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# NexentaStor

## Auto-Sync in reverse Version 2.1

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## Introduction

NexentaStor **Auto-Sync**<sup>(tm)</sup> (a. k. a. auto-sync) maintains a fully synchronized copy of a given volume, file system, or emulated block device (a. k. a. **zvol**) on another ZFS based host. **Auto-sync** provides a true mirror inclusive of all snapshots and file system properties.

Starting with NexentaStor version 2.1, auto-sync is capable to 'reverse-direction', to address the following scenarios:

1. Disaster recovery (DR), or manual failover. There are two appliances installed and one of them is running a given auto-sync service instance. If this appliance goes down, "reverse-direction" operation will let you work with folders on the second appliance.
2. Planned shutdown of source appliance. Similar case as DR, but first you would change direction, and then shutdown NexentaStor for maintenance.
3. Multi-office workplace. This is the case when the user travels between two offices (two different locations) "serviced" by two different local NexentaStor appliance, as far as data storage is concerned. Assuming auto-sync is used to replicate the storage from one (source) appliance to another (destination) appliance, both the source and the destination appliances would need to exchange their roles on user's demand, when the user arrives at the destination.

## Terms

- Master appliance is by definition the one that currently runs auto-sync service instance. Respectively, non-master appliance is the second appliance in the auto-sync "nexus". Note that master appliance can be both a source and destination, as far as the direction of the data replication is concerned.

How does reverse-direction work? The steps are:

1. Unmount source folder
2. Replicate last delta (since last scheduled run).
3. Mount folder on destination appliance.
4. Auto-sync now performs replication in reverse direction, if second appliance is up.

To provide 'reverse-direction' function, auto-sync service copies its configuration to opposite NexentaStor. Service does nothing on non-master appliance, except that it updates its own configuration information.

Reverse-direction command can be run either on a master appliance, or on a non-master. Also opposite appliance can be up, or shut down. Here are cases:

- You've run 'reverse-direction' on master appliance, second appliance is up. This could be a multi-office scenario, and it'd allow you to change master appliance and prepare for maintenance, if needed.
- Master appliance, second appliance is down. This operation would be invalid.
- Non-master appliance, second appliance is up. The same as first case: multi-office.
- Non-master appliance, opposite appliance is down. This is a "disaster recovery" case. Appliance becomes master, you obtain access to reserve data. When the second appliance comes up, it will become non-master automatically.

## How to enable reverse-direction

While creating auto-sync service, you will be prompted to enable 'reverse-direction' capability:

```
Reverse capability      :
yes no
-----
Decide if you going to use reverse-direction command in future. This option
will work only if service has been setup between two NexentaStor appliances.
Service will create its copy on another appliance. If not sure, please select
'no'. You will be able to turn on this option later by executing
'reverse-direction'. Navigate with arrow keys (or hjkl), or Ctrl-C to exit.
Use regular auto-sync service
```

You can also enable the 'reverse-direction' capability at any later time, as follows:

```
nmc@appliance:/$ setup auto-sync :vol-folder-000 reverse-direction
Reverse-direction feature is currently disabled
Do you want enable 'reverse-direction' feature? Yes
```

This will create a copy of auto-sync service config on a non-master appliance.

## Running 'reverse-direction'

To run reverse-direction, use nmc:

```
nmc:/$ setup auto-sync :volume-000 reverse-direction
```

and follow interactive instructions. The operation's log file can be viewed via:

```
nmc$ show auto-sync :volume-000 logtail
```

## Case 1. Multioffice

Check that both appliances are up and running well. Run reverse-direction on the master appliance. You will see the following lines in services' log file:

```
[Reverse-direction: working with fmri: svc:/system/filesystem/zfs/auto-sync:vol-
folder-000 ]
[Reverse-direction: remote appliance: alive ]
[Reverse-direction: L2R, master, remote_u p. ]
[Reverse-direction: Unmounting master co py of a folder ]
[Reverse-direction: Syncing last delta b efore changing direction ]
```

followed by:

```
[Starting incremental ZFS send/recv of delta -R -I vol/folder@sync-minute-10:1d78887720d2f5cd171cf3163892f4df:vol/folder@sync-minute-10:b3525c6b3053ad71d0e7f7025e8673e1 => vol200 ]
[vol/folder@sync-minute-10:b3525c6b3053ad71d0e7f7025e8673e1 => Test200.nexenta.com/vol200 OK (37 sec) ]
[SUCCESS: localhost/vol/folder => Test200.nexenta.com/vol200/folder OK (37 sec) ]
[Reverse-direction: Mounting folder on remote side ]
```

## Case 2. Disaster Recovery

Master appliance (in the example 'test200') failed and you need access to data. Non-master appliance (in the example 'devel119') is up and running. Currently you do not have access to folder (it is not mounted, by "show folder" command). You have activated 'reverse-direction' option in advance, and it has 'autosync\_role' property set to 'non-master'.

Run reverse direction:

```
nmc@devel119:/$ setup auto-sync :vol-folder-000 reverse-direction
IMPORTANT! You are about to reverse direction of 'auto-sync:vol-folder-000' from non-master appliance. If master appliance is up and running well, please run this command from there. If you have disaster recovery scenario, note that you WILL LOOSE CHANGES on master appliance, since last successful replication. BE SURE YOU AWARE OF CONSEQUENCES
Proceed reversing 'auto-sync:vol-folder-000'? Yes
Reversed direction for 1 auto-sync instance

nmc@devel119:/$ show auto-sync :vol-folder-000 logtail -f
[Reverse-direction: working with fmri: svc:/system/filesystem/zfs/auto-sync:vol-folder-000 ]
[Reverse-direction: remote appliance: down ]
[Reverse-direction: DR scenario. We are non-master and remote is down ]
[Rereading configuration. ]
```

Now, this appliance becomes a master. When you recover the failed appliance, data will start flowing into it, in the opposite (reversed) direction. Log of the recovered (test200) appliance:

```
nmc@Test200:/$ show auto-sync :vol-folder-000 logtail -f
[Reverse-direction: sync_configuration_with_remote_side() - DR case, rolling back to last synced state ]
[RECOVERED => devel119.nexenta.com:/vol200/st@9f0e84dde63f22024d21ec9a0e804dc6 OK (3 sec) ]
```

The appliance 'test200' became a non-master, and now accepts data from 'devel119'.

## Known limitations

Currently only Local-to-Remote services support 'reverse-direction'.

## References

- [How can I use NexentaStor to backup/archive/restore/replicate/recover my data?](#)
- [What's new in auto-sync replication?](#)
- [What is the difference between 'auto-sync' and 'auto-tier' storage services?](#)
- [How can I protect/replicate/recover/restore appliance's system configuration and the OS itself?](#)
- [How can I clone: \(1\) a folder, and \(2\) a zvol?](#)
- [Auto-sync replication is slow... Please advise.](#)