FLI offline workflow

ONTAP FLI

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Table of Contents

FLI offline workflow

FLI offline workflow

This section provides an example of the FLI offline workflow, one of the four FLI workflows.

This workflow uses an HDS AMS2100 array as the source array. The offline workflow has the following tasks:

1. Preparation for cutover
2. Importing the data
3. Verifying migration results (optional)
4. FLI offline post-migration tasks

FLI offline: Preparation for cutover

FLI offline: Preparation for cutover

During pre-migration of foreign LUN imports (FLIs), validate and verify the hosts and source LUN paths. After the host reboots, it is shut down in preparation for the migration.

When migration and remediation are complete, hosts can be brought up connected to the new destination storage, and the applications can be verified by end users.

Rebooting the host to validate the system state

Migration hosts are rebooted prior to making any changes to their configuration. Before proceeding with migration, verify that the system is in a known good state.

To verify that the server configuration is persistent and pristine across reboots, complete the following steps:

Steps

1. Shut down all your open applications.
2. Reboot the host.
3. Review the logs for errors.

Verifying host LUN path and multipath configuration verification

Verifying host LUN path and multipath configuration verification

Prior to any migrations, verify that multipathing is correctly configured and working properly. All available paths to LUNs should be active.

Multipath verification for Windows hosts

As part of the Foreign LUN Import (FLI) process, you should verify that multipath is configured and functioning correctly on your hosts.

Step-by-step instructions for Windows hosts can be found in the Multipathing section of Using Windows Server 2022 with ONTAP.

Multipath verification for Linux hosts

As part of the Foreign LUN Import (FLI) process, you should verify that multipath is configured and functioning correctly on your hosts.

Complete the following steps for Linux hosts.

Step

1. To verify that DM-MP multipath is configured and functioning correctly on a Linux host, run the following commands:`multipath -ll`

```
mpath2 (360060e801046b96004f2bf4600000012) dm-6 HITACHI,DF600F
[size=2.0G][features=0][hwhandler=0][rw]
\_ round-robin 0 [prio=1][active]
 \_ 0:0:1:2 sdg 8:96  [active][ready]
 \_ 1:0:1:2 sdo 8:224 [active][ready]
\_ round-robin 0 [prio=0][enabled]
 \_ 0:0:0:2 sdc 8:32  [active][ready]
 \_ 1:0:0:2 sdk 8:160 [active][ready]
mpath1 (360060e801046b96004f2bf4600000011) dm-5 HITACHI,DF600F
[size=2.0G][features=0][hwhandler=0][rw]
\_ round-robin 0 [prio=1][active]
 \_ 0:0:0:1 sdb 8:16  [active][ready]
 \_ 1:0:0:1 sdj 8:144 [active][ready]
\_ round-robin 0 [prio=0][enabled]
 \_ 0:0:1:1 sdf 8:80  [active][ready]
 \_ 1:0:1:1 sdn 8:208 [active][ready]
mpath0 (360060e801046b96004f2bf4600000010) dm-0 HITACHI,DF600F
[size=20G][features=0][hwhandler=0][rw]
\_ round-robin 0 [prio=1][active]
 \_ 0:0:1:0 sde 8:64  [active][ready]
 \_ 1:0:1:0 sdm 8:192 [active][ready]
\_ round-robin 0 [prio=0][enabled]
 \_ 0:0:0:0 sda 8:0   [active][ready]
 \_ 1:0:0:0 sdi 8:128 [active][ready]
mpath3 (360060e801046b96004f2bf4600000013) dm-7 HITACHI,DF600F
[size=3.0G][features=0][hwhandler=0][rw]
\_ round-robin 0 [prio=1][active]
 \_ 0:0:0:3 sdd 8:48  [active][ready]
 \_ 1:0:0:3 sdl 8:176 [active][ready]
\_ round-robin 0 [prio=0][enabled]
 \_ 0:0:1:3 sdh 8:112 [active][ready]
 \_ 1:0:1:3 sdp 8:240 [active][ready]
[root@dm-rx200s6-22 ~]#
```

Multipath verification for ESXi hosts

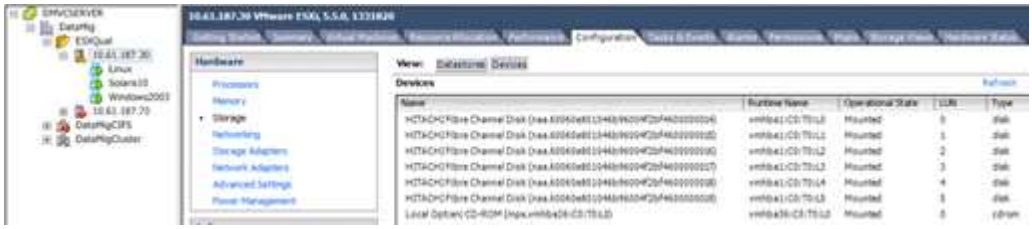
As part of the Foreign LUN Import (FLI) process, you should verify that multipath is configured and functioning correctly on your hosts.

Complete the following steps for ESXi hosts.

Steps

1. Determine ESXi and virtual machine using VMware vSphere Client.

2. Determine SAN LUNs to be migrated using vSphere Client.



3. Determine VMFS and RDM (vfat) volumes to be migrated: `esxcli storage filesystem list`

```
Mount Point                                          Volume Name
UUID                                   Mounted  Type            Size
Free
----------------------------------------------------  -----------------
-----------------------------------  -------  ------  -----------
-----------
/vmfs/volumes/538400f6-3486df59-52e5-00262d04d700  BootLun_datastore
538400f6-3486df59-52e5-00262d04d700     true  VMFS-5  13421772800
12486443008
/vmfs/volumes/53843dea-5449e4f7-88e0-00262d04d700  VM_datastore
53843dea-5449e4f7-88e0-00262d04d700     true  VMFS-5  42681237504
6208618496
/vmfs/volumes/538400f6-781de9f7-c321-00262d04d700
538400f6-781de9f7-c321-00262d04d700     true  vfat     4293591040
4269670400
/vmfs/volumes/c49aad7f-afbab687-b54e-065116d72e55
c49aad7f-afbab687-b54e-065116d72e55     true  vfat      261853184
77844480
/vmfs/volumes/270b9371-8fbedc2b-1f3b-47293e2ce0da
270b9371-8fbedc2b-1f3b-47293e2ce0da     true  vfat      261853184
261844992
/vmfs/volumes/538400ef-647023fa-edef-00262d04d700
538400ef-647023fa-edef-00262d04d700     true  vfat      299712512
99147776
~ #
```

In case of VMFS with extends \(spanned VMFS\), all LUNs that are part of the span should be migrated. To show all the extends in the GUI, go to Configuration \> Hardware \> Storage and click datastore to select the Properties link.

> Post-migration, while adding them back to storage, you will see multiple LUN entries with the same VMFS label. In this scenario you should ask the customer to select only the entry marked as head.

4. Determine the LUN and size to be migrated: `esxcfg-scsidevs -c`

```
Device UID                            Device Type      Console Device
Size      Multipath PluginDisplay Name
mpx.vmhba36:C0:T0:L0                  CD-ROM
/vmfs/devices/cdrom/mpx.vmhba36:C0:T0:L0                  0MB       NMP
Local Optiarc CD-ROM (mpx.vmhba36:C0:T0:L0)
naa.60060e801046b96004f2bf4600000014  Direct-Access
/vmfs/devices/disks/naa.60060e801046b96004f2bf4600000014  20480MB   NMP
HITACHI Fibre Channel Disk (naa.60060e801046b96004f2bf4600000014)
naa.60060e801046b96004f2bf4600000015  Direct-Access
/vmfs/devices/disks/naa.60060e801046b96004f2bf4600000015  40960MB   NMP
HITACHI Fibre Channel Disk (naa.60060e801046b96004f2bf4600000015)
~~~~~~ Output truncated ~~~~~~~
~ #
```

5. Identify raw device mapping (RDM) LUNs to be migrated.
6. Find RDM devices: `find /vmfs/volumes -name **-rdm**`

```
/vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Windows2003/Windows2003_1-rdmp.vmdk
/vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Windows2003/Windows2003_2-rdm.vmdk
/vmfs/volumes/53843dea-5449e4f7-88e0-00262d04d700/Linux/Linux_1-rdm.vmdk
/vmfs/volumes/53843dea-5449e4f7-88e0-00262d04d700/Solaris10/Solaris10_1-
rdmp.vmdk
```

7. Remove -rdmp and -rdm from preceding output and run the vmkfstools command to find vml mapping and RDM type.

```
# vmkfstools -q /vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Windows2003/Windows2003_1.vmdk
vmkfstools -q /vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Windows2003/Windows2003_1.vmdk
Disk /vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Windows2003/Windows2003_1.vmdk is a Passthrough Raw Device
Mapping
Maps to: vml.020002000060060e801046b96004f2bf46000000016444636303046
~ # vmkfstools -q /vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Windows2003/Windows2003_2.vmdk
Disk /vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Windows2003/Windows2003_2.vmdk is a Non-passthrough Raw
Device Mapping
Maps to: vml.020003000060060e801046b96004f2bf46000000017444636303046
~ # vmkfstools -q /vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Linux/Linux_1.vmdk
Disk /vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Linux/Linux_1.vmdk is a Non-passthrough Raw Device Mapping
Maps to: vml.020005000060060e801046b96004f2bf46000000019444636303046
~ # vmkfstools -q /vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Solaris10/Solaris10_1.vmdk
Disk /vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Solaris10/Solaris10_1.vmdk is a Passthrough Raw Device
Mapping
Maps to: vml.020004000060060e801046b96004f2bf46000000018444636303046
~ #
```

Passthrough is RDM with physical \(RDMP\), and nonpassthrough is RDM with virtual \(RDMV\). VMs with virtual RDMs and VM Snapshot copies will break after migration due to VM Snapshot delta vmdk pointing to an RDM that has a stale naa ID. So before migration, ask the customer to remove all Snapshot copies in such VMs. Right-click VM and click the Snapshot --\> Snapshot Manager Delete All button. Refer to NetApp KB 3013935 for details about hardware-accelerated locking for VMware on NetApp storage.

8. Identify LUN naa to RDM device mapping.

```
~ # esxcfg-scsidevs -u | grep
vml.020002000060060e801046b96004f2bf4600000016444636303046
naa.60060e801046b96004f2bf4600000016
vml.020002000060060e801046b96004f2bf4600000016444636303046
~ # esxcfg-scsidevs -u | grep
vml.020003000060060e801046b96004f2bf4600000017444636303046
naa.60060e801046b96004f2bf4600000017
vml.020003000060060e801046b96004f2bf4600000017444636303046
~ # esxcfg-scsidevs -u | grep
vml.020005000060060e801046b96004f2bf4600000019444636303046
naa.60060e801046b96004f2bf4600000019
vml.020005000060060e801046b96004f2bf4600000019444636303046
~ # esxcfg-scsidevs -u | grep
vml.020004000060060e801046b96004f2bf4600000018444636303046
naa.60060e801046b96004f2bf4600000018
vml.020004000060060e801046b96004f2bf4600000018444636303046
~ #
```

9. Determine virtual machine configuration: `esxcli storage filesystem list | grep VMFS`

```
/vmfs/volumes/538400f6-3486df59-52e5-00262d04d700  BootLun_datastore
538400f6-3486df59-52e5-00262d04d700     true  VMFS-5  13421772800
12486443008
/vmfs/volumes/53843dea-5449e4f7-88e0-00262d04d700  VM_datastore
53843dea-5449e4f7-88e0-00262d04d700     true  VMFS-5  42681237504
6208618496
~ #
```

10. Record the UUID of the datastore.
11. Make a copy of `/etc/vmware/hostd/vmInventory.xml` and note the contents of file and vmx config path.

```
~ # cp /etc/vmware/hostd/vmInventory.xml
/etc/vmware/hostd/vmInventory.xml.bef_mig
~ # cat /etc/vmware/hostd/vmInventory.xml
<ConfigRoot>
  <ConfigEntry id="0001">
    <objID>2</objID>
    <vmxCfgPath>/vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Windows2003/Windows2003.vmx</vmxCfgPath>
  </ConfigEntry>
  <ConfigEntry id="0004">
    <objID>5</objID>
    <vmxCfgPath>/vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Linux/Linux.vmx</vmxCfgPath>
  </ConfigEntry>
  <ConfigEntry id="0005">
    <objID>6</objID>
    <vmxCfgPath>/vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Solaris10/Solaris10.vmx</vmxCfgPath>
  </ConfigEntry>
</ConfigRoot>
```

12. Identify the virtual machine hard disks.

    This information is required post-migration to add the removed RDM devices in order.

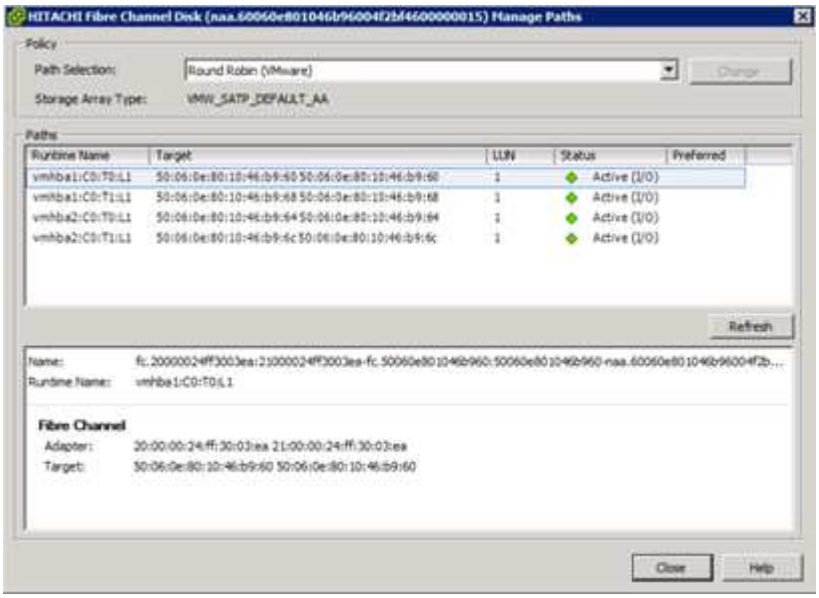
```
~ # grep fileName /vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Windows2003/Windows2003.vmx
scsi0:0.fileName = "Windows2003.vmdk"
scsi0:1.fileName = "Windows2003_1.vmdk"
scsi0:2.fileName = "Windows2003_2.vmdk"
~ # grep fileName /vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Linux/Linux.vmx
scsi0:0.fileName = "Linux.vmdk"
scsi0:1.fileName = "Linux_1.vmdk"
~ # grep fileName /vmfs/volumes/53843dea-5449e4f7-88e0-
00262d04d700/Solaris10/Solaris10.vmx
scsi0:0.fileName = "Solaris10.vmdk"
scsi0:1.fileName = "Solaris10_1.vmdk"
~ #
```

13. Determine RDM device, virtual machine mapping, and compatibility mode.
14. Using the preceding information, note the RDM mapping to device, virtual machine, compatibility mode, and order.

    You will need this information later, when adding RDM devices to the VM.

```
Virtual Machine -> Hardware -> NAA -> Compatibility mode
Windows2003 VM -> scsi0:1.fileName = "Windows2003_1.vmdk" ->
naa.60060e801046b96004f2bf4600000016
-> RDM Physical
Windows2003 VM -> scsi0:2.fileName = "Windows2003_2.vmdk" ->
naa.60060e801046b96004f2bf4600000017
-> RDM Virtual
Linux VM -> scsi0:1.fileName = “Linux_1.vmdk” ->
naa.60060e801046b96004f2bf4600000019 -> RDM Virtual
Solaris10 VM -> scsi0:1.fileName = “Solaris10_1.vmdk” ->
naa.60060e801046b96004f2bf4600000018 -> RDM Physical
```

15. Determine multipath configuration.
16. Obtain multipath settings for your storage in the vSphere Client:
    a. Select an ESX or ESXi host in the vSphere Client and click the Configuration tab.
    b. Click **Storage**.
    c. Select a datastore or mapped LUN.
    d. Click **Properties**.
    e. In the Properties dialog box, select the desired extent, if necessary.
    f. Click **Extent Device** > **Manage Paths** and obtain the paths in the Manage Path dialog box.



17. Obtain LUN multipathing information from the ESXi host command line:
    a. Log in to the ESXi host console.
    b. Run esxcli storage nmp device list to get multipath information.

```
# esxcli storage nmp device list
naa.60060e801046b96004f2bf4600000014
```

```
   Device Display Name: HITACHI Fibre Channel Disk
(naa.60060e801046b96004f2bf4600000014)
   Storage Array Type: VMW_SATP_DEFAULT_AA
   Storage Array Type Device Config: SATP VMW_SATP_DEFAULT_AA does
not support device configuration.
   Path Selection Policy: VMW_PSP_RR
   Path Selection Policy Device Config:
{policy=rr,iops=1000,bytes=10485760,useANO=0; lastPathIndex=3:
NumIOsPending=0,numBytesPending=0}
   Path Selection Policy Device Custom Config:
   Working Paths: vmhba2:C0:T1:L0, vmhba2:C0:T0:L0, vmhba1:C0:T1:L0,
vmhba1:C0:T0:L0
   Is Local SAS Device: false
   Is Boot USB Device: false

naa.60060e801046b96004f2bf4600000015
   Device Display Name: HITACHI Fibre Channel Disk
(naa.60060e801046b96004f2bf4600000015)
   Storage Array Type: VMW_SATP_DEFAULT_AA
   Storage Array Type Device Config: SATP VMW_SATP_DEFAULT_AA does
not support device configuration.
   Path Selection Policy: VMW_PSP_RR
   Path Selection Policy Device Config:
{policy=rr,iops=1000,bytes=10485760,useANO=0; lastPathIndex=0:
NumIOsPending=0,numBytesPending=0}
   Path Selection Policy Device Custom Config:
   Working Paths: vmhba2:C0:T1:L1, vmhba2:C0:T0:L1, vmhba1:C0:T1:L1,
vmhba1:C0:T0:L1
   Is Local SAS Device: false
   Is Boot USB Device: false

naa.60060e801046b96004f2bf4600000016
   Device Display Name: HITACHI Fibre Channel Disk
(naa.60060e801046b96004f2bf4600000016)
   Storage Array Type: VMW_SATP_DEFAULT_AA
   Storage Array Type Device Config: SATP VMW_SATP_DEFAULT_AA does
not support device configuration.
   Path Selection Policy: VMW_PSP_RR
   Path Selection Policy Device Config:
{policy=rr,iops=1000,bytes=10485760,useANO=0; lastPathIndex=1:
NumIOsPending=0,numBytesPending=0}
   Path Selection Policy Device Custom Config:
   Working Paths: vmhba2:C0:T1:L2, vmhba2:C0:T0:L2, vmhba1:C0:T1:L2,
vmhba1:C0:T0:L2
   Is Local SAS Device: false
   Is Boot USB Device: false
```

```
naa.60060e801046b96004f2bf4600000017
   Device Display Name: HITACHI Fibre Channel Disk
(naa.60060e801046b96004f2bf4600000017)
   Storage Array Type: VMW_SATP_DEFAULT_AA
   Storage Array Type Device Config: SATP VMW_SATP_DEFAULT_AA does
not support device configuration.
   Path Selection Policy: VMW_PSP_RR
   Path Selection Policy Device Config:
{policy=rr,iops=1000,bytes=10485760,useANO=0; lastPathIndex=1:
NumIOsPending=0,numBytesPending=0}
   Path Selection Policy Device Custom Config:
   Working Paths: vmhba2:C0:T1:L3, vmhba2:C0:T0:L3, vmhba1:C0:T1:L3,
vmhba1:C0:T0:L3
   Is Local SAS Device: false
   Is Boot USB Device: false

naa.60060e801046b96004f2bf4600000018
   Device Display Name: HITACHI Fibre Channel Disk
(naa.60060e801046b96004f2bf4600000018)
   Storage Array Type: VMW_SATP_DEFAULT_AA
   Storage Array Type Device Config: SATP VMW_SATP_DEFAULT_AA does
not support device configuration.
   Path Selection Policy: VMW_PSP_RR
   Path Selection Policy Device Config:
{policy=rr,iops=1000,bytes=10485760,useANO=0; lastPathIndex=1:
NumIOsPending=0,numBytesPending=0}
   Path Selection Policy Device Custom Config:
   Working Paths: vmhba2:C0:T1:L4, vmhba2:C0:T0:L4, vmhba1:C0:T1:L4,
vmhba1:C0:T0:L4
   Is Local SAS Device: false
   Is Boot USB Device: false

naa.60060e801046b96004f2bf4600000019
   Device Display Name: HITACHI Fibre Channel Disk
(naa.60060e801046b96004f2bf4600000019)
   Storage Array Type: VMW_SATP_DEFAULT_AA
   Storage Array Type Device Config: SATP VMW_SATP_DEFAULT_AA does
not support device configuration.
   Path Selection Policy: VMW_PSP_RR
   Path Selection Policy Device Config:
{policy=rr,iops=1000,bytes=10485760,useANO=0; lastPathIndex=1:
NumIOsPending=0,numBytesPending=0}
   Path Selection Policy Device Custom Config:
   Working Paths: vmhba2:C0:T1:L5, vmhba2:C0:T0:L5, vmhba1:C0:T1:L5,
vmhba1:C0:T0:L5
```

```
    Is Local SAS Device: false
    Is Boot USB Device: false
```

Prepare hosts for FLI offline migration

The FLI offline execution phase includes the preparation of migration hosts.

In many instances it may be possible to have performed this remediation prior to this step. If not, then this is where you would perform any host remediation such as installing host attach kits or DSMs. From the analysis phase, you will have a gap list of items that need to be performed on each host in order for that host to be in a supported configuration using ONTAP. Depending on the type of migration being performed, either the host would be remediated and then rebooted (online FLI/7-Mode to ONTAP FLI), or it would be remediated and then shut down pending the completion of the migration process (offline FLI).

Presenting source LUNs to ONTAP storage during FLI

As part of the offline FLI process, you must present your source LUNs to your ONTAP storage.

Steps

1. Log in to the source array.
2. Add the NetApp initiators to the host group created during the plan phase.
3. Select the host LUNs that need to be migrated from available logical LUNs. Use LUN names for each host mentioned in the source LUNs section of your Site Survey and Planning worksheet.

Verifying source LUNs on destination storage for offline FLI

As part of the offline Foreign LUN Import process, you must verify your source LUNs on your destination storage.

Steps

1. Verify the source LUNs and mapping from source storage to destination storage.
2. Log in to the ONTAP storage through SSH using admin user.
3. Change the mode to Advanced: `set -privilege advanced`
4. Enter `y` when asked if you want to continue.
5. Discover the source array on ONTAP. Wait for a few minutes and retry to detect the source array. `storage array show`

```
DataMig-cmode::*> storage array show
Prefix                          Name   Vendor            Model Options
-------- ---------------------------- -------- ----------------
----------
HIT-1                HITACHI_DF600F_1  HITACHI           DF600F
```

When the storage array is discovered for the first time, ONTAP might not show the array by discovering automatically. Use the following instructions to reset the switch port where ONTAP initiator ports are connected.

6. Verify the source array is discovered through all the initiator ports.

```
DataMig-cmode::*> storage array config show -array-name HITACHI_DF600F_1
             LUN   LUN
Node         Group Count     Array Name       Array Target Port
Initiator
------------ ----- ----- ----------------------------
-----------------------
DataMig-cmode-01 0     1    HITACHI_DF600F_1     50060e801046b960
0a
                                                 50060e801046b964
0b
                                                 50060e801046b968
0a
                                                 50060e801046b96c
0b
DataMig-cmode-02 0     1    HITACHI_DF600F_1     50060e801046b960
0a
                                                 50060e801046b964
0b
                                                 50060e801046b968
0a
                                                 50060e801046b96c
0b
```

7. List the source LUNs mapped from Hitachi storage. Verify the disk properties and paths.

   You should see the number of paths expected based on your cabling (at least two paths for each source controller). You should also check the event log after masking the array LUNs.

```
DataMig-cmode::*> storage disk show -array-name HITACHI_DF600F_1 -fields
disk, serial-number, container-type, owner, path-lun-in-use-count,
import-in-progress, is-foreign
disk     owner is-foreign container-type import-in-progress path-lun-in-
use-count serial-number
-------- ----- ---------- -------------- ------------------
--------------------- -------------
HIT-1.2  -     false      unassigned     false        0,0,0,0,0,0,0,0
83017542001E
HIT-1.3  -     false      unassigned     false        0,0,0,0,0,0,0,0
83017542000E
HIT-1.14 -     false      unassigned     false        0,0,0,0,0,0,0,0
830175420019
3 entries were displayed.

DataMig-cmode::*>
```

Configuring migration jobs

The FLI offline workflow requires configuration of the source LUN and destination LUNs.

Steps

1. For FLI migration, the source LUN needs to be marked as foreign. Mark the source LUNs as foreign using the serial number.

```
DataMig-cmode::*> storage disk set-foreign-lun { -serial-number
83017542001E }
                   -is-foreign true
DataMig-cmode::*> storage disk set-foreign-lun { -serial-number
83017542000E }
                   -is-foreign true
DataMig-cmode::*> storage disk set-foreign-lun { -serial-number
83017542000F }
                   -is-foreign true
```

2. Verify the source LUN is marked as foreign.

```
DataMig-cmode::*> storage disk show -array-name HITACHI_DF600F_1 -fields
disk, serial-number, container-type, owner,import-in-progress, is-
foreign
disk     owner is-foreign container-type import-in-progress serial-
number
-------- ----- ---------- -------------- ------------------
-------------
HIT-1.2  -     true       foreign        false              83017542001E
HIT-1.3  -     true       foreign        false              83017542000E
HIT-1.4  -     true       foreign        false              83017542000F
3 entries were displayed.
```

3. Create destination volumes.

```
DataMig-cmode::*> vol create -vserver datamig winvol aggr1 -size 100g
[Job 5606] Job succeeded: Successful
```

4. Disable default Snapshot policy on each volume. If default Snapshot copies exist prior to FLI migration, the volume needs additional space to store changed data.

```
DataMig-cmode::> volume modify -vserver datamig -volume winvol -snapshot
-policy none

Warning: You are changing the Snapshot policy on volume winvol to none.
Any Snapshot copies on this volume from the previous policy will not be
deleted by
         this new Snapshot policy.
Do you want to continue? {y|n}: y
Volume modify successful on volume winvol of Vserver datamig.
```

5. Set `fraction_reserveoption` for each volume to `0` and set the Snapshot policy to `none`.

```
DataMig-cmode::> vol modify -vserver datamig -volume * -fractional
-reserve 0 –snapshot-policy none
Volume modify successful on volume winvol of Vserver datamig.
```

6. Check your volume settings.

```
DataMig-cmode::> vol show -vserver datamig -volume * -fields fractional-
reserve,snapshot-policy
vservervolumesnapshot-policyfractional-reserve
-----------------------------------------------
datamig datamig_rootnone0%
datamigwinvolnone0%
Volume modify successful on volume winvol of Vserver datamig.
```

7. Delete any existing Snapshot copies.

```
DataMig-cmode::> set advanced; snap delete -vserver datamig -vol winvol
-snapshot * -force true
1 entry was acted on.
```

> FLI migration modifies every block of the target LUN. If default or other Snapshot copies exist on a volume prior to FLI migration, the volume gets filled up. Changing the policy and removing any existing Snapshot copies before FLI migration are required. Snapshot policy can be set again post-migration.

> The LUN create command detects the size and alignment based on partition offset and creates the LUN accordingly with foreign-disk option. For a review, see the NetApp Knowledgebase article **What is an unaligned I/O?** Also note that some I/O will always appear be partial writes and will therefore look misaligned. Examples of this would be database logs.

What is an unaligned I/O?

8. Create destination LUNs using foreign LUN.

```
DataMig-cmode::*> lun create -vserver datamig -path /vol/winvol/bootlun
-ostype windows_2008 -foreign-disk 83017542001E

Created a LUN of size 40g (42949672960)

Created a LUN of size 20g (21474836480)
DataMig-cmode::*> lun create -vserver datamig -path
/vol/linuxvol/lvmlun1 -ostype linux -foreign-disk 830175420011

Created a LUN of size 2g (2147483648)
DataMig-cmode::*> lun create -vserver datamig -path /vol/esxvol/bootlun
-ostype vmware -foreign-disk 830175420014

Created a LUN of size 20g (21474836480)
```

9. List the destination LUNs and verify the size of LUN with source LUN.

```
DataMig-cmode::*> lun show -vserver datamig
Vserver   Path                            State   Mapped   Type
Size
--------- ------------------------------- ------- -------- --------
--------
datamig   /vol/esxvol/bootlun             online  unmapped vmware
20GB
datamig   /vol/esxvol/linuxrdmvlun        online  unmapped linux
2GB
datamig   /vol/esxvol/solrdmplun          online  unmapped solaris
2GB
datamig   /vol/winvol/gdrive              online  unmapped windows_2008
3GB
4 entries were displayed.

DataMig-cmode::*>
```

For FLI offline migration, the LUN must be mapped to the igroup and then be offlined before creating the LUN import relationship.

10. Create host igroup of protocol FCP and add initiators. Find initiator WWPNs from storage groups section of your Site Survey planning worksheet.

```
DataMig-cmode::*> lun igroup create -ostype windows -protocol fcp
-vserver datamig -igroup dm-rx200s6-21 -initiator
21:00:00:24:ff:30:14:c4,21:00:00:24:ff:30:14:c5

DataMig-cmode::*> lun igroup create -ostype linux -protocol fcp -vserver
datamig  -igroup dm-rx200s6-22 -initiator
21:00:00:24:ff:30:04:85,21:00:00:24:ff:30:04:84

DataMig-cmode::*> lun igroup create -ostype vmware -protocol fcp
-vserver datamig -igroup dm-rx200s6-20 -initiator
21:00:00:24:ff:30:03:ea,21:00:00:24:ff:30:03:eb
```

Use the same LUN ID as source. Refer to source LUNS section of your Site Survey planning worksheet.

11. Map the destination LUNs to igroup.

```
DataMig-cmode::*> lun map -vserver datamig -path /vol/winvol/bootlun
-igroup dm-rx200s6-21 -lun-id 0
DataMig-cmode::*> lun map -vserver datamig -path /vol/linuxvol/bootlun
-igroup dm-rx200s6-22 -lun-id 0
DataMig-cmode::*> lun map -vserver datamig -path /vol/esxvol/bootlun
-igroup dm-rx200s6-20 -lun-id 0
```

12. Offline the destination LUNs.

```
DataMig-cmode::*> lun offline -vserver datamig -path /vol/esxvol/bootlun
DataMig-cmode::*> lun offline -vserver datamig -path
/vol/esxvol/linuxrdmvlun
DataMig-cmode::*> lun offline -vserver datamig -path
/vol/esxvol/solrdmplun
```

13. Create import relationship with destination LUN and source LUN.

```
DataMig-cmode::*> lun import create -vserver datamig -path
/vol/winvol/bootlun -foreign-disk 83017542001E
DataMig-cmode::*> lun import create -vserver datamig -path
/vol/linuxvol/ext3lun -foreign-disk 830175420013
DataMig-cmode::*> lun import create -vserver datamig -path
/vol/esxvol/linuxrdmvlun -foreign-disk 830175420018
DataMig-cmode::*> lun import create -vserver datamig -path
/vol/esxvol/solrdmplun -foreign-disk 830175420019
```

14. Verify the import job creation.

```
DataMig-cmode::*> lun import show -vserver datamig
vserver foreign-disk   path                operation admin operational
percent
                                         in progress state state
complete
---------------------------------------------------------------------
-------
datamig 83017542000E   /vol/winvol/fdrive  import    stopped
                                                           stopped
0
datamig 83017542000F   /vol/winvol/gdrive  import    stopped
                                                           stopped
0
datamig 830175420010   /vol/linuxvol/bootlun
                                            import    stopped
                                                           stopped
0
3 entries were displayed.
```

FLI offline: Importing the data

These steps describe how to import the data from the source LUN to the destination LUN.

Steps

1. Start the migration import.

```
DataMig-cmode::*> lun import start –vserver datamig –path
/vol/winvol/bootlun

DataMig-cmode::*> lun import start –vserver datamig –path
/vol/winvol/fdrive

DataMig-cmode::*> lun import start –vserver datamig –path
/vol/winvol/gdrive
```

2. Monitor the import progress. You can compare the progress you are seeing here with the migration performance estimates that you developed after performing your test migrations.

```
DataMig-cmode::*> lun import show -vserver datamig -fields vserver,
foreign-disk, path, admin-state, operational-state, percent-complete,
imported-blocks, total-blocks, , estimated-remaining-duration
vserver foreign-disk path               admin-state operational-state
percent-complete imported-blocks total-blocks estimated-remaining-
duration
------- ------------ ------------------ ----------- -----------------
---------------- --------------- ------------
----------------------------
datamig 83017542000E /vol/winvol/fdrive started     completed
100              4194304         4194304      -
datamig 83017542000F /vol/winvol/gdrive started     completed
100              6291456         6291456      -
datamig 830175420010 /vol/linuxvol/bootlun
                                        started     in_progress       83
35107077        41943040     00:00:48
3 entries were displayed.
```

3. Check the import job is completed successfully.

```
DataMig-cmode::*> lun import show -vserver datamig -fields vserver,
foreign-disk, path, admin-state, operational-state, percent-complete,
imported-blocks, total-blocks, , estimated-remaining-duration
vserver foreign-disk path               admin-state operational-state
percent-complete imported-blocks total-blocks estimated-remaining-
duration
------- ------------ ------------------ ----------- -----------------
---------------- --------------- ------------
----------------------------
datamig 83017542000E /vol/winvol/fdrive started     completed
100              4194304         4194304      -
datamig 83017542000F /vol/winvol/gdrive started     completed
100              6291456         6291456      -
datamig 830175420010 /vol/linuxvol/bootlun
                                        started     completed
100
3 entries were displayed.
```

FLI offline: Verifying migration results

A verify job is optional, but recommended. It is a block-by-block comparison of the source and destination LUNs. Verify jobs take almost the same or slightly more time than migration time.

Steps

1. Start the verify job to compare source and destination LUN. Monitor the verify progress.

```
DataMig-cmode::*> lun import verify start -vserver datamig -path
/vol/winvol/bootlun

DataMig-cmode::*> lun import verify start -vserver datamig -path
/vol/winvol/fdrive

DataMig-cmode::*> lun import verify start -vserver datamig -path
/vol/winvol/gdrive
```

2. Monitor the verify job status.

```
DataMig-cmode::*> lun import show -vserver datamig -fields vserver,
foreign-disk, path, admin-state, operational-state, percent-complete,
imported-blocks, total-blocks, , estimated-remaining-duration
vserver foreign-disk path               admin-state operational-state
percent-complete imported-blocks total-blocks estimated-remaining-
duration
------- ------------ ------------------ ----------- -----------------
---------------- --------------- ------------
----------------------------
datamig 83017542000E /vol/winvol/fdrive started     in_progress       57
-               4194304      00:01:19
datamig 83017542000F /vol/winvol/gdrive started     in_progress       40
-               6291456      00:02:44
datamig 830175420010 /vol/linuxvol/bootlun
                                        started     in_progress       8
-               41943040     00:20:29
3 entries were displayed.
```

3. Confirm that verify jobs are completed.

```
DataMig-cmode::*> lun import show -vserver datamig -fields vserver,
foreign-disk, path, admin-state, operational-state, percent-complete,
imported-blocks, total-blocks, , estimated-remaining-duration
vserver foreign-disk path               admin-state operational-state
percent-complete imported-blocks total-blocks estimated-remaining-
duration
------- ------------ ------------------ ----------- -----------------
---------------- --------------- ------------
-----------------------------
datamig 83017542000E /vol/winvol/fdrive started     completed
100              -               4194304      -
datamig 83017542000F /vol/winvol/gdrive started     completed
100              -               6291456      -
datamig 830175420010 /vol/linuxvol/bootlun
                                        started     completed
100              -               41943040     -
3 entries were displayed.
```

4. Stop the verify job after verify is completed.

```
DataMig-cmode::*> lun import verify stop -vserver datamig -path
/vol/esxvol/winrdmplun
```

5. Delete the import relationship to remove the migration job.

```
DataMig-cmode::*> lun import delete -vserver datamig -path
/vol/winvol/bootlun

DataMig-cmode::*> lun import delete -vserver datamig -path
/vol/winvol/fdrive

DataMig-cmode::*> lun import delete -vserver datamig -path
/vol/winvol/gdrive
```

6. Verify import jobs are deleted.

```
DataMig-cmode::*> lun import show -vserver datamig
There are no entries matching your query.
```

7. Mark the foreign LUN attribute to `false`.

```
DataMig-cmode::*> storage disk modify { -serial-number 83017542001E }
-is-foreign false

DataMig-cmode::*> storage disk modify { -serial-number 83017542000E }
-is-foreign false

DataMig-cmode::*> storage disk modify { -serial-number 83017542000F }
-is-foreign false
```

8. Verify the foreign LUNs are marked as `false` after import.

```
DataMig-cmode::*> storage disk show -array-name HITACHI_DF600F_1 -fields
disk, serial-number, container-type, owner,import-in-progress, is-
foreign
disk     owner is-foreign container-type import-in-progress serial-
number
-------- ----- ---------- -------------- ------------------
-------------
HIT-1.2  -     false      unassigned     false              83017542001E
HIT-1.3  -     false      unassigned     false              83017542000E
HIT-1.4  -     false      unassigned     false              83017542000F
3 entries were displayed.
```

9. Bring the destination LUNs online using the lun online command.

```
DataMig-cmode::*> lun online -vserver datamig -path /vol/winvol/bootlun

DataMig-cmode::*> lun online -vserver datamig -path /vol/winvol/fdrive

DataMig-cmode::*> lun online -vserver datamig -path /vol/winvol/gdrive
```

10. Verify the LUNs are online.

```
DataMig-cmode::*> lun show -vserver datamig
Vserver   Path                            State   Mapped   Type
Size
--------- ------------------------------- ------- -------- --------
--------
datamig   /vol/esxvol/bootlun             online  mapped   vmware
20GB
datamig   /vol/esxvol/linuxrdmvlun        online  mapped   linux
2GB
datamig   /vol/esxvol/solrdmplun          online  mapped   solaris
2GB
3 entries were displayed.
```

Import logs are stored in cluster event log file.

```
  DataMig-cmode::*> event log  show -event fli*
  7/7/2014 18:37:21   DataMig-cmode-01 INFORMATIONAL
fli.lun.verify.complete: Import verify of foreign LUN 83017542001E of
size 42949672960 bytes from array model DF600F belonging to vendor
HITACHI  with NetApp LUN QvChd+EUXoiS is successfully completed.
  7/7/2014 18:37:15   DataMig-cmode-01 INFORMATIONAL
fli.lun.verify.complete: Import verify of foreign LUN 830175420015 of
size 42949672960 bytes from array model DF600F belonging to vendor
HITACHI  with NetApp LUN QvChd+EUXoiX is successfully completed.
  7/7/2014 18:02:21   DataMig-cmode-01 INFORMATIONAL
fli.lun.import.complete: Import of foreign LUN 83017542000F of size
3221225472 bytes from array model DF600F belonging to vendor HITACHI  is
successfully completed. Destination NetApp LUN is QvChd+EUXoiU.
```

FLI offline post-migration tasks

Any outstanding server remediation not performed earlier is performed during post-migration.

The third-party software is removed, NetApp software is installed and configured, and then the host is brought up accessing the LUNs on NetApp. See the topic *Host remediation* for examples of post-migration remediation for specific host types.

Review logs for errors, check pathing, and perform any application testing to verify that your migration completed cleanly and successfully.

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