



About host-side space management

ONTAP 9

NetApp
January 13, 2023

Table of Contents

- About host-side space management 1
 - Host-side space management overview 1
 - Automatic host-side space management with SCSI thinly provisioned LUNs 1
 - Enable space allocation for SCSI thinly provisioned LUNs 2
 - Host support for SCSI thin provisioning 2
 - Simplified host management with SnapCenter 3

About host-side space management

Host-side space management overview

In a thinly provisioned environment, host side space management completes the process of managing space from the storage system that has been freed in the host file system.

A host file system contains metadata to keep track of which blocks are available to store new data and which blocks contain valid data that must not be overwritten. This metadata is stored within the LUN. When a file is deleted in the host file system, the file system metadata is updated to mark that file's blocks as free space. Total file system free space is then recalculated to include the newly freed blocks. To the storage system, these metadata updates appear no different from any other writes being performed by the host. Therefore, the storage system is unaware that any deletions have occurred.

This creates a discrepancy between the amount of free space reported by the host and the amount of free space reported by the underlying storage system. For example, suppose you have a newly provisioned 200-GB LUN assigned to your host by your storage system. Both the host and the storage system report 200 GB of free space. Your host then writes 100 GB of data. At this point, both the host and storage system report 100 GB of used space and 100 GB of unused space.

Then you delete 50 GB of data from your host. At this point, your host will report 50 GB of used space and 150 GB of unused space. However, your storage system will report 100 GB of used space and 100 GB of unused space.

Host-side space management uses various methods to reconcile the space differential between the host and the storage system.

Automatic host-side space management with SCSI thinly provisioned LUNs

If your host supports SCSI thin provisioning, you can enable the `space-allocation` option in ONTAP to turn on automatic host-side space management.

Enabling SCSI thin provisioning enables you to do the following.

- Automatic host-side space management

When data is deleted on a host that supports SCSI thin provisioning, host-side space management identifies the blocks of deleted data on the host file system and automatically issues one or more SCSI UNMAP commands to free corresponding blocks on the storage system.

- Notify the host when a LUN runs out of space while keeping the LUN online

On hosts that do not support SCSI thin provisioning, when the volume containing LUN runs out of space and cannot automatically grow, ONTAP takes the LUN offline. However, on hosts that support SCSI thin provisioning, ONTAP does not take the LUN offline when it runs out of space. The LUN remains online in read-only mode and the host is notified that the LUN can no longer accept writes.

Related information

[ONTAP SAN host configuration](#)

Enable space allocation for SCSI thinly provisioned LUNs

If you set the `space-allocation` option to `enabled`, ONTAP notifies the host when the volume has run out of space and the LUN in the volume cannot accept writes. This option also enables ONTAP to reclaim space automatically when your host deletes data.

About this task

The `space-allocation` option is set to `disabled` by default, and you must take the LUN offline to enable space allocation. After you enable space allocation, you must perform discovery on the host before the host will recognize that space allocation has been enabled.

Steps

1. Take the LUN offline.

```
lun modify -vserver vservice_name -volume volume_name -lun lun_name -state offline
```

2. Set the `-space-allocation` parameter to `enabled`:

```
lun modify -vserver vservice_name -volume volume_name -lun lun_name -space-allocation enabled
```

3. Verify that space allocation is enabled:

```
lun show -vserver vservice_name -volume volume_name -lun lun_name -fields space-allocation
```

4. Bring the LUN online:

```
lun modify -vserver vservice_name -volume volume_name -lun lun_name -state online
```

5. On the host, rescan all disks to ensure that the change to the `-space-allocation` option is correctly discovered.

Host support for SCSI thin provisioning

To leverage the benefits of SCSI thin provisioning, it must be supported by your host. SCSI thin provisioning uses the Logical Block Provisioning feature as defined in the SCSI SBC-3 standard. Only hosts that support this standard can use SCSI thin provisioning in ONTAP.

The following hosts currently support SCSI thin provisioning when you enable space allocation:

- VMware ESX 5.0 and later
- Red Hat Enterprise Linux 6.2 and later
- Citrix XenServer 6.5 and later
- Microsoft Windows 2012
- Microsoft Windows 2016

When you enable the space allocation functionality in ONTAP, you turn on the following SCSI thin provisioning features:

- Unmapping and reporting space usage for space reclamation
- Reporting resource exhaustion errors

Simplified host management with SnapCenter

You can use SnapCenter software to simplify some of the management and data protection tasks associated with iSCSI and FC storage. SnapCenter is an optional management package for Windows and UNIX hosts.

You can use SnapCenter Software to easily create virtual disks from pools of storage that can be distributed among several storage systems and to automate storage provisioning tasks and simplify the process of creating Snapshot copies and clones from Snapshot copies consistent with host data.

See NetApp product documentation for more information on [SnapCenter](#).

Copyright information

Copyright © 2023 NetApp, Inc. All Rights Reserved. Printed in the U.S. No part of this document covered by copyright may be reproduced in any form or by any means—graphic, electronic, or mechanical, including photocopying, recording, taping, or storage in an electronic retrieval system—without prior written permission of the copyright owner.

Software derived from copyrighted NetApp material is subject to the following license and disclaimer:

THIS SOFTWARE IS PROVIDED BY NETAPP “AS IS” AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE HEREBY DISCLAIMED. IN NO EVENT SHALL NETAPP BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

NetApp reserves the right to change any products described herein at any time, and without notice. NetApp assumes no responsibility or liability arising from the use of products described herein, except as expressly agreed to in writing by NetApp. The use or purchase of this product does not convey a license under any patent rights, trademark rights, or any other intellectual property rights of NetApp.

The product described in this manual may be protected by one or more U.S. patents, foreign patents, or pending applications.

LIMITED RIGHTS LEGEND: Use, duplication, or disclosure by the government is subject to restrictions as set forth in subparagraph (b)(3) of the Rights in Technical Data -Noncommercial Items at DFARS 252.227-7013 (FEB 2014) and FAR 52.227-19 (DEC 2007).

Data contained herein pertains to a commercial product and/or commercial service (as defined in FAR 2.101) and is proprietary to NetApp, Inc. All NetApp technical data and computer software provided under this Agreement is commercial in nature and developed solely at private expense. The U.S. Government has a non-exclusive, non-transferrable, nonsublicensable, worldwide, limited irrevocable license to use the Data only in connection with and in support of the U.S. Government contract under which the Data was delivered. Except as provided herein, the Data may not be used, disclosed, reproduced, modified, performed, or displayed without the prior written approval of NetApp, Inc. United States Government license rights for the Department of Defense are limited to those rights identified in DFARS clause 252.227-7015(b) (FEB 2014).

Trademark information

NETAPP, the NETAPP logo, and the marks listed at <http://www.netapp.com/TM> are trademarks of NetApp, Inc. Other company and product names may be trademarks of their respective owners.