Abstract
This white paper provides an overview of a shared library and NDMP shared library configured using EMC® NetWorker®. This paper also provides details on which license to choose for a shared library configured on a NetWorker Storage Node.

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Executive summary
Today's storage industry has pioneered the use of virtual tape library (such as EMC® Disk Library) for backing up data. The main advantage of tape-based backup is for archiving data to an offsite location.

A shared library shares a library (VTL) between two storage nodes. Each storage node has access to a set of drives within the same library and all the drive paths have either a SCSI or NDMP path. The library handler is controlled by any one of the primary storage nodes.

Shared library configurations have been supported with EMC NetWorker® backup and recovery software from version 6.0 onward. Storage capacity and scalability increase with virtual tape libraries such as EMC Disk Library as the primary backup media.

Introduction
This white paper provides an overview of the shared library and NDMP shared library change introduced with EMC NetWorker and comprehensive detail on how to configure a shared library and NDMP shared library with NetWorker. It will guide users on deploying an NDMP shared library in the data zone.

This white paper also provides details on configuring a shared library in a mixed environment (using a tape library shared across SCSI and NDMP paths) with NetWorker and on which license to choose for a shared library configured on a NetWorker Storage Node.

The white paper will explain the various methods of shared library configuration using the EMC Disk Library VTL.

Audience
This white paper is intended for EMC customers, system engineers, EMC partners, and the EMC sales team. This paper will help you understand the difference between shared library and NDMP shared library configurations and also will help in choosing the right license for a shared library with NetWorker.

Terminology
The following abbreviations are used in this paper:

- ID: Identifier
- LUN: Logical Unit Number
- NDMP: Network Data Management Protocol
- SCSI: Small Computer System Interface
- Shared library: Shared library without NDMP
- SN: NetWorker Storage Node

Shared library overview
NetWorker 5.x introduced a feature for configuring a shared library using the NSR RAP resource, also known as the NSR jukebox (or tape library).

The brief introductions about how a shared library can be configured are listed in the following section:
NetWorker Server: robotic and no drive(s)
Order of storage node hostnames:
  snA
  snB
  nsrserverhost

SN (snA): drive(s)
Order of storage node hostnames:
  snA
  snB

SN (snB): drive(s)
Order of storage node hostnames:
  snB
  snA

The following is example NetWorker Storage Node information for the next figure:
NetWorker Storage Node1 (snA): johnny.lss.emc.com
NetWorker Storage Node2 (snB): noddy.lss.emc.com

Figure 1. Shared library diagram
Configuring a shared library

The following steps describe how to configure a shared library using NetWorker:

1. If the shared library is in a SAN environment, then do zoning for the drives that are being exported to NetWorker storage node1 and NetWorker storage node2, as shown in Figure 1. Then make sure that the NetWorker Storage Node is seeing the drives from the tape library.

2. Execute the NetWorker “inquire” command to see the robotic arm and two tape drives from NetWorker storage node1. The following is output:

```
bash-3.00# inquire
scsidev@1.0.0:FUJITSU MAT3073N SUN72G 0602|Disk, /dev/rdsk/c1t0d0s2
    S/N: 000523B06T4Y    AANOP5606T4Y
scsidev@1.1.0:FUJITSU MAT3073N SUN72G 0602|Disk, /dev/rdsk/c1t1d0s2
    S/N: 000532B09PUD    AANOP5809PUD
scsidev@4.0.1:IBM    ULTRIUM-TD3     54K1|Tape, /dev/rmt/29cbn
    S/N: 1258537537
    ATNN=IBM    ULTRIUM-TD3     1258537537
Virtual device
scsidev@4.3.2:ADIC    Scalar i2000    100A|Autochanger (Jukebox), /dev/scsi/changer/c4t203908001b806185d2
    S/N: 0MIXS0023J
    ATNN=ADIC    Scalar i2000    0MIXS0023J
Virtual device
scsidev@4.4.0:IBM    ULTRIUM-TD3     54K1|Tape, /dev/rmt/2cbn
    S/N: 1258537536
    ATNN=IBM    ULTRIUM-TD3     1258537536
Virtual device
```

3. Similarly, execute the inquire command on NetWorker storage node2 and the remaining two tape drives will be allocated to storage node2.

```
bash-3.00# inquire -l
-l flag found: searching all LUNs, which may take over 10 minutes per adapter for some fibre channel adapters. Please be patient.
scsidev@1.0.0:SEAGATE ST373207LSUN72G 045A|Disk, /dev/rdsk/c1t0d0s2
    S/N: 3432CAW5    3KT2CAW5
scsidev@1.1.0:SEAGATE ST373207LSUN72G 045A|Disk, /dev/rdsk/c1t1d0s2
    S/N: 3632FZ43    3KT2FZ43
scsidev@5.0.1:IBM    ULTRIUM-TD3     54K1|Tape, /dev/rmt/29cbn
    S/N: 1258537539
    ATNN=IBM    ULTRIUM-TD3     1258537539
Virtual device
scsidev@5.2.0:IBM    ULTRIUM-TD3     54K1|Tape, /dev/rmt/30cbn
    S/N: 1258537538
    ATNN=IBM    ULTRIUM-TD3     1258537538
Virtual device
```

4. A shared library configuration on NetWorker can be done either with the NetWorker Management Console GUI or with the command line using the “jbconfig” command. The following is an example.

bash-3.00# jbconfig -s tintin.talisman.com

On a storage node, the hostname is a prefix to the jukebox name.
Enter the hostname to use as a prefix? [johnny.lss.emc.com]
Using 'johnny.lss.emc.com' as the hostname prefix

Jbconfig is running on host johnny.lss.emc.com (SunOS 5.10),
and is using tintin.talisman.com as the NetWorker server.

1) Configure an AlphaStor Library.
2) Configure an Autodetected SCSI Jukebox.
3) Configure an Autodetected NDMP SCSI Jukebox.
4) Configure an SJI Jukebox.
5) Configure an STL Silo.

What kind of Jukebox are you configuring? [1] 2
14484:jbconfig: Scanning SCSI buses; this may take a while ...
Installing 'Standard SCSI Jukebox' jukebox - /dev/scsi/changer/c4t203908001B806185d2.

What name do you want to assign to this jukebox device? shared_library
using 'rd=johnny.lss.emc.com:shared_library' as jukebox device name

15814:jbconfig: Attempting to detect serial numbers on the jukebox and drives ..
.
15815:jbconfig: Will try to use SCSI information returned by jukebox to configure drives.

Detected emulated library `rd=johnny.lss.emc.com:shared_library' on storage node `johnny.lss.emc.com'.

The following drive(s) can be auto-configured in this jukebox:
1> LTO Ultrium-3 @ 4.4.0 --> /dev/rmt/2cbn
2> LTO Ultrium-3 @ 4.0.1 --> /dev/rmt/29cbn
The 2 drive(s) that cannot be auto-configured will be addressed in a moment, but first:
Do you want to configure any of the detected drives as shared or NDMP drives or otherwise manually change their configuration? (yes / no) [no]

Is (any path of) any drive intended for NDMP use? (yes / no) [no]

Is any drive going to have more than one path defined? (yes / no) [no]

Please enter the device path information in one of the following formats:

/dev/rmt/1cbn --for local path or
host:device-path --for remote node or NDMP device(s) or
host:drive-letter:directory path --for Windows disk file

You will be prompted only for those drives that could not be auto-configured; the others will be skipped. Please provide the paths for these drives:
Drive 3, element 258
Drive path ? noddy.lss.emc.com:/dev/rmt/30cbn

Drive 4, element 259
Drive path ? noddy.lss.emc.com:/dev/rmt/29cbn

Only model LTO Ultrium-3 drives have been detected.
Are all drives in this jukebox of the same model? (yes / no) [yes]

A Dedicated Storage Node can backup only local data to its devices.
Should johnny.lss.emc.com be configured as a Dedicated Storage Node? (yes / no) [no]

A Dedicated Storage Node can backup only local data to its devices.
Should noddy.lss.emc.com be configured as a Dedicated Storage Node? (yes / no) [no]

Jukebox has been added successfully

The following configuration options have been set:

> Jukebox description to the control port and model.
> Autochanger control port to the port at which we found it.
> Barcode reading to on.
> Volume labels that match the barcodes.

You can review and change the characteristics of the autochanger and its associated devices using the NetWorker Management Console.

Would you like to configure another jukebox? (yes/no) [no]
bash-3.00#

5. Run the “nsrjb” command to view the configured tape library.

bash-3.00# nsrjb -s tintin.talisman.com
1:    rd= johnny.lss.emc.com:shared_library    [enabled]

There is only one enabled and configured jukebox: rd= johnny.lss.emc.com:shared_library

Jukebox rd= johnny.lss.emc.com:shared_library: (Ready to accept commands)

14119:nsrjb: No volumes labeled.
slot volume pool barcode volume id recyclable
1: -* QXCOB400  -
2: -* QXCOB401  -
3: -* QXCOB402  -
4: -* QXCOB403  -
5: -* QXCOB404  -
6: 
?: 
8:
NDMP shared library overview

An NDMP shared library shares a library (VTL) between two NDMP storage nodes. Each storage node will have access to a set of drives within the same library and all the drive paths will have an NDMP path instead of a SCSI path. The library handler will be controlled by any one of the NDMP storage nodes. The library handler will be controlled by the primary NDMP storage node (nfscifs.talisman.com as listed in Figure 2).

Brief introductions about how an NDMP shared library can be configured are listed in the following section:

The following is example NetWorker storage and filer information for the next figure:

NetWorker Server: Daisy.talisman.com
Celerra Filer-1: nfscifs.talisman.com
Celerra Filer-2: network2.talisman.com
Figure 2. NDMP shared library diagram

**Configuring an NDMP shared library**

Before starting the configuration, a single VTL should be exported from EMC Disk Library (EDL) to two different NDMP hosts. Here, in this configuration, a VTL is exported between two NDMP hosts / NAS filer.

The following steps describe how to configure a NDMP shared library using NetWorker:

1. Execute the NetWorker “inquire –N <filer_name>” command on NetWorker Server to get the drive paths.

2. Configuration on NetWorker can be done either with the NetWorker Management Console GUI or with the command line using the “jbconfig” command. An example of configuring an NDMP shared library using the NMC GUI follows:

   bash-3.00# jbconfig

   Jbconfig is running on host daisy.talisman.com (SunOS 5.10),
   and is using daisy.talisman.com as the NetWorker server.

   1) Configure an AlphaStor Library.

   2) Configure an Autodetected SCSI Jukebox.
3) Configure an Autodetected NDMP SCSI Jukebox.

4) Configure an SJI Jukebox.

5) Configure an STL Silo.

What kind of Jukebox are you configuring? [1] 3

Enter NDMP Tape Server name?: nfscifs.talisman.com

Communicating to devices on NDMP Server 'nfscifs.talisman.com', this may take a while...

14484:jbconfig: Scanning SCSI buses; this may take a while ...

NDMP Service Debug: The process id for NDMP service is 0x8f363710
42597:jbconfig: ndmp scsi open: the device is in use
42597:jbconfig: ndmp scsi open: the device is in use
42597:jbconfig: ndmp scsi open: the device is in use
42597:jbconfig: ndmp scsi open: the device is in use
NDMP Service Debug: The process id for NDMP service is 0x8f363710
NDMP Service Debug: The process id for NDMP service is 0x8f363710
NDMP Service Debug: The process id for NDMP service is 0x8f363710

These are the SCSI Jukeboxes currently attached to your system:

1) scsidev@0.0.0: Standard SCSI Jukebox, EMC / svtlRobot
2) scsidev@0.0.5: Standard SCSI Jukebox, EMC / svtlRobot
3) scsidev@0.0.10: Standard SCSI Jukebox, EMC / svtlRobot

Which one do you want to install? 3

NDMP Service Debug: The process id for NDMP service is 0x8f363710
Installing 'Standard SCSI Jukebox' jukebox - scsidev@0.0.10.

What name do you want to assign to this jukebox device? Cel240

NDMP Service Debug: The process id for NDMP service is 0x8f363710
NDMP Service Debug: The process id for NDMP service is 0x8f363710

15814:jbconfig: Attempting to detect serial numbers on the jukebox and drives ...

None of the methods tried returned drive serial number information

15815:jbconfig: Will try to use SCSI information returned by jukebox to configure drives.

Turn NetWorker auto-cleaning on (yes / no) [yes]? no

The drives in this jukebox cannot be auto-configured with the available information. You will need to provide the path for the drives.
Is (any path of) any drive intended for NDMP use? (yes / no) [no] yes

Is any drive going to have more than one path defined? (yes / no) [no]

Please enter the device path information in one of the following formats:
/dev/rmt/1cbn --for local path or
host:device-path --for remote node or NDMP device(s) or
host:drive-letter:directory path --for Windows disk file

After you have entered a device path, you will be prompted for an NDMP
user name for that path's host. If this device path is not an NDMP device,
press the enter key to advance to the next device path. For NDMP devices,
you need to enter the user name and password the first time we encounter
that NDMP host. Pressing the enter key for the NDMP user name for any
subsequent device path on the same host will set the user name and password
to those defined the first time. You will not be prompted for the password
in such a case.

Drive 1, element 1

Drive path ? nfscifs.talisman.com:c0t0111

Is this device configured as NDMP? (yes / no) [no] yes

Drive 2, element 2

Drive path ? network2.talisman.com:c0t0112

Is this device configured as NDMP? (yes / no) [no] yes

Drive 3, element 3

Drive path ? nfscifs.talisman.com:c0t0113

Is this device configured as NDMP? (yes / no) [no] yes

Drive 4, element 4

Drive path ? network2.talisman.com:c0t0114

Is this device configured as NDMP? (yes / no) [no] yes

Please select the appropriate drive type number:

1) 3480  2) 3570  3) 3590  4) 3592  26) 9840D  27) 9940  28) 9940B  29) adv_file
51) qic  52) SAIT-1  53) SAIT-2  54) SD3
5) 4890  30) Atmos COS  55) sdlt
6) 4mm   31) Data Domain  56) sdlt320
7) 4mm 12GB  32) dlt  57) sdlt600
8) 4mm 20GB  33) dlt vs160  58) SLR
9) 4mm 4GB   34) dlt-s4  59) T10000
10) 4mm 8GB   35) dlt-v4  60) T10000B
11) 4mm DAT160  36) dlt1  61) tkz90
12) 4mm DAT72   37) dlt7000  62) travan10
13) 8mm     38) dlt8000  63) TS1120
14) 8mm 20GB   39) dst  64) TS1130
15) 8mm 5GB    40) dst (NT)  65) tz85
16) 8mm AIT    41) dtf    66) tz86
17) 8mm AIT-2   42) dtf2  67) tz87
18) 8mm AIT-3   43) file  68) tz88
19) 8mm AIT-4   44) himt  69) tz89
20) 8mm AIT-5   45) logical  70) tz90
21) 8mm Mammoth-2  46) LTO Ultrium  71) tzs20
22) 9490    47) LTO Ultrium-2  72) VXA
23) 9840    48) LTO Ultrium-3  73) VXA-172
24) 9840b   49) LTO Ultrium-4  74) VXA-2
25) 9840C   50) optical  75) VXA-320

Enter the drive type of drive 1? 48

Are all the drives the same model? (yes / no) [yes]

NDMP Service Debug: The process id for NDMP service is 0x8f363710

Jukebox has been added successfully

The following configuration options have been set:

> Jukebox description to the control port and model.
> Autochanger control port to the port at which we found it.
> Autocleaning off.
> Barcode reading to on.
> Volume labels that match the barcodes.
You can review and change the characteristics of the autochanger and its associated devices using the NetWorker Management Console.

Would you like to configure another jukebox? (yes/no) [no]

3. Run "nsrjb" command to view the configured tape library

bash-3.00# nsrjb

    1:      Cel240  [enabled]

There is only one enabled and configured jukebox: Cel240

Jukebox Cel240: (Ready to accept commands)

14118:nsrjb: No volumes found in the media database...continuing.

<table>
<thead>
<tr>
<th>slot</th>
<th>volume</th>
<th>pool</th>
<th>barcode</th>
<th>volume id</th>
<th>recyclable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:</td>
<td>00290000*</td>
<td>00290000</td>
<td>4205445517</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2:</td>
<td>-*</td>
<td>00290001</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3:</td>
<td>00290002*</td>
<td>00290002</td>
<td>4288746479</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4:</td>
<td>-*</td>
<td>00290003</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5:</td>
<td>00290004*</td>
<td>00290004</td>
<td>4224266968</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6:</td>
<td>00290005*</td>
<td>00290005</td>
<td>4207492424</td>
<td></td>
<td></td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>
*not registered in the NetWorker media data base

drive 1 (rd=nfscifs.talisman.com:c0t0l11 (NDMP)) slot 1:
drive 2 (rd=network2.talisman.com:c0t0l12 (NDMP)) slot 2: -
drive 3 (rd=nfscifs.talisman.com:c0t0l13 (NDMP)) slot 3: -
drive 4 (rd=network2.talisman.com:c0t0l14 (NDMP)) slot 4: -
Configure a shared library in a mixed environment

Figure 3. A shared library in a mixed environment

The following steps describe how to configure in a mixed environment using NetWorker:

1. Export the tape drives and tape library to a traditional NetWorker Storage Node host and NDMP hosts, as shown in Figure 3. Then make sure that the NetWorker Storage Node is seeing the tape drives and tape library on respective hosts.

2. Execute the NetWorker “inquire” command to make sure that NetWorker storage node1 sees the drives and robotic arm of the tape library.

3. Execute the NetWorker “inquire-N <NAS_Filer>” command to make sure that NetWorker storage node2 sees the tape drives alone.

4. Configuration on NetWorker can be done either with the NetWorker Management Console GUI or with the command line using the “jbconfig” command.
   
   An example of configuring an NDMP shared library using the NMC GUI is shown next.

5. Launch the NMC then connect to NetWorker Server. From the device pane in the NetWorker Administration user interface, right-click Libraries and choose either Configure All Libraries or Scan for Devices.

   If you choose Scan for Devices, NetWorker will scan for available devices on selected Storage Nodes and you will be allowed to configure the required library among the list of libraries scanned. Figure 4 shows how to configure a tape library using Scan for Devices.
6. In the **Scan for Devices** dialog box in Figure 5, under **Select existing or create new storage nodes to scan**, select the Storage Nodes, provide the NDMP Username and NDMP Password, and click **Start Scan**.

**Figure 4. Scan for Devices configuration using NMC**

**Figure 5. Select existing or create new storage nodes to scan**
7. The **Message** dialog box appears and reads **The Scan for devices process has started.** Click **OK** to scan the tape drives and library.

![Figure 6. Scan for devices process](image-url)
8. Select the tape library as displayed in Figure 7. Now, click **Configure Library** to configure the library.

![Configure Library](image1)

**Figure 7. Configure tape library scanned**

9. Select the tape drives as displayed in Figure 8. Click **Start Configuration** to configure the library.

![Start Configuration](image2)

**Figure 8. Select the tape drives to configure the tape library**
10. From the device pane in the NetWorker Administration user interface, click one of the configured tape libraries as displayed in Figure 9.

![NetWorker Administration user interface](image)

Figure 9. Configured tape drives

In the jukebox configuration above, the first two devices are configured as normal devices and the third and fourth devices are configured as NDMP devices.

11. The shared library is configured using NetWorker. Click Libraries in the Devices pane and check for the Library Ready state. View its properties as displayed in Figure 10.
Shared library licenses

The following are the NetWorker licenses available to support shared library operation. If you have configured a shared library using NetWorker, the following applies:

- An NT or UNIX Autochanger sharing license is needed based on if you have a Windows or UNIX host.
- An Autochanger license is needed based on the number of slots being licensed.
- An NDMP client connection license is needed if the library is shared across NDMP hosts.

Note: If NetWorker Server is running with EDL/VTL then a VTL frame enabler license and a VTL capacity license are required.

Merits of using shared library

The following are the advantages of using the shared library:

- EMC EDL/VTL provides flexibility for configuring a shared library in a SAN environment.
- The jukebox can be shared with multiple hosts and within a single data zone.
- Autochanger sharing between cross-platforms is supported.
- An Autochanger sharing for enabler license (NT or UNIX) is required to activate.
- Resources are optimally utilized in this configuration, as the same tapes can be accessed by both storage nodes.
- Library management is easy from the NMC as there are a low number of library resources.
- A dedicated device is available for each storage node, thereby reducing device conjunction.
- Centralized data management or storage uses a single library for multiple NAS filers (NDMP host).
Conclusion
A shared library can optimally utilize and dedicate a device across each storage node and thereby reduce device conjunction. EMC NetWorker is an enterprise backup application that has wide varieties of feature support, including shared library support. Users can use a single library for multiple NAS filers in centralized data storage. And since a shared library can be shared and accessed by both storage nodes, library and tapes can be effectively utilized.

Shared library provides a significant advantage in scalability in conjunction with virtual tape libraries. Backup and restore can now easily be completed with smaller backup windows.

References
The following can provide more information:

- [EMC NetWorker page on EMC.com](#)
- [EMC Powerlink®](#)