

Configuring Dell EMC Unity XT storage and support for IBM VM Recovery Manager

*Automated tool to communicate and
support Dell EMC Unity storage from KSYS
node using VM Recovery Manager*



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Overview

Challenge

It is a challenging task to configure the Dell EMC Unity storage parameters manually as user must plan carefully, possess technical expertise, pay close attention to detail, and gather diverse information from various sources.

Solution

The KSYS subsystem of the IBM VM Recovery Manager facilitates easy and automatic configuration of the storage parameters for the user.

IBM VM Recovery Manager provides disaster recovery solution which enables users to migrate their virtual machines (VMs) from home site to backup site. Users must configure multiple aspects of the backup site's storage subsystem to perform discovery, verification, and move operations. This paper describes how to configure the Dell EMC Unity storage subsystem using the VM Recovery Manager automated steps.

Introduction to IBM VM Recovery Manager

IBM VM Recovery Manager provides disaster recovery (DR) and high availability (HA) solutions for virtual machines.

High availability

VM Recovery Manager HA for IBM Power systems is a high availability solution that is easy to deploy and is also an automated solution to recover the VMs, also known as logical partitions (LPARs). It provides HA solutions for data centres, and helps to migrate VMs from one host to another within a site.

Disaster recovery

VM Recovery Manager DR for Power Systems is a disaster recovery solution that is easy to deploy and will provide automated operations to recover the production site. It also helps to migrate VMs from one site to another site.

Storage subsystems

IBM VM Recovery Manager supports many storage subsystems like IBM DS8000, IBM Storwize, Dell EMC storage, Dell EMC Unity XT, Hitachi, IBM XIV.

Note: For Dell EMC Unity XT storage, VM Recovery Manager supports both synchronous and asynchronous types of replications.

Prerequisite configuration for Dell EMC Unity XT

Following are the prerequisites required to setup KSYS node and configure Dell EMC Unity XT:

- Storage firmware version must be 5.1 or later.
- VIOS version must be 3.1.2.21 or later.
- KSYS node build must be VMRM 1.5.0.1 or later for asynchronous replication and 1.6.0.0 for synchronous replication.
- For AIX version 7.2 or earlier, the user needs to install Python 3.7.
- Export the Python 3.7 path on your KSYS node using the command:
`export PATH=$PATH:/opt/bin/`

Install Python

Use one of the following options to install Python 3.7 on KSYS node

- Through AIX Toolbox filesets:
 1. Download the Python package from [aixtools](#).
 2. Install the files using following command:
`installp -d aixtools.python.py37.3.7.7.0.I -a all`

- Through RPMs:
 1. Refer to [AIX Toolbox for Open Source Software](#) for license, installation guide, and package details.
 2. Refer to [configuring YUM and creating local repositories on IBM AIX](#) for configuring YUM and to install the RPM packages.

Note: A system that does not have access to the AIX toolbox requires downloading these packages manually and installing them.

Setup EMC Unity on KSYS node

IBM VM Recovery Manager provides a sample script to setup required configuration needed by KSYS node for Dell EMC UNITY storage.

Script location: `/opt/IBM/ksys/storages/utils`

Use this script to setup the required path and the package for Dell EMC Unity Storage:

```
./VMDR_unity_setup
```

Usage help

- `-d` <Path to folder to download require packages>
- `-m` <Mode to install package, either online or offline>
- <Offline mode - packages should already download to path> with `<-p>`
- `-p` <Path to already download packages for offline mode>
- `-v` <Validated the installation>

Command usage

- Validating only installation: `VMDR_unity_setup -v`
- Installing packages in online mode: `VMDR_unity_setup -m online`
- Download library packages on a machine with internet access: `VMDR_unity_setup -d /home/VMDR_python_package`
- Installing packages in offline mode: `VMDR_unity_setup -m offline -p /home/copied/VMDR_python_package`

Configure Dell EMC Unity storage for the home site

Following are the steps to configure Dell EMC Unity storage on home site using Dell EMC UNITY Storage GUI:

Step 1. Create Host

By creating a host object and mapping it to the VM's worldwide port name (WWPN), you enable the VM to access and use the storage resources on the Dell EMC Unity system in a secure and efficient manner.

1. Open the Dell EMC dashboard, click **ACCESS** → **Hosts** and then expand the **+** icon and click **Host**.

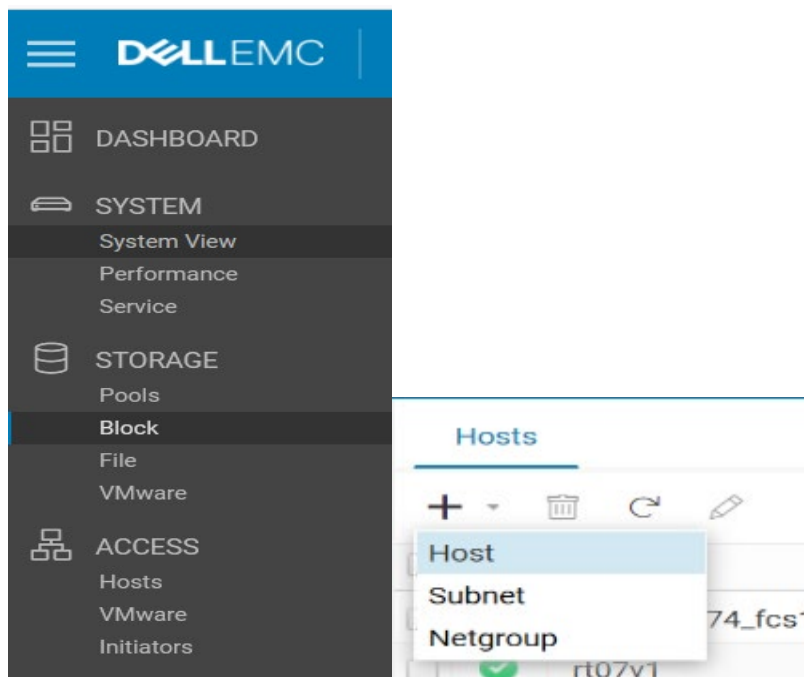


Figure 1. Create the host through the Dell EMC dashboard.

2. Enter the host name in the **Name** field and operating system details in the **Operating System** field and then click **Next**.

Add a Host

Name

Specify a Name and Additional Information

Name: *

Description:

Operating System:

Network Address:

Tenant:

While the host operating system information is not required, providing it will allow for more specific setup and troubleshooting instructions.

In order to customize access to NFS shares, the Network Address (name or IP address) is required. Port information is not allowed.

Network Address examples:
IPv4 address: 192.168.1.2
IPv6 address: FE80:3202:B3FF:FE1E:8329
Host name: hostname

Tenant information is not required. To create a tenant, select the Tenants tab for a file system.

Cancel Next

Figure 2. Specify the host name.

Step 2. Add initiators to the host

1. In the Initiators panel, click the **+** icon, select **Fibre channel initiator** and then click **Next**.

Add a Host

Initiators

Select Discovered Initiators or Manually Add Initiators

Automatically Discovered Initiators

0 Items

No available initiators discovered.

Manually Added Initiators

+ -

Create iSCSI Initiator

Create Fibre Channel Initiator

Initiator IQN / WWN

No initiators have been manually added yet. Click the + button to manually add an initiator.

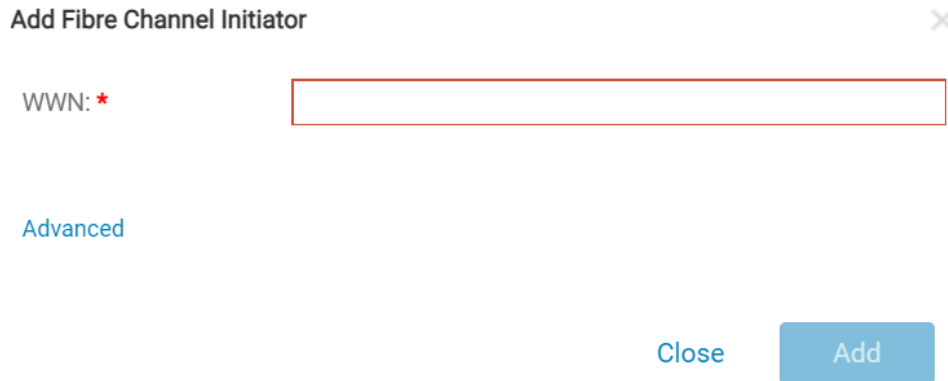
The host uses initiator(s) to access the storage resources.

Select from the list of initiators the system has auto-discovered or click the "+" button to manually add an initiator if they are not connected yet.

Cancel Back Next

Figure 3. Create Fibre Channel Initiator.

2. In the resulting form, enter the network address and WWPN of VM in the **WWN** field and then click **Add**.



The image shows a web form titled "Add Fibre Channel Initiator" with a close button (X) in the top right corner. Below the title is a label "WWN: *" followed by an empty text input field. At the bottom left of the form is a link labeled "Advanced". At the bottom right are two buttons: "Close" and "Add".

Figure 4. Add Fibre Channel Initiator form.

For example, if VM1 consists of wwpn1 and wwpn2, provide the details as shown:

Network_address_of_wwpn1:wwpn1

Then click **Add**. Repeat the previous step to add another wwpn.

Network_address_of_wwpn2:wwpn2

Then click **Add**. Click **Next** and then click **Finish**.

Step 3. Create LUN

1. Open Dell EMC dashboard, click **STORAGE** → **Block** and then click on **+** icon.

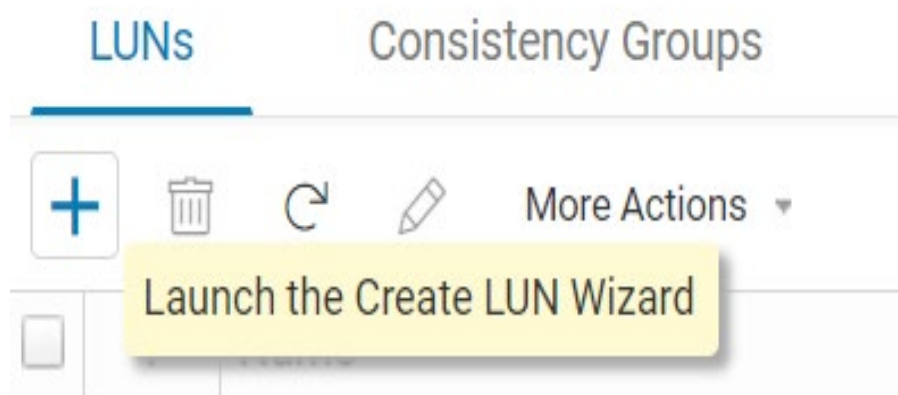


Figure 5. Launch the Create LUN Wizard.

2. In the resulting form, fill in the details of the LUNs and then click **Next**.

Figure 6. Configure LUN(s).

3. Click the + icon on the **Configure Access** panel.

Figure 7. Configure Access panel in the Create LUNs window.

4. In the resulting window, select the host and click **Next** and then click **Finish**.

Figure 8. Select Host Access window.

Step 4. Verify Host

Open Dell EMC dashboard, click **ACCESS** → **Hosts** and click **Filter the table** option to verify the host name.

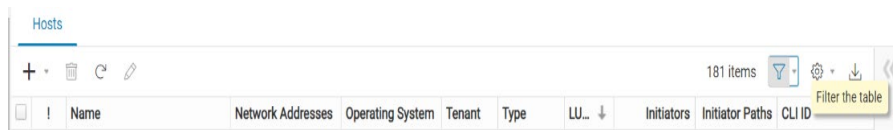


Figure 9. Hosts panel with Filter the table option.

Step 5. Verify LUNs

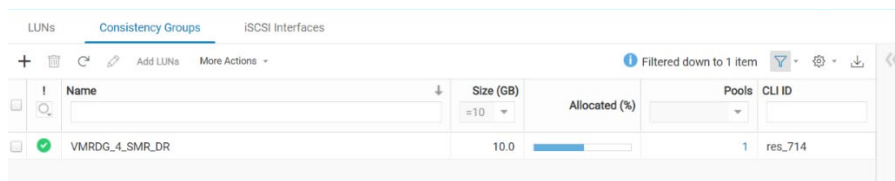
Dell EMC Unity Storage is different from other storage systems. After creating a consistency group, you can only view the LUNs only under **Consistency Group**. If no consistency group has been created, you can view the LUNs under **Block**.

Step 6. Create consistency group and replication

In Dell EMC Unity Storage, the consistency group and replication is created by KSYS subsystem during the first discovery. The output shows how a storage replication and disk group is created by KSYS during discovery.

```
# ksysmgr -t discover site India
03:45:16 Running discovery on entire site, this may take a few
minutes...
03:45:37 Storage state synchronization has started for Host Group HG1
03:45:37 Storage state synchronization has completed for Host Group
HG1
03:46:14 Discovery has started for VM VM1
03:46:14 Configuration information retrieval started for VM VM1
03:46:22 Configuration information retrieval completed for VM VM1
03:46:22 Storage information retrieval from VIOS started for VM VM1
03:46:22 Storage information retrieval from VIOS completed for VM VM1
03:46:22 Discovery for VM VM1 is complete
03:46:37 Disk Group creation on storage subsystem started for
Workgroup wg1
03:46:59 Disk Group creation on storage subsystem completed for
Workgroup wg1
Storage replication setup may add delay to discovery operation
03:48:45 Discovery has finished for India
1 out of 1 managed VMs have been successfully discovered
```

To view the details of the consistency group created during discovery, open Dell EMC dashboard, then click **Storage** → **Block** → **Consistency Group**.



	Name	Size (GB)	Allocated (%)	Pools	CLI ID
<input checked="" type="checkbox"/>	VMRDG_4_SMR_DR	10.0	<div><div></div></div>	1	res_714

Figure 10. Consistency Groups tab under the Block option.

A consistency group will be created in the following format:

VMRDG_<hgid|wgid>_clustername

Configure Dell EMC Unity storage for the backup site

Step 1. Create Host

To create a host, follow the same steps as used for creating hosts in the home site storage.

Step 2. Create LUN

In Dell EMC Unity storage, there is no need to create a disk for backup storage. During the first discovery, KSYS will create a disk in the backup storage with the same name as in the home storage and assign the disk to the host.

The following example illustrates the process of creating a LUN.

- **Before discovery:** There is no LUN on backup site for VM2.

	!	Name	Size ...	Allocated (%)	Pool	CLI ...	Ho...	SP ...	Sn...	Re...	WWN	Thi...
		VM2										
No records found matching your filter criteria.												

Figure 11. No LUN is created for VM2 under the Block option.

- **Discovery results:** During discovery, a disk is created and automatically assigned to the VM host in the target site's storage.

```
# ksysmgr -t discover site India
23:19:10 Running discovery on entire site, this may take a few
minutes...
23:19:32 Storage state synchronization has started for Host Group HG1
23:19:32 Storage state synchronization has completed for Host Group
HG1
23:19:47 Discovery has started for VM VM1
23:19:47 Configuration information retrieval started for VM VM1
23:19:55 Discovery has started for VM VM2
23:19:55 Configuration information retrieval started for VM VM2
23:19:55 Configuration information retrieval completed for VM VM1
23:19:55 Storage information retrieval from VIOS started for VM VM1
23:19:55 Storage information retrieval from VIOS completed for VM VM1
23:19:55 Discovery for VM VM1 is complete
23:20:03 Configuration information retrieval completed for VM VM2
23:20:03 Storage information retrieval from VIOS started for VM VM2
23:20:03 Storage information retrieval from VIOS completed for VM VM2
23:20:03 Discovery for VM VM2 is complete
23:20:12 Disk Group creation on storage subsystem started for
Workgroup wg1
23:20:12 Disk Group creation on storage subsystem started for
Workgroup wg2
23:20:27 Disk Group creation on storage subsystem completed for
Workgroup wg1
Storage replication setup may add delay to discovery operation
23:23:37 Disk Group creation on storage subsystem completed for
Workgroup wg2
Storage replication setup may add delay to discovery operation
23:24:39 Discovery has finished for India
2 out of 2 managed VMs have been successfully discovered
```

- **After discovery:** The following output confirms the successful creation of a LUN in the backup storage, which has been subsequently added to the consistency group for VM2.

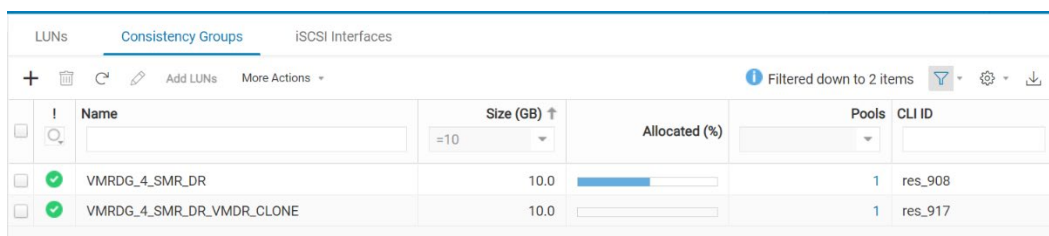
+ More Actions ▾				1 item ▾ ▾	
!	LUN		Size (GB)	WWN	
✓	VM2		10.0	60:06:01:60:1D:20:52:00:96:1C:CA:63:20:BD:2F:83	

Figure 12. A LUN is created for VM2.

Create a clone disk

In Dell EMC Unity Storage, there is no need to manually create the clone disk. The KSYS subsystem will create the clone disk during the DR rehearsal first discovery and provide host access to the disk. The user can verify the details of the clone disk and its host access in the consistency group created for the clone disk in this storage.

The following output shows the details of consistency group of clone disk in the backup site's storage.



	Name	Size (GB) ↑	Allocated (%)	Pools	CLI ID
<input type="checkbox"/>	VMRDG_4_SMR_DR	10.0	<div><div></div></div>	1	res_908
<input type="checkbox"/>	VMRDG_4_SMR_DR_VMDR_CLONE	10.0	<div><div></div></div>	1	res_917

Figure 13. Details of Consistency Groups in backup storage.

The clone disk will be created in the following format:

```
VMRDG_<hgid|wgid>_clustername_VMDR_CLONE
```

For example

```
# ksysmgr -t discover site India dr_test=yes
08:48:52 Running dr_test discovery on entire site, this may take a few
minutes...
08:49:16 Storage state synchronization has started for Host Group HG1
08:49:16 Storage state synchronization has completed for Host Group
HG1
08:49:51 Discovery has started for VM VM1
08:49:51 Configuration information retrieval started for VM VM1
08:49:57 Configuration information retrieval completed for VM VM1
08:49:57 Storage information retrieval from VIOS started for VM VM1
08:49:57 Storage information retrieval from VIOS completed for VM VM1
08:49:57 Discovery for VM VM1 is complete
08:50:15 Disk Group creation on storage subsystem started for
Workgroup wg1
08:50:32 Disk Group creation on storage subsystem completed for
Workgroup wg1
Storage replication setup may add delay to discovery operation
08:51:26 Dr_test Discovery has finished for India
1 out of 1 managed VMs have been successfully discovered
Dr_test setup for Host Group HG1 is successful
Dr_test setup for Host Group Default_HG is successful
```

Configure N_Port ID Virtualization (NPIV)

NPIV enables multiple virtual machines to share a single physical host bus adapter port on a Storage Area Network switch. It allows each virtual machine to maintain a unique WWPN, which is crucial for identifying its storage resources during recovery.

- Configure NPIV by creating a host on the backup storage with the same name as the home storage host and initiators.
- Creating a LUN is optional.
- If a LUN is created with the same name as the home storage LUN, but not mapped to the host, VM Recovery Manager will automatically map it to the host.
- In case a LUN is not created, VM Recovery Manager will create one and map it to the host.

Configure Virtual Small Computer System Interface (VSCSI)

VSCSI enables virtual machines to communicate with storage devices, providing virtual interface to manage storage resources.

- Create a host and disk in home storage for home site Virtual I/O Servers (VIOS).
- The Host and LUN creation is not mandatory on the backup storage.
- During discovery, the KSYS subsystem will create the LUN on backup storage for target site VIOS.
- User must map the LUNs to the target site VIOS host and change the reserve policy of LUN to **no_reserve** in VIOS.
- During DR rehearsal discovery, clone LUNs will be created for each VSCSI LUN on the target site storage, but it will not be mapped to the target VIOS host.
- User must map them manually and change the reserve policy to **no_reserve** as we do for main disk.

Change reserve policy:

- Go to VIOS and run the following command:
`cfgmgr`
- To check new LUNs run the following command:
`lspv`
- Run the following command to change reserve policy of LUN:
`chdev -l hdisk$i -a reserve_policy=no_reserve`

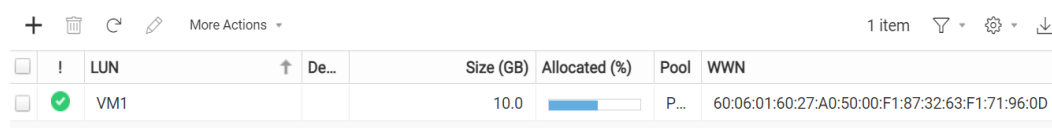
Note: Here i is the LUNs hdiskid.

Disk pair view for Dell EMC Unity

To verify if a disk pair belongs to a VM, run the following command

- From KSYS level:
Run `ksysmgr` command 'disk_pair' on KSYS node to get disk pair details.

```
# ksysmgr q disk_pair
Storage: unity4801 (India)          <->          Storage: unity4802 (Austin)
=====
6006016027A05000F1873263F171960D <-> 600601601D20520DD8C3263DD769E24
```
- From Dell EMC Unity home storage GUI:
After discovering a VM on an EMC Unity storage system, you can verify its LUNs within a consistency group or under **Block**.



More Actions ▾							1 item ▾ ⚙ ▾ ⬇	
<input type="checkbox"/>	!	LUN	↑	De...	Size (GB)	Allocated (%)	Pool	WWN
<input type="checkbox"/>	✓	VM1			10.0	<div></div>	P...	60:06:01:60:27:A0:50:00:F1:87:32:63:F1:71:96:0D

Figure 14. Verify LUNs within a consistency group or under Block on home storage.

- From the Dell EMC Unity backup storage GUI:
The storage system automatically creates and assigns LUNs to a target site storage VM host upon discovery. On an EMC Unity storage system, you can verify a VM's LUNs within a consistency group after discovery or under **Block** before discovery.

+ More Actions ▾				1 item ▾	
!	LUN		Size (GB)	WWN	
✓	VM1		10.0	60:06:01:60:1D:20:52:00:DD:8C:32:63:DD:76:9E:24	

Figure 15. Verify LUNs within a Consistency Group or under Block on backup storage.

Verify disk for a specific VM

- To view disk from KSYS node, run the following command to verify LUNs for a particular VM:

```
# ksysmgr q disk_pair vm=VM1
Storage: unity4801 (India)      <->      Storage: unity4802 (Austin)
WM-WWPN
=====
6006016027A05000F1873263F171960D <-> 600601601D205200DD8C3263DD769E24
C050760563790702
```

- To view disk inside a VM, login to the VM and run following command:

```
(0) root @ VM1: /
# lsmpio -q -l hdisk0
Device: hdisk0
Vendor Id: DGC
Product Id: VRAID
Revision: 5006
Capacity: 10.00GiB
Volume Serial: 6006016027A05000F1873263F171960D (Page 83 NAA)
(0) root @ VM1: /
```

Disk pair view for DR rehearsal

Users can verify a VM's disk pair after a DR rehearsal discovery using the following methods:

- From KSYS level, to verify the disk pair for a cloned disk run the **ksysmgr** command `disk_pair`, output of the clone disks is displayed as follows:

```
Tertiary Disks:
Source disk      -> Tertiarydisk
=====
600601601D205200DD8C3263DD769E24 -> 600601601D2052007798C7639C818F9A
```

- On the Dell EMC Unity storage, a clone disk is created and added to a consistency group upon discovery. You can check the output from the consistency group as follows:

LUN	↓	Size (GB)	WWN
VMRDG_4_SMR_DR_VMDR_CLONE-VM1		10.0	60:06:01:60:1D:20:52:00:77:98:C7:63:9C:81:8F:9A

Figure 16. consistency group details

Add storage agent to KSYS configuration

User must add a storage agent for each site to communicate between the storage and the KSYS node. To add the storage agent to the KSYS configuration, run the following command:

```
ksysmgr add storage_agent <storage_agent_name>
hostname|ip=<hostname|ip> site=<sitename> storagetype=unity
serialnumber=<number> login=<username> [password=<password>]
```

Summary

This paper explains how to configure the Host and LUN for home and backup storages in Dell EMC Unity, and how the KSYS node creates LUNs for backup storage, clone disk, and Consistency Group during the discovery operation with examples. It also provides a detailed explanation of how to set up KSYS node for Unity storage with the required Python packages.

About the Authors

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