host operation can then resume and continue during the import.



Foreign LUN Import features

FLI features allow you to migrate data from third-party SAN storage to ONTAP systems. FLI migration features support a variety of processes and systems.

- Support for online and offline migrations.
- Operating system independence: block-level data migration does not rely on volume managers or operating system utilities.

- Fibre Channel fabric independence: FLI is fully compatible with Brocade and Cisco FC fabrics.
- Support for most Fibre Channel storage arrays. See the Interoperability Matrix for a list of supported arrays.
- Support for native multipath and load balancing.
- CLI-based management.

Related information

NetApp Interoperability Matrix Tool

Benefits of an FLI-based solution

The FLI solution is designed to give NetApp customers exceptional value with these benefits.

- FLI is built into ONTAP and requires no additional licensing.
- FLI does not require an additional hardware appliance for data migration.
- FLI-based solutions support a variety of migration types and configurations of third-party storage platforms.
- FLI automatically aligns LUNs and can migrate a LUN hosted in a 32-bit aggregate to a 64-bit aggregate hosted on an ONTAP array. This makes FLI for 7-Mode to ONTAP an excellent choice for transitioning 7-Mode-hosted LUNs that are hosted on 32-bit aggregates and/or are misaligned.

LUN requirements and limitations

Your LUNs should meet the following requirements before beginning an FLI migration.

- FLI requires at least one FC port on each controller and to have LUNS migrate directly in Initiator mode.
- The foreign LUN must be marked foreign on the destination array to prevent assignments from ONTAP.
- The foreign LUN must be in an import relationship before starting import.
- The LUN must be the same size as the foreign LUN .This requirement is taken care of during the LUN creation steps.
- The foreign LUN block size must be 512b. NetApp LUNs support only 512b block size.
- The LUN must not be expanding or contracting.
- The LUN must be mapped to at least one igroup.
- The NetApp LUN should be brought offline before creating a relationship. However, after the LUN relationship is created, it can be brought back online in case of online FLI.

Limitations

- All migrations are at the LUN level.
- FLI supports Fibre Channel (FC) connections only.
- FLI does not support iSCSI connections directly. In order for iSCSI LUNs to be migrated using FLI, the LUN type must be changed to FC. After the migration is complete, the LUN type is changed back to iSCSI.

FLI supported configurations

The FLI environment must be deployed in a supported manner to ensure proper

operation and support. As engineering qualifies new configurations, the list of supported configurations will change. Refer to the NetApp Interoperability Matrix to verify support for specific configurations.

ONTAP 8.3 and later are the only supported destination storage. Migrations to third-party storage are not supported.

For a list of supported source storage arrays, switches, and firmware, see the Interoperability Matrix. The data migration program will provide support for the configurations in the NetApp Interoperability Matrix.

Once the import is complete and all LUNs have been migrated to NetApp controllers, ensure that all configurations are supported.

Related information

NetApp Interoperability Matrix Tool

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