

DTA2800™

Data Migration Space Reclamation Utility

User's Guide

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The NetApp data migration space reclamation utility helps you regain free file system space and to prepare a thick-provisioned LUN to migrate into a thin-provisioned LUN. *Free space* refers to the free data blocks present in the file system that may contain stale data.

The utility is designed to be run:

- ◆ Before migrating a LUN to a thin-provisioned destination; and
- ◆ When the file system is not operating under a heavy I/O load.

Note

Although NetApp recommends running the utility under a light I/O load, it is also capable of reclaiming stale file system space in a high I/O load environment.

This chapter provides the following information about the data migration space reclamation utility:

- ◆ “General Function” on page 1-4
- ◆ “Usage Scenarios” on page 1-5
- ◆ “Thread Count” on page 1-6
- ◆ “Thin-Provisioned LUN Considerations” on page 1-7
- ◆ “Usage Notes” on page 1-8
- ◆ “Statistics Output Columns Description” on page 1-9
- ◆ “Returns and Errors” on page 1-10

General Function

The data migration space reclamation utility primarily takes a mount point path on a disk-based mounted file system as an input, and then runs in the foreground. You can also run it in the background as a daemon by specifying a log file name. During the execution, the output is stored in a log file that you specify in the CLI. Even though this utility operates on the active file system, it avoids any interruption in the normal activity (write or read I/Os) of the file system.

The data migration space reclamation utility allows you to reserve some percentage of free space for file system activities. The default value of the reserved free space is ten percent of the available free space, although you can specify a different percentage in the CLI. During the execution, the utility always tries to maintain equal amounts of free and reserved space. If the free space is approaching or exceeding the reserved space threshold limit, the utility exits immediately.

Usage Scenarios

The following scenarios can help you understand the data migration space reclamation utility. When the utility starts, it calculates the *target conversion* and indicates the free space (in bytes and MB) that the utility attempts to reclaim. In both scenarios, the utility always tries to maintain a constant reserve space, whether the file system free space is growing or shrinking.

Scenario 1

If you operate the file system under heavy write I/O, free space is reduced at a faster rate. The utility may exit earlier than its target conversion. If the utility runs the conversion of only the target amount, you may need to rerun the utility to increase the free space. That may require you to repeat the conversion even for the free blocks that were previously converted.

Scenario 2

If you operate the file system under no or fewer write I/O and it has more free space (due to deletion of files or file system expansion), then the utility may run longer than its target conversion. In this scenario, keeping the reserve space constant is extremely helpful.

Thread Count

For faster reclamation, this utility achieves parallelism by running `threadcount`, the number of threads. The default value of `threadcount` is 4; the maximum value is 16. You can specify the thread count value in the CLI.

- ◆ If a file system has more free space and fewer I/O loads, NetApp recommends that you run the utility with more threads.
- ◆ If a file system is undergoing a heavy I/O load, NetApp recommends that you run the utility with the default thread count.

Thin-Provisioned LUN Considerations

The data migration space reclamation utility uses available free space on the file system volume to prepare the free blocks for thin-provisioned data migration. While running the utility, it is important that you reserve enough free space for application I/Os; otherwise applications running on the host may run out of space. However, if you reserve too much free space, less space may be reclaimed for thin-provisioned migration. After the utility finishes preparing the free blocks for thin-provisioned migration, all blocks return to free space in the file system volume.

By default, the data migration space reclamation utility leaves 10 percent of the free space on a file system volume for host I/O while the utility prepares the volume for thin-provisioned migration. To specify a different percentage of free space for application I/O, issue the `-reserve` command when you start the utility. For details, refer to “Linux Options” on page 3-17 or “Non-Linux Options” on page 4-23.

To maximize the amount of space reclaimed, NetApp recommends that you run the utility during off-peak hours.

Usage Notes

The following notes apply to the data migration space reclamation utility:

- ◆ The utility is designed for a thick to thin-provisioned data migration environment. The source LUNs are *not* thin-provisioned and the destination LUNs *are* thin-provisioned.
- ◆ If the reserved, free space is set to zero, all free blocks are reclaimed until the utility reaches the out-of-space error. Space reclamation may require a substantial amount of time to complete, and it requires user attention.
- ◆ You can interrupt the utility at any time by pressing the CTRL+C keys. When interrupted, the utility cleans up and print statistics of the currently reclaimed blocks.
- ◆ On some Linux OSs, you may need to run the utility as a superuser.
- ◆ If you reboot the system while the utility is running, you must restart the utility.
- ◆ The utility creates a temporary directory, `space_reclamation_dir`, in the mount point. If you manually delete this directory before the utility cleanup process can delete it, the utility behavior becomes undefined because the temporary directory is no longer valid.

Statistics Output Columns Description

The data migration space reclamation utility statistics output are displayed with the following columns of information:

```
RsSpInit (MB)   FrSpCur (MB)   DataReclmd (MB)   Target (MB)   RP   Th   IO Size (KB)
=====
```

Table 1-1 describes each column heading.

Table 1-1. Statistics Output Columns

Column Title	Description
RsSpInit(MB)	Amount of space (in MB) reserved when the utility was started
FrSpCur(MB)	Amount of free space (in MB) currently available
DataReclmd(MB)	Amount of free data space (in MB) reclaimed
Target(MB)	Amount of target space (in MB) this utility attempted to reclaim
RP	Reserved space percentage
Th	Number of threads spawned for I/O operations
IO Size(KB)	I/O size (in KB) used by for each I/O operation

Returns and Errors

Return Values:: The utility returns **0** on success, or **1** if it fails to perform the specified operation.

Error Values:

0x100	Read-related errors
0x200	Write-related errors
0x300	Verification-related errors
0x400	Miscellaneous errors

This chapter provides the following information about system requirements, downloading, and installing the NetApp data migration space reclamation utility CLI:

- ◆ “System Requirements” on page 2-12
- ◆ “Downloading the Utility” on page 2-13
- ◆ “Installing the Utility” on page 2-14
- ◆ “Starting the Utility” on page 2-15

System Requirements

You can use the data migration space reclamation utility on a system running any of the following operating systems:

- ◆ Linux[®]
- ◆ AIX[®]
- ◆ HP[®]
- ◆ Solaris[®]
- ◆ Windows[®]

Downloading the Utility

To download the data migration space reclamation utility from the NetApp support site, follow these steps:

1. Access the NetApp support site using the URL, login, and password provided by the NetApp marketing manager.
2. Locate the appropriate zipped tarball for your OS, platform, and vendor. The tarball contains the binaries for multiple platforms.
3. Download the zipped tarball to your local machine.

Installing the Utility

To install the data migration space reclamation utility, follow these steps:

1. Unzip or untar the previously downloaded, zipped tarball. It untars into multiple binaries.
2. Select the appropriate binary for your OS, platform, and vendor, and then use FTP to move the file to the server or host. NetApp suggests that you create a directory named `sru` on the server or host to contain the binary file for the utility.

Starting the Utility

To start the data migration space reclamation utility, follow these steps:

1. On the server or host, access the `srp` directory containing the binary file.
2. Run the binary file.
3. At the prompt, read the disclaimer agreement. You must agree to the terms of the agreement before you can run the utility.

This chapter provides the following information about using the NetApp data migration space reclamation utility CLI on Linux platforms:

- ◆ “Synopsis” on page 3-17
- ◆ “Linux Options” on page 3-17
- ◆ “Examples” on page 3-19

Synopsis

The data migration space reclamation utility has the following format:

```
sru --path PATH [options]
```

Linux Options

The data migration space reclamation utility shared command line arguments and their descriptions are as follows:

```
--help
```

Optional. Prints the help information and the utility version number.

```
--version
```

Optional. Shows the utility version number.

```
--path [ PATH ]
```

Required. Indicates the absolute path for the file system mount point.

Note

This utility supports only a single mount point. If you specify multiple mount points, only the first one is used.

```
--reserve [ PERCENT_RESERVED_FREE_FS_SPACE ]
```

Optional. Specifies the PERCENT_RESERVED_FREE_FS_SPACE to set aside from the total file system free space. Default is 10 (percent).

```
--threadcount [ 1..16 ]
```

Optional. Specifies the number of threads (in the range of 1-16) to perform various operations. Default is 4.

Note

For single-processor machines, specify only one thread.

`--log [ FILENAME ]`

Optional. Specifies the name of the log file in which output is stored. When specified, the utility runs in the background and the output is directed to the specified log file.

`--dirname [ NAME ]`

Optional. Specifies the base directory name in which files are created. Default name is `space_reclamation_dir` in `-p` path.

`--format [ 1|2 ]`

Optional. Specifies output in bytes or megabytes (MB). Specify either **1** for bytes or **2** for megabytes (the default).

`--interval [ 1..N ]`

Optional. Specifies the interval (in seconds) for statistics output. Default is 1, which shows output every second.

Note

The interval highly depends on host CPU utilization. The interval output may sometimes be delayed in high CPU utilization machines or in uniprocessor machines.

`--iosize [ NUMBER ]`

Optional. Specifies the I/O size in kilobytes (KB). Valid values are as follows:

1 = 8KB	5 = 512KB
2 = 32KB	6 = 1024KB
3 = 64KB	7 = 2048KB
4 = 256KB	8 = 4096KB

Default I/O size is 64KB (option 3).

Examples

In the following examples, the binary name is `sru`. The binary name may vary, depending on the vendor, platform, or release.

Running the Utility with Default Options

To run the utility with the default options, follow these steps:

1. To choose the default options, issue the following command:

```
$> sru --path /mnt/db-fs
```

2. To specify 8 threads and 15 percent reserve, issue the following command:

```
$> sru --path /mnt/db-fs --threadcount 8 --reserve 15
```

3. To specify the I/O size as 4MB and show the output bytes, issue the following command:

```
$> sru --path /mnt/db-fs --iosize 8 --format 1
```

4. To specify an interval of 10 seconds and the log file as `sru.log`, issue the following command:

```
$> sru --path /mnt/db-fs --interval 10 --log sru.log
```

Running the Utility with Custom Options

To run the utility with custom options, change the current directory to the `/home/space_reclamation_dir` by issuing the following command:

```
$> ./sru -path /home
```

Example Output

The `space_reclamation_dir` directory contains the following output:

```
space reclamation started
Monitor Thread Started...

Thu Mar 17 14:35:11 IST 2011
Mount Point = /home
Total FileSystem Size = 11264 (MB)

RsSpInit(MB)   FrSpCur(MB)   DataReclmd(MB)  Target(MB)   RP   Th   IOSize(KB)
=====
```

```
660          6607          0          5946    10  4          64
```

```
Thu Mar 17 14:35:12 IST 2011
```

```
Mount Point = /home
```

```
Total FileSystem Size = 11264 (MB)
```

RsSpInit (MB)	FrSpCur (MB)	DataReclmd (MB)	Target (MB)	RP	Th	IOSize (KB)
=====	=====	=====	=====	==	==	=====
660	6597	7	5946	10	4	64

```
Thu Mar 17 14:35:13 IST 2011
```

```
Mount Point = /home
```

```
Total FileSystem Size = 11264 (MB)
```

RsSpInit (MB)	FrSpCur (MB)	DataReclmd (MB)	Target (MB)	RP	Th	IOSize (KB)
=====	=====	=====	=====	==	==	=====
660	6569	25	5946	10	4	64

```
[..]
```

At the end of the output, summary information is listed. For example:

```
#####  
#                               Summary Information  
#                               space reclamation utility  
#                               1.8  
#####  
#      Start Time =                Thu Feb 17 14:35:11 2011  
#      End Time =                  Thu Feb 17 14:43:23 2011  
#      Total time taken =              492s 131ms 534us  
#      Mount Point =                  /home  
#      Number of threads =              4  
#      IO Size =                      64 (KB)  
#      Percentage Reserved =           10  
#  
#      When space reclamation started
```

```

# -----
# Initial Total File System Space =          11264 (MB)
# Initial Free Space =                      6607 (MB)
# Initial Reserve Space =                   660 (MB)
# Initial Space to be Re-claimed =          5946 (MB)
#
# When space reclamation done
# -----
# Current Total File System Space =          11264 (MB)
# Current Free Space =                      655 (MB)
# Actual Space Re-claimed =                 5916 (MB)
# Actual Space Re-claimed in percentage =    99.50%
# Average Space Re-claimed Per Second =     12 (MB)
#
# PS#1: If percentage is more than 100, then filesystem has
# got more free space. This is possible when files are
# deleted or reduced from filesystem or filesystem itself
# got expanded during the utility execution.
#
# PS#2: If percentage is less than 99, then filesystem has
# got less free space. This is possible when files are
# created or appended during the utility execution.
#
# PS#3: If percentage lies between 99 and 100, then output
# is as expected.
#
# PS#4: ERRORS (If Any)
# [0] NONE, space reclamation done successfully
#####

```

Note

In the summary information, take special note of any PS#4 errors.

This chapter provides the following information about using the NetApp data migration space reclamation utility CLI on platforms other than Linux (for supported operating systems, see “System Requirements” on page 2-1):

- ◆ “Synopsis” on page 4-23
- ◆ “Non-Linux Options” on page 4-23
- ◆ “Examples” on page 4-25

Synopsis

The data migration space reclamation utility has the following format:

```
sru -p PATH [options]
```

Non-Linux Options

The data migration space reclamation utility shared command line arguments and their descriptions are as follows:

-h

Optional. Prints the help information and the utility version number.

-i

Optional. Shows the utility version number.

-p [PATH]

Required. Indicates the absolute path for the file system mount point.

Note

This utility supports only a single mount point. If you specify multiple mount points, only the first one is used.

-r [PERCENT_RESERVED_FREE_FS_SPACE]

Optional. Specifies the PERCENT_RESERVED_FREE_FS_SPACE to set aside from the total file system free space. Default is 10 (percent).

-t [1..16]

Optional. Specifies the number of threads (in the range of 1-16) to perform various operations. Default is 4.

Note

For single-processor machines, specify only one thread.

`-L [ FILENAME ]`

Optional. Specifies the name of the log file in which output is stored. When specified, the utility runs in the background and the output is directed to the specified log file.

`-d [ NAME ]`

Optional. Specifies the base directory name in which files are created. Default name is `space_reclamation_dir` in `-p` path.

`-F [ 1|2 ]`

Optional. Specifies output in bytes or megabytes (MB). Specify either **1** for bytes or **2** for megabytes (the default).

`-i [ 1..N ]`

Optional. Specifies the interval (in seconds) for statistics output. Default is 1, which shows output every second.

Note

The interval highly depends on host CPU utilization. The interval output may sometimes be delayed in high CPU utilization machines or in uniprocessor machines.

`-U [ NUMBER ]`

Optional. Specifies the I/O size in kilobytes (KB). Valid values are as follows:

1 = 8KB	5 = 512KB
2 = 32KB	6 = 1024KB
3 = 64KB	7 = 2048KB
4 = 256KB	8 = 4096KB

Default I/O size is 64KB (option 3).

Examples

In the following examples, the binary name is `sru`. The binary name may vary, depending on the vendor, platform, or release.

Running the Utility with Default Options

To run the utility with the default options, follow these steps:

1. To choose the default options, issue the following command:
`$> sru -p /mnt/db-fs`
2. To specify 8 threads and 15 percent reserve, issue the following command:
`$> sru -p /mnt/db-fs -t 8 -r 15`
3. To specify the I/O size as 4MB and show the output bytes, issue the following command:
`$> sru -p /mnt/db-fs -U 8 -F 1`
4. To specify an interval of 10 seconds and the log file as `sru.log`, issue the following command:
`$> sru -p /mnt/db-fs -i 10 -L sru.log`

Running the Utility with Custom Options

To run the utility with custom options, change the current directory to the `/home/space_reclamation_dir` by issuing the following command:
`$> ./sru -p /home`

Example Output

The `space_reclamation_dir` directory contains the following output:

```
space reclamation started
Monitor Thread Started...

Thu Mar 17 14:35:11 IST 2011
Mount Point = /home
Total FileSystem Size = 11264 (MB)

RsSpInit(MB)   FrSpCur(MB)   DataReclmd(MB)  Target(MB)   RP   Th   IOSize(KB)
=====
=====
=====
=====
==   ==   =====
```

```
660          6607          0          5946    10    4          64
```

```
Thu Mar 17 14:35:12 IST 2011
```

```
Mount Point = /home
```

```
Total FileSystem Size = 11264 (MB)
```

RsSpInit (MB)	FrSpCur (MB)	DataReclmd (MB)	Target (MB)	RP	Th	IOSize (KB)
=====	=====	=====	=====	==	==	=====
660	6597	7	5946	10	4	64

```
Thu Mar 17 14:35:13 IST 2011
```

```
Mount Point = /home
```

```
Total FileSystem Size = 11264 (MB)
```

RsSpInit (MB)	FrSpCur (MB)	DataReclmd (MB)	Target (MB)	RP	Th	IOSize (KB)
=====	=====	=====	=====	==	==	=====
660	6569	25	5946	10	4	64

```
[..]
```

At the end of the output, summary information is listed. For example:

```
#####
#                               Summary Information
#                               space reclamation utility
#                               1.8
#####
#      Start Time =                Thu Feb 17 14:35:11 2011
#      End Time =                  Thu Feb 17 14:43:23 2011
#      Total time taken =                492s 131ms 534us
#      Mount Point =                                /home
#      Number of threads =                                4
#      IO Size =                                64 (KB)
#      Percentage Reserved =                                10
#
#      When space reclamation started
```

```

# -----
# Initial Total File System Space =          11264 (MB)
# Initial Free Space =                      6607 (MB)
# Initial Reserve Space =                   660 (MB)
# Initial Space to be Re-claimed =          5946 (MB)
#
# When space reclamation done
# -----
# Current Total File System Space =          11264 (MB)
# Current Free Space =                      655 (MB)
# Actual Space Re-claimed =                  5916 (MB)
# Actual Space Re-claimed in percentage =      99.50%
# Average Space Re-claimed Per Second =       12 (MB)
#
# PS#1: If percentage is more than 100, then filesystem has
# got more free space. This is possible when files are
# deleted or reduced from filesystem or filesystem itself
# got expanded during the utility execution.
#
# PS#2: If percentage is less than 99, then filesystem has
# got less free space. This is possible when files are
# created or appended during the utility execution.
#
# PS#3: If percentage lies between 99 and 100, then output
# is as expected.
#
# PS#4: ERRORS (If Any)
# [0] NONE, space reclamation done successfully
#####

```

Note

In the summary information, take special note of any PS#4 errors.
